Strategies for Implementation of Green Spaces in Cities and Urban Mobility Planning

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Green areas, Superblock, Traffic, Urban mobility

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INTRODUCTION

•**Car-oriented urban development** has led to congested and polluted cities. At present, transportation is responsible for 29% of greenhouse gas emissions.
•Several initiatives have been launched in recent years to promote sustainable transport (public transport, bike lanes, etc.) in order to improve **urban livability and sustainability in cities**. One of them that has emerged most in recent years has been the **restructure of urban spaces** to include more green zones for pedestrians.
•These types of measures **request a coordination between urban and mobility planning**. There are clear improvements (benefits) in the green areas, but mobility costs, including externalities, can increase because of the **spillover impact** in the surrounding network of green spaces.

AIM

The objective is to analyze the trade-off between the benefits of green areas and social mobility costs and to provide recommendations on the goals of reducing private cars in mobility policy. The analysis has been focused on the case of Barcelona.

METHODS

- It has been used the **superblock concept as a green area.** The trips generated or attracted from or towards a superblock can only have access to move inside the superblock while the by-pass traffic is restricted.
- Develop a **traffic assignment problem** able to model superblock.
- A **MATLAB simulation program** assigns traffic based on superblock-induced topological changes and assesses transport cost-benefit function.
- The **cost-benefit function** accounts for travel cost (value of travel time 10€/hour), pollutants depend on velocity of vehicles, and benefits of superblock according to the approximation from Mueller et. al. (2020); 150.75 €/hour-superblock.
- To assess the cost benefit function in an **isotropic homogeneous city** grid (figure 2).
- The range of **scenarios** for calculating the objective cost-benefit function is illustrated in Figure 4.

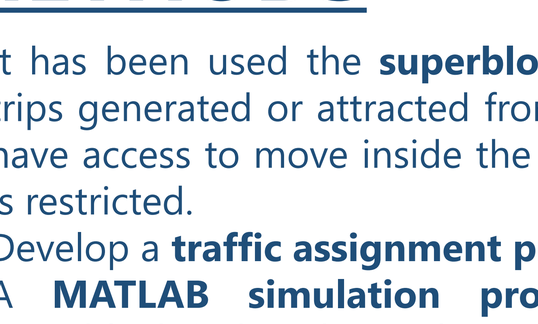


Figure 1. Barcelona study area (10X10 streets in green)

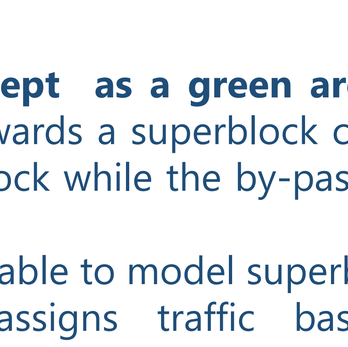


Figure 2. Network model with a superblock

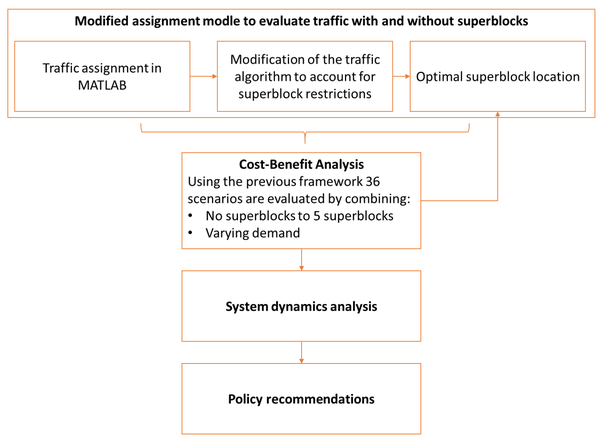


Figure 3. Methodological framework

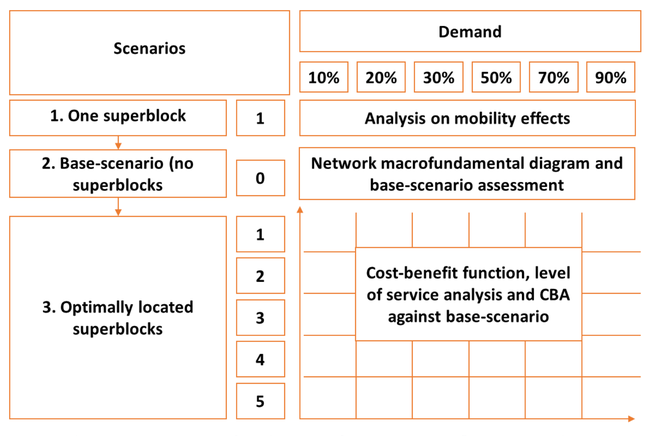
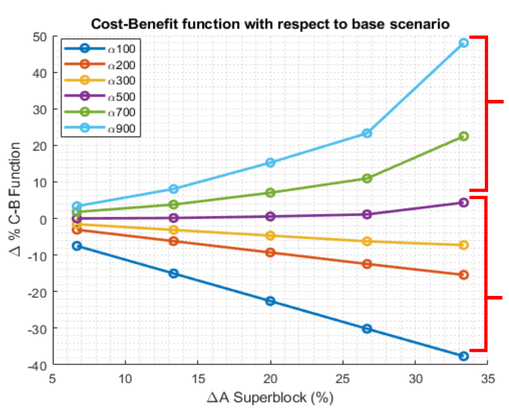


Figure 4. Analysis and range of scenarios assessed in the study

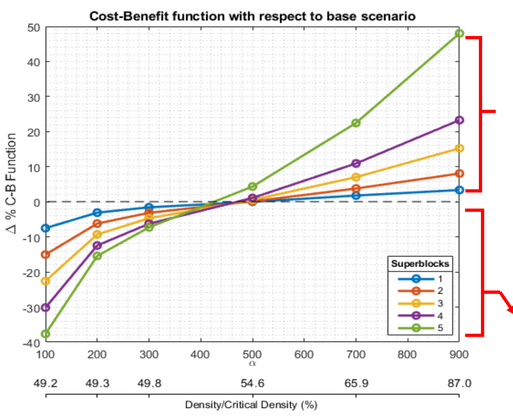
FINDINGS

- The variation in **objective cost-benefit function (CBF)** with respect to base scenario (no superblock) is illustrated as follows:



When the **network capacity can not absorb the traffic without congestion**, the cost of traffic grows faster than the benefits of superblocks.

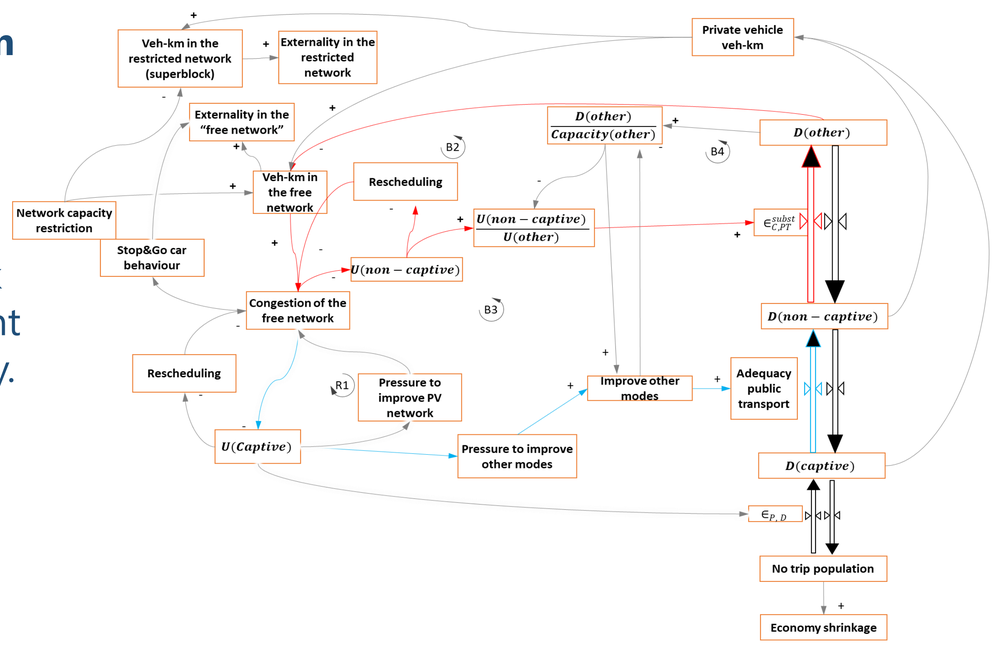
When the **network capacity can handle spillover traffic**, the benefits from the green areas grow faster than the mobility cost



High traffic demand will result in exponentially higher costs rather than benefits, even in the case of few superblocks in the city

When there is less traffic in the network, there is an improvement of the Cost-Benefit from the superblocks, even when superblocks encompass the entire city.

- The **system dynamics** represents the effects of the superblock deployment on mobility.



POLICYMAKING IMPLICATIONS

- There is a trade-off between benefits from the green zones and mobility costs. The **coordination between mobility policy and implementing green areas are necessary**.
- In the studied case, when the city will covered with **10% with superblocks** the demand would need to be reduced by 2.8%. If up **to 35% of the network became superblocks**, demand would need to be lowered by up to 14.1%. Policymakers should assess how much modal shift the city should aim for to accommodate this demand.
- Policymaking should provide alternative transport options for captive motorists to prevent inequalities between travel cost and greener spaces.

References

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