

BENEFITS AND SOCIO-ECONOMIC COSTS RELATED TO THE CONSTRUCTION OF THE HIGHWAY S3 SECTION LINKING SZCZECIN AND GORZÓW WIELKOPOLSKI

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ABSTRACT

The condition and development of transport infrastructure together with its impact on economic growth and regional competitiveness are subjects raised in the economic studies. The fact being strongly pointed out is that the increasing regional competitiveness always has its microeconomic background. The key subject of this article is to show how the project implementation which is the construction of the highway S3 section linking Szczecin and Gorzów Wielkopolski brought significant socio-economic benefits not only for Zachodniopomorskie and Lubuskie regions but for the whole Polish transportation system.

Introduction

The highway S3 section linking Szczecin and Gorzów Wielkopolski is one of the main Polish roads together with the international E65 belonging to the national and European road network. This route connects the countries of northern Europe with the northern part of the southern Polish regions and further with the countries like the Czech Republic, Slovakia, Hungary, Croatia, Bosnia and Herzegovina, Montenegro, Kosovo, Macedonia and it leads to

Greece. The highway E65 being the bridge between western part of Poland and the southern Europe, it's of high importance for international transit and the national and local transport.

Built on the axis North-South, passing through Zachodniopomorskie and Lubuskie regions, the road starts with a junction in one of the quarters of Szczecin "Key" (two-level crossroad of the present highway with the existing one A6) and it ends before the junction "Gorzów North" (built for the western bypass of Gorzów Wielkopolski). The total length of this section is 81,613 km.

The part of the road S3 passing through the Zachodniopomorskie region is in 13% woody area and in 87% agricultural one, while in the Lubuskie region, the road passes through 64% of woody land and 36% of farming land).

Overview of the completed investments

Before building the new section of the highway S3, the national road No. 3 (DK3) was in use. The technical condition of the road was not satisfactory though, and in some parts, it was even inadmissible which resulted in serious speed limitation and there was a high risk of accidents for drivers and the population living in the villages nearby.

The overview of the new investment concerning the construction of the S3 segment Szczecin–Gorzów Wielkopolski englobed the construction of (Figure 1):

- a new part of the highway 81,613 km long with two double lanes,
- two-level safe traffic junctions – 4 pcs.,
- two-level crossroads with roads intersecting the highway,
- access roads,
- engineering objects along and above the highway (bridges, viaducts, passages for animals – 70 pcs.,
- passes and rain water sewer system,
- traveler service areas (ILO) – 10 pcs.,
- highway maintenance circuit (OU),
- environmental protection equipment (artificial noise barriers, protective greenery separators),
- lighting of the nodes,
- traffic safety equipment (guardrails, fences, signs),
- emergency communication system.

Furthermore, the project includes the reconstruction of existing roads linked to the highway S3 in question.

The construction was held simultaneously on three levels:

- step 1: Klucz–Pyrzyce 28.2 km long (from Feb. 18, 2008 – opened May 26, 2010),
- step 2: Pyrzyce–Myślibórz 26.7 km long from 11 October 2007 – opened on Oct. 22, 2010),
- step 3: Myślibórz–Gorzów Wielkopolski 26.7 kilometers long (from late February 2008 – till December 30, 2010).

The highway S3 was directly linked with the existing communication system by the construction of four two-level grade separated road junctions allowing the safe in and out of the highway.

At the intersections of the highway with other national, regional and municipal, there are two-level grade-separated crossroads blocking the access to the highway by placing the engineering objects above or under it.

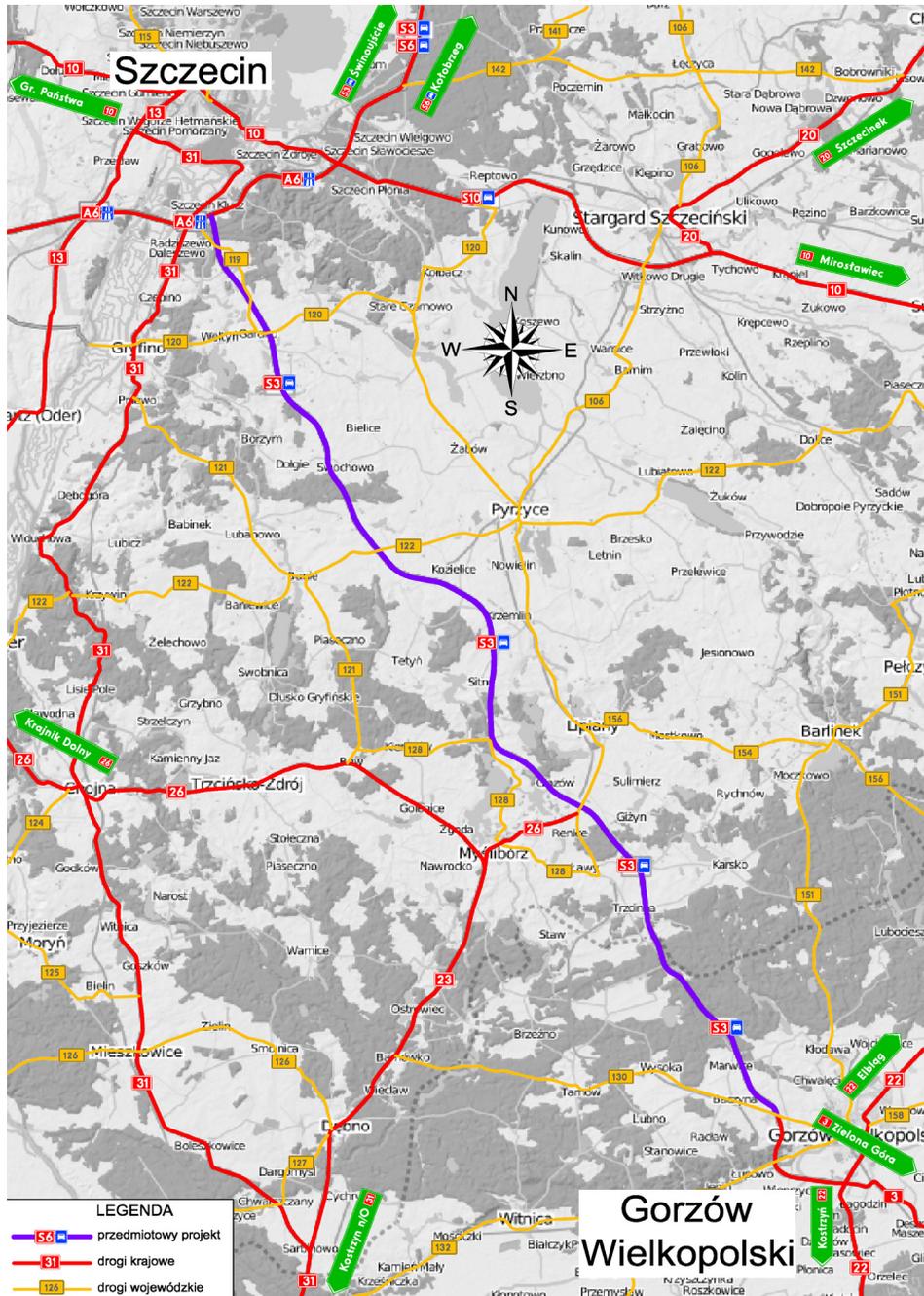


Figure 1. The plan of the highway S3 from Szczecin to Gorzów Wielkopolski

Source: Aktualizacja analizy kosztów... (2012), p. 5.

In the constructed section, there are ten various traveler service points (MOP), only on disposal of highway users. Type I ILO – with a recreational points with car parks, maneuvering areas, recreational equipment, sanitary and lighting equipment and small catering facilities are allowed. Type II ILO – leisure – service points, equipped as the I ILO and with gas station, auto repair services, restaurants and shopping. Type III ILO – leisure-service points, same as the II ILO including hotels, post offices, banks, tourist offices.

For technical road service, there is also one highway circuit maintenance (OU) located at the junction “Pyrzyce” (daily maintenance of the highway and its equipment, the technical supervision over its renovation, organization and traffic control, removing the damage from road accidents and others.

Environment protection

The investment didn't cause any changes and it didn't influence the way of cultivating the land being close proximity of the highway, due to the fact that the road goes through woody and agricultural areas and these are of rural communities excluding large towns and villages.

The road isn't an obstacle for utility reservoirs ground waters and their intakes. It doesn't cross the main groundwater reservoirs that need to be protected. Special measures were taken to protect the waters locally and the surface dehydration of the road lane through bilateral grassy roadside ditches with transversal partitions.

The conducted research and traffic forecasts showed that the concentration levels of air pollutants around the analyzed road section shall not exceed the level predicted for this type of roads. In order to diminish the negative impact of the investment on air pollution protective green belts have been planted along the road lane, which are to reduce the pollutants emitted by the passing cars.

The impact of the highway on the level of emitted noise is not negative, mostly because of the fact that the area around the route S3, for discussed section, is mostly agricultural and woody, while the residential buildings are located generally several meters from the road. To reduce noise, the green belts were set up as passive protection for the buildings and the acoustic screens as an active one.

We should underline the fact that considerable expenses were born to let the animals run safely between the animal habitats that crosses the national road S3 and the discussed section. The passes were built for bigger animals and smaller ones like amphibians and gate crossing for bats. It can be easily stated that the constructed highway is a real “green road” because it meets all EU standards in this matter.

Socio-economic benefits and costs related to the construction of the route S3

The socio-economic benefits related to the investment can be classified in two groups, measurable and immeasurable one. In the group of **measurable benefits**, according to the level of the realization project studies, we include:

1. Reduction of the travelling time for car users – the calculations were made for the capital and non-capital variant. The difference of travel time between the two variants is the social benefit related to the construction of the road. The non-capital variant is the “old” national road No. 3 (Szczecin–Renice–Gorzów Wielkopolski.) and the capital variant is the travel time spent on the new highway. The average travel time from Szczecin to Gorzów Wielkopolski was reduced after the realization of the investment:
 - for cars and buses about 40,47 minutes, by 42.7% in comparison to the non-capital variant,
 - for trucks about 46,05 minutes, by 43.3% in comparison to the non-capital variant.

2. Reduction of the number of cars using the ancient routes (traffic concentration) – the comparison of the traffic on existing roads was made in the non-capital and capital variants.
3. Increase of the traffic safety (decrease of the number of road accidents), which means the reduction of socio-economic costs of road accidents. The accident forecast related to the traffic concentration and type of the road was used to calculate the impact indicator which reflects the reduction of the number of road accidents. The comparison of the forecasted number of accident in the non-capital and capital variant was made.
4. Vehicle operating cost savings – vehicle operating cost savings were calculated for five groups of vehicles (cars, vans, trucks without trailers, trucks with trailers and semi-trailers and buses) estimating the transport work in the area of investment.
5. Reduction of exhaust emission – the emission costs related to the road traffic nuisance on the environment have been determined in the feasibility studies and based on the calculation formulas and unit costs presented in the Blue Book (see *Blue Book, The railway sector. Infrastructure and rolling stock*, Jaspers December 2008). The annual emission costs for respective years of time fence in non-capital and capital variants were calculated on the basis of transport work.

According to the road manager, GDDKiA, the measurable benefits are the revenues from the investment project, it means:

- road tolls for trucks,
- the lease of the ILO,
- sharing road lane for advertising purposes

From the point of view of the users of the infrastructure (individual users and road transport companies), the main benefit from the construction of the highway S3 section is the reduction of the travel time driving from Szczecin to Gorzów Wielkopolski. The savings related to vehicle utilization and exhaust emission are also taken into account but they are not indicative factors due to the small distance between those two cities.

The increase of the competitiveness of transport companies can be viewed in relation to the passenger transport and freight services.

For the passenger transport, the comparison is made in relation to the time and the ticket price for bus, minibus, regional trains, as shown in the Table 1. The railway connection Szczecin–Gorzów Wielkopolski is only possible via Kostrzyn or Krzyż. There are no direct regional trains. The change is obligatory.

As the table above indicates the road travel time is much shorter than rail one. Despite the similar bus and regional train fares, the longer travel time by train becomes unattractive for travelers even if the price of a monthly pass is much lower. The same case is for the minibus journeys. Its longer travel time (shorter than with the regional train though) is compensated with the low fare.

We must also take into account the fact that people travel also with private cars. In this case, the average journey (in normal traffic conditions) takes around 40–50 minutes, and the economic efficiency of the individual transport increases respectively with the number of travelers being at the same time in a car.

For freight services, mainly general cargo, the offer of road carriers had already been attractive for price and time consuming before the construction of the S3 section. Reducing the travel time made the offer more and more interesting.

Table 1. Ticket prices and travel time by bus, minibus and train in the Szczecin–Gorzów Wielkopolski

	Bus		Minibus	Train REGIO			
	journey via S3 – distance 101 km		Partial journey via S3 – distance 130 km	Journey with change (approximately 20 min.) Kostrzyn – distance 144 km		Journey with change (approximately 30 min) Krzyż – distance 186 km	
The travel time [min.]	90		125	180		190	
Ticket price [PLN]	single ticket	monthly pass	single ticket	single ticket	monthly pass	single ticket	monthly pass ticket
	25.00	640.00	15.00	25.50	324.00	29.10	324.00

Source: own calculations based on timetables and pricing of the websites of PKS Gorzów Wielkopolski. (<http://www.pks-gorzow.pl>), the minibus transport KRAJAN Jan Krawczuk (<http://www.krajanbus.pl>) and the Regional Railway Transport Company Przewozy Regionalne (<http://www.przewozyregionalne.pl>).

Analyzing the benefits related to travel time reduction after the construction of the highway S3 section linking Szczecin and Gorzów Wielkopolski it is also worth seeing that this fact impacted the local railway network in that area mostly the lines Pyrzyce–Chwarstnica–Gryfino, Pyrzyce–Myślibórz and Gorzów Wielkopolski–Myślibórz. These lines were cancelled in the past. Any passenger or cargo train wasn't served there. Unfortunately, the construction of the highway finally was decisive that those lines would never be reactivated for transportation because the railway services wouldn't bear competing with the road transport with the new road network.

The projects costs include in first place the **investment costs** and secondly the **operating costs** which will be effective in the following years:

- renovation costs and maintenance of infrastructure costs,
- toll collection system costs.

The estimated profit and loss statement enclosed to the feasibility studies within the financial analysis showed that economic efficiency indicators of the investment mark its unprofitability. With the incremental cash flow method applied, the following financial ratios were calculated for the financial efficiency of the investment (without community help): FNPV/C = –2,578,057,592 PLN. The negative cash flows are visible for every period of the project. This is typical for public infrastructure investments co-financed by EU as it's the case this time as well. The results obtained permitted to apply for EU funding the qualified project costs of the project.

Total investment cost of the construction of the S3 section Szczecin–Gorzów Wielkopolski. Was **2,307,000,000** PLN. The amount of **1,753,378,093** PLN was contributed by EU within the Cohesion Fund (funded in 76%).

The socio-economic analysis including the tangible economic benefits together with the costs and profits showed that the implementation of the investment is fully justified economically (economic net present value ENPV = 2,202,741,615.20 PLN, the economic internal rate of return EIRR = 11.07%, benefit – cost ratio BCR = 2.14), and the biggest contribution of the benefits are cost savings linked with the travel time of the vehicle users.

Together with tangible benefits, the **intangible ones** resulting from the implementation of the investment are identified, such as:

- improvement of regional road system by managing the main transit traffic on the north-south axis,
- increase of employment (in the urban zone of Szczecin), thanks to the better mobility of the population,
- Linkage of the highway S3 with the A2 one, and in the future with the highway A4 which will connect the port Szczecin–Świnoujście Lower and Upper Silesia region,

- construction of the highway S3 connect better the voivodship Lubuskie with the seaside, a very important element for costal municipalities as it builds up the tourist industry in the Lubuskie region itself and in the Lower Silesia as the host region,
- improve the competitiveness of the Szczecin and Gorzów regions both maintaining the relations with the other polish regions and the cross-border ones of our neighbour Germany,
- improvement of the capacity of the main international road network systems in Poland.

Conclusions

The analyzed profit and loss statement shows that the construction of the highway S3 between Szczecin and Gorzów Wielkopolski provides the positive feedback about the socio-economic regional development of road infrastructure in relation to the high competitiveness of the enterprises implementing road passenger and freight transport. In Polish reality, even without coherent highway network yet, every new investment generates similar benefits on the micro level (the operators and the individual users), the mezzo (the regions) and the macro (the national transport system).

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