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IMPLEMENTATION OF THE COMMON SAFETY METHOD IN THE EUROPEAN UNION RAILWAY TRANSPORTATION

Summary. Change management is considered to be an important element of safety management systems, lack of which can lead to industrial accidents and disasters. Therefore, risk management related to changes introduced to the railway system has become one of the processes covered by regulations aimed at harmonising the rules of railway transport in the whole European Union (EU). This article presents the results of a comparative analysis of available source materials in terms of determining the manner and level of implementation of EU-wide rules for risk management related to introduced changes. The analysis was based on data from five selected EU Member States. A common issue raised in practically all of the reports analysed is the lack of detailed definitions of terms such as significant change, insignificant change, the impact of change on the safety of the railway system. Attempts to solve this situation have been specified by us and evaluated from the viewpoint of safety engineering.

Keywords: change management, safety management system, railway undertaking, railways

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1. INTRODUCTION

The main document regulating the railway system safety at the level of the entire European Union (EU) is the Railway Safety Directive 2016/798 (RSD). It states that 'safety should be generally maintained and, when practicable, continuously improved, taking into account technical and scientific progress, and the development of Union and international law', which is to be achieved using common targets, indicators and methods of safety in rail transport. The RSD clearly indicates that the responsibility for the safety level of the railway system rests with infrastructure managers and railway undertakings (carriers), without excluding entities cooperating with them, such as producers, maintenance entities, disposers, service providers and sub-suppliers. To analyse the data collected and evaluate the progress achieved, in 2004, the European Railway Agency was established, which in 2016 was replaced by the European Union Agency for Railways.

Common Safety Targets (CST) set the limit values of certain indicators defining the level of safety, both of the railway system as a whole and of individual aspects of its functioning. Achievements of specific EU Member States in the implementation of CST are indicated by the EU Railway Agency, based on the so-called National Reference Values (NRV) for each Member State. Each EU Member State is obliged to constantly monitor the safety level of its part of the EU rail system, both in achieving CST and calculating values of Common Safety Indicators (CSIs). These indicators form a set of data describing the safety level of the railway system in a given EU Member State, and also provides information about this system and its economic conditions, for example, about the costs of delays.

Common Safety Methods (CSMs) are defined as methods that should be developed to describe ways of assessing the level of safety and meeting the requirements in this regard. It could be achieved by developing and defining guidelines for:

- risk assessment methods.
- methods for assessing compliance with requirements in safety certificates and safety authorisations.
- methods of monitoring the level of achieving the assumed level of safety.

One of the areas that was decided to unify within the entire EU was the process of introducing changes to the railway system, and in particular – the process of managing the risk of hazards related to changes. Change management is considered to be an important element of safety management systems and the lack of which, according to Takeda et al. [12], is one of the main causes of accidents. This opinion is also shared by Gerbec [6] who believes that changes in safety management systems carried out in an uncontrolled manner have caused many industrial accidents and disasters. He also indicates along with Levovnik [11] that problems related to correct change management in safety management systems are hidden, and change management itself is more important for safety than is considered in the industry and scientific literature. At the same time, safety management systems must be adapted to the dynamics of continuous changes, the intensity of which has never been as great as it is today.

Change management in the railway system is a topic much researched by many authors. However, these are rather works focusing on presenting the binding formal and legal requirements [1, 8] or the role of assessment bodies [9], less frequently concern the application of change management in practice [2, 7, 13].

The purpose of this article is to analyse available materials in terms of determining the manner and the level of implementation of EU-wide rules for managing the risk of hazards

related to introduced changes. Section 2 describes the relevant regulation and the source materials used. Section 3 presents the information obtained in the course of analysis with reference to several selected EU Member States. The comparison of this information, their discussion and the conclusions from it are described in Section 4.

2. MATERIALS AND METHODS

2.1. Common Safety Method for risk assessment and evaluation in rail transport

One of the documents belonging to a set of Common Safety Methods is a regulation commonly referred to as 'CSM RA' (Risk Assessment). It was adopted at the European level in the form of Regulation 352/2009 and then replaced with a new version via Regulation 402/2013, that has been partly changed and completed two years later. In these documents, the term 'safety' is understood as 'freedom from unacceptable risk of harm'.

The aim of the CSM RA is to harmonise the activities of entities operating on the railway market in the following areas [2]:

- risk management processes, including obtaining risk-related evidence.
- exchange of safety-related information between various railway undertakings.

In the CSM RA for the first time, the concepts of significant change, technical change, operational change, and organisational change, but their detailed definitions were not given. The use of the CSM RA is mandatory for railway undertakings, infrastructure managers and entities in charge of maintenance. Other entities may use the CSM RA as part of good practices. The following stages of risk management according to the CSM RA can be listed:

- analysis of the significance of change.
- risk management process.
- independent assessment.
- risk supervision and audits.
- monitoring and feedback.

Changes of operational, technical and organisational nature (if they have an impact on safety) are assessed according to the criteria specified in the CSM RA. It is recommended to start activities related to risk management at the earlier stage of developing the change. At the beginning of the process, it should be assessed whether the change has an impact on safety. If there is no such impact, no detailed assessment according to the CSM RA is needed and the change can be implemented into the railway system.

If the change is considered to have an impact on safety, it should be determined whether it is significant or insignificant. The CSM RA provides for the possibility of applying national provisions that determine the significance of a change. If no national rules have been established, the criteria listed in the CSM RA are used to indicate the significance of the proposed change in the system:

- consequences of system failures: a credible worst-case scenario in the event of failure of the system under evaluation, taking into account the existence of safety barriers outside the assessed system.
- innovation used in the implementation of the change: both for the entire railway sector and for the entity introducing the change.
- the complexity of change.

- monitoring: inability to monitor the change introduced during the entire system life cycle and to perform appropriate interventions.
- reversibility of change: inability to return to the system before the change.
- additionality: assessment of the significance of the change, taking into account all recent changes in the system under consideration, which were related to safety and were not considered as significant.

If the change is considered significant, the next step is to assess the risk of hazards related to the introduction of changes in the railway system and then to determine how to respond to the risk, including its monitoring.

If the change is considered significant, the assessment of the adequacy of the risk management process carried out with the requirements of CSM RA is performed by independent Assessment Bodies (AsBo). It is worth adding that AsBo should not assess the substantive scope of the change (for example, its justification), but focus only on the assessment of compliance of the carried out and documented risk management process with the requirements of the CSM RA.

2.2. ERADIS database

The EU Railway Agency publishes data on the railway safety and interoperability in a specially prepared on-line database ERADIS (European Railway Agency Database of Interoperability and Safety) [4]. In the ERADIS database there is, for example, information about the national safety authorities, competent in matters of railway transport in a given Member State, or about safety certificates issued to railway undertakings. The database also publishes annual reports on railway transport which every EU Member State is obliged to send to the EU Railway Agency every autumn. An obligatory part of the report is information on the use of CSM RA in two areas:

- experience of national safety authorities.
- feedback from railway entities.

As part of the research works described here, an analysis of the content of the 2016 reports published in the ERADIS database by five EU Member States: Belgium, Czech Republic, Germany, Italy and Poland, was carried out. Data on the length of railway lines and transport performance in the analysed Member States were presented on the basis of Common Safety Indicators provided by these States, available in the database [5, 10].

3. RESULTS

3.1 Belgium

In 2016, about 97.1 million train-kilometres was performed in the Belgian railway system, of which over 80% was for passenger transport. The Belgian Safety Authority issued 21 safety certificates. The function of Entities in Charge of Maintenance was performed by 5 organisations [4]. The length of railway lines is 97,105 km. Two organisations perform the functions of AsBo – Belgorail SA and Viattech Q&S.

The Belgian Safety Authority emphasises that the change proposers do not pay sufficient attention to the analysis of interfaces with other actors of the railway system. The second

aspect to which attention is drawn is the weak argumentation of the proposers regarding the significance of the changes they evaluate. The idea of developing a list of generic changes that should be treated as significant in the three railway subsystems (rolling stock, infrastructure and railway undertakings) is now under consideration.

3.2 Czech Republic

In the Czech Republic, 117 safety certificates for railway undertakings were issued and 34 entities acted as certified Entities in Charge of Maintenance of freight wagons. In addition, 7 organisations are entitled to act as AsBo. The length of Czech railways, one of the densest in Europe, is 162,000 km.

The Czech Safety Authority requires applicants to attach safety assessment reports to changes affecting safety and to be assessed in accordance with the CSM RA. In this way, the supervision over the quality and level of correctness of results generated by the AsBos is carried out.

In the Czech Republic in 2016, a total of 104 changes was reported. As in Belgium, the National Safety Authority had doubts about the correctness of the results of the change assessment. Proposers were requested to state whether the implemented changes were safe. Based on the statements sent, the changes were divided into the following groups:

- organisational changes that do not affect the operation and maintenance procedures changes to the railway system that do not affect safety.
- changes to the railway system that affect safety, but are insignificant.
- railway system changes, which are significant (in this case the application should have been accompanied by a safety assessment report).

There are independent safety assessors in the Czech Republic who evaluate safety assessment reports. They are appointed by the National Safety Authority.

3.3 Germany

Railway transport in Germany is second in terms of transported goods, just after road transport. According to data from 2016, the length of German railway lines is about 1,066,477 km. There are 10 independent AsBos in this country. Altogether 99 safety certificates were issued, and 82 entities act as Entities in Charge of Maintenance.

In Germany, it is noted that there are no exact definitions of the terms; change and significant change. The safety impact criterion, which has also not been precisely defined in the CSM RA, leaves companies with considerable leeway in making decisions regarding the use of the CSM RA in its full extent. At the same time, the feedback from entities shows that they do not have a full understanding of the CSM RA method and change management.

3.4 Italy

In Italy, 67 security certificates have been issued. Fourteen companies act as Entities in Charge of Maintenance and there are 6 AsBos. The railway lines operated in Italy have 373,461 km in length.

Compared to the other EU Member States, in Italy, like in the Czech Republic, independent safety assessors dedicated to CSM RA are active.

One of the producers operating in Italy, Bombardier, emphasises that it identifies difficulties in dealing with clients due to the lack of awareness and knowledge regarding the use of CSM RA. Bombardier points to a significant lack of uniformity in the application of the CSM RA at the national and international level, in particular in the case of rolling stock.

In 2016, 531 changes were introduced in Italy, of which 51 were considered significant. Most of the changes were rated as operational (39%) or technical (33%), and organisational changes accounted for about 17% of all changes. No information was given on the type of the remaining 11% of changes. Changes made by the manufacturer were technical in nature, related to changes in vehicles and integration control within the railway system.

The inspections of management methods and evidence of the use of CSM RA by rail entities in 2016 found that the CSM RA was not applied in an appropriate manner, in particular with regard to risk reduction measures. Despite the fact that the results are better compared to 2015, due to the interest and greater awareness of the issue, there is still room for improvement in the way the CSM RA is applied.

3.5 Poland

In Poland, 198 safety certificates were issued, and 62 organisations have the status of a certified Entity in Charge of Maintenance. In addition, there are 7 AsBos. The length of railway lines is 234,298 km.

In 2017, 1,068 changes were made to the railway system. Most of them (515) by infrastructure managers. Up to 50 changes were introduced by railway undertakings and Entities in Charge of Maintenance. Over 1000 changes were considered insignificant and only 37 were qualified as significant changes.

4. DISCUSSION AND CONCLUSIONS

In order to harmonise the approach to issues related to the safety of rail transport, a number of common tools have been introduced across the EU. One of them is the CSM RA – a risk management procedure related to changes introduced to the railway system. Monitoring of compliance with this procedure was entrusted to the National Safety Authorities, which annually publishes reports containing information on the implementation of the CSM RA in their part of the EU railway system.

The structure of reports developed by the National Safety Authorities is defined in EU legislation, but the exact scope presented in the actual reports prepared by the Member States is very different. In some cases, for example, in the Belgian report, it is limited to a few sentences describing the position of the Authority, some subsections are even left empty. Other reports, for example, the Polish authority, also contain numerical data regarding the number and types of implemented changes.

A common issue raised in practically all of the reports analysed is the lack of detailed definitions of terms such as significant change, non-significant change, the impact of change on the safety of the railway system. There are indications of interpretation problems that make comparable changes in different entities treated in different ways. At the same time, some Safety Authorities (for example, German) complain about the lack of legal grounds to impose their own understanding of the key terms. As an alternative to administrative solutions, therefore, there are supporting activities, for example:

- elaboration of lists of typical significant and non-significant changes.

- training for entities operating on the railway market.

These activities are the result of the adoption of two different regulatory strategies for safety management [3]. The first one assumes that the answer to the problems related to the application of CSM RA is the introduction of subsequent procedures that will clarify the existing provisions and allow for the unambiguous assignment of the proposed change to one of the categories – significant or insignificant changes. This facilitates the supervision performed by Safety Authorities and also stabilizes the operating conditions of, for example, rolling stock manufacturers, which can repeat their actions for each subsequent type of vehicle.

On the other hand, however, rigid lists of significant and insignificant changes may also have negative effects, especially in the light of large fragmentation of entities operating on the rail market in a given Member State. An analogous change introduced in a large entity may be insignificant, but in the case of a smaller carrier, it will require, for example, the creation of an additional position and should be analysed in a more accurate manner. The introduction of lists removes responsibility for decisions made by entities, although according to EU law, it is them, and not the National Safety Authority, that are actually responsible for the safety level of the EU railway system.

In summary, the assessment of change in accordance with CSM RA is a difficult issue for many Member States of the EU and, despite the issuance of a variety of guidelines, it still causes a lot of difficulties for entities obliged to use it. Therefore:

- further steps should be taken to simplify the use of CSM RA, but in a way, that real decision making remains at the level of entities operating on the rail market.
- it is worth getting to know and evaluate ideas implemented in the other Member States, such as the appointment of dedicated safety assessors in Italy and the Czech Republic.

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