Cycling accessibility in urban areas:

a first step towards a better integration of non-motorised modes in LUTI modelling.

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Introduction

Non-motorised modes appear to be a solution to contemporary goals such as decreasing greenhouse gas emission, having a healthier way of life, building a safe city, while ensuring the economic need of firms and people are met. At first, walk or bicycle were not implemented in transport models mainly because of the car-centred vision of urbanism models needed to assess at the time they were developed. Now that the context has changed, it is interesting and important to work on this limitation of Land-Use and Transport Interactive (LUTI) modelling, in order to extend the use of this tool.

LUTI models are econometric tools to appraise and forecast the evolution of a territory regarding transport or land-use policy changes. More precisely, it consists in calculating meaningful socioeconomic indicators (such as growth value added, rents, number of jobs, population, accessibility, household types etc.) that can change thanks to a particular planning policy on an urban area. Accessibility calculation is central in LUTI modelling: it takes the information from the transport model and is the basis of urban-related calculations, as employment growth for instance.

The aim of this dissertation is to work on a methodology for cycling accessibility calculations, implementing three main parameters: distance, safety and topography. Then, a study case based on the effect of the tunnel of Croix-Rousse in Lyon on employment is shown as a proof of concept.

Methodology

Hansen’s work on accessibility (1959) has been take over to set up size-based measures, allowing to appraise behavioural effect of the studied parameters. A very simplistic transport model has been created to calculate generalised costs, integrating distance, topography and safety.

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<tr>
<th>Safety</th>
<th>Topography</th>
<th>Distance</th>
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<td>It has been considered regarding the quality of the network and the qualitative feedbacks on people behaviours. However, a meaningful data is still hard to obtain.</td>
<td>This is one of the most repulsive parameters according to cycling surveys. Including its effect on behaviours in order to appraise the effects of a tunnel seems to be relevant.</td>
<td>Distance is the base parameter of the generalised cost that’s been build. It also has a deterrent effect on behaviours and has been appraised by creating an algorithm of shortest paths for the purpose of the study.</td>
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Results

This study forecasts a maximum improvement of 7% on companies’ attractiveness, meaning that 7% of the jobs within zones are more reachable by bike thanks to the tunnel (Figure 1). More generally, western zones are more concerned by these improvements as they were quite isolated, and the tunnel now links them to the employment hubs located in the city centre. This effect on accessibility could be expected to spread in the ninth district of Lyon.

Results show a quite good appraisal of the impacts of the infrastructure on employment accessibility, including topography deterrent effect as shown on figure 2. This work was undertaken in a larger thinking about the integration of non-motorised modes in LUTI modelling. It shows how to set up a study and focus on the difficulties encountered as the lack of quantitative and qualitative data, the needs of equitable funding from public authorities and the consideration of external factors. Depending on cases, other relevant factors could be chosen, and new models could be set up. Besides, further work on this topic could integrate socio-economic considerations to have a precise overview on cycling behaviours and forecasts ranges of cycling-related infrastructures as bike-parks or shared-bike station.