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**Improving the safety of railway transport by changing the system
of examining and monitoring drivers**

Abstract: The article presents the most important aspects of changes in the training and examination system for candidates for train drivers and train drivers, which will enter into force on January 1, 2023. First, the system currently in force in Poland is characterized and its basic disadvantages are indicated. Then, the scope of legal changes resulting from the amendment to the Act on Rail Transport is described, which will lead to the separation of training and examination processes, and, as a result, to improvement of the efficiency of these processes. The article also presents the scope of activities of the currently built Center for Examination and Monitoring of Train Drivers, which will function at The Office of Rail Transport and will be equipped with modern simulators.

Keywords: Train driver; Training; Examination; Simulator

Introduction

The safety of rail transport depends on many different factors, which can be divided into two main categories: technical and human.

In the past, the fundamental importance of ensuring the security of complex systems was attributed to technical factors, but the very rapid technological progress and the increasing reliability of technical means meant that today the weakest link in such systems is a man. Even in the case of advanced automation of some processes, which is usually introduced to reduce the occurrence and potential effects of human error, human misconduct can lead to system destabilization. This was noticed first in areas that require the highest security regimes, such as nuclear energy and aviation. Knowledge from these industries is increasingly used in other areas, including rail transport.

The impact of the human factor on the safety of the entire railway system depends to a large extent on the level of training of its staff, including both "hard skills" related to qualifications and competencies as well as "soft skills" related to interpersonal relations and the ability to communicate properly. In particular, this applies to persons directly related to

railroad traffic. In turn, in this group - in terms of the entire system - train drivers play a very important role.

The old model of the system of training and examining train drivers, which is still in force in Poland, does not ensure the proper separation of these two processes, which negatively affects their effectiveness. Almost as a rule, both the quality of training and the reliability of exams are at risk, and the additional pressure resulting from the growing market demand for new employees and the need to recruit people from retraining (without well-established railway knowledge) intensifies the threat and its impact on the safety level of the railway system. As a response to the indicated problems, from January 1, 2023, new rules for examining candidates for train drivers and train drivers will come into force, the general shape of which is presented in the article.

General characteristics of the existing train driver training and examination system

Train driver license and certificate

The rules for obtaining the license to practice as a train driver in the European Union are regulated by Directive 2007/59/EC of the European Parliament and the Council [1]. Pursuant to this Directive, all train drivers in the European Union must have health conditions as well as qualifications and competencies necessary to drive trains, confirmed by having two documents, i.e. a train driver's license and certificate.

The train driver's license, valid throughout the territory of the European Union, confirms that the train driver meets the minimum requirements in terms of health conditions, basic education, and general professional skills. The President of UTK keeps a register of licenses in electronic form, containing data on the license holder, its status (valid, suspended, revoked), and its history, as well as the fulfillment of basic requirements by the license holder (e.g. health) to maintain its validity.

The train driver's certificate indicates the type of infrastructure within which its holder may drive railway vehicles as well as the types of railway vehicles that he is authorized to drive. By definition, therefore, the validity of the certificate is limited only to the infrastructure and types of vehicles indicated therein. The register of train drivers' certificates is kept in electronic form by the railway undertaking or infrastructure manager. The register includes, among others: numbers of train driver's certificates, information on their status, personal data of train drivers, data on railway undertakings, categories and subcategories of certificates, the scope of authorizations in relation to the area of infrastructure, and types of railway vehicles, information on authorizations contained in certificates and results of knowledge and skills tests of train drivers.

The condition for obtaining a train driver's license as well as a train driver's certificate is the completion of appropriate training and then passing the required exams with a positive result. In this respect, the European Union law imposes only a general requirement that there should be no conflict of interest in the process of examining candidates for train drivers. This is described directly in Art. 25 sec. 2 and 4 of Directive 2007/59/EC.

In practice, the requirement formulated in this way does not properly protect against the lack of objectivity and reliability of the examinations conducted, because it does not exclude the examiner from an entity that has an interest in employing an employee.

Training and examination centers

The education of railway staff, including candidates for train drivers, is carried out in training and examination centers, which are entered in the register kept by the President of UTK. The activity of the centers is carried out according to the provisions of the Railway Transport Act [3] and the Regulation on Training and Examination Centers for Train Drivers and Candidates for Train Drivers [5].

Training and examination centers employ instructors who conduct training and examiners who must demonstrate the competencies specified in the above-mentioned regulation in the fields of professional experience, education, training completion, and knowledge of the Polish language. At least once a year, the center is obliged to organize consultations for instructors and examiners performing the tasks of the center.

Training is conducted per the training program specified in the regulation on the train driver's license [6] and the regulation on the train driver's certificate [7], respectively. Importantly, each training and examination center must provide the possibility of conducting training using a railway vehicle simulator.

The most important issues in the existing system of examining train drivers

An important organizational problem in the railway transport market, which indirectly affects the safety of the railway system, is the existing generational gap in the train driver profession. According to the data of the President of UTK from 2019, the largest group is train drivers aged over 55 (4,401 people, i.e., approximately 26% of the entire professional group). It is estimated that in the next 10 years, about 7,000 employees will be able to leave the profession, which means almost 42% of professionally active train drivers. The need to fill this gap requires the recruitment of a large group of young people to the train driving profession as soon as possible, which creates time pressure felt especially with railway undertakings. At the same time, the entire process of training new staff, and then verifying their knowledge and skills (i.e., examining them) should be conducted in such a way as to ensure that employees admitted to the profession will have knowledge in the field of operation of railway vehicles and knowledge of railway regulations to the extent that allows them to independently and safely perform work in railway traffic. Therefore, one of the necessary actions is to significantly reduce or eliminate the existing threats to the safety of the railway system, which appear at the stage of obtaining qualifications to drive railway vehicles (train driver's license and certificate) by candidates and then in the area of monitoring their qualifications and the course of their professional work. The most important risks associated with the above aspects are presented in the following paragraphs.

Insufficient reliability of exams (unproven correlation between the exam result and the level of knowledge and skills of the examinee)

The analyses conducted by the President of UTK based on exam applications and their results in 2016–2019 show that there is a large group of training and examination centers where the pass rate is 100%. This disturbing trend is supported by the growing number of centers for training and examining train drivers that operate based on freedom of economic activity and are focused mainly on economic results. Moreover, some training and examination centers are established by railway undertakings for their own needs. The high passing rate in these centers may be the result of more lenient treatment of candidates for train drivers by examiners and interest in the faster and trouble-free introduction of a new group of train drivers to the profession (in the face of an increase in freight turnover and shortages in the employment of train drivers). The economic pressure caused by the lack of train drivers on the market may contribute to lowering the examination requirements for candidates. It should be noted, however, that the necessary systemic changes should not be aimed at lowering the pass rates. Their effect should rather be to confirm that the persons who pass the exam with a positive result have the necessary knowledge and skills to safely drive railway vehicles.

There is no uniform standard for exams

The existing legal regulations only define the thematic scope of the exam and the general substantive content of the exam questions, but there is no uniformly detailed database of specific questions. The lack of standardization of questions in the exam means that even after candidates for train drivers pass the exam with a positive result, the level of their knowledge

and skills is not always at a similar level. This is particularly important in the case of the train driver's license exam, where the level of basic knowledge of rail transport issues should be the same for all license holders.

Failure to ensure the impartiality of the examinations conducted

In the current legal status, the examiner's obligation to submit a declaration on conducting examinations in an impartial and non-discriminatory manner is, in the opinion of the national security authority, an insufficient solution. This is due to the simple fact that persons employed in one entity can simultaneously educate and verify the level of education of candidates for train drivers, thus becoming "judges in their case".

Previously unverified ability of a train driver candidate to act correctly in dangerous and unusual situations

During the practical part of the exam, conducted in normal operating conditions, there is a low probability of a potentially dangerous situation for railroad traffic. In the current legal system, the ability of a train driver candidate to react correctly in such a situation is not properly verified beforehand.

Lack of an effective tool for managing the common risk of railway undertakings and infrastructure managers in the area of competencies and authorizations of drivers and drivers of railway vehicles

In the current legal status, there is no electronic centralized register of persons driving railway vehicles, train drivers, and candidates for train drivers. There are several distributed databases maintained by the President of UTK, the Railway Labor Medicine Centers, railway undertakings, infrastructure managers, and other railway entities. Legal and organizational constraints related to data dispersion prevent railway undertakings and infrastructure managers from fulfilling their risk management obligations referred to in the Railway Safety Directive [2].

New system of examining train drivers

Change of legal conditions

In 2021, the Act amending the Railway Transport Act [4] was announced, in Art. 13.1 sec. 1a) point 1b) granted the President of UTK new powers to conduct examinations for candidates for train drivers applying for a train driver's license (hereinafter referred to as the "train driver's license examination") and for candidates for train drivers applying for a train driver's certificate (hereinafter referred to as the "train driver's certificate examination").

Further, under art. 13.1 sec. 1a) point 5), the competencies of the President of UTK will include supervision over training centers for train drivers and candidates for train drivers, hereinafter referred to as "training centers", and entities authorized to conduct medical exams and check the fulfillment of health, physical, and mental requirements necessary to obtain a train driver's license and train driver's certificate, as well as to maintain their validity. It is important to change the previously functioning "training and examination centers" into "training centers", which is of course the result of UTK taking over competencies in the field of conducting examinations.

According to Art. 13.1, sec. 1a, point 5a), the President of UTK will also be obliged to keep and update the register of training centers (probably created based on the existing register of training and examination centers) and the national register of train drivers and railway vehicle drivers.

The discussed statutory changes are to come into force from 1 January 2023, and the exams for the train driver's license and first certificate will be carried out in the Train Driver Examination and Monitoring Center, which is currently under construction, which will be an organizational unit within the structures of the Office of Rail Transport.

Center for Examination and Monitoring of Train Drivers

The Train Driver Examination and Monitoring Center will include:

- two examination rooms, allowing up to 75 people to examine the theoretical part of the train driver's license and certificate exam per day (in which the theoretical part of the train driver's license and certificate exams will be held);
- three simulators of railway vehicles, with characteristics including a locomotive, a traction unit, and a special vehicle or a locomotive with a 360° field of view, equipped with unified dashboards, under generally applicable requirements regarding ergonomics and the correct arrangement of instruments, in particular with technical specifications for interoperability for locomotives and rolling stock passenger (TSI Loc&Pas). This will ensure reliable, comparable, and repeatable conduct of examinations in various categories. The simulators will use a representation of over 5,000 km of real railway routes;
- service stations for candidates for train drivers equipped with all necessary devices and systems enabling the completion of all formalities related to the examination process or issuing a train driver's license on site;
- office rooms for a team of employees dealing with the process of examining and monitoring train drivers;
- server room ensuring the highest standards of physical and digital security for data processed as part of the national register of train drivers and railway vehicle drivers.

A novelty in the process of examining candidates for train drivers will be the use of railway vehicle simulators to verify the ability to use knowledge in the field of railway traffic regulations in practice. During this part of the exam, the candidate's ability to behave in typical and unusual situations related to train traffic will be checked, his/her behavior when driving trains in difficult weather conditions (e.g. in fog, snowstorm, downpour or strong wind) and the ability to use appropriate procedures in emergency situations (e.g. using the "Radio-stop" signal).



1. Visualization of the Train Driver Examination and Monitoring Centre

Source: Railway Transport Office [8]

The entire examination process, from applying for admission to the examination, through its conduct, to the issuance of documents entitled to drive railroad vehicles, will be carried out 100% electronically. The advanced ICT system will also include a national register of drivers and drivers of railway vehicles, thanks to which it will be possible to constantly monitor the competencies of railway personnel to ensure safety in railway transport. This is another, after the examination, the new task of the President of UTK in the area of security.

In addition, entrusting the President of UTK with examining persons entering the profession will ensure a uniform and coherent process of examining train drivers and, as a result, improving the safety of railway transport by minimizing railway incidents within the railway system, in which the human factor plays a key role.

Summary

The entry into force of the changes in the system of training and examination of train drivers described in this article on January 1, 2023, will separate the training (which will remain the competence of training centers) and the examination (which will now be implemented by the President of UTK). This should result in both an increase in the quality of training as well as the reliability and equality of examinations, thus ensuring a higher level of safety for the railway system in the face of the challenges of the present, especially the need to quickly deliver new, but appropriately qualified, train drivers to the market.

The implementation of the above objective will be possible with the use of the latest technological achievements, which will be used in the Train Drivers' Examination and Monitoring Center, which is currently under construction. The investment is carried out by the Office of Rail Transport under the OPI&E 5.2-21 project entitled "Improvement of railway safety through the Construction of the Train Driver Examination and Monitoring System" which is co-financed by the European Union. One of the conditions for granting funding was the development of a feasibility study, which was undertaken by the consortium of the Railway Institute (Lider) and Infra Centrum Doradztwa Sp. z o. o. (Consortium member), using their previous experience gained in the implementation of work related to the implementation and use of railway simulators, e.g., as part of projects financed by the National Center for Research and Development and implemented in cooperation with railway carriers (including PKP Intercity S.A. and PKP Energetyka S.A.)

Traction vehicle simulators, which will be a very important component of the Center for Examination and Monitoring of Train Drivers, are the perfect answer to today's training needs. Thanks to them, it is possible to significantly expand the range of skills that can be passed on to candidates for train drivers and train drivers as part of training and then verified in the course of exams. The greatest added value of these devices is the practically unlimited possibility of implementing the so-called simulation scenarios. Unusual events that, for technical, organizational, and economic reasons, cannot be practiced and checked during rides on real rolling stock. In addition, it is also possible to train and check the so-called soft skills, because a qualified instructor can play the role of other people involved in rail traffic.

Source materials

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