

ASSESSMENT OF PASSENGER SAFETY ON STATION PLATFORMS: SETUP OF A QUANTITATIVE METHOD FOR RELEVANT CASE STUDIES

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Summary: The rail infrastructure managers must frequently manage the hazards generated on the platforms and the consequences of accidental events involving passengers during boarding and alighting operations but also during their waiting because of passing trains. The identification of the highest risk conditions depending on this typology of hazards is a prerequisite for the appropriate design of platforms and for the appropriate management of passengers' accessibility and trains traffic management. The paper describes an original quantitative methodology based on the calculation of integrated risk indexes considering the criteria fixed by the normative for infrastructures (geometrical-architectural features of the platforms), vehicles (typologies of services, geometrical features and speed performances) and operation (use of station tracks and services thereby available). The methodology setup, carried out in cooperation with Rete Ferroviaria Italiana (RFI), the main rail infrastructure manager in Italy, was based on one side on: (A) preliminary investigation on the state of the assets to identify common standards and infrastructure-specific elements (typology and accessibility) at network level to qualify the platforms in terms of number of served tracks, calling passenger services, passing through trains, etc., and (B) systematic analysis of accidents database from the stochastic viewpoint to identify recurrent locations, periods, causal factors and correlate accidents with single or groups of infrastructural and operational features. The methodology, presented in its first formulation in (Baldassarra A., Marinacci C., Ricci S. – Risk assessment for passengers on station platforms: a quantitative approach - Road and Rail Infrastructure VIII, Proceedings of the Conference CETRA 2024. 61-66. doi: 10.5592/CO/CETRA.2024.1535) has been further developed and validated on a large set of stations characterized by different operational challenges and safety concerns. These stations were chosen strategically for their distinctive characteristics: Roma Termini (Italy's largest and busiest station, it serves as a central hub for high-speed, InterCity, and regional trains), Bologna Centrale (vital interchange connecting northern and southern Italy, known for its intricate platform operations), Pisa Centrale (medium-sized station that accommodates both commuters and tourists, experiencing seasonal fluctuations in passenger traffic), Riomaggiore: small regional station in the picturesque Cinque Terre area, notable for its challenging geographical layout). By studying these stations, the analysis provides a comprehensive cross-section of infrastructural and operational conditions, paving the way for adaptable and effective safety strategies applicable to stations with similar profiles. The expected results are to apply widely and systematically the methodology at network level to rank the stations and the single platforms according to the risk level with the final purpose to (i) identify preventive and mitigative actions, such as morphological, technological, operational measures, (ii) further development towards the analysis of life cycle costs of these actions their socio-economical sustainability.