5 – 7 June 2026 Cambridge , United Kingdom

The Need for a Tool to Assess Competence and Awareness of Limits in Railway Safety

Paraschiv-Bratei Florina , Rus Mihaela

Romanian Academy

Abstract

Railway safety is a safety-critical field in which the quality of human decisions directly influences error prevention and operational risk management. The literature highlights the role of overconfidence, metacognitive processes, and self-assessment errors in the emergence of risky decisions; however, studies directly applied to the railway context remain limited. Furthermore, most of the tools used in psychological assessment measure skills, cognitive performance, or personality traits, without specifically evaluating how individuals assess their own competence and recognize their decision-making limitations.

Given this gap, this paper aims to argue for the need to develop a specific tool for assessing the calibration of competence in railway safety. The research is based on a systematic review of the literature on metacognition, the Dunning–Kruger effect, performance evaluation, and risk-taking behaviors in safety-critical contexts. The study selection process was conducted based on inclusion/exclusion criteria, and the conceptual analysis highlighted consistent relationships between self-assessment of competence, performance estimation, and the capacity for decision-making calibration.

Based on these results, the conceptual framework for the CASF tool—the Railway Safety Self-Assessment and Recalibration Questionnaire—is proposed. The model includes three main dimensions: self-assessment of professional competence, comparison between perceived performance and objective benchmarks, and metacognition associated with recognizing one's limitations and receptiveness to feedback.

The results support the need to integrate competency calibration assessment into selection, periodic evaluation, and psychological prevention practices within railway systems. In this context, CASF can serve as a useful tool for identifying discrepancies between actual competency and the level of perceived confidence in the decision-making process.

Keywords: **Railway Safety, Metacognition, Competence Calibration, Decision-Making, CASF**