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Determination of Integrated Indicator for Analysis of the Traffic Safety Condition for Traction Rolling Stock

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Abstract

Traffic safety is a major priority in railway transport operation. Locomotive facility is one of the responsible units in general system of railways. A complex and cumbersome system of indicators is used in locomotive facilities to analyze the operation. The existing system makes it difficult to analyze the general level of work organization in the locomotive facilities. Purpose of the study is to determine the methodology of forming a certain dimensionless indicator (or group of indicators) that will reflect the general level of safety in the locomotive facilities. As the research methodology it was chosen principal component analysis as the corresponding mathematical apparatus, which makes it possible to analyze the existing indicators characterizing the performed work and the traffic safety condition with the necessary degree of informativity. As a result, the main components and the degree of their influence on the general level of traffic safety in the locomotive facilities are set. The indicators that have the most influence on the technical and safety components of the integrated indicator of traffic safety condition are determined. Originality of the work is that it for the first time proposes the concept of index of traffic safety condition and the method of its determination using the principal component analysis. Practical value of the work lies in the fact that the ranking of technical and safety components according to the degree of their influence on the general traffic safety index has been performed. Also, the locomotive units which have the greatest influence on the traffic safety condition and reliability were determined.

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Keywords: railway transport, traffic safety, locomotive, reliability, principal component analysis, traffic safety condition

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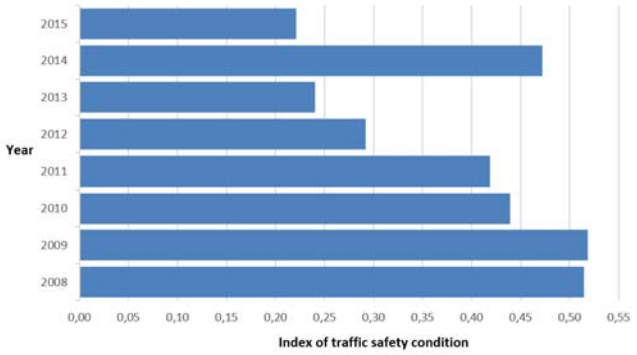

Fig. 7. Index of traffic safety condition in the locomotive facilities

The values I_{ts} are influenced by both technical and economic, social and other factors, which can explain the sharp increase of the index in 2014.

Conclusion

We can conclude that the proposed index I_{ts} can be further improved by the determination of the specific values of the index, taking into account the work performed by locomotives, the inventory locomotive fleet, the number of employees in the locomotive facilities, and others. At the initial stage, the value of the index I_{ts} allows evaluating the general traffic safety condition and can be used to compare the level of traffic safety by years.

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