Ministerstvo financií
Slovenskej republiky

MINISTERSTVO
DOPRAVY, VÝSTAVBY
A REGIONÁLNEHO ROZVOJA
SLOVENSKEJ REPUBLIKY

Transport Spending Review

Final Report

October 2016

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Acknowledgements

We thank the following for their valuable comments and suggestions during the preparation of the Report: Colleagues from the Strategy Institute and other employees of the Ministry of Transport, Construction and Regional Development, Professor Ján Čelko from the University of Žilina, Zuzana Gimerská from DOPRAVOPROJEKT, František Brliť from CEMOS, Kristian Duus from JASPERS at the European Investment Bank, Ján Kovalčík from INEKO, Ľudovít Ódor from the Council for Budget Responsibility, Michal Polaček and Lucia Šrámková and other employees of the Ministry of Finance.

The authors are responsible for any errors and omissions.

Operačný program Efektívna verejná správa

Európska únia
Európsky sociálny fond

This project is supported by the European Social Fund.

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Introduction and summary

The Slovak Government has launched the Value for Money Project, under which it intends to reform rules, establish processes and strengthen institutions that promote sound decision-making in the public interest and significantly increase value for money in the Slovak public sector.

One of the Value for Money mechanisms involves the comprehensive review of most public spending. The Government committed itself to this under its Policy Statement and has detailed plans for the electoral term in the Stability Programme of the Slovak Republic.
In 2016, the health sector, transport and the computerisation of public administration are being reviewed. The spending review reassesses public spending during the electoral term. It evaluates spending effectiveness and efficiency and identifies measures that will increase value for money from public finances, thereby facilitating fiscal savings, improved public services for citizens (results), and/or a shift in finances for Government priorities. It makes sustainable proposals of the measures to be taken.

An interim report singled out those areas offering most opportunity for streamlining. The Final Report elaborates on the issues that were outlined and includes measures. This Report is part of the general government budget.

In developed countries, spending reviews are a standard resource helping governments to pinpoint areas in public policies where public money could be used more efficiently and the savings needed to comply with national and European fiscal commitments can be made.

Identifying and correctly assessing all costs and benefits holistically is essential for the evaluation. Financial costs and benefits form the basis. Another aim is to quantify, as far as possible, non-financial benefits and costs in financial terms in order to provide the State with a full picture of each project's benefits and costs.

Review background and objectives

- Transport spending, amounting to 2.3 % of GDP per year, is being reviewed in order to pave the way for measures that will streamline the current investment package without intruding on its scale, and that will improve the efficiency of unit operating costs under the Ministry of Transport's budget heading in a sustainable way.
- Public transport-sector investments and policies should develop transport so that goods and people can be transported quickly, well and safely, with minimum negative externalities, and affordably in those areas where this cannot be delivered by the private sector.
- While there is no optimal result indicator for this objective yet, progress can be tracked by what are largely output indicators, such as the level of traffic congestion, the time it takes to travel between economic centres, the traffic accident rate, the number of people using public transport, and environmental impacts.
- The Ministry of Finance will also assess large investment projects in cost-benefit analyses. Those projects generating the best value for money in the long run will be prioritised.
- The medium-term goal is to place more of an emphasis on infrastructure maintenance and on establishing a system for the financing of infrastructure development, maintenance and operation that will remain sustainable beyond the programming period.

Investment project planning and preparation

- It is the investment project planning and preparation process that largely determines the future benefits, quality and costs of the version of the investment that is made. In motorway and expressway projects, the

construction cost is just one of the overall project price's components. A lot of money is also channelled into design documentation and the settlement of property rights (the purchase and expropriation of land).

- Transparency and control at all stages of the process will be enhanced, in part by the publication of data and documents. In certain cases, the contract prices of projects have been well wide of the estimated value of the contract.
- With motorways and expressways, the Ministry of Transport estimates that project preparations take an average of seven years, though there are many as-yet unimplemented projects where preparations began 10 or more years ago. EUR 12 million has been channelled into project preparations and land purchases for other projects by NDS, the national motorway company.
- Environmental impact assessments, coordinated by the Ministry of the Environment, are another key phase in investment preparations. The Ministry of the Environment's final opinion is binding for downstream authorisation proceedings, though the option that is permitted need not be the most advantageous option recommended by the feasibility study.
- With new projects, the feasibility study (which includes a cost-benefit analysis) is carried out at the beginning. In the third programming period, from 2014 to 2020, feasibility studies are required for all EU-funded projects. As the EIA process had already been completed and Ministry of the Environment decisions had been issued for most projects, feasibility studies were carried out as a subsequent step and merely confirmed the route that had already been selected.
- The selection of transport projects is preceded by a comprehensive evaluation. Projects for which a feasibility study is drawn up should be based, as far as possible, on a cost-benefit analysis (CBA) quantifying the project's impact not only on transport, but also on the environment and public health. A CBA compares projects and/or their various versions by expressing the costs and benefits of each of them in monetary terms.
- The aim is to shift as much as possible from a collective analysis to a quantification of impacts in all areas where this is possible. As it is impossible to quantify all transport-related impacts in this way, the CBA is also complemented by a multi-criteria analysis.
- The evaluation must always spell out the objective and name several plausible alternative means of achieving that objective, including alternative routes and variously sized sections. Where necessary, all modes of transport, possible regulations and policies should also be taken into account.

Transport data, models and methodology for CBAs

- The three basic prerequisites for the decent preparation of transport projects are high-quality and mutually consistent transport data, a reliable national multimodal transport model, and uniform methodology for cost-benefit analysing. A lot of the transport data that could be used as a basis for the uniform modelling of transport projections is still missing, inaccessible, or imprecise and inconsistent with that of neighbouring countries.
- It is important to collect and disclose data in a user-friendly form, depending on how it can be used. Data currently subject to legal restrictions on how it is to be shared among public-administration organisations, data that is owned by private companies despite being of a public nature, and data not processed in a form that is fit for purpose (i.e. suitably aggregated for transport modelling) has the potential to be used on a greater scale.
- In the past, different CBA calculation methodologies have been used in various transport projects. It will be important to update existing methodology so that it is able to compare and prioritise projects across Slovakia and all modes of transport.

Motorways, expressways and class I roads

- Spending on motorways, expressways and class I roads averaged EUR 1.15 billion per year in 2014 and 2015. Spending in 2016 is expected to tally with this.
- A high proportion of class I roads is in poor or unsatisfactory condition, largely because of the lack of funding for repairs and maintenance. Consequently, they are in need of costly reconstruction. Motorways and expressways, on the other hand, are in relatively good shape.
- A 2013 international comparison with EU-15 countries showed that, typically for a converging country, Slovakia had few motorways and expressways. Once the priority package of projects has been completed, Slovakia's motorways will run for a length that, relative to area, stands at roughly the EU-15 average.
- The general government budget has allocated EUR 1.7 billion to the construction of new sections of motorway and expressway in 2017-2019. This is the Ministry of Transport's biggest item of expenditure.
- PPP (public-private partnership) construction is assessed in the same way as any other option from the perspective of value for money and is only used when it is demonstrably more advantageous for the State.
- The Ministry of Transport will work with the Ministry of Finance to evaluate the efficiency of priority investment projects with a view to delivering the best possible value for money.

Railways

- Železnice Slovenskej republiky (ŽSR) operates a dense rail network in which little use is made of available capacity. Scant financing has made much of the railways the worse for wear. Train speeds are reduced by the restrictions that have been imposed in many sections.
- Spending could be further optimised if the cost structure were changed, which can be achieved by introducing rationalisation measures (more automation and technology, which will reduce staffing capacity and centralise train transport control), by scaling down components and structures in the railway infrastructure (including integrated sections of track), and by optimising processes.
- Compared to the Czech Republic, Slovakia spends much more on transport control, but less on maintenance. This may be due to the fact that Slovak railway infrastructure has not been modernised to the same extent as its Czech counterpart. If control costs per train-kilometre were on a par with those in the Czech Republic, ŽSR's expenditure could potentially contract by EUR 33 million. However, one-off investments are required before control costs can be cut.
- The operating costs of poorly frequented tracks with no passenger transport outweigh the benefits several times over. The strategic significance of these tracks in the future needs to be analysed in detail. The benefits of several tracks where passenger transport is low also need to be reassessed.
- While 19 % of category-one railway lines have been modernised to cope with speeds of 160 km/h, they have yet to be used to maximum capacity. The Ministry of Transport will work with the Ministry of Finance to keep evaluating the efficiency of railway investment projects with a view to delivering the best possible value for money.

Public passenger transport

- Železničná spoločnosť Slovensko, a.s. (ZSSK) should make more efficient use of its rolling stock. The capacity used depends on the public-interest orders placed by the State. The mileage of the average Czech train set is twice as much as a Slovak one.
- Much better value for money could be achieved if public bus transport and public rail transport were aligned with each other. Some of the poor efficiency and unused capacity in public transport can be attributed to the unwelcome overlapping of bus and train routes and the lack of coordination between the different modes of transport.
- ZSSK runs services that, on average, are hardly used to capacity. In 2014, the number of passengers travelling in 56 % of regional trains averaged fewer than 50. Conversely, some services appear to be used heavily and it would be worth considering the introduction of more trains here.

- Demand for bus travel has plunged by 45 % since 2006, but the subsidies channelled into the operation of transport services in the public interest have spiralled by 79 %.

Measures

Investment project planning and preparation

- **With new investment projects worth more than EUR 20 million, during the preparations for the commission of a feasibility study assess how appropriate it would be to apply multimodal variants, and conduct such an assessment.** This evaluation will start by identifying the problem and the objective that is to be achieved by the investment. On the strength of a multimodal analysis, the most appropriate solution to the transport problem, entailing one or a combination of modes of transport, will be selected and then drawn up in more detail. (coordinator: Ministry of Transport, Construction and Regional Development)
- **Update the feasibility study methodology and the method used to select the recommended solution.** Strengthen the role of the cost-benefit analysis. A multi-criteria analysis takes further aspects of projects into account and provides additional qualitative information. (coordinator: Ministry of Transport, Construction and Regional Development, in conjunction with the Ministry of Finance)
- **Conduct a feasibility study at the beginning of the pre-investment process.** (coordinator: Ministry of Transport, Construction and Regional Development)
- **Review the EIA process** in relation to other stages of project preparation with a view to streamlining the entire process. The main measures to be assessed include the integration of the EIA process into the zoning proceedings, an extension to the content of the plan submitted by the investor, an increase in the involvement of investors and the authorising authority in the EIA process, better quality control, the reining-in of subjective requirements sought by stakeholders, and the timely notification of changes in proposed activities. (coordinator: Ministry of the Environment)
- **Reassess whether to continue pre-project and project preparations in those cases where a project is planned for implementation only in the long term** (in accordance with the Ministry of Transport's strategy documents). (coordinator: Ministry of Transport, Construction and Regional Development)
- **Review legislative opportunities to minimise non-construction investments,** together with a quantification of budgetary implications. (coordinator: Ministry of Transport, Construction and Regional Development, in conjunction with the Ministry of Finance)
- Scrupulously keep track of opportunities to make maximum use of previous stages of design documentation. (coordinator: Ministry of Transport, Construction and Regional Development)
- **Improve the internal expert capacities of those placing orders at the Ministry of Transport** to improve the way terms of reference are formulated and enhance interim and final project inspections. (coordinator: Ministry of Transport, Construction and Regional Development)
- **Publish relevant underlying documentation on investment projects that are under preparation** in keeping with this common practice in other countries. (coordinator: Ministry of Transport, Construction and Regional Development)

Transport data, models and methodology for CBAs

- **Define the scope of data collection, the frequency, format and sourcing of this data collection, the responsible organisation,** and the initiation of adjustments to the Statistical Office's surveying methodology in response to current data requirements. Data currently subject to legal restrictions on how it is to be shared among public-administration organisations, data that is owned by private companies despite being of a public nature, and data not processed in a form that is fit for purpose (i.e. suitably aggregated for transport modelling) has the potential to be used on a greater scale. (coordinator: Ministry of Transport, Construction and Regional Development, in conjunction with the Ministry of Finance)

- **Make relevant transport data available to the public,** in particular for the production of transport-related policy materials and strategies. (coordinator: Ministry of Transport, Construction and Regional Development)
- **Safeguard access to transport model input data, methodologies and outputs** by establishing terms and conditions in contracts with suppliers of works. (coordinator: Ministry of Transport, Construction and Regional Development)
- **Create methodology and minimum standards for transport modelling** that establish limits for the model creators depending on the type of transport model. (coordinator: Ministry of Transport, Construction and Regional Development, in conjunction with the Ministry of Finance)
- **As far as NDS finances and capacities allow, arrange, on request, for toll data** to be anonymised so that it can be used for transport modelling (not only intensities, but also directional data) and, on request, make data available, in a predefined scope, to the Ministry of Transport and producers of local and regional transport models. (coordinator: Ministry of Transport, Construction and Regional Development)
- **Arrange for the preparation, collection and processing of data on the mobility habits of the population** as part of the family-account statistics. (coordinator: Statistical Office)
- **Create uniform standardised CBA methodology** with consistent and validated assumptions. Harmonise the model for socio-economic benefits (HDM-4) and the CBA methodology. Periodically update the coefficients used in transport modelling and in the calculation of socio-economic benefits. (coordinator: Ministry of Transport, Construction and Regional Development, in conjunction with the Ministry of Finance)
- **Ensure that the CBA can be checked in NDS feasibility studies** by the Ministry of Transport and the Ministry of Finance: ask the author to provide detailed documentation on the CBA, the actual transport model, and the project for the calculation of socio-economic benefits. (coordinator: Ministry of Transport, Construction and Regional Development)

Motorways, expressways and class I roads

- **Look at ways of increasing spending on the repair and maintenance of class I roads** in order to avoid an increase in the proportion of such roads that are in an unsatisfactory condition or in a state of serious disrepair. (coordinator: Ministry of Transport, Construction and Regional Development, in conjunction with the Ministry of Finance)
- **Every year, publish the quantity of selected key individual repair activities and selected key maintenance activities for class I roads** and the costs thereof, broken down by self-governing region. (coordinator: Ministry of Transport, Construction and Regional Development)
- **Look for ways of reducing the unit costs of individual activities relating to motorway and expressway repair and maintenance carried out by NDS using its own internal capacities.** Periodically (at least once a year) publish the quantity of selected key individual repair activities and selected key maintenance activities for motorways and expressways and the costs thereof, broken down by maintenance centre. (coordinator: Ministry of Transport, Construction and Regional Development)
- **Priority motorway and expressway projects, prior to the award of a public contract to the works contractor (Table 14), will also be evaluated by the Ministry of Finance.** (coordinator: Ministry of Finance)
- **All future investment projects with an estimated investment cost of more than EUR 40 million will also be subject to a cost-benefit analysis by the Ministry of Finance at the stage when the feasibility study is being prepared** (if applicable)**.** The Ministry of Finance's opinion will ordinarily be updated before work starts on settling property rights relating to the land covered by the project. (coordinator: Ministry of Finance)

- **Prepare rules for the approval of PPP projects and concessions to safeguard the sustainability of public funds** and define the scope for the implementation of PPP projects and concessions generating value for money. (coordinator: Ministry of Finance)

Railway infrastructure

- **Analyse in detail the overall effects of removing 234 km of track where passenger transport is low and, drawing on the results, refine the estimated savings of EUR 6 million per year with potential one-off costs of up to EUR 70 million.** (coordinator: Ministry of Transport, Construction and Regional Development, in conjunction with the Ministry of Finance)
- **Analyse in detail of the overall effects of discontinuing transportation and the decision to scrap 91 km of track where passenger transport is minimal.** On the basis of the results, weigh up the impacts and the feasibility of savings, and then rationalise the passenger transport network that is to be operated. The potential savings if tracks were to be closed would amount to EUR 2.6 million, measured as a direct reduction in ŽSR's costs, while the one-off costs of decommissioning have been estimated by ŽSR to be a maximum of EUR 27.2 million. (coordinator: Ministry of Transport, Construction and Regional Development, in conjunction with the Ministry of Finance)
- All future investment projects with an estimated investment cost of more than EUR 40 million will also be subject to a cost-benefit analysis by the Ministry of Finance at the stage when the feasibility study is being prepared (if applicable). The Ministry of Finance's opinion will ordinarily be updated before work starts on settling property rights relating to the land covered by the project. (coordinator: Ministry of Finance)
- **Priority railway infrastructure projects, prior to the award of a public contract to the works contractor (Table 20), will also be evaluated by the Ministry of Finance.** (coordinator: Ministry of Finance)
- **Optimise the number of ŽSR employees in connection with modernisation, the scaling down of railway infrastructure components, and the optimisation of operations.** (coordinator: Ministry of Transport, Construction and Regional Development)
- **Make savings in transport control by carrying out investments as far as current general government budget and EU funds resources allow.** Make the most beneficial investments as a matter of priority. (coordinator: Ministry of Transport, Construction and Regional Development)
- **Quantify the optimal funds for maintenance and the resulting benefits.** Every year, publish the quantity of selected key individual repair and maintenance activities and the costs thereof. (coordinator: Ministry of Transport, Construction and Regional Development, in conjunction with the Ministry of Finance)
- Achieve annual cost savings of EUR 0.5 million by increasing effectiveness, entailing the building of filtering compensation facilities and a power dispatching system. Further opportunities to cut the costs of electricity purchasing will be explored. (coordinator: Ministry of Transport, Construction and Regional Development)

Public passenger transport

- Pinpoint measures to optimise unit costs and increase revenues by a total of 20 % in subsidised public passenger transport by rail. (coordinator: Ministry of Transport, Construction and Regional Development, in conjunction with the Ministry of Finance)

1. Transport and development in Slovakia

1.1. The transport sector's impact on the country's economic development

The transport sector is important for the economic development of the country, its regions and its municipalities. Transport enables goods and people to be moved around, thereby creating opportunities for trade, services, work and recreation, and increases people's well-being. For the sake of economic development, stable transport links need to be created between producers and consumers. Economically, a transport network's most important factor is the cost of use, as the high costs of transporting goods erode the competitiveness of their producers. The importance of network reliability is rising in line with the transition of our economy. In particular, modern just-in-time supply methods require precise planning for the delivery time of goods. Traffic congestion, frequent repairs and road closures can have a negative impact on this ability.

As for workforce mobility, an important factor alongside the cost of passenger transportation is the speed of that transportation. People's desire to commute to work in economic centres drops off rapidly as the time it takes to get there rises. Congestion in cities and on the roads leading into cities can therefore be discouraging and reduce people's productivity. Public transport can be an important means of reducing the cost and speeding up the mobility of the workforce. Compared with single-occupant cars, trains and buses are more cost-efficient and are more effective at moving numbers of people from one place to another in the flow of traffic.

1.2. Transport objectives in Slovakia

The spending review considers the headline targets of public transport investments and policies to be the development of transport infrastructure and modes of transport so that goods and people can be transported **quickly, well and safely, with minimum negative externalities, and affordably in those areas where this cannot be delivered by the private sector.**

Specific transport projects and policies should aim to address specific problems. Specific objectives may include:

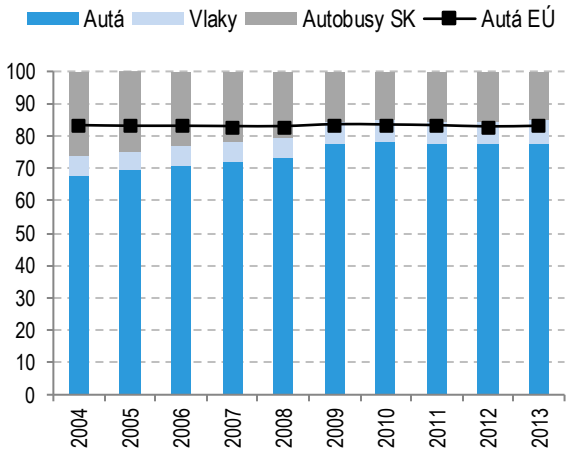
- *Tackling congestion in selected areas;*
- *Cutting the time it takes to travel between economic centres;*
- *Increasing traffic safety;*
- *Developing regions where economic activity is low;*
- *Developing public transport and making it more attractive;*
- *Reducing negative impacts on the environment;*

Tackling congestion in selected areas

One of the specific objectives of transport policies is to reduce congestion. We can assume that increasing numbers of vehicles or will use Slovak roads, and hence this problem will become increasingly serious. The time spent in traffic jams is affected by the regional population's overall ability to move around, the way traffic is distributed over the day, and the share of private road transport in the modal split. The average Slovak inhabitant's mobility (measured as the number of kilometres travelled by an inhabitant over the year) has not changed that much over the past decade, while the share of road transport in the modal split was the fifth lowest in the EU in 2013. Compared with other EU countries, the low but recently rising level of motorisation (the number of cars per thousand inhabitants) indicates that private car travel is set to grow further. In terms of freight

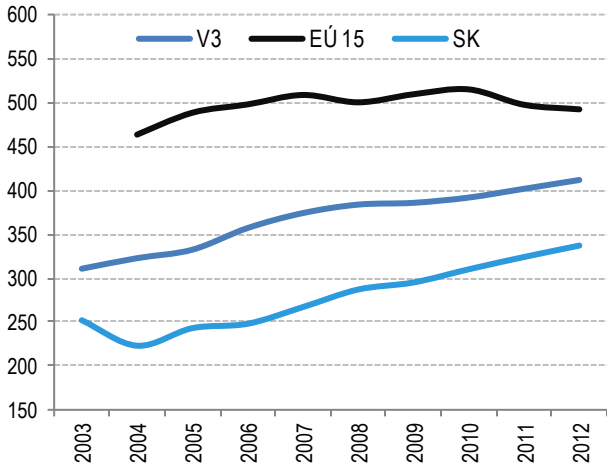
transport, road transport accounts for 76 % of all goods transported, which in contrast to cars was just above the European average in 2013.

Graph 1: Modal split in passenger transport (%)



Source: Eurostat

Graph 2: Number of cars per thousand inhabitants



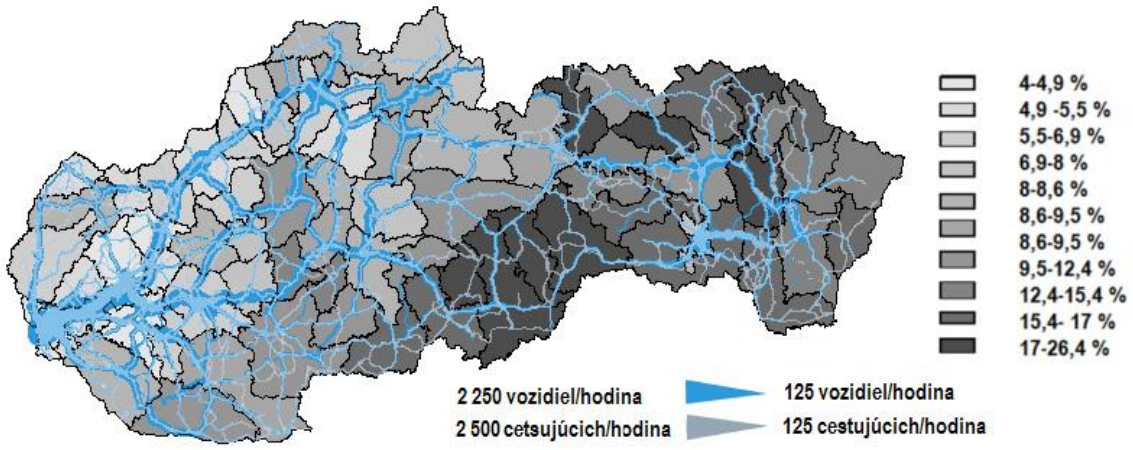
Source: Eurostat

Key: Cars Trains Buses (Slovakia) Cars (EU)

The number of roads is close to capacity, which means that congestion is already occurring, particularly during rush hour. Road capacities are reaching their limits especially around the missing sections of the D1 near Ružomberok and Žilina, and also around Bratislava, Nitra, Zvolen, between Michalovce and Humenné, and in the Kysuce and Orava regions. In Bratislava, drivers spend an average of 23 %[1] of their time in traffic jams, which is comparable to similarly sized European cities. A European Commission report[2] shows that rush-hour delays are around average when compared with other European countries. On 10 % of Slovak roads, travellers were held up for more than 10 seconds per kilometre during rush hour in 2012.

[1] According to the TomTom Traffic Index.
[2] Measuring road congestion (European Commission, 2012).

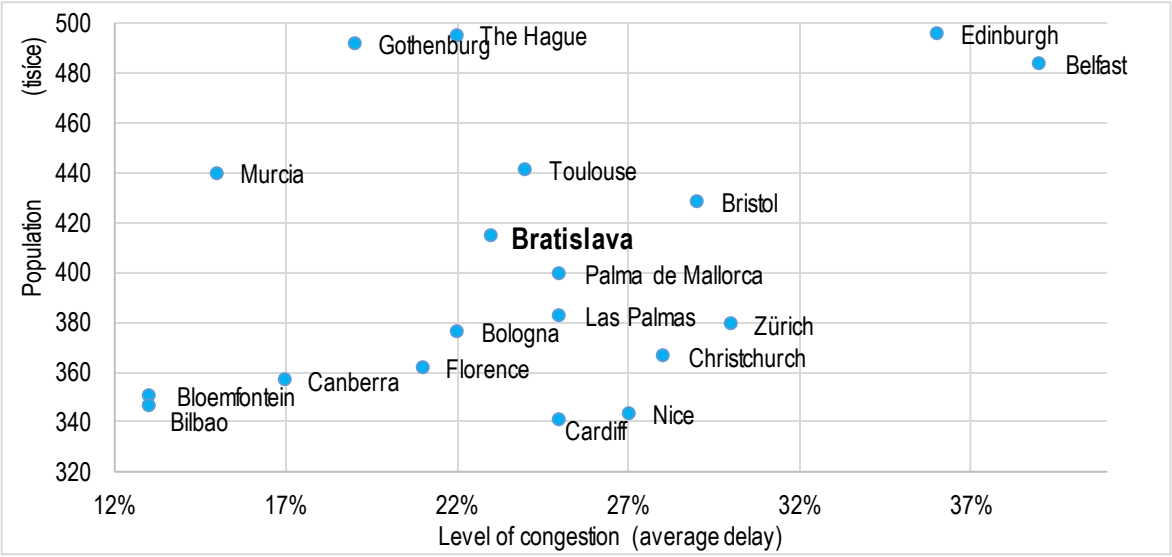
Graph 3: Maximum passenger transport speed and intensity in 2014 and unemployment by district



Source: Slovak Transport Model, Ministry of Transport, Construction and Regional Development, Central Office of Labour, Social Affairs and Family

Key: 2 250 vehicles per hour 125 vehicles per hour
2 500 passengers per hour 125 passengers per hour

Graph 4: Share of congestion in selected cities



Source : TomTom Index

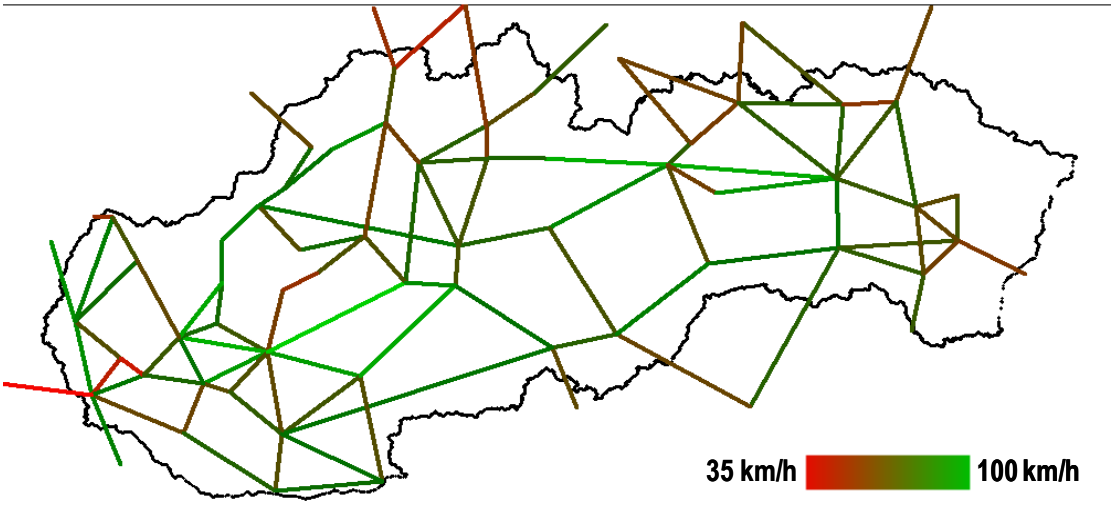
Cutting the time it takes to travel between economic centres

The objective of a transport project or policy that does not aim to alleviate the impacts of road congestion may be to reduce journey times. Slovakia has not yet completed its motorway network from west to east and from north to south. In this respect, each stretch of motorway speeds up travel considerably and can reduce journey times to as little as a third of what they were[3].

[3] If we compare speeds of less than 50 km/h in municipalities and 130 km/h on a motorway.

The Ministry of Transport has plans to monitor journey times (speed) between transport centres in the future. For the sake of illustration, we present a map of transport centres created by reference to road transport data available on public portals. A comparison of average speeds on roads with their speed limits could also prove interesting. The Ministry of Transport is now developing similar indicators.

Graph 5: Illustrative average speed at which a passenger car travels in normal traffic[4]



1. *Source : Google*

Journey times (speeds) can also be an important objective in rail transport when it comes to investments (track modernisation, which increases the top speed) and decisions on whether to scrap or add stops (a compromise between the area served by the train and the speed it can offer). The same applies to the coordination of the overall graphical timetable and the minimisation of the time to change trains. In freight transport, there is also the possibility of switching today's lorries to the railways, although this is hindered by issues of lower flexibility and potential time and financial losses (transshipment, the wait for the train to fill up and leave, and the lower speeds on the railways).

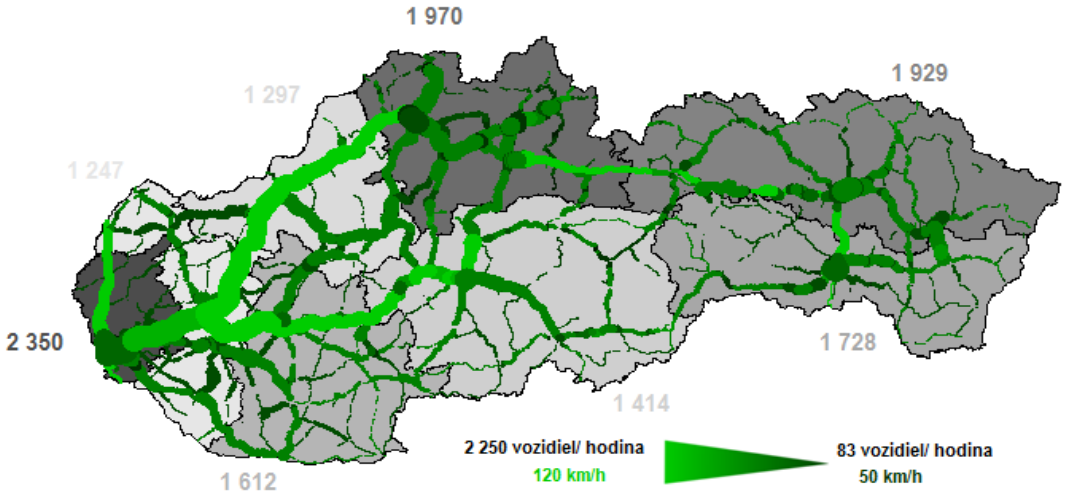
Increasing traffic safety

Another objective could be to enhance road safety. This can be achieved by the amendment or enforceability of regulations, by improving infrastructure, and by enhancing infrastructure safety standards. Most accidents occur around regional cities. In 2014, most fatal accidents were reported in the districts of Nitra, Trnava, Žilina and Dolný Kubín.

Sensor, a joint project among countries in eastern and south-eastern Europe, evaluated traffic accident numbers, converted into vehicle-kilometres, with a view to enhancing road safety. The area around Bratislava, which nominally appears to be the most prone to accidents, was actually one of the safest places when measured in vehicle-kilometres. Generally, the project conclusions can be reduced to the following: on motorways and expressways, there are fewer accidents per vehicle-kilometre, whereas the risk of an accident is higher on lower-class roads. Where traffic intensity is not enough to warrant the construction of motorways and expressways, it is also theoretically possible to reduce the accident rate by repairing and working on roads under class I or lower. Besides improvements in road traffic safety, it is also desirable to enhance safety in rail transport.

[4] The average speed is measured in sections from city centre to city centre, so the average speed for large cities is distorted by the low speeds recorded in their inner areas.

Graph 6: Map of accident rates by region (a darker colour denotes more accidents) and selected roads, based on their traffic levels (a thicker line means more traffic)



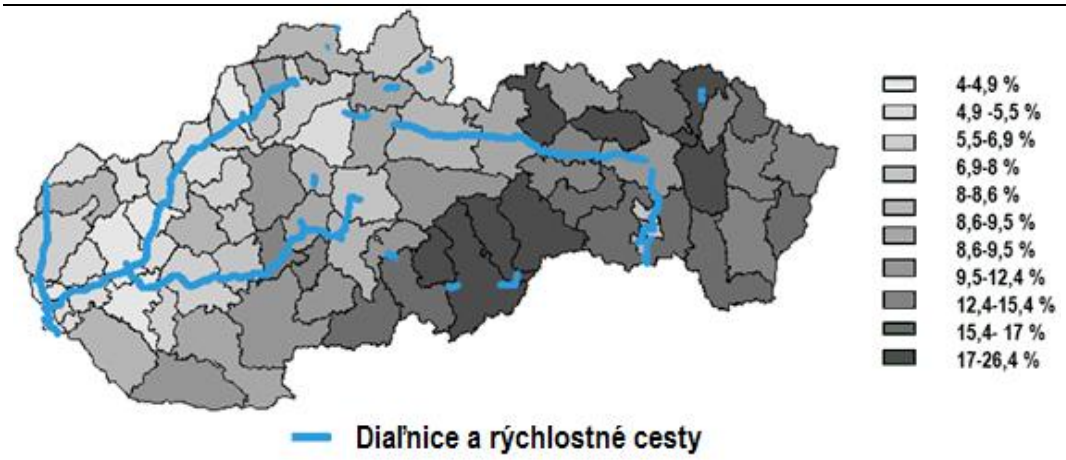
Source : Transport Model, Ministry of Transport, Construction and Regional Development, Ministry of the Interior

Key: 2 250 vehicles per hour 83 vehicles per hour

Developing regions where economic activity is low

The development of transport infrastructure is generally regarded as a source of economic development. In Slovakia, too, quality roads and economic activity are interlinked and, for example, the distance from a motorway junction sometimes correlates directly with local unemployment. Nevertheless, no causal relationship (i.e. that the accessibility of a motorway reduces unemployment) has been proven. Economic research[5] shows that the construction of new transport infrastructure that is not accompanied by any other means of kick-starting economic activity in regions will not reduce unemployment, but poor-quality roads could be one of the stumbling blocks to job creation.

Graph 7: Map of constructed motorways and expressways and unemployment in the districts (a darker colour denotes higher unemployment)



Source : Ministry of Transport, Construction and Regional Development, Central Office of Labour, Social Affairs and Family

Key: Motorways and expressways

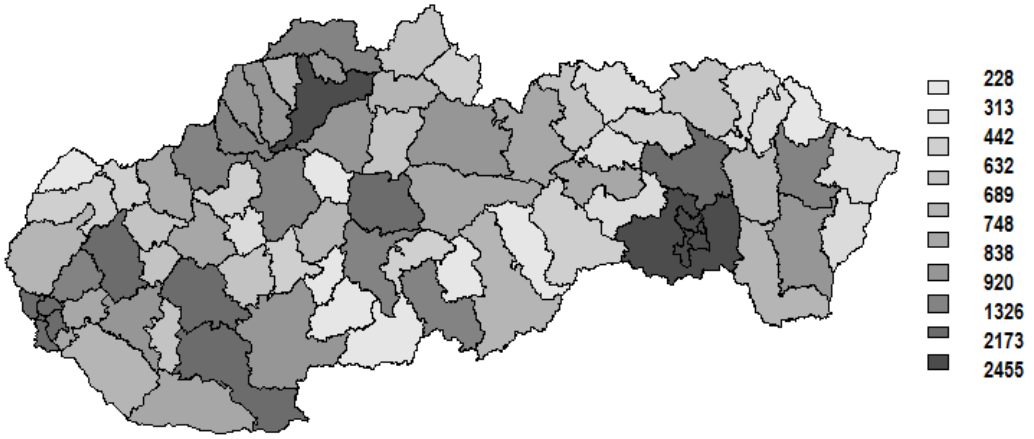
[5] OECD (2002): *Impact of Transport Infrastructure Investment on Regional Development.*

Developing public transport

Public transport is naturally concentrated in regional cities, hence it is here – as shown by the following map – that the highest number of services can be found. In particular, there are a lot of public transport services in and around the capital and the second largest city – Košice.

Other public transport indicators include a comparison of the speed, in particular, of rail transport and private transport (which may be especially attractive during rush hours in densely populated areas). Likewise, it is possible to monitor the degree to which public transport is coordinated, not only within the framework of a particular mode of transport, but also among the various modes of transport (rail transport, suburban bus transport, and urban mass transit). The quality of public transport is indicated, for example, by average delay times or the numbers of services cancelled.

Graph 8: Map of the number of public transport services in district towns[6]



Source : Timetables

2. Transport spending overview

Table 1: Transport spending by the Ministry of Transport and organisations set up by the Ministry (EUR millions)

Spending (EUR millions)	2014 (Actual)	2015 (Actual)	2016 (Budgeted)	2016 (Projected)	2017 (Proposed)	2018 (Proposed)	2019 (Proposed)
Road transport	**899**	**1408**	**1110**	**1145**	**1173**	**1069**	**774**
Class I roads	134	356	123	173	219	237	250
Motorways and expressways (NDS)*	765	1052	987	972	954	832	524
Rail transport	**1134**	**1307**	**983**	**904**	**1098**	**1286**	**937**
Railway infrastructure (ŽSR)*	800	867	718	565	716	840	562
Passenger transport by rail (ZSSK)*	327**	432**	257**	331**	374**	436**	367**
Public transport service contract with RegioJet	7	8	8	8	8	8	8
Air transport	**8**	**6**	**1**	**1**	**1**	**1**	**1**
Water transport	**0**	**0**	**9**	**3**	**3**	**4**	**7**
PPP projects	**124**	**129**	**135**	**138**	**134**	**134**	**134**
Total	**2 165**	**2 850**	**2 238**	**2191**	**2409**	**2494**	**1853**

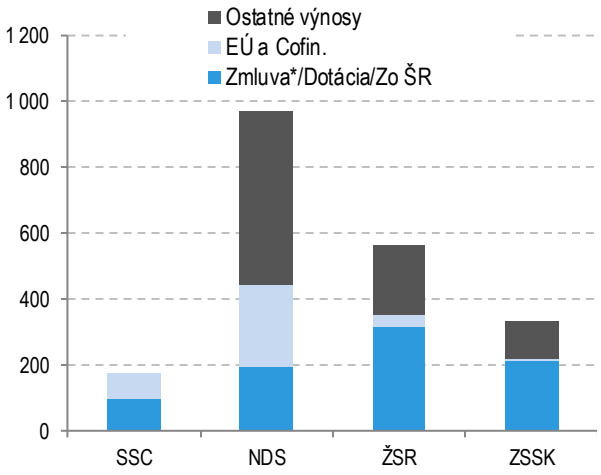
[6] The number of services means the number of buses in a district town + 6 times the number of trains in the district town. We used a multiple of six because, in 2016, the average train had a capacity of 330 seats, which is approximately the capacity of six buses.

Note: * Resources from the central government budget, the EU and co-financing, own resources (excluding spending on the repayment of credit principals – Category 820)

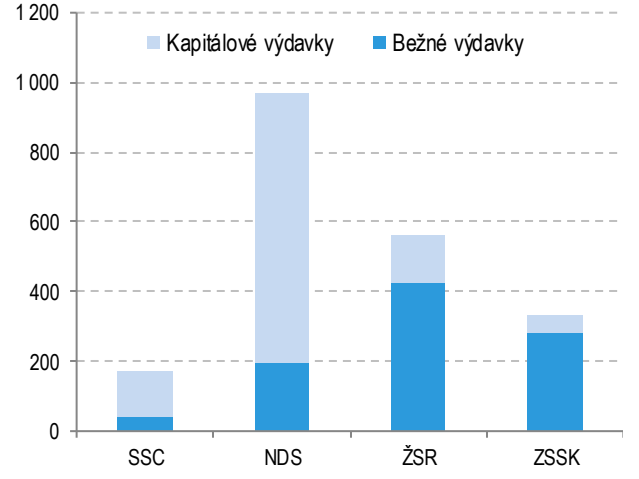
** Until 2016 (budgeted), spending on passenger transport by rail only encompassed the Ministry of Transport's funding further to a Public Transport Service Contract and grant agreements under the Operational Programme Transport. Since 2016, Eurostat has included ZSSK in the general government sector. With this in mind, the result projected for 2016 and the budgets proposed for 2017-2019 include all ZSSK spending on passenger transport by rail.

Transport spending in 2017 will come to EUR 2.2 billion. The largest component of this spending is channelled into motorways and expressways (EUR 1 billion) and ŽSR spending on railway infrastructure management and operation.

Graph 9: Income of transport companies (2016 – projected, EUR millions)



Graph 10: Spending by transport companies (2016 – projected, EUR millions)



Note: * With ŽSR, this is a railway infrastructure operation contract With ZSSK, this is a contract on public services in the operation of passenger transport on a track

Key: Other revenues — Capital expenditure — Ordinary expenditure
EU and co-fin.
Contract*/Subsidy/Central government budget

2.1. Class I roads

In 2009-2015, Slovenská správa ciest (Slovak Road Administration – SSC) spent EUR 779 million on the construction, modernisation and reconstruction of class I roads. Investments started to reduce the proportion of roads in an unsatisfactory condition or in a state of serious disrepair, though the share of such roads is still higher than it was prior to 2005. SSC's capital expenditure in 2016 is expected to come to EUR 132 million. Investments in class I roads will continue between 2017 and 2019. These funds are sourced primarily from the Operational Programme Integrated Infrastructure 2014-2020 and the CEF (Connecting Europe Facility), accompanied by co-financing and resources from the central government budget. Central government budget resources are used to cover project preparation, ineligible expenditure and investment projects that cannot be financed with EU funds. It is projected that a total of EUR 560 million will be invested up to 2019.

In 2015, the number of SSC employees rose by 2 % to 335.

Table 2: SSC spending

Spending (EUR millions)	2014 (Actual	2015 (Actual	2016 (Budge	2016 (Project	2017 (Propo	2018 (Propo	2019 (Propo

	)	)	ted)	ed)	sed)	sed)	sed)
Current expenditure	**45**	**50**	**40**	**40**	**48**	**48**	**48**
From central government budget resources	43	47	40	40	48	48	48
EU resources	2	3	0	0	0	0	0
Capital expenditure	**89**	**306**	**83**	**133**	**170**	**189**	**202**
From central government budget resources	38	22	22	59	71	21	22
EU resources	43	242	52	62	84	143	153
EU fund co-financing	8	42	9	12	15	25	27
Total	**134**	**356**	**123**	**173**	**219**	**237**	**250**
Average number of employees*	**328**	**335**	**345**	**341**	**345**	**345**	**345**

Note: * 2014, 2015 and 2016 (projected) – average FTE number; 2016, 2017-2019 – limit prescribed for the number of employees

2.2. Motorways and expressways

Compared to EU-15 countries, Slovakia – typically for a converging country – has few motorways and expressways. In 2015, Slovakia invested a record of almost a billion euro in the construction of motorways and expressways. Investments in 2016 are projected to stand at EUR 779 million. This high investment momentum will also continue in 2017-2019, with EUR 1.7 billion allocated for the construction of new sections. Most of these investments are financed by the Operational Programme Integrated Infrastructure, the CEF (Connecting Europe Facility), central government budget resources and NDS's own resources.

At the end of 2015, NDS was managing 603 km of dual-carriageway motorways and expressways, 73 km of single-carriageway motorways and expressways, and 83 km of class I roads. The length of sections managed by NDS, weighted by the number of lanes and the month of commissioning, increased by 2.6 % in 2015. Compared to 2014, the number of NDS employees was up by 8 % to 1 450 in 2015, largely on the back of increased capacities at maintenance centres after new sections were put into operation.

Table 3: NDS spending

Spending (EUR millions)	2014 (Actual)	2015 (Actual)	2016 (Budgeted)	2016 (Projected)	2017 (Proposed)	2018 (Proposed)	2019 (Proposed)
Current expenditure	292	204	190	193	194	208	208
From central government budget resources	29	18	29	29	16	16	16
From Other Sources	263	186	161	165	178	192	192
Capital expenditure	473	848	797	779	760	624	316
From central government budget resources	121	216	173	163	125	129	125
EU resources	227	458	488	211	498	374	116
Co-financing from the central government budget	40	81	86	37	88	66	20
From Other Sources	84	94	50	367	50	55	55
Total	**765**	**1 052**	**987**	**972**	**954**	**832**	**537**
Average number of employees	1 341	1 450	1 489	1 540	1 540	1 580	1 610

2.3. Railway infrastructure

The Ministry of Transport subsidises Železnice Slovenskej republiky (ŽSR) under a Railway Infrastructure Operation Contract. The budgeted subsidy for 2017-2019 is EUR 273 million, just as it was in 2014-2016.

Table 4: Ministry of Transport subsidy for the operation of railway infrastructure

EUR millions	2014 (Actual)	2015 (Actual)	2016 (Budgeted)	2016 (Projected)	2017 (Proposed)	2018 (Proposed)	2019 (Proposed)
Railway Infrastructure Operation Contract	273	273	273	273	273	273	273

Approximately half of ŽSR's subsidy for the operation of the railway infrastructure (current expenditure) comprises payroll costs and the related contributions. In 2015, the average number of employees was 1 % down on 2014 to 14 018. The payroll package has been frozen for 2017-2019.

ŽSR not only operates, but also modernises the railway infrastructure. Investment in 2016 is expected to amount to the EUR 138 million. In 2017-2019, EUR 809 million has been allocated for investment from the Operational Programme Integrated Infrastructure 2014-2020, the CES (Connecting Europe Facility), the central government budget and ŽSR's own resources.

Table 5: ŽSR spending

Spending (EUR millions)	2014 (Actual)	2015 (Actual)	2016 (Budgeted)	2016 (Projected)	2017 (Proposed)	2018 (Proposed)	2019 (Proposed)
Current expenditure	**420**	**398**	**417**	**427**	**441**	**434**	**434**
From central government budget resources	273	273	273	273	273	273	273
From Other Sources	147	125	145	154	168	162	162
Capital expenditure	**380**	**469**	**301**	**138**	**275**	**406**	**128**
From central government budget resources	36	116	63	41	23	46	44
EU resources	128	142	117	30	132	235	0
EU fund co-financing	23	25	21	5	23	41	0
Other sources	193	186	100	62	96	83	83
Total	**800**	**867**	**718**	**565**	**716**	**840**	**562**
Average number of employees*	**14 109**	**14 018**	**14 155**	**14 030**	**14 027**	**13 618**	**13 200**

Note: * FTE

2.4. Passenger transport by rail

Public transport services for passenger transport by rail in Slovakia are provided by two carriers, Železničná spoločnosť Slovensko, a.s. (ZSSK) and RegioJet, a.s. ZSSK is a wholly owned by Slovakia (the Ministry of Transport). ZSSK, as a dominant carrier, provides transport services under a public transport service contract. On the Komárno-Bratislava-Komárno route, transport services are provided by the private carrier RegioJet, a.s. under a public transport service contract. In 2016, the Ministry of Transport provided it with funding of EUR 8 million for these services.

In 2015, ZSSK covered 3.1 billion passenger-kilometres. The growth in performance was accompanied by a 1 % increase in ZSSK employee numbers to 5 929 in 2015.

ZSSK is making major investments in the modernisation of its obsolete fleet. In 2016, the plan is to use EUR 48 million to this end. These investments will continue apace in subsequent years. In 2017 and 2019, ZSSK is planning to invest EUR 330 million in passenger transport by rail.

Table 6: Ministry of Transport subsidisation of passenger transport by rail

Spending (EUR millions)	2014 (Actual)	2015 (Actual)	2016 (Budgeted)	2016 (Projected)	2017 (Proposed)	2018 (Proposed)	2019 (Proposed)
Public transport service contracts	265*	218	218	218	218	218	218

Note: * In 2014, the Ministry of Transport covered ZSSK's accumulated losses.

Table 7: ZSSK spending

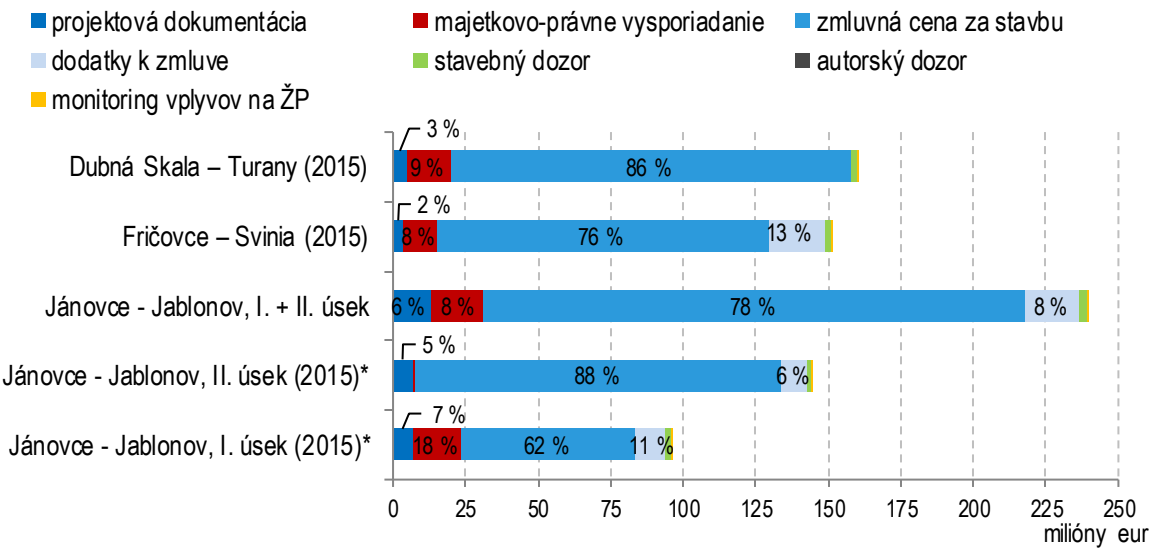
Spending (EUR millions)	2014 (Actual)	2015 (Actual)*	2016 (Budgeted)*	2016 (Projected)	2017 (Proposed)	2018 (Proposed)	2019 (Proposed)
Current expenditure	**258**	**210**	**210**	**283**	**285**	**287**	**275**
From central government budget resources	258	210	210	**210**	210	210	210
From other sources*	**-**	**-**	**-**	**73**	75	77	65
Capital expenditure	**69**	**222**	**47**	**48**	**89**	**149**	**92**
EU resources	**59**	**189**	**40**	6	51	97	25
EU fund co-financing	**10**	**33**	**7**	1	9	17	5
From other sources*	**-**	**-**	**-**	41	29	35	62
Total	**327**	**432**	**257**	**331**	**374**	**436**	**367**
Average number of employees	**5807**	**5929**	**6 000**	**6 000**	**6 000**	**6 000**	**6 000**

Note: * Figures for other resources encompassing 2014 (Actual), 2015 (Actual) and 2016 (Budgeted) are not presented; ZSSK became a public administration entity from 2016.

3. Investment project planning and preparation

It is the investment project planning and preparation process that largely determines the future benefits, quality and costs of the version of the investment that is made. In investment projects, the construction cost is just one of the overall project price's components. A lot of money is also channelled into design documentation and the settlement of property rights (the purchase and expropriation of land).

Graph 11: Total spending on projects for motorways and expressways delivered in 2015 (excluding VAT)



Note: designer supervision is usually part of the contract with the contractor *Source : NDS*

* The Jánovce – Jablonov I. and II. sections were probably resolved in the same settlement of property rights

Key: - design documentation - settlement of property rights - contract price for project
- contract addenda - site supervision - designer supervision
- monitoring of environmental impacts

EUR millions

In the projects to date, the most important process has been the EIA (environmental impact assessment). Under projects financed with EU funds, responsibility for this process rests with the Ministry of the Environment. Since 1 January 2015, the Ministry of the Environment's final opinion on the recommended route has been binding. As of the third programming period (2014-2020), under projects financed with EU funds the feasibility studies are also regarded as an essential part of the design documentation. As the EIA process had already been completed and Ministry of the Environment decisions had been issued for most projects, feasibility studies were carried out as a subsequent step and merely confirm the route already selected. With new projects, the feasibility study is carried out at the beginning.

Feasibility studies are conducted with a view to selecting the most appropriate variant for the project that is to be implemented. The selection of a preferred project is subject to comprehensive evaluation (a multi-criteria analysis, or MCA). A multi-criteria analysis should detail the method used to score unquantified factors. In the future, it should describe the relevance of such impacts only on a qualitative basis, assess them in the context of the results of a cost-benefit analysis (CBA), and select a recommended solution. This will allow all stakeholders to

conduct an informed assessment of each project. It is intended to be a way of comparing the alternatives of an investment project at the beginning of implementation.

A CBA evaluates projects and/or their various versions by expressing the costs and benefits of each of them in monetary terms. It sets out to quantify all of the most important costs and benefits of a project or project alternatives. Besides a project's impacts on transport, it can also quantify impacts on the environment and public health, and the projected level of risk. In other countries, it has become trendy to include a project's broader macroeconomic benefits (the impact on employment, corporate productivity, etc.) into the CBA. The intention is for the CBA to include as many quantifiable effects as possible. These factors quantify the positive effect of transport systems on employment and productivity among the population where the project is to be implemented.

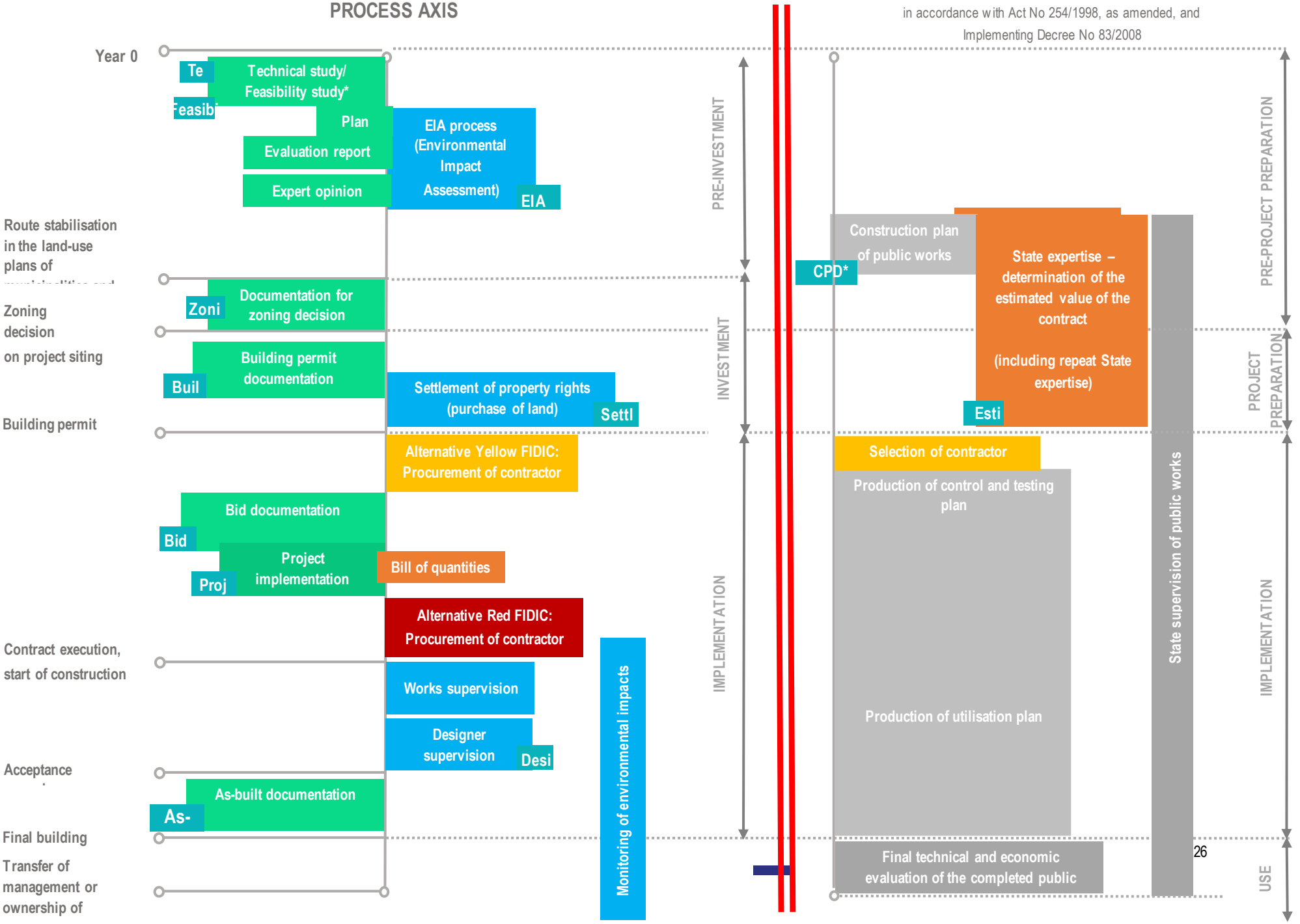
Feasibility studies drawn up in the past three years at the Ministry of Transport have used different CBA methodologies for the various corridors. These methodologies are described in more detail in the following chapter. The aim is to harmonise methodologies so that it is easier to compare projects in relation not only to the individual corridors, but to the transport network as a whole. The CBAs conducted so far have evaluated transport-related effects, certain environmental impacts (e.g. vehicle emissions) and investment costs.

As CBAs and MCAs only assess a project from the perspective of one mode of implementation (e.g. only a motorway or railway solution), the feasibility study needs to be complemented with a multimodal evaluation. This analysis should be carried out before the feasibility study. It starts by identifying the problem and determining the objective that is to be improved and achieved by the intervention. It takes into account all methods of solution, including the use of various modes of transport and other economic solutions, and assesses the project and its variants comprehensively. It results in a recommended method of achieving the identified objective.

With motorways and expressways, the Ministry of Transport estimates that project preparations take an average of seven years, though there are many as-yet unimplemented projects where preparations began 10 or more years ago. EUR 12 million has been channelled into project preparations and land purchases for other projects by NDS, the national motorway company. The spending review includes measures to limit spending on projects that are not expected to be implemented beyond the short term.

The EIA should be linked to the drawing up documentation for a zoning decision as this will speed up and simplify the process and prevent the required documentation from being duplicated. It should also improve the price estimates. Transparency and control at all stages of the process will be enhanced, in part by the publication of data and documents. The introduction of benchmarks for site supervision prices in 2017-2019 means there is potential to make savings.

PROJECT



* It is only in the third programming period (2014-2020) that feasibility studies have been required as an essential part of design documentation for motorway and expressway projects financed with EU funds. This is why they were only drawn up in later stages of project preparations, rather than at the beginning, for many projects.

The role of the Public Works Act in the investment process

Act No 234/1998 on public works regulates conditions for the preparation of public works, the assessment, quality and evaluation thereof, and the State supervision of public works.

State expertise is the inspection work carried out by the State on the construction plan of public works. The aim is to evaluate the optimal utilisation of public investments in the financing of public works.

State supervision is the supervisory work carried out by the State in the individual stages of the investment process.

The **construction plan** contains construction plan documentation and that the final opinion from the environmental impact assessment process[7]. The construction plan documentation is part of the pre-project preparation of the structure; its detailed content is set out by a Ministry of Transport implementing decree[8]. The construction plan is drawn up in accordance with the sector development concept, basic programming documents for the support of regional development and valid land-use planning documentation, and in keeping with the efficiency of utilisation of public investments. The term 'efficiency' encompasses not only an assessment of the legitimacy of the costs required for the direct implementation of public works, but also an evaluation of the optimal utilisation of public investments.

A **final technical and economic evaluation of the completed public works** is drawn up after the final building approval has been granted and is used to verify that public investments in public works have been used in accordance with the construction plan and the conclusions of the State expertise.

3.1. Pre-investment and investment preparations

Technical study

The technical study is usually the initial stage of project preparation. NDS publicly procures a study contractor to select routing alternatives for each section and quantify the rough estimate of costs for each of them. The technical parameters of motorways and roads are established by STN technical standards[9].

Feasibility study

The feasibility study, carried out as part of a cost-benefit analysis supplemented by a qualitative multi-criteria analysis, assesses the construction options. In this respect, it decides on the routing and on how wide the roads are to be (e.g. two-lane of four-lane). In the third programming period (2014-2020), feasibility studies are required for all motorway and expressway projects financed with EU funds. Feasibility studies should be prepared at the start of the pre-investment process. At the time it became compulsory to prepare feasibility studies, numerous projects were already at an advanced stage of project preparation and had completed the EIA process, so feasibility studies, and hence CBAs, were drawn up as a subsequent step and simply confirmed the routing that had already been selected. With new projects, the feasibility study is carried out at the beginning.

NDS publicly procures a study contractor. The contract always includes the production of a local transport model and a socio-economic benefits model, which is part of the CBA. In certain cases, a specific local traffic survey is

[7] Act No 24/2006 on environmental impact assessments and amending certain laws, as amended.
[8] Implementing Decree of the Ministry of Transport, Construction and Regional Development No 83/2008 implementing Act No 254/1998 on public works, as amended.
[9] STN 736101 (Road and motorway design) and 736102 (Road junction design).

carried out for the transport model. The feasibility study lifts the routing options from the technical study. The feasibility study results in a recommendation on the use of the most appropriate option.

There is currently no analytical tool to compare all potential transport problem solutions with each other under an individual project (e.g. the acceleration of the railway versus the construction of a motorway). The CBA should serve as the basis for decisions in the feasibility study. In reality, the multi-criteria analysis has assigned CBA results a very low weighting (e.g. just 20 %), resulting in a situation where they have hardly been authoritative in the final decision-making.

- **Measure: With new investment projects worth more than EUR 20 million, during the preparations for the commission of a feasibility study assess how appropriate it would be to apply multimodal variants, and conduct such an assessment.** This evaluation will start by identifying the problem and the objective that is to be achieved by the investment. On the strength of a multimodal analysis, the most appropriate solution to the transport problem, entailing one or a combination of modes of transport, will be selected and then drawn up in more detail.
- **Measure: Update the feasibility study methodology and the method used to select the recommended solution.** Strengthen the role of the cost-benefit analysis. A multi-criteria analysis takes further aspects of projects into account and provides additional qualitative information.
- **Measure: Prepare a feasibility study at the beginning of the pre-investment process.**

Environmental impact assessment (EIA) process

The EIA process is coordinated by the Ministry of the Environment. Here, the routing options are assessed from the perspective of the environment and stakeholders. The Ministry of the Environment issues the scope of the evaluation (what environmental impacts need to be assessed), on the basis of which the investor delivers an evaluation report. The opinions of the municipalities affected and the public are also taken into consideration in the final decision. The option that is permitted, however, need not be the option recommended as the most advantageous in the feasibility study.

Numerous motorway and expressway projects under preparation underwent the EIA process many years ago according to rules that no longer apply. Their EIAs will therefore have to be repeated/supplemented in the future in order to comply with Directive 2011/92/EU of the European Parliament and of the Council.

Since 1 January 2015, the Ministry of the Environment's final opinion has been binding on downstream authorisation proceedings, although the EIA process has not been integrated with the authorisation proceedings (zoning and building permit proceedings). This results in the duplication of acts (e.g. the duplication of consultations with municipalities, the public, etc.), protracting the overall period of pre-investment and investment preparations, but also theoretically means that a zoning decision does not have to be issued for the routing determined by the Ministry of the Environment. Stakeholders sometimes exploit their negotiating position to push for investments that are not related to the construction project. The investor pays for the expert opinion. The author of the expert opinion may then draw up supplementary underlying documentation for the investor. This could prompt a conflict of interest. Changes in activities proposed after a final EIA opinion has been issued are often submitted only when the public procurement procedure to find a contractor has come to an end. If the environmental assessment needs to be repeated, this therefore means there will be delays before the construction project can be started.

- **Measure: Review the EIA process in relation to other stages of project preparation with a view to streamlining the entire process.** The main measures to be assessed include the integration of the EIA process into the zoning proceedings, an extension to the content of the plan submitted by the investor, an

increase in the involvement of investors and the authorising authority in the EIA process, better quality control, the reining-in of subjective requirements sought by stakeholders, and the timely notification of changes in proposed activities (coordinator: Ministry of the Environment).

Construction plan documentation

The content and scope of the construction plan assessed by State expertise is determined by the Public Works Act and its implementing decree. It includes an economic report containing an evaluation of the economic efficiency of the public works.

Zoning decision documentation

Zoning decision documentation forms a basis for the zoning decision. It is used for the building authority's decision determining the area to be developed and the siting of the structure in that area. It includes the performance of preliminary geological survey – all geological surveys that have been conducted in the area are looked up. The producer of the documentation updates the estimated construction costs of the project again, and this is used as an annex for the performance of State expertise. Investors tend to arrange for the production of all this documentation at once, hence the zoning decision documentation is largely the same as the construction plan documentation.

Each municipality has a say in the issuance of the zoning decision. Municipalities therefore enjoy a strong negotiating position. They sometimes exploit their position to negotiate investments that are not related to the construction project. As shown by the results of audits conducted by the Supreme Audit Office, public resources have also been spent on this purpose in Slovakia during road construction.

NDS also initiates project preparations for those sections of motorways and expressways that are projected for launch in the medium to long term. EUR 12 million has been channelled into project preparations and land purchases for other projects by NDS, the national motorway company.

- **Measure: The Ministry of Transport will reassess whether to continue pre-project and project preparations in those cases where a project is planned for implementation only in the long term (in accordance with the Ministry of Transport's strategy documents).**

- **Measure: Review legislative opportunities to minimise non-construction investments, together with a quantification of budgetary implications.**

State expertise

State expertise, carried out by the Ministry of Transport, assesses the construction plan in order to evaluate the optimal utilisation of public investments in the financing of public works. The State expertise report contains the price which, according to the law, is the estimated value of the contract under a special regulation – the Public Procurement Act – and is a binding basis for subsequent stages in the preparation and performance of public works.[10]

Building permit documentation

[10] State expertise is carried out in accordance with Act No 254/1998 on public works, as amended. According to that Act, State expertise is an assessment of the construction plan in order to evaluate the optimal utilisation of public investments in the financing of public works. State expertise results in a State expertise report. According to the Act, the report is a binding basis for subsequent stages in the preparation and performance of public works. The report's conclusion contains the price which, according to the Act, is the estimated value of the contract under a special regulation – the Public Procurement Act.

A detailed geological survey and other surveys are carried out for the building permit documentation. Again, this is a complex process in which responses from many stakeholders – municipalities are required, the settlement of property rights relating to immovable property needs to be evidenced, gas and water companies express opinions, and the necessary relaying of utilities is documented. Building permit documentation is often procured together with the bid documentation.

Settlement of property rights (purchase of land)

NDS commissions a company to coordinate the purchase of land. A relationship with the land needs to be demonstrated in order for a building permit to be issued.

In accordance with expert methodology for the appraisal of land, the factor of any future rise in the value of privately owned land is incorporated into the price by defining such land as a building plot as soon as the zoning decision is issued. This has a fundamental impact on the level of the general value ascertained and hence on the purchase price offered.
It is advisable, in cooperation with the Ministry of Justice, to analyse opportunities to revise the methodology used to ascertain the general value of immovable property, where this value is administratively increased even though no action is taken by the owner and there is no change in the actual situation (e.g. a change from arable land to a building plot).

Box 1: Cross-sectional problems in pre-investment and investment preparations

- **Content is duplicated in multiple stages of the design documentation.** From one stage of the design documentation to another, parts of the documentation focusing on identical issues are repeated. For example, the transport engineering part is virtually repeated by the constant updating of the original solution to include new, often highly dubious requirements for the handling of the transport situation. If pointless duplication is detected that offers no additional details on the issue being addressed and does not expand the issue, it is necessary in particular to look out for any duplication in the commissioning of the documentation and to take over parts already drawn up in previous stages of preparation. This is current best practice.
- **Parties ordering design documentation to not have enough internal capacities** for interim and final detailed inspections of the supplier's expert outputs within the framework of the various professions involved.
- **Improved public awareness of underlying documentation in pre-investment and investment preparations**. Underlying documentation for large investment projects under preparation is not publicly available. This hampers checks on the efficient spending of public funds on such projects by experts and the general public.
- **The time for pre-project preparations is too short.** Designers have relatively little time to examine in detail the area involved and to identify the best routing options in that area – usually fewer than five months and sometimes just three months (e.g. only 63 or 100 days).

Measures:

- Scrupulously keep track of opportunities to make maximum use of previous stages of design documentation.
- Improve the internal expert capacities of those placing orders at the Ministry of Transport to improve the way terms of reference are formulated and enhance interim and final project inspections.
- Publish relevant underlying documentation on investment projects that are under preparation in keeping with this common practice in other countries.

3.2. Implementation stage/construction

Bill of quantities

The bill of quantities is a detailed itemised statement of construction works in units of measure (m^3, pieces, kilograms, hours, etc.). It is part of numerous stages of documentation and is made more precise at each stage. The most detailed bill of quantities is included in the project implementation documentation, which is part of the bid documentation (the tender dossier). It is drawn up by the producer of the bid documentation.

Yellow FIDIC and red FIDIC

FIDIC conditions of contract are internationally standardised and applied in international construction for the contracting of the supply of works, and may be locally adjusted. The FIDIC yellow book covers conditions of contract where the tenderer determines the precise design solution for the project, drawing on the tenderer's know-how, machinery, licences, synergies, etc., and then uses that as a basis to set the resultant price. Public procurement to find a contractor by using FIDIC yellow conditions of contract is usually carried out after the building permit documentation has been drawn up (i.e. bid documentation is not produced). The FIDIC red book covers conditions of contract where the contracting authority (NDS) precisely determines the bill of quantities and the tenderers then just compete in the unit prices they offer. Technically, therefore, procurement preparations in accordance with the FIDIC red book are much more difficult for the contracting authority. If the FIDIC yellow book is applied, it is assumed that the resultant price implicitly incorporates the contractor's risk-related mark-up.

Estimated value of the contract

In public procurement to find a project contractor, the estimated value of the contract, as determined by the Ministry of Transport in the State expertise process, is stated. Sometimes it is adjusted in the as-built documentation further to project changes before the building permit is issued. This is an important signal for tenderers, indicating the pricing expected by the client in relation to the bid amount. The Ministry of Finance assumes that the bids will be lower. In this respect, the methodology used in the State expertise to calculate the estimated value of the contract is crucial for the final project price. The State expertise assesses the construction plan submitted by the tenderer. The designer prices the budget for the public works by applying available price indicators (in particular the UNIKA and CENEKON databases, etc.). State expertise methodology is laid down in Act No 254/1998, as amended, and that Act's Implementing Decree No 83/2008.

In certain cases, the contract prices of projects derogate too far from the estimated value of the contract. When the construction industry was hit by crisis, numerous projects put out to tender were won at prices less than 50 % of the estimated value of the project. A study produced for the European Commission by COWI[11] claims that, at least as far as railway projects are concerned, the reason for this can be found in the systematically overpriced bids of suppliers, the averages of which were used to form the unit prices in the database. The study also points out that, with railway projects, the CENEKON price database is not a suitable means for the planning and estimate of costs, and that its use should be discontinued. The exorbitant unit prices distort the cost part of the cost-benefit analysis, which could affect the selection of alternatives and result in a distorted net present value of the project and its internal rate of return.

Site and technical supervision

[11] Feasibility study Žilina – Košice – Čierna nad Tisou and section Púchov – Považská Teplá in Slovakia, final short-listing report (produced for the Commission by COWI, 2014).

Site and technical supervision ensures that construction is checked against the technical documentation for the investor. As such, it is not part of the public procurement procedure held to find the contractor, but is procured separately. The estimated value of the site and technical supervision contract is usually calculated as 1 %-2.5 % of the estimated value of the construction contract. The contract price tends to be much different from the estimated value of the contract and is based on the agreed number of man-hours of key and non-key experts and their daily rates.

The daily rates applicable to the contracted site and technical supervision differ significantly from one project to another. For key experts, the rates ranged from a low of EUR 100 per day to a high of EUR 580 per day. Similarly, the rates for non-key experts ranged from EUR 80 per day to EUR 420 per day. The average of the three lowest daily rates[12] for key experts is EUR 300 per day; for non-key experts, the figure is EUR 175 per day.

Table 8: Site and technical supervision – daily-rate benchmarking

Project title	Key expert (EUR per day)**	Non-key expert (EUR per day)**	Contract price for supervision (exclusive of VAT)	Supervision benchmark
D1 Fričovce – Svinia	324	**169**	1 418 000	1 418 000
D1 Dubná Skala – Turany	**309**	179	1 356 400	1 153 960
D1 Jánovce – Jablonov (Sections I and II)	**260**	**137**	1 888 235	1 888 235
D1 Hubová – Ivachnová	481	213	3 941 563	2 740 400
D3 Čadca, Bukov – Svrčinovec	446	320	4 767 194	2 806 912
D1 Lietavská Lúčka – Višňové – Dubná Skala	580	420	11 504 420	5 090 939
D1 feeder road – Lietavská Lúčka – Žilina, II	**260**	**180**	472 160	472 160
D1 Prešov West – Prešov South*	521	420	8 729 045	4 016 918
the average of the three lowest rates (indexed)**	**300**	**175**		

Note: Only contracts where the number of days for the deployment of the individual experts is also known are presented.
** Certain contracts contain different rates for each type of expert; the rates for key and non-key experts are calculated as the weighted average of the different rates

Source : Central Contract Register

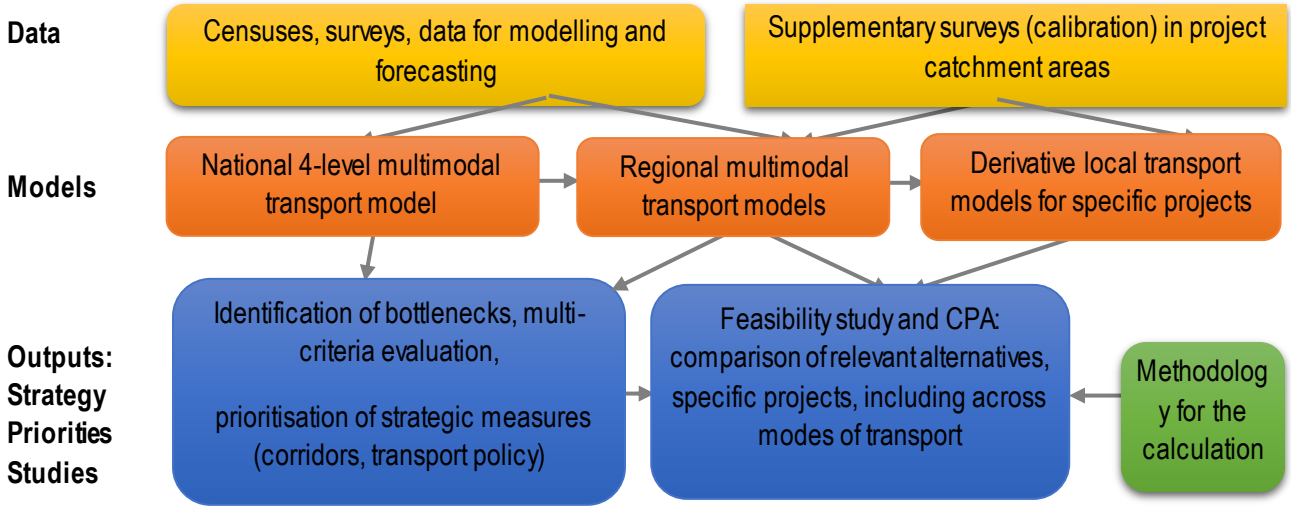
According to Commission recommendations, the contract price of site supervision should be up to 2.5 % of the estimated value of the works contract. This is in keeping with the Commission's best practice.

[12] The lowest daily rates were taken only from the set of contracts in which the number of days for the deployment of the individual experts is also known. Where contracts featured different rates for each type of expert, the weighted average of the rate, separately for key and non-key experts, was taken into account.

4. Transport data, models and methodology for CBAs

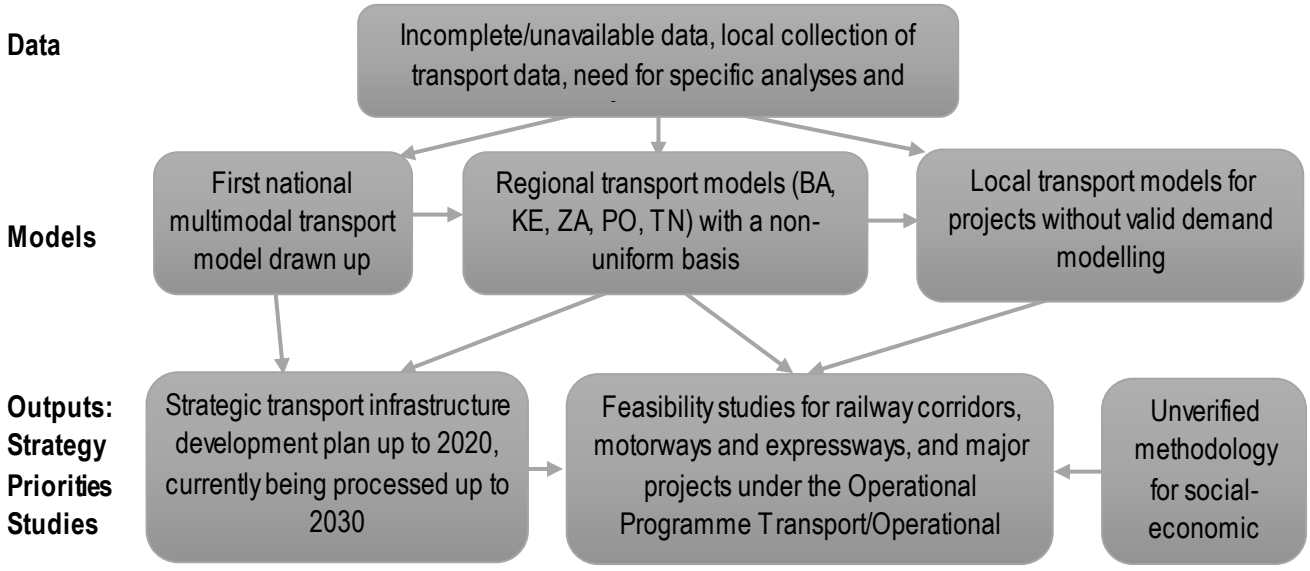
The three basic prerequisites for the decent preparation of transport projects are high-quality and mutually consistent transport data, a comprehensive transport model, and uniform methodology for cost-benefit analysing. The spending review proposes measures to improve the collection, processing and publication of the most important transport data, and for the update of CBA methodology with consistent and validated assumptions.

Graph 12: Data, models and outputs – target



Source: Ministry of Transport

Graph 13: Data, models and outputs – current



* SMP – sustainable mobility plan, RITS – regional integrated territorial strategy.
** In feasibility studies of TEN-T Core Network corridors defined by an EU directive, it is impossible to apply a multimodal approach. These are always specific diversified studies covering the specific mode of the corridor. These individual single-modal studies subsequently form a comprehensive multimodal basis for the establishment of annual and multiannual plans for the preparation and implementation of individual projects on the multimodal corridors of the TEN-T Core Network.

Source : Ministry of Transport

4.1. Transport data and models

For the preparation of high-quality transport projects, it is essential to have a reliable national multimodal transport model covering the whole of Slovakia. The first version of this model was completed in 2016. It is expected that the model will be periodically updated and improved in the future by adding newly acquired sources of input data and input data *per se*, with a need for the consistency and precision thereof. As a result of these updates, the model will reflect changes and trends in transport behaviour and demand for transportation. It should form a basis for strategic planning, project prioritisation and the evaluation of each project. In regional and local transport models, it is necessary to define clear methodology for transport modelling that will avoid vague model modifications. For local models, it is important to enhance the mutual comparability and consistency of inputs by means of uniform methodology. For the validation of input demand (transport) data and models, it is also important for them to be readily available to public administration bodies and to experts.

A lot of the transport data that could be used as a basis for the uniform modelling of transport projections is still missing, inaccessible, or imprecise and inconsistent with that of neighbouring countries. A national census should continue to be carried out on a regular five-year basis. A national directional traffic survey of road transport in towns with populations of more than 5 000 – a factor central to modelling – was last conducted in 2007. It is important to collect and disclose data in a user-friendly form. A lot of existing data has the potential to be used on a greater scale. Some data is currently subject to legal restrictions on how it is to be shared among public-administration organisations, because despite its public nature it is owned by private companies. Other data (e.g. data from the toll system) is not processed in a form that can be used for modelling purposes.

The calibration of models has not been optimised for Slovakia. As all models are acquired from third parties, they can only be checked to a very limited extent. The Ministry of Transport and NDS will therefore ensure that models can be checked on a greater scale in particular by setting conditions of access to details for the processing of a work in public procurement.

Box 2: Explanations of most important terms

Traffic intensity – the number of vehicles passing through a particular section over a certain interval (e.g. 24 hours). Usually, the different types of vehicle (passenger cars, lorries, buses, etc.) are distinguished.

Data on traffic direction/directional traffic data – in addition to the fact that a vehicle passes through a monitored point, this data also provides information on the start and end of the vehicle's journey.

Modal split – the extent to which individual modes of transport are used (e.g. private car transport, bus transport, rail transport) in a particular area (town, region, country) and at a particular time.

Transport model – a means of simplifying the actual transport process in the form of mathematical calculation procedures drawing on input figures and data, usually created with software, and resulting in a forecast of future transport relations. Transport model inputs are as follows:

- *definition of transport infrastructure:* precise road parameters (length, width, number of lanes), speed limit, road capacity
- *traffic surveys:* directional traffic surveys (where vehicles are coming from and where they are going), section surveys (vehicle intensity per hour/day), surveys of freight transport, rail transport, mass transit, etc.
- *sociological transport service:* the mobility of the population – what vehicles the population tends to use, when, and where it is travelling to, the types of vehicles owned by the population, the purpose of journals, the frequency of journeys, commuting to work or school, the transport facilities of households, etc.

- *sociological transport and demographic data:* e.g. the population, the number of job opportunities, economic activity, the number of unemployed persons, demographic trends (drawing on multiple scenarios).

National transport model – a multimodal model covering the whole of Slovakia. The national transport model should also be used as a basis for Slovakia's general national transport plan, which is under preparation, and for the preparation of transport policies. It is calibrated with data from the section-based national traffic census, which is carried out once every five years, and with data from transport, sociological transport and demographic surveys.

Regional transport models are used as a basis in the production of the land-use plan of a city/region. In Slovakia, they exist for certain regional cities, including Bratislava, Žilina, Košice and Prešov, though the quality varies.

Local transport models are created only to assess a specific project (e.g. the construction of a stretch of motorway); they should also be used to assess various routing alternatives and the 'zero option', i.e. the variant in which the project is not implemented. For these models, the local collection of traffic data is typically required (e.g. local directional surveys). The outputs are traffic intensities on individual roads, taking into account the various alternatives, which can be used to calculate the socio-economic benefits.

Problems identified in transport modelling

Multiple types of high-quality and consistent input data need to be collected for transport models. To enhance the quality of models, national and local directional surveys, as well as local section-based surveys of traffic intensity, are required. Furthermore, the national model lacks detailed surveys of the population's mobility and statistical quantitative data drawing on a large enough sample, and the modal split calculation is imprecise.

National directional surveys should be carried out more frequently and regularly. A survey in towns with a population of more than 5 000, which would ensure that there was a consistent and comparable database of regional and local models, was last conducted in 2007. In reality, this survey should be carried out on a regular basis of at least once every five years. As things stand, the models often rely solely on section-based data from the national traffic census, when this data should actually be used only for comparative purposes. There are brighter spots wear local directional and section-based surveys have been carried out for certain projects. These local surveys have a value that extends even beyond the national directional survey because they provide more details about the local directional flow of traffic. At the moment though, they have no uniform methodology. Again, this makes it difficult to compare different models.

The toll system, which is currently only mined for intensity data, could partially replace directional traffic surveys. This is because the system also contains data about the directional flow of freight transport on toll sections, though this needs to be appropriately processed.

The calibration of models should be optimised for Slovakia. Many parameters of regional and local models are lifted from other countries. This calibration need not be appropriate for Slovakia. Surveys of the preferences of the transport system's various stakeholders – parameters for the delay function, demand elasticity, the modal split, the value of time, etc. – need to be carried out. The models also lack or inadequately define future developments in road lengths, the attractiveness of zones, and the analysis of the characteristics and regularity of long-distance routes.

Models can only be checked to a very limited extent because they are always procured from third parties and arrangements are not in place for adequate internal capacity to run checks on them. This is because conditions for checks are not defined in public procurement procedure. It is nearly always the contractor who retains a

model's copyright, even in cases where the entire model has been created solely for the requirements of the contracting authority. As a result, neither the Ministry of Transport nor NDS has the opportunity to carry out further work on the models, to check the model calibration, or to validate the model. Furthermore, neither the Ministry of Transport nor NDS has the internal capacity to verify the transport models used.

- **Measure: Define the scope of data collection, the frequency, format and sourcing of this data collection, the responsible organisation, and the initiation of adjustments to the Statistical Office's surveying methodology in response to current data requirements.** Data currently subject to legal restrictions on how it is to be shared among public-administration organisations, data that is owned by private companies despite being of a public nature, and data not processed in a form that is fit for purpose (i.e. suitably aggregated for transport modelling) has the potential to be used on a greater scale.
- **Measure: Make relevant transport data available to the public,** in particular for the production of transport-related policy materials and strategies.
- **Measure: Safeguard access to transport model input data, methodologies and outputs by establishing terms and conditions in contracts with suppliers of works.**
- **Measure: Create methodology and minimum standards for transport modelling that establish limits for the model creators depending on the type of transport model.**

Box 3: Specific solutions

1. Process data from the toll system

Data on the directional flow of freight vehicles already exists in the toll system and NDS has access to it. Since 2010, all freight vehicles have had to be fitted with an on-board unit, which tracks the vehicle's presence on toll roads. The toll system collects data separately for each on-board unit. The intensity of freight vehicles, their direction of travel and average speed can be ascertained for each section by aggregating that data. Virtual tollgates cover virtually the whole of the road network in Slovakia: 17 770 km of motorway, expressway and class I, II and III roads. This potentially very precise directional data, however, is not put to use in transport modelling. It is used only to determine intensity (the number of vehicles passing through a given virtual gate per day). This is because NDS does not have the staff to anonymise and then process this data into a usable form.

If this existing data were to be harnessed, it would significantly enhance the quality of transport model outputs and, by extension, the quality of the decision-making process involved in strategic planning, project prioritisation, and the selection of the best option offered by a project.

- **Measure:** As far as NDS finances and capacities allow, **arrange, on request, for toll data to be anonymised so that it can be used for transport modelling (not only intensities, but also directional data) and, on request, make data available, in a predefined scope, to the Ministry of Transport and producers of local and regional transport models.**

2. Collect data on mobility habits as part of the family-account statistics

A survey of the population's mobility was conducted on a sample of 10 000 households as part of the Transport Model of the Slovak Republic. However, this sample is not enough for more detailed modelling of mobility habits in smaller territorial units (e.g. districts). The Statistical Office regularly collects household data, 'family-account statistics', on a representative sample. It would be enough to add several questions on the mobility habits of individual household members (what sort of transport they use to get to work/school, where they travel, etc.) as part of the questionnaire. This output would significantly improve the quality of the Transport Model database and also allow for the population's mobility habits to be modelled in regional transport models.

- **Measure: Arrange for the preparation, collection and processing of data on the mobility habits of**

the population as part of the family-account statistics (coordinator: Statistical Office)

4.2. Cost-benefit analysis methodology

In the past three years, different CBA calculation methodologies have been used in various transport projects. It will be important to create uniform methodology so that it is able to compare and prioritise projects across Slovakia and all modes of transport. The following methodologies have been used in feasibility studies:

- Slovak methodology for the calculation of the socio-economic benefits: ***Technical conditions – methodology for the application of HDM-4 in Slovakia*** (effective from 1 December 2012)
- CBA methodology for the Operational Programme Transport: ***Slovak guide on the cost-benefit analysis of investment projects in the transport sector*** (valid from 1 February 2014)
- CBA methodology for the Operational Programme Integrated Infrastructure: ***Methodology guide for the creation of cost-benefit analyses (CBAs) in the submission of transport-related investment projects for the 2014-2020 programming period*** (valid from 1 September 2015)

In this respect, the Ministry of Finance and the Ministry of Transport will work together on the creation of uniform standardised CBA methodology that will be consistent with European methodology and can be applied to all transport investment projects (ideally it will draw on standardised CBA methodology for projects across public administration). In keeping with the latest trends, it should be able to quantify as many project costs and benefits as possible.

For projects financed with EU funds (the Operational Programme Transport and the Operational Programme Integrated Infrastructure), Slovakia is required to apply CBA methodologies that comply with European methodology. Slovak methodologies also borrow certain assumptions on transport impacts from European methodology, though these need not be relevant to the Slovak economy. With this in mind, on a national level it will be necessary to quantify individual socio-economic impacts in a way that better reflects local conditions (e.g. economic and financial discount rates are recommendatory, but countries are free to apply other rates if they can duly justify this) and is consistent with the Commission's manual. The manual places no restrictions on such modifications to methodologies.

Certain coefficients in the methodologies require further validation. These include the time value, the fatal accident value, and the average fuel consumption. In the CBAs, it will also be necessary to define a risk analysis, which should work with various discount rate scenarios and should include a robust analysis of sensitivity that encompasses as many parameters as possible. Compared to the current situation, another of the objectives pursued by the Ministry of Finance and the Ministry of the Transport will be to quantify, in the CBA, as many impacts as possible in order to increase its informative value. It is a global trend for CBAs to move beyond classic socio-economic benefits and to quantify broader economic benefits that take into account, for example, the impact on regional employment and productivity.

Uniform socio-economic impacts

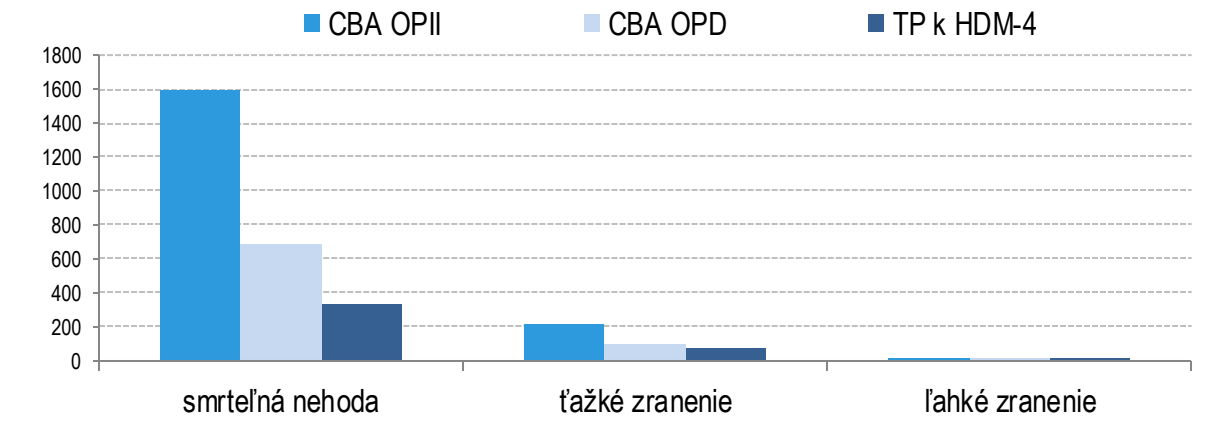
The methodologies for the calculation of socio-economic benefits in the three guides above are inconsistent with each other. This impairs the reliability of the various coefficients and inhibits mutual comparisons of the advantages offered by each project. The biggest socio-economic benefits tended to stem from the time savings made by travellers, reductions in vehicle operating costs, and the lower accident rate (in that order).

Table 9: Travel time value (EUR per hour) – selected coefficients

Journey type	Mode of transport	CBA under the Operational Programme Integrated Infrastructure (EUR, 2014)	CBA under the Operational Programme Transport (EUR, 2012)	Technical assistance for HDM-4 (EUR, 2012)
Work travel/working time	passenger car	EUR 10.52	EUR 24.43	EUR 8.52
	train	EUR 9.57	EUR 24.43	
	bus	EUR 9.57	EUR 19.61	EUR 6.60
Non-work travel short/long	passenger car	EUR 5.26	EUR 7.63/9.80	EUR 8.52
	train	EUR 4.78	EUR 7.63/9.80	
	bus	EUR 4.78	EUR 5.50/7.06	EUR 6.60
Methodology taken from		*calculated from the average wage in the economy*	*HEATCO studies*	*Methodology of the Ministry of Transport*

There are major differences in the way the different methodologies appraise time. Appraisals using the methodology for HDM-4 technical assistance, where working and non-working time are appraised in the same way, could also prove problematic. Similar differences can be found in the appraisal of the different types of accidents. Foreign standards and international literature can be a source of inspiration when setting appropriate values.

Graph 14: Unit value for an accident in various methodologies (EUR thousands)



Source: Ministry of Transport

Key: OPII CBA OPT CBA HDM-4 TA
fatal accident serious injury minor injury

The process giving rise to cost-benefit analyses for the individual corridors resulted in a situation where coefficients from different methodologies were applied in a single analysis. Most often, this was a combination of the value of travel time from the Operational Programme Transport methodology and the unit costs of an accident from the HDM-4 technical assistance methodology, which is used in two versions. Numerous project analyses fail to mention which coefficients were used. To objectify and confirm the data, following the next CBA methodology update it will therefore be necessary to revise each analysis using uniform coefficients.

Table 10: CBA methodology used in the calculation of individual socio-economic benefits in studies

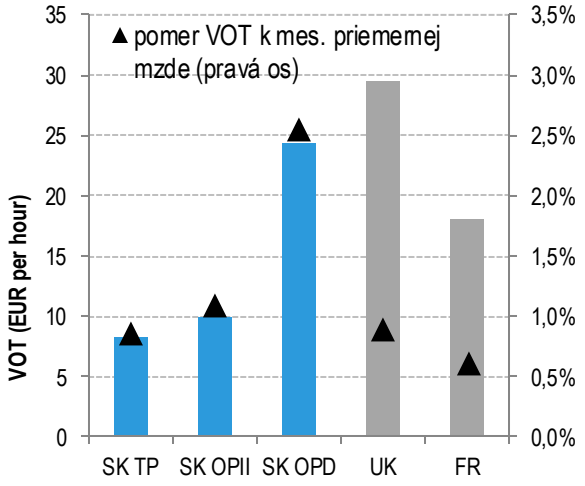
	value of travel time		accident rate			
	work travel	journey elsewhere for	fatal injury	serious injury	minor injury	material damage

			work purposes			
D3 Čadca, Bukov – Svrčinovec	24.43	8.9	691 671	94 543	6 737	
R2 Tornaľa – Včeláre	24.43	8.9	691 671	94 543	6 737	
R2 Kriváň – Tornaľa	n/a	n/a	639 000	27 000	27 000	1 090
R1 Banská Bystrica – Ružomberok	25.49	9.75	336 480	27 000	27 000	3 090
R2 D1 junction – Nováky	24.8	9.48	336 480	27 000	27 000	3 090
R2 Včeláre – Košické Olšany	24.8	9.48	336 480	27 000	27 000	3 090
D3 Žilina, Strážov – state border	10.42	10.42	336 482	78 892	8 919	

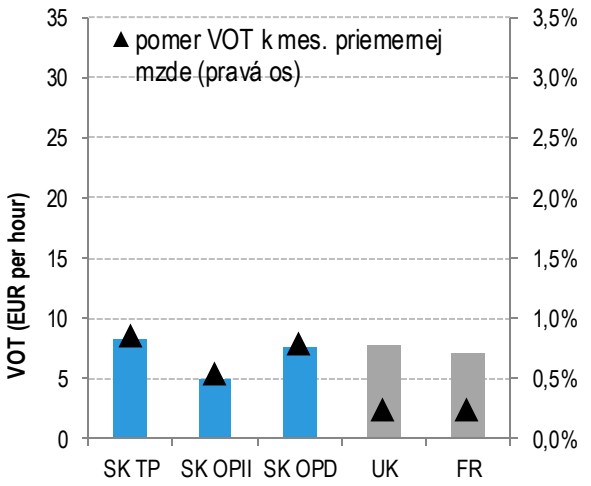
key:	CBA under the Operational Programme Transport	Technical assistance for HDM-4	Technical assistance for HDM-4, version 2

Certain inputs in the calculations of socio-economic benefits need to be examined in more detail and validated. This is illustrated by a comparison of the value of travel time in a passenger car with foreign values. This factor has the most significant impact in a socio-economic analysis.

Graph 15: Value of travel time (VOT) – work travel, passenger car



Graph 16: Value of travel time (VOT) – non-work travel, passenger car



Sources: OECD, UK VOT data book 2015, Valeur du temps 2013, Operational Programme Transport methodology, Operational Programme Integrated Infrastructure methodology, technical assistance for HDM-4

Key: VOT relative to monthly average wage (right axis) VOT relative to monthly average wage (right axis)

The value of time needs to be quantified by means of a multi-criteria approach that takes account of the average wage in the national economy and the potential production of goods by an employee per time unit, and financially quantifies the delay in products entering the production chain (the just-in-time transportation system, especially for the automotive sector).

A similar example of a value that needs to be analysed in more detail, this time in relation to vehicle operating costs, is the average amount of fuel consumed by a passenger car. For example, consumption on a class I road at a speed of 90 km/h is greater than on a motorway at a speed of 130 km/h.

Table 11: Average fuel consumption in litres per kilometre, passenger vehicles up to 3.5 t

Average speed (km/h)	<=30	<=40	<=50	<=60	<=70	<=80	<=90	<=100	<=110	110-130
Motorways and expressways	0.045	0.045	0.040	0.038	0.042	0.045	0.051	0.057	0.057	0.067
Class I and II roads	0.058	0.058	0.054	0.056	0.060	0.063	0.071	0.079	0.092	0.093

Source: Operational Programme Transport methodology, methodology taken from Valuch: Average fuel consumption, by type of road, vehicle and travel speed, in litres per kilometre, 2009

- **Measure: Create uniform standardised CBA methodology with consistent and validated assumptions. Harmonise the model for socio-economic benefits (HDM-4) and the CBA methodology. Periodically update the coefficients used in transport modelling and in the calculation of socio-economic benefits.**
- **Measure: Ensure that the CBA can be checked in NDS feasibility studies by the Ministry of Transport and the Ministry of Finance: ask the author to provide detailed documentation on the CBA, the actual transport model, and the project for the calculation of socio-economic benefits.**

5. Motorways, expressways and class I roads

Spending on motorways, expressways and class I roads averaged EUR 1.15 billion per year in 2014 and 2015. Spending in 2016 is expected to tally with this. The spending review, in keeping with the instructions, focuses on investments and the costs of repairing and maintaining motorways, expressways and class I roads. A high proportion of class I roads is in poor or unsatisfactory condition, largely because of the lack of funding for repairs and maintenance. Consequently, they are in need of costly reconstruction. Motorways and expressways, on the other hand, are in relatively good shape.

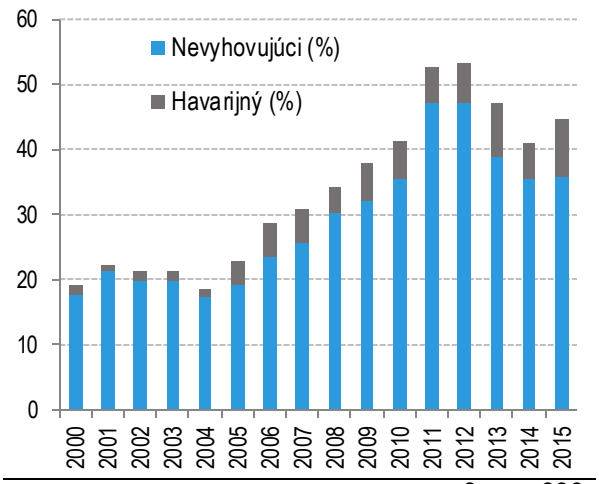
EUR 1.7 billion is planned for the construction of new sections of motorway and expressway in 2017-2019. This is the Ministry of Transport's biggest item of expenditure. A 2013 international comparison with EU-15 countries showed that, typically for a converging country, Slovakia had few motorways and expressways. Once the priority package of projects has been completed, Slovakia's motorways will run for a length that, relative to area, stands at roughly the EU-15 average. With investment projects, the issue is often whether they are to be implemented directly by the State, entirely by the private sector, or in the form of a public-private partnership (PPP). The main criterion when assessing whether to build via a PPP is a comparison of the value for money offered by the public and public-private alternatives. The Ministry of Finance will work with the Ministry of Transport to evaluate the efficiency of priority investment projects with a view to delivering the best possible value for money.

5.1. Maintenance and repairs, reconstruction and modernisation of class I roads

Slovenská správa ciest (SSC) manages 3 176 km of class I roads. Their condition has deteriorated considerably since 2005. In 2015, up to 9 % of these roads were in a state of serious disrepair. In the long run, it is cheaper to maintain the road network in good condition than to make subsequent investments in costly reconstruction. Spending on the reconstruction of roads that are in a state of serious disrepair or in an otherwise unsatisfactory condition costs more than maintaining and repairing the road network to keep it in good condition. In 2009-2015, SSC spent EUR 779 million on the construction, modernisation and reconstruction of 991 km[13] of class I roads. Investments started to reduce the proportion of roads in poor condition, though the share of such roads is still higher than it was prior to 2005. SSC's capital expenditure in 2016 is expected to come to EUR 132 million. SSC estimates that the necessary modernisation or reconstruction of a further 1 400 km of class I roads will come to EUR 2.1 billion.

[13] Not including the km of roads that were new, reconstructed and modernised in 2010.

Graph 17: Condition of class I roads



Source : SSC

Graph 18: SSC spending (EUR millions)

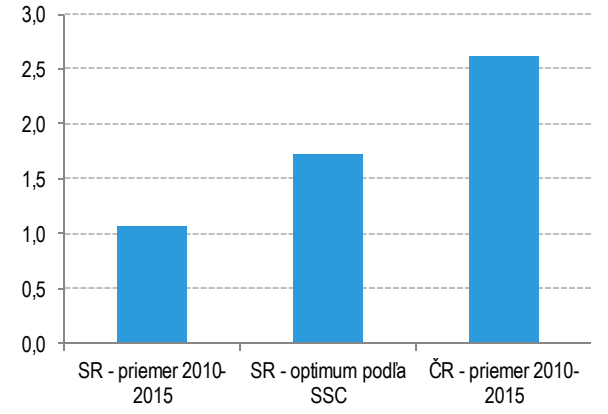
Source : Ministry of Transport, Construction and Regional Development, general government budget

Key: Unsatisfactory (%) — Capital expenditure
Serious disrepair (%) — Current expenditure (Repairs, maintenance, operation)

Efficiency of road maintenance and repair

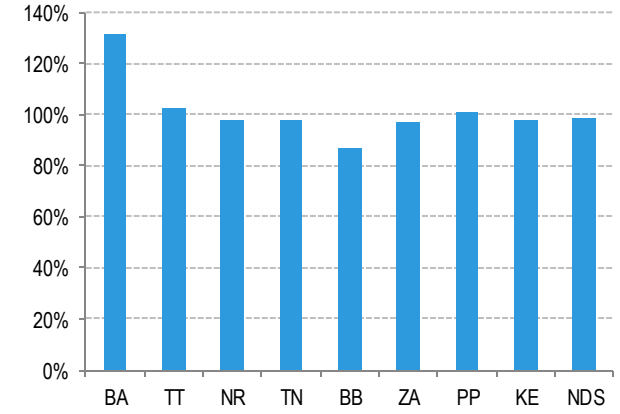
SSC spending on maintenance and repair remains insufficient. Average annual spending in 2009-2015 was EUR 46 million. This means that even those roads that are currently in a good condition are becoming unsatisfactory and will eventually require expensive reconstruction on account of the lack of maintenance and repair funding. SSC has estimated the optimal number of maintenance and repair jobs that need to be carried out so that class I roads are not in a state of permanent degradation. At current average unit prices, the costs of such maintenance and repairs would amount to EUR 64 million per year.

Graph 19: Cost of class I road repair and maintenance (excluding winter maintenance) per km² (EUR millions)



Source : SSC, Slovak Ministry of Transport, Construction and Regional Development, Czech State Fund for Transport Infrastructure, Czech Ministry of Finance, Czech Road and Motorway Directorate, Eurostat, internal calculations

Graph 20: Average unit prices of repair and maintenance activity of SSC (in each higher territorial unit) and NDS (%)



Note: The average of all regions is taken as the benchmark (100 %)

Source : SSC, internal calculations

Key: Slovakia – average 2010-2015 — Slovakia – optimum according to SSC — Czech Republic – average 2010-2015

A comparison with the Czech Republic also illustrates the need to increase spending on repairs and maintenance. The costs of class I road repair and maintenance per km^2 are much lower in Slovakia than in the Czech Republic. Despite this, we need to seek ways of reducing the unit prices of repairs and maintenance, i.e. the prices of specific activities per unit of measure (tonnes, m^2, m, km, pieces, hours). A comparison of the purchase prices of individual units in Slovakia's self-governing regions (the prices in the Bratislava Self-governing Region are by far the highest) shows that leeway exists for this.

If the prices in all regions were to be reduced to the level of the second lowest price in the current price list,[14] costs would go down from EUR 64 million to EUR 63 million.

Table 12: Optimal spending on repairs and maintenance at current unit prices

Category of repairs and maintenance	Level of the second lowest price*	Average of current prices*
Winter maintenance	13.5	13.5
Road repair and maintenance	13.4	13.4
Road signage	7.5	7.5
Safety installations	10.7	10.7
Road works prior to paving, drainage	4.8	4.7
Bridge repair and maintenance	7.4	7.4
Other structures	1.1	1.1
Planting and landscaping	2.8	3.5
Other activities	2.2	1.9
TOTAL	**63.3**	**63.8**

Note: * Based on contract prices between SSC and the road administration authorities of the self-governing regions and NDS

Procurement of repairs and maintenance

SSC currently orders repairs and maintenance for class I roads mainly from regional road administration authorities, which are owned by the self-governing regions, or from NDS (which may provide maintenance only in those areas that it is able to cover with its maintenance centres). Public procurement procedure is not required when placing orders with higher territorial units or NDS. SSC has little room to manoeuvre in price negotiations with these entities. In a system without public procurement, the regional road administration authorities are the only possible suppliers for the area they cover and hence they enjoy a decisive role in the provision of repairs and maintenance in the absence of an alternative. This is not conducive to the formation of an environment in which unit prices could be brought down.

Unit prices in the Bratislava Self-governing Region are much higher than in other self-governing regions. SSC arranges for the maintenance of class I roads via the Trnava Region Road Administration and Maintenance, which increases the price considerably (because of the longer distance required to move machinery from the Trnava Region's maintenance centres). In this light, the optimal solution for the Bratislava Region in the future appears to be the organisation of public procurement for repairs and maintenance. Experience of public procurement in the Bratislava Region will then be used to organise repairs and maintenance in other self-governing regions.

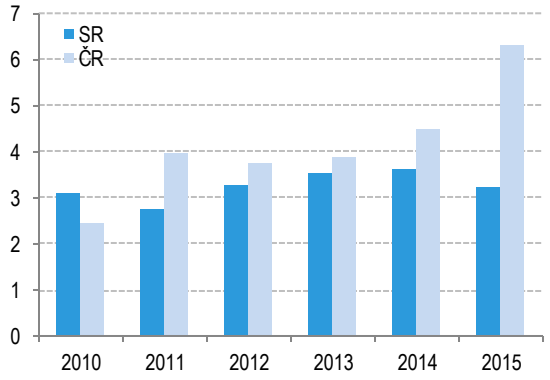
- **Measure: Look at ways of increasing spending on the repair and maintenance of class I roads in order to avoid an increase in the proportion of such roads that are in an unsatisfactory condition or in a state of serious disrepair.**
- **Measure: Every year, publish the quantity of selected key individual repair activities and selected key maintenance activities for class I roads and the costs thereof, broken down by self-governing region.**

[14] Not including the prices for the Banská Bystrica Self-governing Region, which have remained unchanged since 2010.

5.2. Repairs and maintenance of motorways and expressways

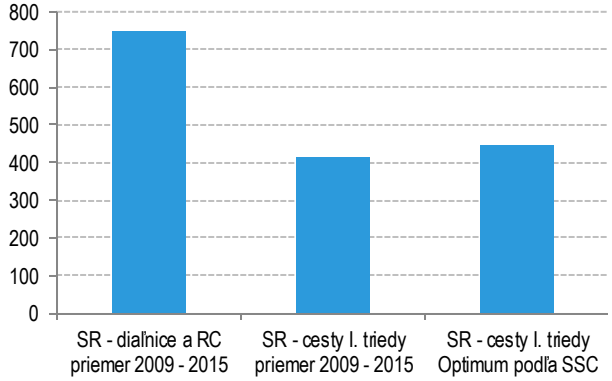
At the end of 2015, the national motorway company Národná diaľničná spoločnosť (NDS) was managing 675 km of motorways and expressways and 83 km of class I roads. In its spending review, the Ministry of Finance compared the costs of preparing and maintaining motorways and expressways per square kilometre in Slovakia and the Czech Republic. In 2010-2015, the costs of repairing and maintaining 1 km of motorway and expressway were 22 % lower on average in Slovakia than in the Czech Republic.

Graph 21: Cost of motorway and expressway repair and maintenance (excluding winter maintenance) per km² (EUR millions)



Source : Annual reports of NDS, Czech State Fund for Transport Infrastructure, Czech Ministry of Finance, Czech Road and Motorway Directorate, Eurostat, Slovak Ministry of Finance's internal calculations

Graph 22: Cost of motorway, expressway and class I road winter maintenance per km² (EUR thousands)



Source : Annual reports of NDS, SSC, Ministry of Transport, Construction and Regional Development, Ministry of Finance's internal calculations

Key: Slovakia – M&EWs average 2009-2015; Slovakia – class I roads average 2009-2015; Slovakia – class I roads Optimum according to SSC

The winter maintenance of motorways and expressways is more costly than that of class I roads. NDS's costs per square kilometre are almost twice as much as those of SSC, mainly because of the higher standard of maintenance and, partially, because of the technology used. Nevertheless, this should not be a stumbling block in the search for internal savings.

- **Measure: Look for ways of reducing the unit costs of individual activities relating to motorway and expressway repair and maintenance carried out by NDS using its own internal capacities. Periodically (at least once a year) publish the quantity of selected key individual repair activities and selected key maintenance activities for motorways and expressways and the costs thereof, broken down by maintenance centre.**

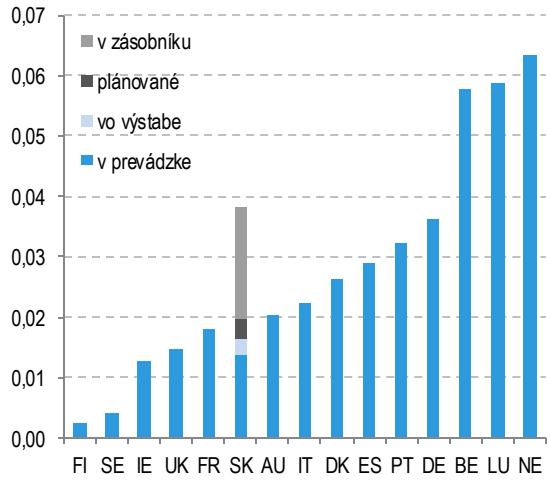
5.3. Investments in the construction of motorways and expressways

In the past three years (2013-2015), investments in motorways and expressways have come to more than EUR 2.1 billion.[15] This high momentum will also continue in 2017-2019, with EUR 1.7 billion allocated for the construction of new sections. This makes motorways and expressways a major item of public funding. They are easily the biggest expenditure item reported by the Ministry of Transport. The spending review assignment, adopted by the Government under the Stability Programme, requires the Ministry of Finance and the Ministry of Transport to streamline the current investment package for priority transport projects.

A 2013 international comparison with EU-15 countries showed that, typically for a converging country, Slovakia had few motorways and expressways. Assuming that the reference countries do not build new motorways, the situation in Slovakia will not change that much even after the sections currently being constructed have been finished. Once the priority package of projects has been completed, there will be a more of a sea change because Slovakia's motorways will run for a length that, relative to the area, stands at roughly the EU-15 average. However, this would necessitate investment running into several billion euro.

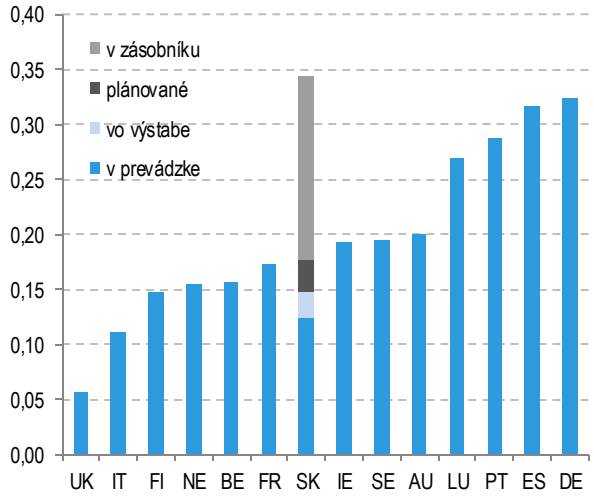
The Ministry of Transport's investment priorities are geared, first and foremost, towards the completion of the basic transport infrastructure and the associated quality and accessibility of transport services. It will become all the more important to set priorities correctly and ensure that they are covered financially after 2020, or 2023, when the EU funds' current programming period comes to an end.

Graph 23: Length of motorways relative to area* (km/km²)



Source : Eurostat 2013, NDS, Ministry of Transport, Construction and Regional Development

Graph 24: Length of motorways relative to the population* (km / 1 000 inhabitants)



Source : Eurostat 2013, NDS, Ministry of Transport, Construction and Regional Development

*Note: * The figure for Slovakia comprises both motorways and expressways.*

Key: - listed
- planned
- under construction
- in operation

[15] This figure is partly influenced by lower investments in the past and by the exhaustion of resources from EU funds as the last programming period came to an end.

Unit investment costs

Because the construction of motorways and expressways is so complex, there are no simple benchmarks for prices per kilometre of motorway. The costs of the individual areas of construction works (e.g. excavations, the building of embankments, the installation of noise barriers) need to be compared. However, data for an international comparison is almost non-existent.

An evaluation of planned investment projects in accordance with value-for-money principles will help to increase the benefits of the existing investment package. The Ministry of Finance and the Ministry of Transport will work together in this way to evaluate priority projects (Table 14). The settlement of property rights for projects subject to comprehensive evaluation will typically be commenced after a decision has been taken on the best alternative. All projects will undergo comprehensive evaluation unless they are in an advanced stage of preparation, public procurement has already commenced and the settlement of property rights is at an advanced stage (Table 13).

Table 13: Projects at an advanced stage of preparation (EUR millions)

Name of section	Total costs (millions)	Length (km)	Cost per km (millions)	Intensity in 2020 (vehicles/24 hours)*	Level of preparation
D1 Prešov West – Prešov South	370	8	47	10 135	Competition for building contractor
D1 Budimír – Bidovce	209	13	16	14 791	Construction contract
D3 Čadca Bukov – Svrčinovec	199	6	35	17 970	Competition for building contractor
R2 Košice, Šaca – Košické Oľšany (Stage I and II)	400	21	19	14 186	Building permit proceedings
R2 Kriváň – Lovinobaňa, Tomášovce	355	23	16	7 627	Building permit proceedings
R4 Prešov North Bypass (Stage I and II)	535	15	37	12 348	Building permit proceedings
Reconstruction of I/65 Turčianske Teplice – Príbovce	35				Competition for building contractor
Modernisation of selected sections of class I roads in the PO and KE regions	35				Finalisation of tender dossier
Modernisation of selected sections of class I roads in the BB region	33				Finalisation of tender dossier
Modernisation of selected sections of class I roads in the ZA and TN regions	27				Finalisation of tender dossier
Modernisation of selected sections of class I roads in the TT and NR regions	29				Finalisation of tender dossier
Reconstruction of class I road junctions	27				Finalisation of tender dossier
Construction and improvement of the safety specifications of bridges on class I roads (Stage 1)	22				Finalisation of tender dossier
Total	2,276	85			

Note: * On the basis of feasibility study projections

Source : Ministry of Transport

Table 14: Priority investment projects of the Ministry of Transport (EUR millions)

Name of section		Total costs	Length (km)	Cost per km	Intensity in 2020 (vehicles/24 hours)	Level of preparation
D1	Turany – Hubová	738	14	55		EIA process
D1	Bratislava – Senec – Stage I, increase in capacity (Bratislava – Triblavina)	109	4	31		Preparation of underlying documentation for building permit proceedings

D3	Žilina Brodno – Kysucké Nové Mesto	386	11	34	21608	Scope of evaluation issued for a change of route
D3	Kysucké Nové Mesto – Oščadnica	244	11	23	18566	Arrangements for the settlement of property rights
R1	Banská Bystrica – Slovenská Ľupča	156	8	19	12520	Preparation of public procurement for building permit documentation, bid documentation, an adequate assessment of the impacts on Natura 2000 areas is being drawn up
R2	Rožňava – Jablonov nad Turňou (Soroška)	413	14	29	1040	Building permit documentation is being drawn up
R3	Nižná – Dlhá nad Oravou	235	8	31	6666	Preparation of public procurement for building permit documentation, bid documentation
R4	Ladomírová – Hunkovce	40	8	5	5963	Building permit documentation is being drawn up
R1	Slovenská Ľupča – Korytnica	765	15	51		Preparation of underlying EIA documentation
R1	Korytnica – Ružomberok	725	27	27	10189	Preparation of underlying EIA documentation
R1	Ružomberok South – D1 Junction	157	7	21	21774	The EIA plan is being drawn up
R2	Lovinobaňa – Ožďany	208	21	10	2709	Final zoning decision
R2	Ožďany – Zacharovce	121	11	11	6931	Final zoning decision
R2	Zacharovce – Bátka	89	8	11	5871	Final zoning decision
R2	Bátka – Figa	72	6	12	5888	Final zoning decision
R2	Trenčianska Turná – Mníchová Lehota	60	3	22	12634	Preparation of public procurement for building permit documentation
R2	Mníchová Lehota – Ruskovce	251	16	16	9632	Building permit documentation is being drawn up
R2	D1 Junction – Trenčianská Turná	113	6	19	16,778	Public procurement for building permit documentation is in progress
R3	Tvrdošín – Nižná	83	4	19	6768	Final building permit
R3	Dlhá nad Oravou – Sedliacka Dubová	104	5	21	7778	Preparation of public procurement for building permit documentation, bid documentation
R4	Lipníky – Kapušany	100	4	25	10726	EIA is being processed
R4	Giraltovce – Kuková	105	7	16	5691	EIA is being processed
R4	Svidník – Rakovčík	98	6	16	7195	EIA is being processed
Total		**5,372**	**243**			
SSC* – investment projects on class I roads (more than EUR 50 million)		1,110				
TOTAL for all projects		**6,483**				

* Most recent figure **SSC inclusive of VAT

Source: Ministry of Transport, Construction and Regional Development

Assessment of public-private partnership alternatives

With investment projects, the issue is often whether they are to be implemented directly by the State, entirely by the private sector, or in the form of a public-private partnership (PPP). The main criterion when assessing whether to build via a PPP should be a comparison of the value for money offered by the public and public-private alternatives. The Ministry of Finance has binding methodology for comparisons of these alternatives. In both cases, it should be assumed that both the State and the private partner can start the project at the same time, and other realistic alternatives need to be taken into account. Even if, according to the methodology, a PPP project is not included in general government spending, it creates a conditional commitment and, from an economic perspective, should be approached in the same way as any other increase in State debt. For this reason, the systemic measure covering future public financing commitments should be at a sustainable level.

The State's most important advantage is its cheaper financing. In contrast, the main advantage of PPP projects is that the private partner is expected to be more efficient. Another advantage that is often cited is that some risks are passed to the private partner, and in this respect it is assumed that the private partner will reduce the likelihood of risks by engaging in better management.

- **Measure: All future investment projects with an estimated investment cost of more than EUR 40 million will also be subject to a cost-benefit analysis by the Ministry of Finance at the stage when the feasibility study is being prepared (if applicable). The Ministry of Finance's opinion will ordinarily be updated before work starts on settling property rights relating to the land covered by the project.**
- **Measure: Priority motorway and expressway projects, prior to the award of a public contract to the works contractor (Table 14), will also be evaluated by the Ministry of Finance.**
- **Measure: Prepare rules for the approval of PPP projects and concessions to safeguard the sustainability of public funds and define the scope for the implementation of PPP projects and concessions generating value for money. (coordinator: Ministry of Finance)**

6. Railway infrastructure

Železnice Slovenskej republiky (ŽSR) operates a dense rail network in which little use is made of available capacity.[16] According to the general government budget, ŽSR's spending on railway infrastructure will come to EUR 716 million in 2017. Besides its own income, ŽSR will receive EUR 273 million from the central government budget in the form of a subsidy for infrastructure operation and further resources to finance its investments.

Spending could be further optimised if the cost structure were changed, which can be achieved by introducing rationalisation measures (more automation and technology, which will reduce staffing capacity and centralise train transport control), by scaling down components and structures in the railway infrastructure (including integrated sections of track), and by optimising processes.

Compared to the Czech Republic, Slovakia spends much more on transport control, but less on maintenance. This may be due to the fact that Slovak railway infrastructure has not been modernised to the same extent as its Czech counterpart. If control costs per train-kilometre were on a par with those in the Czech Republic, ŽSR's expenditure could potentially contract by EUR 33 million. However, one-off investments are required before control costs can be cut.

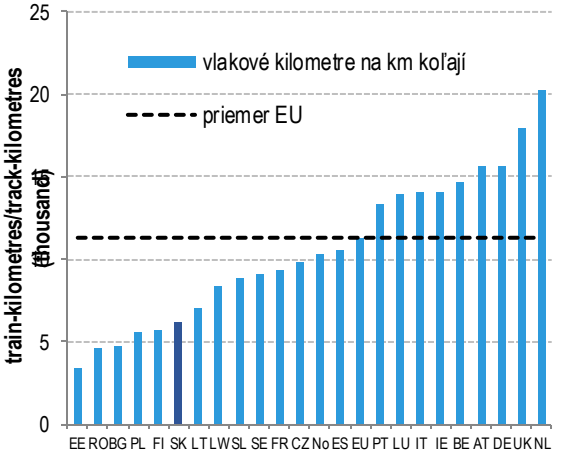
The operating costs of poorly frequented tracks with no passenger transport outweigh the benefits several times over. The strategic significance of these tracks in the future needs to be analysed in detail. The benefits of several tracks where passenger transport is low also need to be reassessed. While 19 % of category-one railway lines have been modernised to cope with speeds of 160 km/h, they too are not used to maximum capacity. The Ministry of Finance will work with the Ministry of Transport to evaluate the efficiency of railway investment projects with a view to delivering the best possible value for money.

[16] According to an international comparison.

6.1. Scope of railway infrastructure

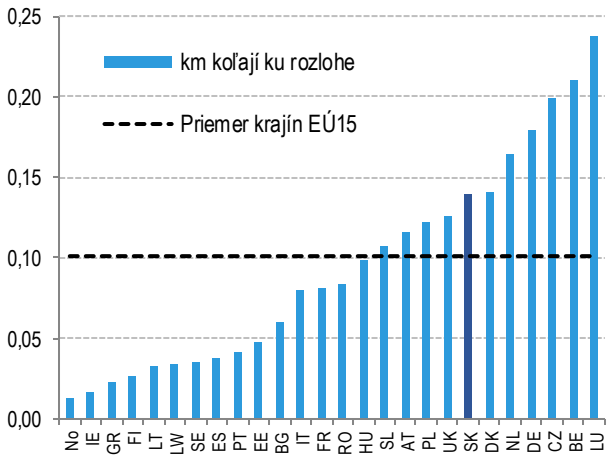
Slovakia has a dense rail network, but makes relatively little use of it.[17] The total length of all tracks per capita in Slovakia is the fifth highest of all EU countries. Relative to its area, Slovakia operates 40 % more tracks than the average EU-15 country. Approximately 6 000 trains pass through each kilometre of track every year, which is well below the EU average. In total, 3 600 km of railway lines are in operation.[18] As line operation has high fixed costs,[19] it is efficient to increase the volume of passengers and freight carried on the railways. ŽSR can help to increase the use of capacity by efficiently prioritising investments and maintenance.

Graph 25: Annual intensity of rail network use, 2011



Source : EC monitoring of rail markets

Graph 26: Share of track-kilometres relative to area, 2011



Source : Eurostat

Key: train-kilometres per km of track — EU average

km of track relative to area — EU-15 average

The scope of railway tracks operated in Slovakia has not change that much in the last 10 years. The share of rail transport in the overall modal split in passenger transport has been stable in the past decade. However, the share of freight rail transport has dipped by 10 percentage points, while the volume of goods transported by rail has remained more or less the same.[20]

From both the financial and economic perspective, operating lines that are not used much is inefficient[21] because the costs of certain lines that are not used to capacity are similar to the costs of more heavily used lines. This is because of the share of fixed costs. ŽSR operates more than 400 km of lines over which no more than five trains pass every day. In addition, ŽSR maintains lines on which services have long been discontinued or are only occasional. The direct cost (the subsidy less depreciation and overheads) per train-kilometre therefore ranges, on the various lines, from less than EUR 1 to more than EUR 40 000 on those lines where services are occasional.

[17] The intensity of railway network use (train-kilometres per kilometre of track) is lower than in most EU countries.

[18] Of this, there are 2 600 km of single-track lines and 1 000 km of double-track lines. The total developed structural length of the tracks is almost 6 900 km. Of this, 2 200 km are station tracks on branch lines.

[19] This is a universal truth and is not a Slovak shortcoming.

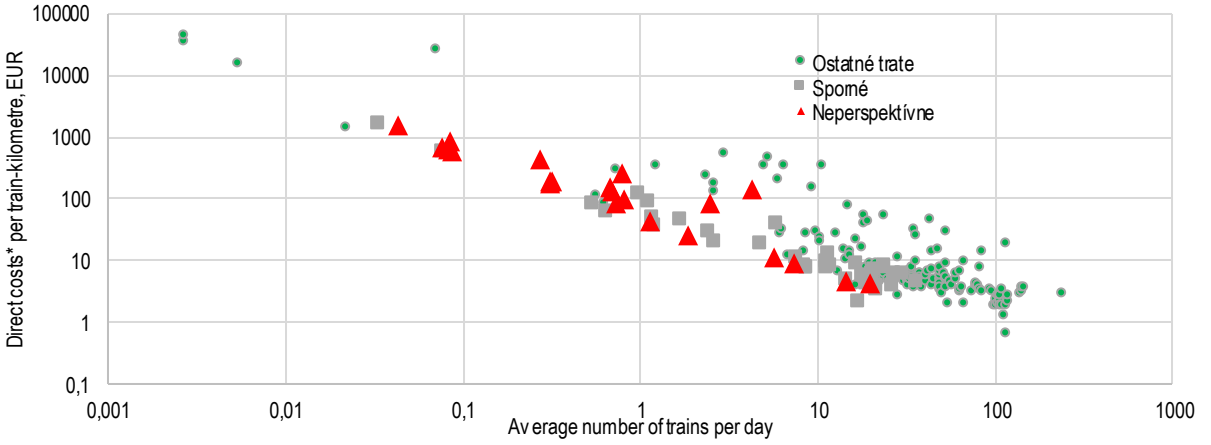
[20] The goods transported by the State carrier ZSSK Cargo have fallen, mainly on account of the economic crisis in 2008 and 2009. The volume of goods transported is rising slowly but surely, but is still short of the volumes reported prior to the crisis years.

[21] Indirect line costs were allocated according to ŽSR methodology.

Nevertheless, even a line that is not used can, in certain circumstances, be transformed into viable infrastructure. For example, the Lysá nad Labem – Milovice line in the Czech Republic, which also lacked prospects going forward, has become extremely busy following its electrification (measured by hourly frequency).

Lines where the current and future economic benefits fall short of the costs need to be phased out, according to a study by the Transport Research Institute (2015)[22] assessing the viability and economic benefits of individual lines according to a multi-criteria analysis. The study took into account financial and non-financial aspects and any potential they might have to change in the future. Although some of the assumptions were arbitrary (the weightings, the thresholds set to determine whether aspects were viable), this is still the most competitive evaluation of the ŽSR network.

Graph 27: Average daily number of trains on the line and direct costs[23] less revenues per train-kilometre in EUR, 2015, logarithmic scale



Source : ŽSR

Key: - Other lines
- Contentious
- Inviable

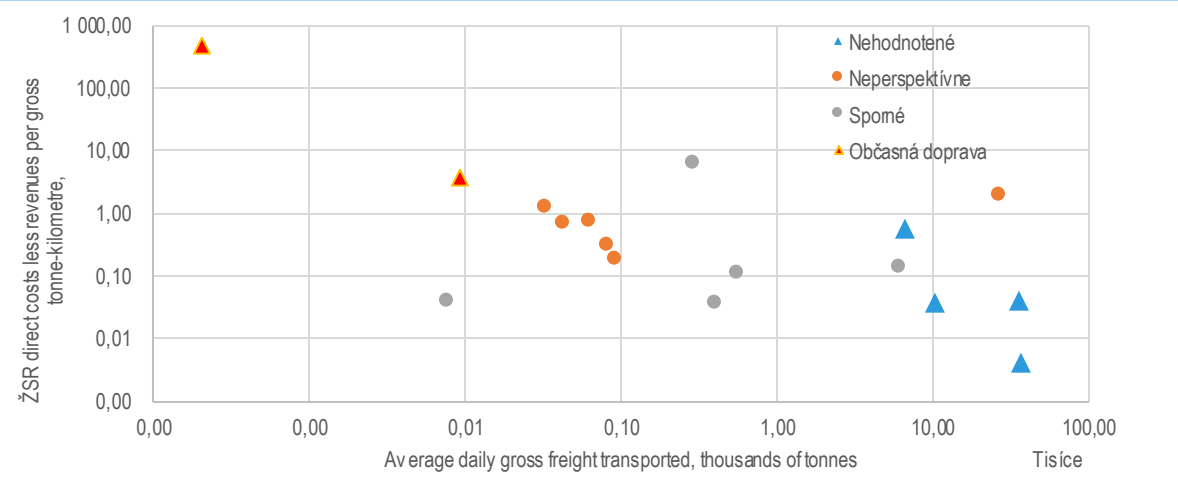
[22] Identifikácia perspektívnych traťových úsekov a relácií [Identification of Viable Sections and Relations], Transport Research Institute, 2015

[23] We calculated direct costs as the overall line costs less the cost of depreciation, administrative overheads and company-wide costs, and less income from line charging.

Box 4: Lines operated without passenger transportation

Payments made by the State for the operation of certain lines with freight services are several times higher than the benefits (a lower accident rate, emissions, noise, congestion and road wear). The direct costs of operating little-used lines per unit of performance (gross tonne-kilometres) range from EUR 0.20 to EUR 460. The need to maintain a service on lines where the costs outweigh the benefits of freight rail transport compared to road transport should be reviewed on a case-by-case basis. These reviews should also take account of the impacts on efficiency from the point of view of transport serviceability, regional development, defence, and the costs and revenues of the measure that is implemented.

Graph 28: Average daily number of gross tonnes transported on lines used solely for freight services, and direct costs less revenues per gross tonne-kilometre, EUR, average for 2013-2015, logarithmic scale



Source : ŽSR

Key:
- Not evaluated
- Inviable
- Contentious
- Occasional service

Academic literature and government institutions have estimated the social costs of transporting freight by rail and by road. By comparing them and adjusting them to current prices, we can estimate the benefit of transporting freight by rail instead of by road, per tonne-kilometre, to be an average of **1.08 euro cent**. This is a volatile estimate that could change dramatically in the future and may vary from line to line and country to country. Lines where we pay more than 10 times the difference in external costs per tonne-kilometre for operating a transport route on which there is little potential to increase transport volumes in the future should therefore be classified as inviable with relatively high certainty. These are all lines without passenger services that have been identified by the Transport Research Institute's report, along with most lines classified as borderline.

Table 15: Overview of literature on the external costs of rail and road transport, translated into 2015 euro cent per tonne-kilometre.

Study	*External rail costs*	*External road costs*	*Difference*	*Costs considered*
Transport Concepts (1994), External Costs of Truck and Train, Brotherhood of Maintenance of Way Employees (Ottawa).	**0.27**	**2.06**	**1.79**	Accident rate, congestion, emissions, underfinanced maintenance
David Gargett, David Mitchell and Lyn Martin (1999), Competitive Neutrality Between Road and Rail, Bureau of Transport Economics, Australia	**0.98**	**1.54**	**0.56**	Accident rate, congestion, noise, emissions

Estimates of the Full Cost of Transportation in Canada, Economic Analysis Directorate of Transport Canada	**0.26**	**1.41**	**1.14**	Congestion, emissions, accident rate
David Forkenbrock (1999 & 2001), 'External Costs of Intercity Truck Freight Transportation'	**0.22**	**1.04**	**0.81**	Accident rate, noise, emissions, underfinanced maintenance
Average	**0.43**	**1.51**	**1.08**	**-**

Source : Ministry of Finance's internal calculations by reference to the above literature and to NBS and FRED figures

Potential savings in ZSR operating costs were identified, entailing the elimination of 234 km of inviable lines without passenger services, amounting to EUR 6 million per year, with the one-off costs of closing these lines estimated by ŽSR to be a maximum of EUR 70 million. Other costs and potential benefits of the measure (e.g. proceeds from the sale of inviable line assets) have yet to be quantified and will be analysed further. These are lines where the benefits of freight rail transport are at least 10 times lower than the cost of financing them. Furthermore, the Transport Research Institute's report found these lines to be strategically entirely inviable. In 2015, use of these lines averaged one train every two days. The Transport Research Institute's report proposes selling these lines, preferably to higher territorial units and, if these units are not interested, on the open market. If no buyers are found, the lines will have to be closed (dismantled), and the resources will have to be found for this.

- **Measure: Analyse in detail the overall effects of removing 234 km of track where passenger transport is low and, drawing on the results, refine the estimated savings of EUR 6 million per year with potential one-off costs of up to EUR 70 million.**

Table 16: Inviable lines with no passenger services (according to the Transport Research Institute's report)

Route book line	*Line name*	*Transport Research Institute's assessment*[24]	*Total costs*, EUR thousands*	*Line length*	*Average daily number of trains in 2015*	*Direct costs per train-kilometre* (EUR)*	*Direct costs per gross tonne-kilometre* (EUR)*
104 E	Bánovce nad Ond. odb – Hatalov odb	0.24	45	0.9	0.7	155	0.20
101 E	Barca St. 1 – Košice (along track 102)	-	251	0.4	0.0	N/A	N/A
117 B	Breznička – Katarínska Huta nz.	-	127	9.8	0.0	N/A	N/A
115 D	Fiľakovo – Fiľakovo state border	0.23	451	11.8	0.1	892	1.01
129 C	Holíč nad Moravou – Holíč nad Moravou state border	-	228	3.0	0.0	44,564	909.48
116 C	Hronec – Chvatimech	0.15	117	1.4	0.8	265	1.06
128 D	Jablonica – Brezová pod Bradlom	0.25	311	11.7	0.1	605	4.19
124 B	Komárno – Kolárovo	0.26	114	26.0	0.0	N/A	N/A
123 A	Kozárovce – Zlaté Moravce	0.26	631	21.5	0.3	193	0.70
103 C	Lastovce odb. - Michaľany odb.	-	78	0.7	0.0	N/A	N/A
115 C	Lenartovce – Lenartovce state border	0.18	166	1.9	2.5	87	0.09
117 C	Lučenec – Lučenec state border	0.29	412	11.6	0.8	98	0.16
117 C	Lučenec state border - Malé Straciny state border	0.29	0	2.4	0.0	N/A	N/A
130 C	Nemšová – Lednické Rovne	0.27	546	17.3	0.3	202	0.79
129 E	Piešťany – Vrbové	0.22	516	7.8	0.1	718	1.32
126 C	Plavecký Mikuláš – Rohožník	-	280	12.2	0.0	N/A	N/A
107 B	Plaveč výh č.1/3 – Plaveč výh č. 5/6	-	161	0.9	0.0	N/A	N/A
122 C	Prievidza – Nitrianske Pravno	0.30	570	10.9	0.3	437	1.96
122 B	Prievidza nákladná stanica – Prievidza St. 3	0.21	183	0.7	4.3	141	0.17
111 C	Revúca – Muráň	0.23	201	8.8	0.3	183	0.65
111 A	Rožňava – Dobšiná	0.30	566	26.1	1.2	44	0.12

[24] The Transport Research Institute's assessment is a coefficient from the multi-criteria analysis; the higher the value, the greater the viability. According to the Transport Research Institute, lines with a coefficient of up to 0.3 are inviable, while those between 0.3 and 0.4 are borderline.

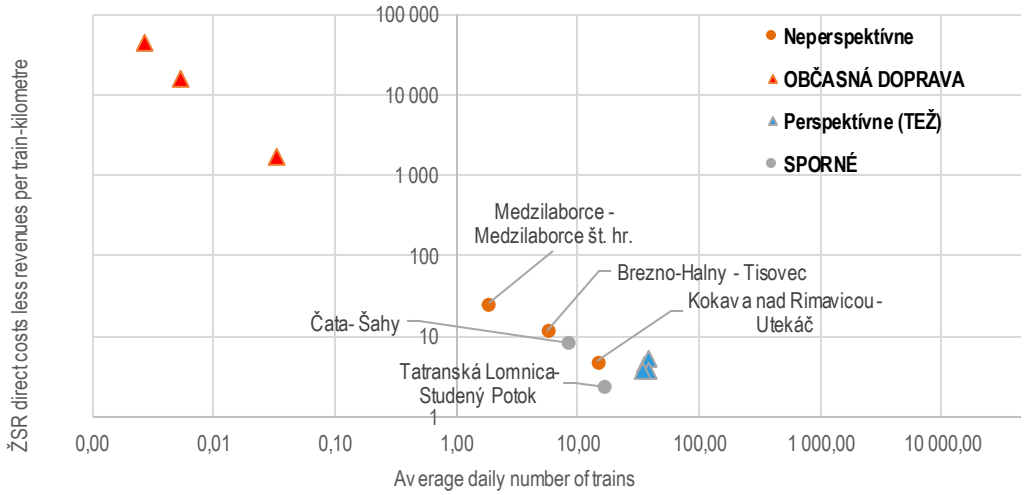
112 B	Spišská Belá – Spišská Belá odb.	0.17	102	2.6	0.0	1,629	9.35
110 B	Spišské Vlachy – Spišské Podhradie	-	410	9.2	0.0	15,358	40.63
124 C	Šaľa – Neded	0.24	610	19.0	0.1	642	1.54
123 B	Topoľčianky – Odb.Topoľčianky	0.27	74	1.8	0.7	136	0.33
117 C	Veľký Krtíš – Malé Stračiny state border	0.29	459	13.8	0.7	89	0.16
	TOTAL	**0.25**	**7,608**	**234.2**	**234.2**	**0.5**	**0.55**

Note: N/A – No service
* 2013-2015 average

Source : ZSR

Low-use lines also include 91 km of lines on which passenger services are operated. In order to assess viability, a transport serviceability analysis has to be conducted and the client and the provider of public passenger transport need to work together on a comprehensive plan of public passenger transport services. However, by the date of the spending review Železničná spoločnosť Slovensko (ZSSK) had not disclosed the cost structure for these lines, so the overall savings (including ZSSK) will not be worked out until a later date.

Graph 29: Average daily number of trains on lines used solely for passenger services, and direct costs less revenues per train-kilometre, EUR, average for 2013-2015, logarithmic scale



Source : ŽSR

Key:
- **Inviable**
- **OCCASIONAL SERVICE**
- **Viable**
- **CONTENTIOUS**

ŽSR costs per ZSSK passenger-kilometre on these lines are close to EUR 1. For the sake of comparison, on the Bratislava – Púchov main line, the cost of operation is less than EUR 0.09 per passenger-kilometre. The ideal is to secure higher numbers of passengers on trains to the detriment of road transport, as this will also reduce unit costs and slacken the pressure to increase the capacity of road transport. The alternative, i.e. line closure and the provision of bus services, could be much cheaper, more environmentally friendly when measured per person, and equally fast, if not faster, if the number of stops and preferences are optimised.

Table 17: Lines making little use of passenger services (according to the Transport Research Institute's report)

Route book line	*Line name*	*Transport Research Institute's assessment*	*Total average costs* (EUR thousands)*	*Line length (km)*	*Average daily number of trains in 2015*	*Direct costs per train-kilometre* (EUR)*	*Direct costs per passenger-kilometre** (EUR)*

121 B	Banská Štiavnica – Hronská Dúbrava	0.30	796	19.7	7.4	9	**1.44**
117 A	Breznička – Kokava nad Rimavicou	0.22	953	22.7	19.9	4	**0.37*** **
116 B	Brezno-Halny – Tisovec	0.27	859	28.2	5.7	12	**1.04**
103 A	Medzilaborce – Medzilaborce state border[25]	0.14	561	14.5	1.9	26	**N/A**
117 A	Kokava nad Rimavicou – Utekáč	0.22	155	5.5	14.7	5	**0.37*** **
	TOTAL	**0.23**	**3,325**	**90.63**	**90.6**	**9.9**	**0.69**

Note: * 2013-2015 average *Source : ZSR, ZSSK, Transport Research Institute*

** Passenger-kilometres from 2013, before free trains were introduced – this measure had a dramatic effect on the passenger service market

*** This figure for the Breznička – Utekáč section

- **Measure: Analyse in detail of the overall effects of discontinuing transportation and the decision to scrap 91 km of track where passenger transport is minimal. On the basis of the results, weigh up the impacts and the feasibility of savings, and then rationalise the passenger transport network that is to be operated. The potential savings if tracks were to be closed would amount to EUR 2.6 million, measured as a direct reduction in ŽSR's costs, while the one-off costs of decommissioning have been estimated by ŽSR to be a maximum of EUR 27.2 million.[26]**

6.2. Investments in railway infrastructure

Underfinancing has made much of the railways the worse for wear. The quality of the railway infrastructure on offer can roughly be measured, from the perspective of passenger services, by the average line speed and the density of speed restrictions. These are permanent design restrictions reducing train speeds due to geography or ageing infrastructure. Some of the more important lines are also plagued by such restrictions (e.g. the whole of the Nitra area)[27]. The postponement of maintenance can result in temporary speed restrictions; the long-term postponement of investments and reconstruction can result in permanent speed restrictions.

Only the Bratislava – Púchov line has been modernised to cope with speeds of up to 160 km/h. The Žilina – Kysucké Nové Mesto line has been modernised with a capacity of 140 km/h. Together, these lines account for approximately 5 % of the length of all lines, or 19 % of category-one lines[28]. Only three pairs of trains can currently travel at speeds of 160 km/h. There are no ZSSK trains capable of 160 km/h. Consequently, in terms of time savings the true benefit of modernisation is relatively low at the moment. It remains important, then, in feasibility studies to consider carefully the costs of line modernisation in the context of the benefits that could be derived from the higher speeds. As certain other less costly measures could generate more added value in the form of savings, higher average speeds and/or lower operating costs, cost-benefit analyses are also necessary for those measures and, if the returns they offer are better, they should be implemented as a matter of priority.

Table 18: Cost of modernising railway infrastructure (EUR millions)

Line	Contract signed	Length (km)	Costs	Cost per km	Speed limit
Žilina-Krásno nad Kysucou	2008	19	152	8	140
Nové Mesto nad Váhom – Zlatovce (tunnel)	2009	17	239	14	160
Trenčianska Teplá – Beluša	2009	20	257	13	160

[25] According to the Ministry of Transport, since 2017 a Polish partner has been interested in operating a service on the line for the development of tourism.

[26] Not including the rehabilitation of the Banská Štiavnica tunnel.

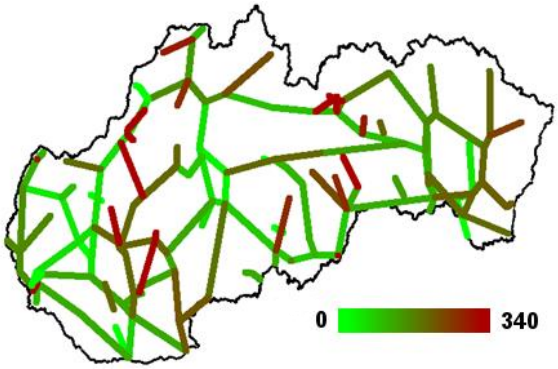
[27] ŽSR cites the relief of Slovakia's mountains as the reason for this.

[28] Line categorisation in accordance with Part III of the Annex to Implementing Decision of the Railway Regulatory Authority 03/2010, as amended.

Beluša – Púchov	2012	7	88	13	160

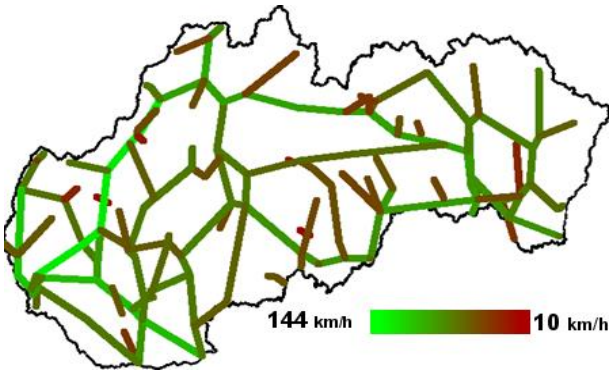
Source: rokovania.sk, ŽSR

Graph 30: Speed restrictions on railway lines (number of restrictions per 100 km, 2016)



Source : Ministry of Transport, Construction and Regional Development, ŽSR

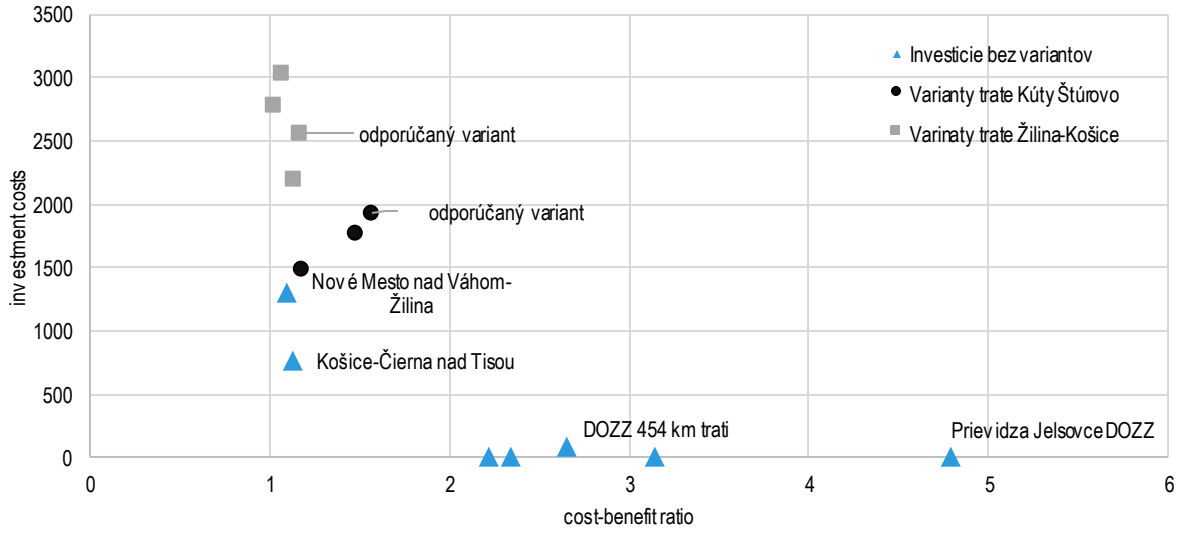
Graph 31: Average speed on railway lines



Source : Ministry of Transport, Construction and Regional Development, ŽSR

ŽSR takes measures to remove speed restrictions under its three-year investment plan. However, in the production of that plan, the actual benefits for society at large are not assessed for small-scale investments. These measures are often not implemented because they have to make way for more important matters, such as the fixing of certain parts of the railway infrastructure that are in a state of serious disrepair. Increases in the maximum speed and the elimination of speed restrictions therefore need to be evaluated and implemented comprehensively, depending on the particular line and its strategic importance. As a general rule, there are smaller projects that deliver many times more benefits than the modernisation of corridors.

Graph 32: Estimated values of selected investments and their cost-benefit ratio[29]



Source : Feasibility study, ŽSR, Ministry of Transport, Construction and Regional Development

[29] The comparability of each calculation has not been examined in detail, so this is an approximate comparison. 'RCSI' here means remote-controlled safety installations.

Key:

- recommended option - Investments without options
- recommended option - Kúty Štúrovo options
- Žilina – Košice options

454 km of lines with remote controlled safety installations

- **Measure: All future investment projects with an estimated investment cost of more than EUR 40 million will also be subject to a cost-benefit analysis by the Ministry of Finance at the stage when the feasibility study is being prepared (if applicable). The Ministry of Finance's opinion will ordinarily be updated before work starts on settling property rights relating to the land covered by the project.**
- **Measure: Priority railway infrastructure projects, prior to the award of a public contract to the works contractor (Table 20), will also be evaluated by the Ministry of Finance.**

Table 19: Planned ŽSR investments with a value of more than EUR 20 million at an advanced stage of preparation

Structure/project title	Estimated Ministry of Transport costs (EUR millions)	Financing	Current project stage	Note
Organisation of the railway line Devínska Nová Ves – Slovak/Czech state border	273	CEF	feasibility study	project approved under the second CEF call, preparations under way for the signing of the grant agreement (10/2016), the project covers the production of design documentation + construction, a Jaspers-assessed feasibility study exists for the project
Completion of Žilina – Teplička marshalling yard and related railway infrastructure at the Žilina hub	340	Operational Programme Integrated Infrastructure/CEF	project preparation	bearing in mind the preparedness for construction and the possible uptake of resources from the Operational Programme Integrated Infrastructure/CES in the near future, the Ministry of Transport does not recommend an analysis; a (Jaspers-assessed) COWI feasibility study exists for the project
Modernisation of the Žilina – Košice railway line, Liptovský Mikuláš – Poprad-Tatry (excluded) line section, implementation of the Poprad-Tatry – Lučivná section	100.6	CEF	project preparation	project approved under the second CEF call, preparations under way for the signing of the grant agreement (10/2016), a (Jaspers-assessed) COWI feasibility study exists for the project
Electrification of the Bánovce nad Ondavou – Humenné line, implementation	114-140	Operational Programme Integrated Infrastructure	project preparation	bearing in mind the project's links with performance indicators under the Operational Programme Integrated Infrastructure (potential forfeiture of approximately EUR 20 million), the Ministry of Transport does not recommend an analysis
Electrification of the Haniska pri Košiciach – Moldava nad Bodvou line, implementation	58.7	Operational Programme Integrated Infrastructure	project preparation	bearing in mind the project's links with performance indicators under the Operational Programme Integrated Infrastructure (potential forfeiture of approximately EUR 20 million), the Ministry of Transport does not recommend an analysis
Modernisation of the corridor Czech/Slovak state border – Čadca – Krásno nad Kysucou (excluded), railway line, Stage 3	79.2	Operational Programme Integrated Infrastructure/CEF	project preparation	project preparations for construction have been completed/are about to be finalised, the project was not selected under the second CEF call but, bearing in mind the

(Czech/Slovak – Čadca section)				preparedness for construction and the possible uptake of resources from the Operational Programme Integrated Infrastructure/CES in the near future, the Ministry of Transport does not recommend an analysis; it is expected that the project will be submitted in the third CEF call, which closes on 7 February 2017
ERTMS implementation in the Devínska Nová Ves – Slovak/Czech state border section	87.3	Operational Programme Integrated Infrastructure/CEF	feasibility study	bearing in mind the project's links with performance indicators under the Operational Programme Integrated Infrastructure the possible submission of the project in the third CEF call (which closes on 7 February 2017), the Ministry of Transport does not recommend an analysis
Modernisation of the Žilina – Košice railway line, Liptovský Mikuláš – Poprad-Tatry (excluded) line section, implementation of the Paludza – L. Hrádok section	282	Operational Programme Integrated Infrastructure/CEF	project preparation	bearing in mind the preparedness for construction and the possible uptake of resources from the Operational Programme Integrated Infrastructure/CES in the near future, the Ministry of Transport does not recommend an analysis; a (Jaspers-assessed) COWI feasibility study exists for the project

Source : Ministry of Transport, Construction and Regional Development, ŽSR

Table 20: Priority ŽSR investments with a value of more than EUR 20 million

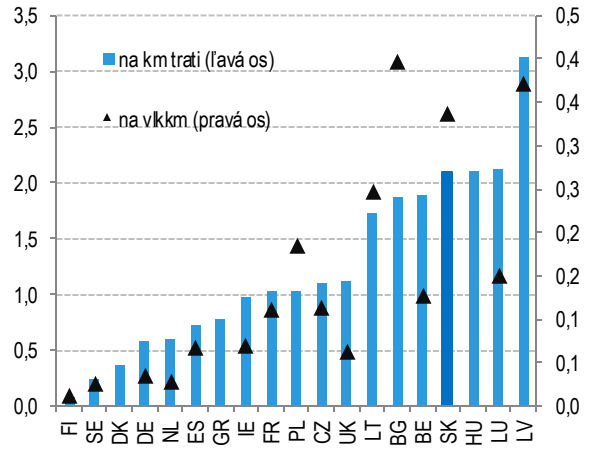
Structure/project title	Estimated costs (EUR millions)	Financing	Current project stage	Note
ŽSR communication structure for telematics services	48.4	Operational Programme Integrated Infrastructure	invitation to tenders about to be announced	-
Diagnostic vehicles	40	Operational Programme Integrated Infrastructure/CEF	preparation	-
ERTMS implementation in the Bratislava – Nové Zámky – Slovak/Hungarian state border section	TBD	Operational Programme Integrated Infrastructure	project preparation not yet started	-
Construction of integrated passenger transport terminals in Bratislava	55	Operational Programme Integrated Infrastructure	project preparation	analyse in response to the results of the feasibility study for the Bratislava Hub project
Modernisation of the Žilina – Košice railway line, Poprad-Tatry (excluded) – Krompachy line section, implementation of the Spišská Nová Ves – Poprad-Tatry section	472	Operational Programme Integrated Infrastructure/CEF	project preparation	a Jaspers-assessed feasibility study exists for the project
Modernisation of the Žilina – Košice railway line, Kysak – Košice line section	TBD	Operational Programme Integrated Infrastructure/CEF	project preparation	project preparation suspended, request for a change in the projected routing, a (Jaspers-assessed) COWI feasibility study exists for the project
Bratislava Hub	TBD	Operational Programme Integrated Infrastructure/CEF	feasibility study	a feasibility study is being prepared
Infrastructure modifications for the public transport graphical timetable 2020	109.8	Operational Programme Integrated Infrastructure/CEF	project preparations are about to start	-
Purchase and modernisation of track machinery	25.7	ŽSR own resources	public procurement process about to	-

			start	
Modernisation of the corridor Czech/Slovak state border – Čadca – Krásno nad Kysucou (excluded), railway line, Stage 2 (Krásno nad Kysucou – Čadca section)	78	Operational Programme Integrated Infrastructure/CEF	project preparation	project preparation suspended, request for a change in the projected routing, a Jaspers-assessed feasibility study exists for the project

Source : Ministry of Transport, Construction and Regional Development, ŽSR

6.3. ŽSR employment and unit costs

Graph 33: Number of employees in railway infrastructure management (ŽSR)

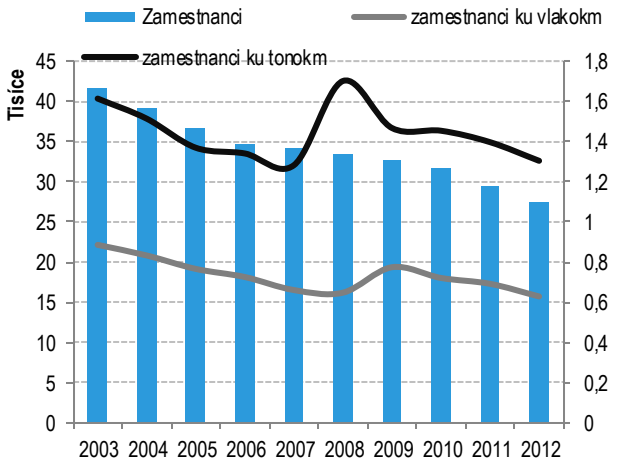


Source : Eurostat, most recent year available

Key:

- per km of line (left axis)
- per train-kilometre (right axis)

Graph 34: Trend in the total number of rail transport employees



Source : Eurostat

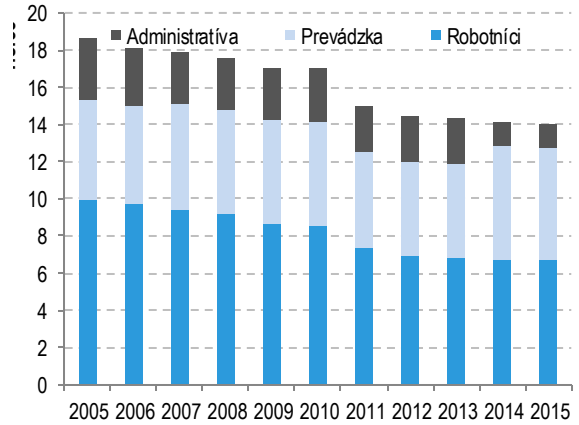
Key: Employees relative to train-kilometres
employees relative to tonne-kilometres

Graph 35: ŽSR employee structure in 2015

Source : ŽSR

Key:
Station dispatcher
Switch supervisor
Line worker
Signalman
Sign supervisor
Electrician for fixed traction
Technical expert
Track structure fitter
Engine-driver – line engineer
Shunting engineer
Controller
Engineer supervisor
Shift leader
Manual transport worker

Graph 36: Trend in the ŽSR employee structure over time



Source : ŽSR

Key: Administration Operation Manual workers

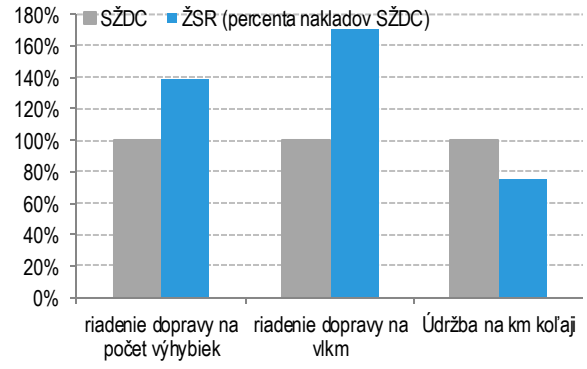
The numbers of employees working for the railways and railway companies in the past 10 years have fallen nominally (a drop by 33 %, or approximately 14,000, since 2003) and relatively (relative to the train-kilometres). In 2012, some 53 % of railway employees were working for ŽSR, i.e. for the infrastructure manager. Despite the fall, this is the fourth highest proportion in the EU. International comparisons may be distorted because of the various activities that the infrastructure managers carry out in each country and also because of the extent to which these activities are externalised.[30] Beyond Slovakia, numerous countries also have more modern infrastructure. Obsolete infrastructure requires more manual interventions and hence many more employees. Employment can be reduced by introducing a simpler traffic control method, by the remote control thereof, or by merging traffic control centres, although this will require a one-off increase in financial resources in order to implement them. Inefficient positions can be eliminated, thanks in part to the closure of low-use lines, or by identifying redundant processes carried out by ŽSR. ŽSR is currently preparing a process map to identify these processes.

In the next decade, it is estimated that approximately 5 000 ŽSR employees will retire. ŽSR already finds it difficult to recruit new employees. If the way human resources are recruited is not modernised, ŽSR could have problems safeguarding the routine operation of the rail network.

- **Measure: Optimise the number of ŽSR employees in connection with modernisation, the scaling down of railway components, and the optimisation of operations.**

In the optimisation process, the minimum number of employees required to ensure the safety and capacity of the rail network needs to be considered. Identify redundant processes, channel investment resources into a change in management method, and minimise occasional procedures where there is an extreme need for human resources relative to the procedure.

Graph 37: Difference in the unit costs of ŽSR and SŽDC[31], 2013-2015 average

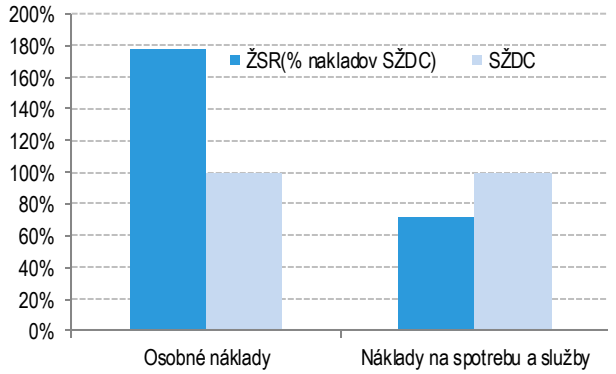


Source : SŽDC, annual reports of Czech Railways and ŽSR

Key: SŽDC ŽSR (percentage of SŽDC costs)

traffic control relative to number of switches

Graph 38: Structure of the unit costs of ŽSR and SŽDC (including the management of Czech Railways assets) per kilometre of line, 2014-2015 average



Source : Annual reports of SŽDC, Czech Railways and ŽSR

Key: ŽSR (percentage of SŽDC costs) SŽDC

Personnel costs

[30] For example, the Czech infrastructure manager does not own railway stations, but the Slovak one does.

[31] SŽDC is the Czech railway infrastructure manager i.e. the equivalent of Slovakia's ŽSR. Since, at the time the results were published, SŽDC did not own stations, the personnel costs of employees responsible for train movements on the line and the corresponding share of operating overheads were included in the ŽSR costs of traffic control.

traffic control per train-kilometre

Maintenance per km of track

Consumption and service costs

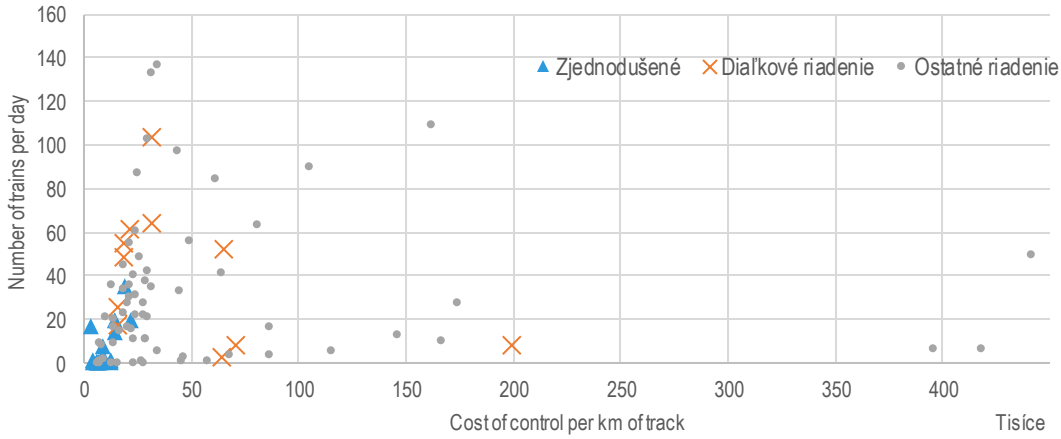
Compared to the Czech infrastructure manager (SŽDC), ŽSR channels more money into traffic control and technical testing, but relatively fewer resources into maintenance. Personnel costs are higher at ŽSR because of the line length, and this is consistent with the relatively higher number of employees. It is clear even from this simple comparison that the traffic control method needs to be reviewed and more resources need to be found for maintenance[32]. If control costs relative to the number of train-kilometres were on a par with those in the Czech Republic, ŽSR's expenditure would contract by EUR 33 million. However, one-off investments are required before control costs can be cut.

- **Measure: Make savings in transport control by carrying out investments as far as current general government budget and EU funds resources allow. Make the most beneficial investments as a matter of priority.**

Cost of line operation

ŽSR's highest cost items are the cost of traffic control and the cost of line maintenance. Line maintenance costs have little to do with the extent to which lines are used. According to ŽSR, maintenance has been underfinanced, so the priority is to stop the lines from falling into a state of serious disrepair. Control costs depend on the method of line control and other technical specifications (the number of marshalling yards, safety installations, the number of points, etc.).

Graph 39: Average daily number of trains on the line and unit costs of traffic control in 2015



Source : ŽSR

Key: Simplified
Remote control
Other control

[32] The method in place for keeping track of costs and the activities carried out have not been reviewed in detail and therefore only those results were there is a big difference (almost double the unit costs of traffic control, costs of technical tests and personnel costs) have been interpreted.

ŽSR provided a list of lines where remote control or simplified traffic control can be introduced [33]. This includes an estimate of investment costs and the savings generated by a change in traffic control. ŽSR should conduct a detailed cost-benefit analysis to quantify the costs and savings more precisely. Where investments are made in remote-controlled safety installations, this also means quantifying other benefits, such as the increased train speed and safety. The gross estimate in Table 25 is a clear sign that, following the analyses, investments should be made in a change of traffic control with a simple return of shorter than 30 years.

Efficiency and savings can also be made by merging traffic control centres, which could also reduce the need for employees. This is the subject of a dispatching project currently being prepared by ŽSR, but the results have yet to be verified. Traffic is currently remotely controlled from six points on 10.6 % of the lines (395 km out of 3 633 km) by 469 employees (7.7 % of the total 6 056 transport employees).

Table 21: Lines where remote traffic control can be introduced

Line	Line length (km)	Reduction in the need for employees (FTE)	Savings in annual personnel costs (EUR millions)	Estimated investment costs (EUR millions)	Investment costs per kilometre (EUR thousands)	Estimated return on investment [year]
Prievidza – Jelšovce	125	187	2.4	20.0	159.6	9.0
Medzilaborce – Bánovce nad Ondavou	120	68	0.9	11.4	94.7	13.1
Maťovce – Bánovce nad Ondavou	29	36	0.5	9.0	311.4	18.3
Leopoldov – Šurany	61	78	1.0	20.8	341.4	20.5
Maťovce ŠRT – Haniska pri Košiciach ŠRT	87	65	0.9	19.0	217.1	22.2
Trstená – Kraľovany	57	20	0.3	10.0	175.3	29.0
TOTAL	**479**	**454**	**6.0**	**90.1**	**216.6**	**18.7**

Source : ŽSR

Table 22: Lines where simplified traffic control can be introduced

Line	Line length	Reduction in the need for employees (FTE)	Savings in annual personnel costs (EUR millions)	Estimated investment costs (EUR millions)	Investment costs per kilometre (EUR thousands)	Estimated return on investment (years)
Stakčín – Humenné	27	27	0.4	3.7	139.5	10.2
Nálepkovo – Červená Skala	93	17	0.2	3.2	35.0	14.1
Zlaté Moravce – Úľany nad Žitavou	37	13	0.2	4.1	111.1	26.3
Utekáč – Lučenec	41	13	0.2	6.0	144.5	26.9
Trenčín – Chynorany	49	17	0.2	8.2	167.8	34.9
Červená Skala – Brezno	86	25	0.3	13.2	152.5	38.8
Plešivec – Muráň	33	10	0.1	6.1	184.0	43.4

[33] However, no information has been provided on the provenance of the estimated investment costs or the quantification of savings in other areas of spending (other than direct personnel expenditure). The Value for the Money Service is therefore unable to verify the relevance of the estimate or to determine the feasibility of the rate of return on the investment.

Rimavská Sobota – Brezno	78	27	0.4	17.7	227.5	46.8
TOTAL	**444**	**149**	**2**	**62.2**	**145.2**	**30.2**

Source : ŽSR

Line maintenance costs

Infrastructure maintenance is underfinanced, which is eroding at its efficiency. According to ŽSR, the current situation is not sustainable. ŽSR's spending on maintenance per kilometre of track in the past three years has been 24 % lower than that of SŽDC on average. Even so, maintenance has also been underfinanced at the Czech infrastructure manager, which has quantified the ideal financial requirement to be EUR 30 000 per kilometre of track. The ideal level of funding required for the sufficient maintenance of the ŽSR network, however, has yet to be quantified.

- **Measure: Quantify the optimal funds for maintenance and the resulting benefits. Every year, publish the quantity of selected key individual repair and maintenance activities and the costs thereof.**

Other significant operating costs

In 2016, ŽSR will purchase 566 000 MWh for EUR 45 million. Consequently, the purchasing of electricity is one of the company's biggest individual items of expenditure.

Table 23: ŽSR contract prices of electricity in 2016

	2016 volume (MWh thousands)	Price exclusive of VAT and excise duty (EUR/MWh)
Electricity supply		
ZSE Energia	113.1	40.65
Stredoslovenská energetika	113.4	41.25
Východoslovenská energetika	339.4	40.68
Average		**40.79**
Assumption of liability for imbalances		4.19
Total	**565.9**	**44.98**

Source: crz.sk

The price of the commodity is affected by the high volatility of ŽSR electricity load diagram values. The curve of the diagram is heavily influenced by the nature of rail transport. Every year, prior to purchasing the commodity, ŽSR updates its load diagram by reference to the planned graphical timetable of train services and historical data on rail transport in order to express the requirement for the upcoming period as faithfully as possible. Prompted by a change in legislation, since 2014 there has been a change in the way the capacity reserved for rail traction units is evaluated, which has pushed down overall costs of electricity purchasing by EUR 7 million.

- **Measure: Achieve annual cost savings of EUR 0.5 million by increasing effectiveness, entailing the building of filtering compensation facilities and a power dispatching system. Further opportunities to cut the costs of electricity purchasing will be explored.**

7. Public passenger transport

The introduction of free travel has helped Železničná spoločnosť Slovensko (ZSSK) and RegioJet to increase the average number of passengers per train dramatically. Even so, actual train utilisation is highly fragmented. In 2014, the number of passengers travelling in 56 % of regional ZSSK trains averaged fewer than 50. Conversely, some trains are used heavily on part of the route and it would be worth considering increasing the number of trains (especially during the busiest parts of the day and/or week). The low use of capacity could be caused by poor coordination between the railways and bus services, the insufficient supply of trains, low demand for rail transport because the line is far from human settlements, or the unappealing transport times. As ZSSK does not break down costs by train or line, it is impossible to tell which trains are the biggest contributors to the loss. Similarly, information is not available on parallel streams of passengers in bus and private transport, hence there is no basic input to evaluate the viability of individual lines and to decide on how to provide transport services. ZSSK does not use its rolling stock sufficiently enough. Clock cycles could be added to the current rolling stock across the network, and the number of connections on the main lines could be increased by approximately 20 %. Demand for bus travel has plunged by 45 % since 2006, but the subsidies have spiralled by 79 %. Some of the poor efficiency and unused capacity in public transport can be attributed to the unwelcome overlapping of bus and train routes and the lack of coordination between the different modes of transport.

In the next stage of the spending review, the Ministry of Finance and the Ministry of Transport will work together to identify solutions on how to determine the optimal supply of public transport in a selected region. In this respect, they will look at how to deal with services for very small population settlements, i.e. those places where demand for public transport will always be low. The analysis will try to identify those settlements where it would make sense to introduce request stops. The aim will be to propose solutions that can improve the coordination and optimisation of public transport. In addition, the analysis will detail the benefits of individual public transport services based on the subsidy per passenger-kilometre, attempt to quantify the benefits of transport coordination, and propose an optimal method of serviceability that takes into account passenger flows. ZSSK's cost efficiency (the use of its rolling stock, technical journeys, etc.) will also be assessed in more detail. The transport authority that is currently being prepared is an institutional solution in the coordination of bus and train public transport.

As ZSSK has yet to supply the data required for analysis, we have only prepared the principles or, more specifically, measures that could enhance the value without requiring a calculation of the financial impacts. The analytical part of the chapter has remained unchanged.

- **Measure: Pinpoint measures to optimise unit costs and increase revenues by a total of 20 % in subsidised public passenger transport by rail.**

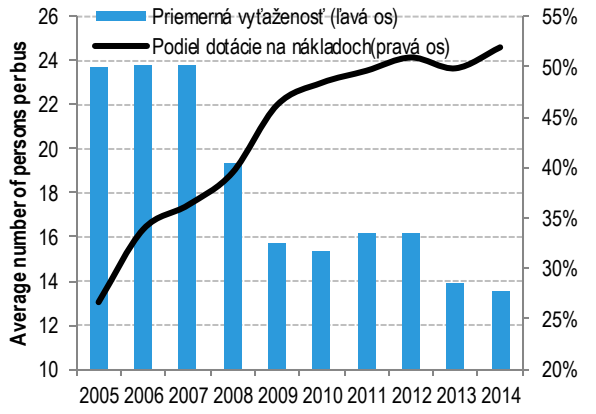
7.1. Passenger rate and subsidies in subsidised suburban bus transport

Between 2006 and 2012, bus supply dipped by 1 %, while demand plunged by 45 %.[34] Bus transport subsidisation amounted to EUR 109 million in 2011, i.e. 79 % more than in 2006. Economic growth and convergence with more developed countries have triggered a rapid rise in the number of cars per capita in Slovakia. Ten years ago, every fourth Slovak citizens owned a car; today, it is every third citizen. This has resulted in a sharp rise in the share of private transport in the overall breakdown of transport. The consequences have been borne most heavily by bus transport, where the average bus occupancy has slipped to 14 passengers

[34] The figures do not include the Prešov and Trnava Regions; supply = vehicle-kilometres, performance = passenger-kilometres.

and the share of subsidisation has increased to 50 % of costs.[35] The Trenčín Region is the only region where the average occupancy has not fallen. However, the drop in passengers (fewer people are travelling long distance) has pushed up the share of subsidisation in costs even here.

Graph 40: Passenger rate and the subsidisation of costs in suburban bus transport



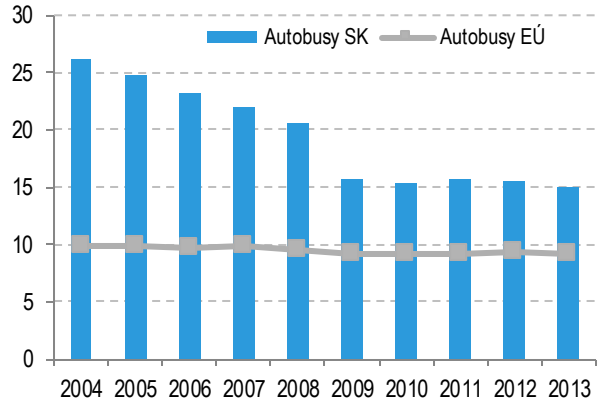
Source : Ministry of Transport, Construction and Regional Development, in 2013-2014 data on costs and subsidies is available only for the Žilina, Trenčín and Banská Bystrica Regions

Key:

Average rate of use (left axis)

Share of subsidy in costs (right axis)

Graph 41: Modal split in passenger transport (%)



Source : Eurostat

Key:

Slovakia – buses

EU – buses

Possible causes of the decline in bus transport are: greater interest in private motoring, the opacity of timetables – the virtual non-existence of uniform scheduled services (it is not unusual for services on a single route to have various stops and detours), and timetables that inadequately reflect changes in the transportation habits of the population in the past few decades. Higher territorial units do not usually have access to transport data (bus companies do not give these units the detailed data they need for transport analyses). Nor do they have a system to create an optimal graphical timetable for regional buses.

7.2. Passenger rate and subsidies in subsidised rail transport

Costs per train-kilometre are influenced in particular by the high railway infrastructure charge,[36] the structure of the average train set, low vehicle utilisation, train-kilometre restrictions,[37] the different shares of long-distance and regional travel, and the operation of services in places where rail transport demand is low. Average ZSSK costs per train-kilometre are consequently 76 % (or 53 %, less the charge for the use of infrastructure) higher than in the Czech Republic (Czech Railways). In 2014, more than half of regional transport trains carried an average of fewer than 50 passengers. Long-distance travel, accounting for just a third of train-kilometres, generated two thirds of all of ZSSK's sales revenue.

While the share of bus transport has fallen in the transport breakdown, passenger transport by rail has remained more or less at the same level. The introduction of social concessions in 2015 brought about a significant change,

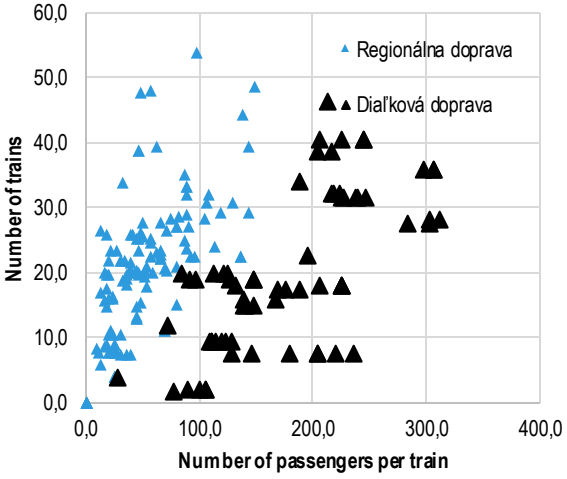
[35] The rise in the share of subsidisation can be attributed to both the dwindling occupancy and the low fare price growth momentum.

[36] According to a Commission report, in 2014 the average infrastructure-use charge per kilometre for a 500-tonne long-distance train was 50% higher than in the Czech Republic, while for a 140-tonne regional train the charge was 2.36 times as much.

[37] The Czech carrier makes more use of vehicles (more trains are travelling relative to the line length) and monitors costs – not only train-kilometres.

pushing up the average passenger rate per train to 100 people (by 28 %). Despite the 4 % fall in the number of passengers between 2005 and 2014, the transport volume did not contract, mainly because there was an increase in the average journey length by 20 % in the same period. Railways have also benefited from the modernisation of lines, stations and rolling stock, covered by EU funds, and from the growing delays in road transport, which can be avoided by passengers using the railways. The State pays for approximately 65 % of rail transport costs, which is above the European average. The ratio of subsidised rail transport to overall rail transport is also higher than in other countries.[38]

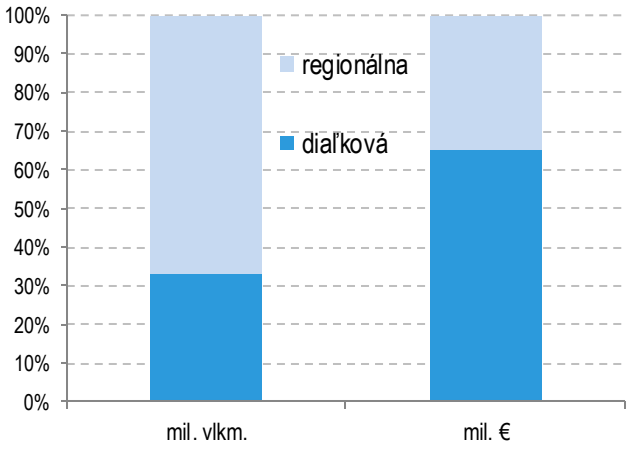
Graph 42: Average number of passengers per train and average daily number of trains on individual lines (2014)



Source : ZSSK

Key:
Regional transport
Long-distance transport

Graph 43: Performance and revenues in regional and long-distance travel (2014)



Source : ZSSK

Key:
regional
long-distance

millions of train-kilometres
EUR millions

The biggest problems in passenger transport by rail include irregularity, the low number of trains on certain lines and the low passenger rates of certain – mainly regional – trains (admittedly, some passenger trains have managed to attract passengers). On some lines, this could be due to the unappealing supply (a low number of trains per day[39]), the line's lack of competitiveness (because private or bus transport is much faster or cheaper), the preference for higher-category trains, or the lack of coordination with bus services.

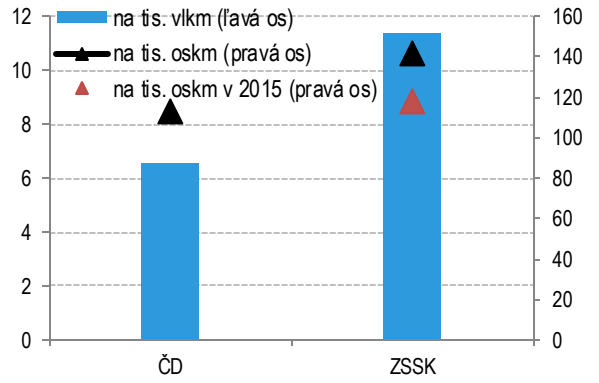
The more-than-double amount of the charge for infrastructure use, the organisation of transport, employment and performance (the inadequate number of connections) meant that, in 2013-2014, the average train-kilometre cost

[38] According to Commission information in the report: Monitoring of rail markets, 2014.

[39] For example, the liberalisation of the Bratislava-Komárno line showed that an increase in the number of trains per day can increase the average number of passengers per train. Increasing the number of connections improves the competitiveness of public transport compared to private transport, and a regular regime (clock cycle) makes the system clearer and simpler for customers and more efficient for the carrier. This was achieved on the Bratislava-Komárno line by significantly increasing train-kilometres, which were then reduced on other lines from other Slovak regions.

ZSSK 76 % more than it did the Czech State carrier (adjusted for infrastructure use costs by 53 %). In the comparison of costs per passenger-kilometre following the introduction of free transport, thanks in part to the better performance in train-kilometres, the costs per passenger-kilometre fell to roughly the same level reported by Czech Railways (even without an adjustment for infrastructure use costs).

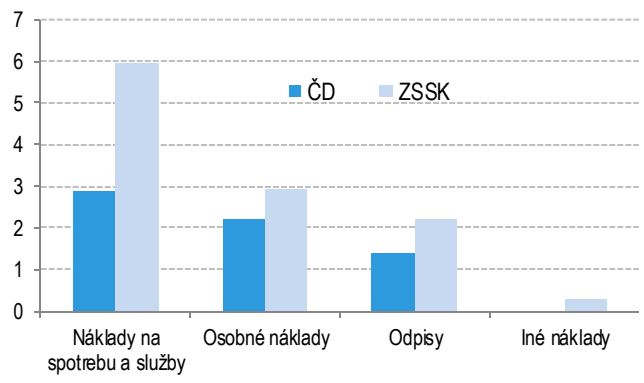
Graph 44: Unit costs of rail carriers (2013-2014 average, EUR)[40]



Source : Annual reports of ZSSK and Czech Railways

Key:
per thousand train-kilometres (left axis)
per thousand passenger-kilometres (right axis)
per thousand passenger-kilometres in 2015 (right axis)

Graph 45: Structure of the costs of rail carriers relative to their train-kilometres (2013-2014 average, EUR)



Source : Annual reports of ZSSK and Czech Railways

Key:
Consumption and service costs
Personnel costs
Depreciation
Other costs

The structure of overall costs is similar; the Czech carrier's personnel costs account for a slightly higher share of overall costs. Relative to train-kilometres, ZSSK's depreciation costs are higher than those of Czech Railways. ZSSK's personnel costs are also higher, despite the fact that the average payroll expenditure per employee at ZSSK is 10 % lower.[41] The higher personnel costs can be linked to the inefficient circulation of vehicles and the poor use of employee capacities. ZSSK's costs of consumption and services per train-kilometre are more than double those of Czech Railways. This can be attributed to the different fuel prices, the type of drive, the infrastructure use charges, and the weight of the average train set and the related energy consumption of trains.

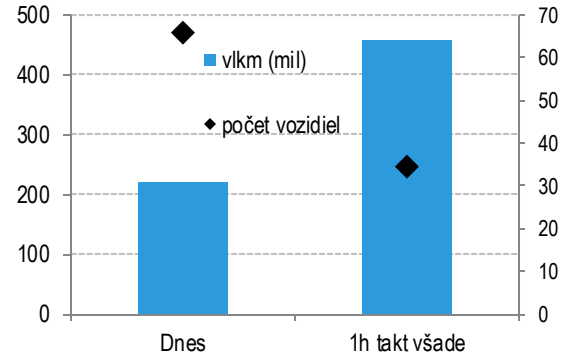
Use of ZSSK rolling stock

ZSSK could make more efficient use of its vehicles. The mileage of the average Czech train set is twice as much as a Slovak one. According to ZSSK, this difference can be attributed to the fact that Slovakia has introduced a limit on train-kilometres, hence Slovakia dispatches fewer trains with higher capacity. Clock cycles could be added to the current rolling stock across the network, and the number of connections on the main lines could be increased by approximately 20 %. This would entail only a minimum increase in the number of employees and slight growth in the direct costs of traction energy. In this situation, the only significant rise in costs would be the charge for the use of railway infrastructure, though this would largely entail just a transfer within public administration (ZSSK – ŽSR). However, ZSSK lays on a relatively high number of booster connections during rush hour, carries out non-service journeys, and runs trains in only one (busy) direction, resulting in the forced inefficient coupling of trains (train sets). To a large degree, this can be attributed to the limit on the maximum number of train-kilometres, which impedes return travel outside of rush hours and the more efficient use of

[40] Translated at the NBS rate prevailing on 1 January 2014.
[41] We calculated the average payroll expenditure as the ratio of personnel costs and the number of employees.

vehicles outside of rush hours. Improved use of rolling stock will be incorporated into the National General Transport Plan.

Graph 46: Millions of train-kilometres (right axis) and need for locomotives (left axis)[42]

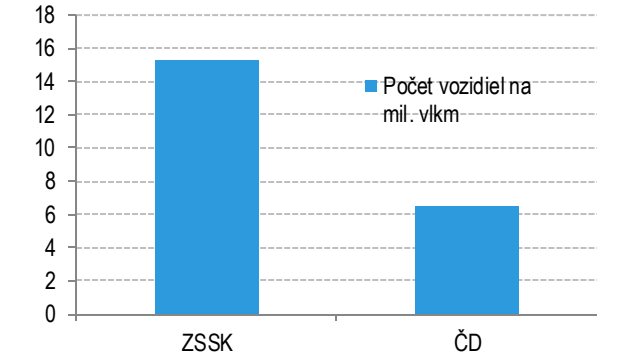


Source : Internal calculations by the Ministry of Finance and ZSSK data

Key:
train-kilometres (millions)
number of vehicles

Today
1-hour tact everywhere

Graph 47: Comparison of the number of locomotives relative to train-kilometres with Czech Railways



Source : ZSSK, Czech Railways

Key:
Number of vehicles per million train-kilometres

Rush-hour booster trains and the subsequent coupling with non-passenger empty trains increase occupancy, but unproductively increase the need for vehicles. As ZSSK has a restricted limit of train-kilometres that can be travelled by its trains, it boosts certain trains only in one direction. Instead of returning trains in the opposite direction, which would be used to transfer the set back to the centre, ZSSK couples these trains and drives them back as a non-service journey (empty trains)[43] without passengers. However, the costs of this return journey are virtually the same as the costs of a passenger-carrying service. A solution to this problem will be proposed on the back of further analysis.

Empty (not-in-service) trains can be found in and around Bratislava in particular. For example, on the Bratislava – Malacky (Kúty) arm there are six empty trains on working days. This is a consequence of a contract between ZSSK and the Ministry of Transport, according to which ZSSK may run approximately 0.5 million empty-train-kilometres (1.5 % of performance) per year in order to compensate for uneven supply during rush-hour and restrictions in the scope of public services. If this disproportion is eliminated, we can expect to see an increase in productivity in the use of train-kilometres for public service obligations and carrier costs. The analysis will also quantify the costs of the various options to improve vehicle use.

[42] This is a theoretical calculation that ignores the need for servicing journeys, booster connections during rush hour, etc. It merely illustrates the efficiency of the regular organisation of transport.

[43] Non-service journeys also take place for objective reasons to some degree because vehicles need to visit the technical base to fill up on fuel and for maintenance. Efforts to cut costs have reduced the number of such centres, but this also results in non-service journeys. This should be cheaper than maintaining the centres.

Box 5: Benefits of clock-cycle transport

Complex efforts to revitalise the railway sector have seen passenger transport by rail make a gradual transition from a commercial to a clock-cycle graphical timetable since 2012. The principle is regularity, with connections operating at a tact of once every two hours, hour, 30 minutes or less. This change has been prompted not only by efforts to rehabilitate passenger rail transport from the point of view of the customer (you can rely on regular, day-round and transparently operated public rail transport without having to list through a complicated timetable) and also from the point of view of rational organisation (a rhythmical and regular graphical timetable can significantly optimise the use of rolling stock). This sort of transport has been typical for Germany, Switzerland, Austria and the Netherlands for several decades. Among the post-communist countries, this system has been applied in the Czech Republic and Hungary for more than 10 years.

7.3. Comparison of costs and subsidies in suburban bus and rail transport

In 2012, the costs per average train-kilometre were almost 10 times higher than the costs per bus-kilometre. Converted to a per-seat basis, the train is approximately 1.7 times more expensive. The higher financial costs can be attributed to some degree to the higher economic benefits of the train (comfort, safety and speed), the charge for intra-infrastructure use, the low operational efficiency and the preservation of inviable lines – a train is in operation where it would be enough to have a bus. Train fares[44] are comparable to bus fares. The question is whether this should be the case when the train is a more comfortable mode of transport.

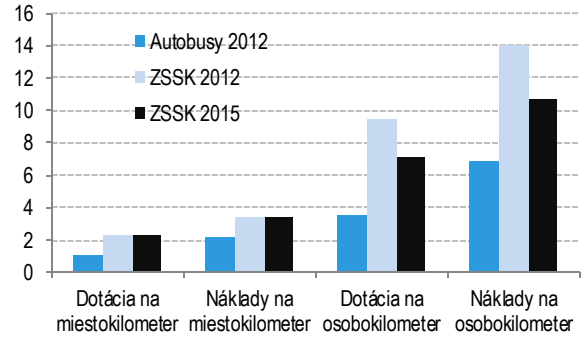
The costs and subsidisation per train seat fall as the train capacity increases. From a purely cost perspective, it is therefore necessary to concentrate trains on those lines where the transport flows are significant enough. Put simply, trains should be operated where they can replace a sufficiently large number of buses. In reality, the choice of transport mode is more complex because other factors need to be taken into account (the travel time, environmental impacts, the distance of stops from the heart of population centres, etc.). However, these factors should not be overestimated where the capacity use of trains and lines is low.

Rail transport is more expensive than bus transport. Because this is not reflected in fares in Slovakia, the difference in the intensity of subsidisation is all the greater. The higher cost may be the result of operating large numbers of inviable lines, the insufficient use of vehicles, the low appeal (and consequently the intensity of use) of trains compared with other modes of transport, the lack of train connections and the undesirable competition between subsidised buses and trains.

The comparison ignores the impact of tolls and road tax, the charge for the use of railway infrastructure and other public administration transfers on the financing of road or rail transport. This is a difficult comparison because of the distribution of costs for the maintenance of roads between buses, freight vehicles and private vehicles, and also because the charges for railway infrastructure, tolls and road taxes effectively amount to just a transfer within public administration.

[44] This applies to non-discounted fares.

Graph 48: Subsidisation and costs relative to the seat-kilometres and passenger-kilometres available[45]



Source : ZSSK, Ministry of Transport, Construction and Regional Development

Key:

Buses 2012

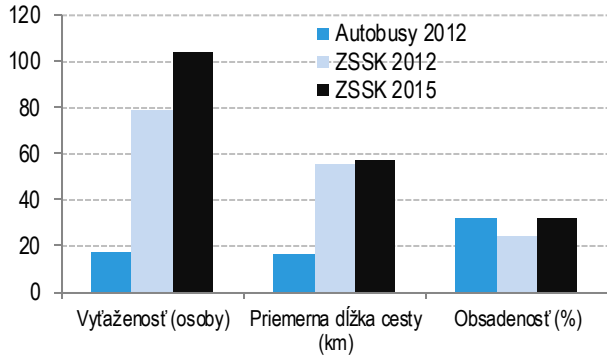
Subsidy per seat-kilometre

Costs per seat-kilometre

Subsidy per passenger-kilometre

Costs per passenger-kilometre

Graph 49: Performance indicators of subsidised bus and train transport before and after the expansion in social concessions



Source : ZSSK, Ministry of Transport, Construction and Regional Development

Key:

Buses 2012

Rate of use (persons)

Average journey length (km)

Occupancy (%)

The comparison of subsidisation per seat-kilometre in a bus and in a train is slightly distorted by the higher average length of the journey and the degressive tariff (the price per kilometre falls on longer journeys, and the average train journey is three times as long as a bus journey). The train and bus fares charged by selected carriers are similar, hence they have no major impact on the relative comparison of the intensity to which a bus or train is subsidised. Various types of prepaid, concession and discounted tickets, and prices for additional services (e.g. the luggage charge), could have had some sort of impact prior to the introduction of 'free trains'.

Table 24: Standard fare per kilometre, depending on the journey length (cents)

	10 km	20 km	50 km	100 km	100 km/10 km ratio
ZSSK	7.5	6.25	5.5	5.25	70 %
SAD Žilina	8	5.5	4.8	4.4	55 %
SAD Humenné	7.5	6.5	5.2	4.85	65 %
SAD Trenčín	8	5.75	5.1	4.75	59 %
SAD Zvolen	7.5	6	5.5	4.9	65 %

Source : Carriers

In their compliance with the public service obligation, rail carriers are required to respect maximum prices for defined groups of passengers, as set by an implementing decision of the independent Transport Authority (previously the regulatory authority). An international comparison shows that average Slovak fares per kilometre were low even before the expansion of social concessions saw the introduction of 'free trains'. However, the number of kilometres that an individual could travel for the average wage was only average.

[45] Subsidisation does not cover the losses of the given year. The Prešov and Trnava Regions were not included in bus transport (data was not available). We assume that the average bus has 55 seats. ZSSK seat-kilometres in 2012 are calculated proportionately according to the train-kilometres.

The question remains as to what the socially and economically accepted level of rail transport subsidisation is. The costs per seat-kilometre are approximately 1.7 times higher than for road transport, even without factoring in the higher costs of rail infrastructure maintenance and operation. The State can operate less cost-efficient rail transport if it delivers much more benefits than bus transport. It is economic practice that customers should pay more for better-quality or more valuable services. However, in this context it is worth also drawing attention to EU legislation and conclusions accepted in public transport, where, for numerous reasons, rail transport is preferred as the basic mode of transport forming the skeleton of the State's transport serviceability.

From an economic perspective, rail transport should definitely not be operated where bus transport is more advantageous financially and from the point of view of other benefits.[46] However, such a decision can be taken only after an analysis of the potential offered by rail transport that draws on data from the changes occasioned by the introduction of free travel. One option is to charge extra for more comfortable train transport, i.e. a change in the fares charged for selected trains, or to consider giving preference to paying customers during rush hour. This could avoid the costs of increasing train capacity during rush-hour (trains are currently free at any time), as well as certain negative externalities brought about by free travel (e.g. people using trains as a place to sleep, or the unnatural preference over slower modes of transport).

Is the train really more environmentally friendly?

The average external costs of rail transport per passenger-kilometre are almost two times lower than the average external costs of bus transport.[47] The railways are also one of the most space-efficient methods of transport.

Used to full capacity, an average-capacity regional train produces one and a half times fewer emissions per person than a bus. However, if capacity is not used to the full and a train could be replaced by a single bus, the bus would produce three times fewer emissions than the unused train. In this respect, the extent to which capacity is used has to be taken into account when comparing the environmental burden of modes of transport on individual routes.

Table 25: Comparison of the price of the emissions of a train and a bus (EUR)

	Weight (tonnes)	Number of seats	Max. passengers	Emissions per tonne-kilometre[48]	Emissions per person	Emissions per vehicle
Train (Unit 671)	167	307	640	0.015	0.39	2.50
Solaris Urbino 15	25	40	144	0.035	0.61	0.88

Source: Ministry of Transport, Construction and Regional Development, carriers

7.4. Parallel bus and train services

The low use of the capacity of some trains and buses may be caused by the fact that they undesirably run as parallel services.[49] Regional trains and buses alike are emptier if services are run in parallel. Fare collection is lower, thereby pushing up the carrier's loss and requiring compensation from the public budget. Nevertheless, cancelling parallel services is sure to make certain customers less happy. Some passengers will lose their direct

[46] After a detailed analysis and consideration of externalities.

[47] Source: ŽSR, by reference to the Handbook on estimation of external costs in the transport sector – CE Delft, February 2008.

[48] This is the average figure for the mode of transport as a whole. In other words, the price of the emissions could vary depending on the specific train or bus. Although Unit 671 is electric, this is an illustrative calculation demonstrating that the train need not always be an environmentally less harmful form of transport.

[49] A parallel service means a bus and a train operated on a similar route at a similar time and unnecessarily competing with each other for customers.

connections and will have to change train or bus, which will make the journey longer because of the distance they have to cover between train and bus stops. However, experience of free travel, which saw a shift in passengers from buses to trains despite the fact that they would have had to change during the journey, goes some way to showing that an acceptable fare could make up for the dissatisfaction caused by the need to transfer. Alternatively, the journey time could be extended for all passengers if the economically more advantageous mode of transport that is selected has a slower travel speed. In this respect, the biggest challenge is to set a borderline distinguishing where parallel services remain acceptable and where it would be more advantageous for society to force passengers to transfer. In other words, to set a combination of the length of minimum parallel services for coordination and the minimum transport serviceability that needs to be safeguarded for all municipalities. The determination of standards regarding the walking distance to stops and standards regarding the wait for a transfer is taken into consideration/respected when drawing up a transport service plan defining, with finality, where there will be a train, where there will be a bus, and where they can be operated in parallel. The principles factored into the production of a transport service plan are described in Box 2.

Considering the high intensity of road transport, the travel time using a combination of a bus and a train could be shorter than or the same as (or perhaps slightly longer than) the time taken by a direct bus connection. The way carriers' tariffs are structured, a direct connection by bus is cheaper than a combined bus/train connection. Successful coordination requires not only a reduction in travel time, but also better-value combined fares. The subsequent integration of public transport could also be highlighted by a surcharge in a direct bus over a section operated in parallel with the railways. This would be a premium for the luxury of enjoying a direct connection, if the carrier decides to operate it.

Box 6: Economic optimisation – an ideal world (objective)

Drawing on the demand model for public transport, it is necessary to define the supply of services (the optimal graphical timetable) on individual routes so that:

- Services are not subsidised by the State where the market is capable of delivering sufficient serviceability, performance stability and coordination with other public transport without subsidisation.
- Every relevant transport objective is served by at least a minimum number of services with sufficient capacity.
- Where it makes sense and where it is possible, clock-cycle services with at least a two-hour tact[50] (mainly on the railways) are applied.
- On individual routes, the mode of transport with the lowest socio-economic costs is selected. These take into account not only the financial costs of operation, but also the costs of lost opportunity, i.e. an appraisal of the difference in travel times (the difference in speed with a train/bus), the difference in the physical distance to and from stops, the difference in safety and the difference in environmental impacts.
- The supply of transport is adapted to changes on the demand side in all cases where the benefits of the change outweigh the costs of the change.

[50] Experience in other countries (Switzerland, the Moravian Region in the Czech Republic) indicates that clock-cycle services are significant for the overwhelming majority of the territory, with the exception of extremely small villages or settlements (+ on the outskirts). In the regional transport, a two-hour tact is generally insufficient (at least a one-hour tact is necessary during rush hour). There is no point in operating regional railways with a two-hour interval (during rush hour) on account of the inadequate service and the expensive mode of transport. A much better service can be provided by bus at the same cost. In suburban transport in the vicinity of large cities, a two-hour tact is entirely inadequate (during rush hour a maximum of 30 minutes is tolerable, while at the weekends a maximum of 60 minutes would be bearable).

- In the production of the graphical timetable, forward-looking investments in infrastructure, demographic forecasts, etc., are taken into account.

Box 7: Case study, Prešov – Bardejov line

The Prešov – Bardejov line has been selected because it illustrates the possibilities of leaving out train stops that are far from population centres and of speeding up transport without investment. This proposal exemplifies the pros and cons of each option in the organisation of public transport.

The Prešov – Bardejov line includes a 22 km long physical parallel route equally serviceable by train and bus. Every day, between 80 and 1 700 people travel the route by train, while between 600 and 6 000 take the bus (depending on the section). Between 500 and 15 000 people go by passenger car.[51] The busiest section for all modes of transport is Prešov – Kapušany; the least busy section is Kapušany – Raslavice.

In the absence of detailed data on demand for all links, it is impossible to determine the optimal supply of transport services.[52] As such, the submitted proposal draws only on best practices and introduces regular clock-cycle transport, which works to the benefit of carriers and users alike. The more even supply of buses will improve serviceability in areas where there are no parallel services. If a train no longer stops in a given area, it will be able to operate more quickly and a regular hourly tact can be introduced. On the other hand, the supply of connections between Raslavice and Prešovom will deteriorate a little if the parallel services are removed.

In this respect, the submitted proposal anticipates that transport services will be reinforced to 123 000 train-kilometres (+34 %), compensated by a cut of 336 000 vehicle-kilometres for buses (-40 %). In terms of the number of vehicles, on the railways it is anticipated that a 50 % increase will be necessary. With buses, the fleets are expected to contract (we are currently unable to provide any figures because of a lack of data). On the Bardejov – Kobyly – Raslavice and Bardejov – Hertník – Raslavice lines, transport serviceability improves, while on the Raslavice – Prešov line it becomes slightly worse.

Graph 50: Example of parallel train/bus services on the Prešov – Raslavice – Bardejov line

Table 26: Transport serviceability proposed during the working day and the impact on the evenness of supply (the smaller the number, the better the serviceability)

[51] According to data from the report published by the Transport Research Institute (2011), ZSSK (2014), and the preliminary national transport census for 2015.

[52] In the absence of available data, the procedure will be as follows: minimum transport services will be applied on a blanket scale (e.g. in the form of six services during the working day for each population centre, while respecting the rule on a maximum walking distance of 2 km), and developments in transport frequency will be monitored. Beyond a designated level (e.g. more than 200 people in one direction during the working day), the service frequency is increased to the relevant standard (e.g. a two-hourly tact).

Link (Arm)	Bardejov – Kobyly – Raslavice (bus)		
	today	proposal	difference
Number of connections	29	26	-10 %
Scope of service*	15h15min	18 h	**18 %**
Evenness**	0.059	0.054	**8 %**
Link (Arm)	Bardejov – Hertník – Raslavice (train)		
	today	proposal	difference
Number of connections	12	14	**17 %**
Scope of service*	13h25min	18 h	**34 %**
Evenness**	0.179	0.062	**65 %**
Link (Arm)	Raslavice – Prešov *(today train + bus, proposal: train only)*		
	today	proposal	difference
Number of connections	31	17	-45 %
Scope of service*	18h43min	18 h	-4 %
Evenness**	0.058	0.068	-17 %

Source : Google *Source: Timetables and the Ministry of Finance's internal calculations*

** Expresses the time between the first and last connection, **The measurement of times between individual connections; the lower this is, the more frequent the transport service*

1.

Coordination of public transport

More efficient cooperation between public bus and rail transport can be achieved by the transport authority that is being prepared for this purpose. Although, by law, public-service suburban bus transport must respect the serviceability of an area with trains and commercial transport, in practice it is rare for buses to link up with trains. Even where they do link up, no one coordinates them. If a train is delayed slightly, especially in relation to the last evening connections, there is no connecting bus.

However, these risks can be eliminated with modern technology, i.e. by creating a single sales and charging system[53] that can keep track of passengers on critical connections and provide information to the carriers' dispatch centres. Such a system would also be able to combine carriers' tariffs so that there is no increase in fare if two connections are used (a similar system has been rolled out by SAD Trenčín, thanks to which revenues have been maintained but the introduction of transfer tickets has lowered the number of passengers and extended the travel distance). ZSSK owns a similar system – the KVC railway booking and sales system, which can be expanded to include other lines without having to be programmed (a data model), can cope with sales of different sales models (kilometre-based fares, global prices for services, seat bookings), and already issues tickets for two carriers within the scope of public service obligations. This system has been expanded to include an electronic ticket module, which allows for the improved tracking of revenues for individual services and can also monitor a passenger's journey and respond if a connection is delayed. Last but not least, if sales are made via a uniform system, data can be collected for all modes of transport and this would help to improve the planning of transport serviceability and determine the need for subsidisation. Another effect of operating such a system

[53] Similar systems are up and running in Switzerland, the Netherlands and Denmark.

would be the lower cost of the various sales systems of individual carriers, and this would also help to bring down public spending. This sort of sales system also complies with EU requirements to promote mobility and public transport because it enables passengers to be issued with a single document at a single sales point.

Urban mass transit

Besides the role it plays in road transport in cities, open mass transit also acts as a downstream service for railway and scheduled bus transport services. In most cities, if they had no quality urban mass transit, the suburban services would also be unable to function efficiently because railway/bus stations and departure points/destinations are often not in walking distance of each other.

Annex 1: Missing/unavailable data

Table 27: Data that does not exist, or is not available at a sufficient frequency

Data	Responsible entity	Frequency proposed[54]
Surveys of (road) transport		
A national directional traffic survey of road transport in towns with populations of more than 5 000. (Partial surveys have been carried out for general transport plans)	SSC – to be conducted regularly (the last one took place in 2007) – at least 24/7, so that it is possible to aggregate data with the objective of daily, weekly and annual flows	To be clarified
More automatic traffic censuses in the road network	SSC – a need for the qualified and transparent typology of road sections, with a continuous year-round record for typical sections, by region, functional classes, the nature of the traffic and centrality (transit, urban, suburban, rule, recreational, etc.) – so that it is possible to aggregate data with the objective of daily, weekly and annual flows	Once per year
Local traffic surveys - Directional traffic surveys - Urban mass transit surveys	Required during the production of general plans for towns and regions, or as part of feasibility studies for (at least more major) projects	As and when required
Socio-demographic and economic surveys		
Data on the mobility habits of the population, collected by means of a uniform methodology for the whole of Slovakia, regularly and in sufficient detail (data are available for 2014 and 2015), periodic updates are required	Statistical Office (incorporate the necessary questions into the national census), or the authors of general plans (in both cases, effective checks by the client are anticipated)	Renew every 5 to 10 years, staggered by region (a different one each year)
Value of time (VOT) surveys and periodic surveys of the preferences of individual transport system stakeholders (the choice of vehicle) - Passenger transport - Freight transport	Statistical Office/external supplier	5-10 years
Vehicle emission classes – data from the toll system (the vehicle type and emission class)	Skytoll, NDS	
Travel time data		

[54] to be implemented depending on the availability of funding.

Table 28: Data that (at least partially) exists but needs to be analysed and processed into a suitable form

Job opportunities – distribution by actual place of work, not by the employer's seat + forecast
Other attractive features – (relative) values of the appeal of zones (municipalities, districts) for journeys for the following purposes: - official paperwork – convert the number of authorities by the significance and anticipated number of journeys generated - leisure – categorise areas in terms of visitor rates for POIs (cultural, natural) - shopping – analyse areas in terms of retail turnover or shopping frequency
Demographics – more detailed (districts, or define functional micro-regions) forecast of the shares of the different socio-economic groups of the population, not only the overall number of inhabitants, taking into account the place of their actual residence.
Production – forecast of the volume of industrial and agricultural output at least by functioning subregions
Motorisation – official scientific forecast of developments by district

Table 29: Data that exists, but is not available (even to the Ministry of Transport), that is held by the public sector or publicly funded organisations

Data	Responsible entity	Frequency
Long-distance and regional bus transport – (average) sales of tickets between zones (to a minimum aggregated extent)	Suburban bus transport operators	annually (the annual average, or the average for a typical transport period covering 1-2 weeks/a month)
Urban mass transit – (average) sales of tickets between zones (to a minimum aggregated extent)	Urban mass transit operators	annually (the annual average, or the average for a typical transport period covering 1-2 weeks/a month)
urban transport (road, cycling, pedestrian)	towns, municipalities (they exist for certain towns)	
Local data from the transport parts of land-use planning documentation	Local government bodies, required contractually with a definition of the conditions	

Table 30: Data that exists, but is not available, that is held by the private sector

Data	Responsible entity
Long-distance and regional bus transport – (average) sales of tickets between zones (to a minimum aggregated extent) + commercial regional transport services	Private carriers
Freight transport – the sites of freight transport points + number of vehicles	Private carriers, freight forwarders, association of carriers – ČESMAD (?)

(Long-distance) rail transport	Carriers

Table 31: Data that exists, is available to the public to a limited extent, only on demand, but could be available in a certain form online, or easily accessible for experts

Data	Responsible entity
Data from automatic traffic censuses on motorways and expressways	NDS, Granvia Operation, a.s.
Aggregated data from the toll system – the traffic intensity of freight transport	NDS
Detailed data from national traffic censuses	SSC
Data on the traffic accident rate	Slovak police force – available only on demand

This last set comprises insufficiently harnessed data that has been collected locally for a specific project, is available to the investor, and is not used for other relevant projects: data from service suppliers within the scope of studies and analyses (the Transport Research Institute), pricing companies, design companies (data from design documentation should usually be available to NDS, SSC, ŽSR).