

## **Evaluation of Socio-economic Impacts of Incidents on the Railway Infrastructure**

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### **1 Introduction**

The paper focuses on presentation of partial results of the research concentrating on the evaluation of benefits associated with increasing safety and reliability of the railway infrastructure. Improvement of safety and reliability is anticipated in particular by the implementation of suitable safety systems into the railway infrastructure to prevent the occurrence of incidents. The research outputs presented in this paper are mainly focused on the evaluation of economic impacts of the incidents. The research is based on the analysis of the database of incidents, provided for the purpose of the research by the Railway Infrastructure Administration (SŽDC), within which the incidents registered for the period 2011–2018 are divided into various sub-categories. Within the framework of the paper, the number of relevant categories is reduced solely to those categories of incidents which occur on the railway infrastructure and for which it can be assumed that they can possibly be prevented by previous implementation of suitable track or station signalling systems. The research does not take into the account the accidents at the level crossings.

### **2 Methodology**

The subject of the research presented in this paper is to define methodological steps for evaluating the impacts of incidents on the railway infrastructure.

This paper evaluates especially the following characteristics of incidents:

- Impacts on health,
- Delay of passenger trains; and
- Delay of freight trains.

### 3 Results

Interim research results are presented on a case study. The case study includes the determination of the average impact of an incident of a defined category on the railway infrastructure. The case study shows the procedure for determining the average economic impact of an incident occurring on the railway infrastructure. It is evident from the results that the average economic impact of one A1 incident is CZK 19,402,501.57. This procedure can be applied at other cases of incidents listed in the Methodology chapter. The subject of further research is supposed to be the calculation of the average economic impacts of other categories of incidents, this calculation will be further refined by dividing the railway infrastructure into regional or national lines, where the average economic impacts of incidents on a regional line may be different from those on the national lines especially with regard to train occupancy or the level of security on the railway line.

### 4 Conclusions

The paper has been elaborated within the research project focused on taking into account the benefits resulting from increasing safety and reliability of the railway infrastructure in the economic evaluation of railway infrastructure projects. Specifically, the paper deals with identification of methodology for the evaluation of impacts caused by the occurrence of incidents on the railway infrastructure. The evaluation methodology is based on common principles of economic analysis of public investment projects and is based on data provided by the Departmental Methodology and data from the database of incidents. The proposed methodology includes, in particular, impacts on the health or lives of casualties involved in an incident, impacts in the form of delays of passenger and freight trains and impacts in the form of material damage and costs. The proposed methodology has subsequently been verified on a case study of the category A1 emergency. Follow-up research is supposed to include also an evaluation of other incidents that may potentially arise in the context of a lack of security and which could be prevented by the possible prior implementation of the new security systems.

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