

Analysis of Rural Roads in Developing Countries Using Principal Component Analysis and Simple Average Technique in the Development of a Road Safety Performance Index

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Abstract : Road safety performance index is a composite index which combines various indicators of road safety into single number. Development of a road safety performance index using appropriate safety performance indicators is essential to enhance road safety. However, a road safety performance index in developing countries has not been given as much priority as needed. The primary objective of this research is to develop a general Road Safety Performance Index (RSPI) for developing countries based on the facility as well as behavior of road user. The secondary objectives include finding the critical inputs in the RSPI and finding the better method of making the index. In this study, the RSPI is developed by selecting four main safety performance indicators i.e., protective system (seat belt, helmet etc.), road (road width, signalized intersections, number of lanes, speed limit), number of pedestrians, and number of vehicles. Data on these four safety performance indicators were collected using observation survey on a 20 km road section of the National Highway N-125 road Taxila, Pakistan. For the development of this composite index, two methods are used: a) Principal Component Analysis (PCA) and b) Equal Weighting (EW) method. PCA is used for extraction, weighting, and linear aggregation of indicators to obtain a single value. An individual index score was calculated for each road section by multiplication of weights and standardized values of each safety performance indicator. However, Simple Average technique was used for weighting and linear aggregation of indicators to develop a RSPI. The road sections are ranked according to RSPI scores using both methods. The two weighting methods are compared, and the PCA method is found to be much more reliable than the Simple Average Technique.

Keywords : indicators, aggregation, principle component analysis, weighting, index score

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