Prioritization of private transport infrastructure actions in cities

Guillem Alandí[*1], Salvador Mateo[1], Alejandro Marco[1] and Ernesto A. Colomer[1]

(1) Institute of Multidisciplinary Mathematics, Universitat Politècnica de València, 46022, València, Spain

Abstract

Following a planning process or because of day-to-day operations, it is necessary to prioritize some projects, initiatives or activities over others. This prioritization must be objective to ensure the correct allocation of economic resources, which are generally public.

The writing team of this paper presents a mathematical model called Priority Factor (PF) that defines, for each section of the network each year of the analysis, the importance of each section in the network. The PF considers two prioritization factors: i) the Technical-Economic Priority Factor (TTEF) and the Socio-Political Priority Factor (SPPF). From this expression, the priority of a section i is evaluated on a scale of 0-1, with 1 being the highest possible priority and 0 the lowest. The PF of each section of the network is calculated as the weighted sum of the FPTE and FPSP.

On the one hand, the FPTE seeks the highest technical-economic efficiency of the available budget to improve the standard of certain sections of the network. The techno-economic priority of a section i of the network in year j is obtained by considering the Urban Pavement Condition Index (UPCI) and the Annual Average Daily Traffic (AADT), among other factors such as cost or the length of the section. The UCPI is a non-deterministic model and is obtained using probabilistic Markov chain models and Monte Carlo simulations to develop a pavement deterioration model [1]. On the other hand, the FPSP considers the socio-political aspects in the prioritization, whose specific weights are determined by expert judgement.

By considering, in an integrated manner, technical, economic, social, political and institutional aspects in the provision of maintenance funds, the proposed Priority Factor allows for a more sustainable management of road infrastructure.

References

[1] Osorio-Lird, A., et al., Application of Markov chains and Monte Carlo simulations for developing pavement performance models for urban network management. *Structure and Infrastructure Engineering*, 14(9): 1169--1181, 2017.

* Corresponding author guialma3@upv.es