ABSTRACT

TITLE: Definition and calculation of the environmental traffic volume
AUTHOR: Mª del Mar Aguilar Rovira
TUTOR: Ole Thorson Jorgensen

For decades, the city has been designed from the technical vision of the engineer having the objective to maximize the space for the mobility of vehicles in detriment of the necessities of other users such as pedestrians, passengers of public transportation and cyclists. This approach has considered traffic volume depending on the physical capacity of street ways the most important driver, trying to optimize the road space available. This model not only causes consumption of the public space, but also it conveys a series of negative effects that affect the quality of the human life and the environment. Atmospheric contamination, noise, accidents, fragmentation of the territory, traffic jams, shortage of urban ground, power dependency, contribution to the climatic change, consequences on the biodiversity and the landscape, etc. are the most important externalities that traffic as well as other ways of transport generates in the cities.

For this reason a new concept of capacity, an innovating concept named environmental capacity, is defined. The environmental capacity informs about the traffic volume of a street combining the optimal use of the road space, the share of the space between the different users and the acceptable environmental quality of the urban space dedicated to mobility.

The externalities considered for the definition of the environmental capacity, whose importance lays on the coexistence with the vehicle traffic in the city, are those that have a direct effect on people, altering their quality of life and causing health problems. These effects are: acoustic contamination, occurrence of accidents, atmospheric contamination and occupation of the space. In order to justify the use of these four negative effects a review of the present state of each one is made, describing their effects as well as the existing methodology for their calculation and the existing strategies for its minimization and correction. The noise, other than being an annoyance, causes fatigue, stress and makes difficult the communication of people in the street. Accidents represent one of the most important social and economic costs of mobility, and it accounts for the first cause of mortality in developed countries. Traffic is the main emitting source of polluting agents in the cities affecting the health of inhabitants. Finally, the necessity of mobility in the city and the increase of the vehicle park have caused that automobiles occupy an important part of public space in detriment of pedestrians and cyclists.

Before proceeding to the calculate the environmental capacity, the concept of capacity of street ways is studied in-depth. This methodology will be applied later on to determine the daily average intensity of streets depending on the number of ways with which it counts.

The environmental capacity of an urban street is directly proportional to the physical capacity, understood the latter as the maximum number of vehicles that can go through a certain section in a determined time. This proportionality is given by the environmental factor, combination of four factors: atmospheric contamination, accidents, acoustic contamination and the occupation of the space. Each factor has associated a characteristic weight which varies according to the relevance of each component, depending on the municipality, the structure of its street-net and the traffic mix. The environmental factor varies between 0 and 10; a punctuation of 0 is granted to those streets which offer the worst environmental situations, whereas a punctuation of 10 is reserved for those offering acceptable environmental conditions. The street, according to its use, has a certain threshold of exigency of the environmental capacity.

The obtained methodology, based on a series of hypothesis and simplifications, allows to calculate the environmental capacity in a valid and simple way. The input data required is not complicated to obtain, being able to either make measurements "in situ" or create models. The resulting environmental capacity will be one first approach necessary to refute arguments in favor of the mobility of the private vehicle in the city.