Abstract: Recently, there is a growing interest in road safety assessments based on the examination of the characteristics of the road aimed at identifying the presence of risk factors. This approach, named road assessment program or network wide road safety assessment, is required by the EU Directive 2019/1936 on road infrastructure safety management. Reliable procedures for assessing the inherent safety of all the elements of the road network are required to conduct roadway safety assessments. To provide a contribution toward the development of procedures for network wide road safety assessment, this paper develops and validates a Safety Index (SI) for evaluating urban roundabouts. The SI is assessed both at the roundabout level as well as at the roundabout approach level. This procedure detects the safety issues that are the largest contributors to crash risk in order to identify the safety measures that provide the greatest crash reduction at roundabouts. The SI is formulated by combining two components: the exposure of road users to road hazards (Exposure) and the risk factors which increase the probability of involvement in crashes (Risk Index). The procedure considers 33 detailed safety issues and 5 general safety issues to compute the Risk Index. Criteria for identifying and ranking the safety issues are defined.

The SI procedure was validated in a sample of 50 urban roundabouts located in Rome, Italy. The sample consisted of 12 single-lane roundabouts and 38 two-lane roundabouts, with a total number of approaches equal to 179. In these roundabouts, the SI scores and the EB crash estimates were compared with reference both to the whole roundabouts as well as to the single roundabout approaches. The correlation between the SI scores and EB estimates was highly significant both at the roundabout level ($R^2 = 0.85$, $t = 16.49$, p-value < 0.001) as well as at the approach level ($R^2 = 0.56$, $t = 14.88$, p-value < 0.001). The results from Spearman's rank-correlation analysis provided further validation for the SI indicating that rankings from the SI and the EB estimates agree at the 99.9 % confidence level both at the roundabout level ($\rho_s = 0.80$) as well as at the approach level ($\rho_s = 0.70$).

Keywords: Roundabouts, Road safety assessment, Safety Index, Ranking criteria, EB procedure.

Link: https://lnkd.in/dTSgEgqH.

Note: il link fornisce accesso gratuito all'articolo fino al 28 novembre 2022.