

Incorporating ethics in the active network design and development

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With a growing population, the demand for transport is also increasing which in turn contributes to more problems; from congestions and disparities in access to the jobs, to environmental and safety risks to the people. Regarding these issues, the policymakers need to address sustainability in their planning to properly control urban traffic flow to ensure the accessibility and smooth mobility of the network users.

In development of the active transport networks, the planners must decide on what design could serve both group of network users best while simultaneously is regarded as an ethical design. The challenge becomes more stark considering various financial and non-financial constraints they face in their decision-making processes. Hence, in their network development plans, the planners must not only define the ethical characteristics of a network and how to measure them, but also, they should address the tacit competition among the users for the limited resources in the network.

In this study we aim to develop ethical measures for different aspects of active transport network design including the street space allocation for both motorised and non-motorised users as well as the financing of the network. In doing so, we first draw on developing active links in a car-oriented road network through reallocation of the street spaces among all users. We also try to capture the flow interactions between users in case of shared lanes through modelling the problem as a non-linear bi-modal user-equilibrium optimisation model. In a separate attempt, we address the active network finance issue through designing a mechanism in which the stakeholders benefit from the network development are incentivised in an equitable manner to provide the financial resources required for the developments. The mechanism is modelled as a mixed-integer linear programming optimisation model and analysed under different scenarios for development and stakeholders' contributions.