



Deliverable 6.3

SPECIFICATION OF THE METHOD FOR CLASSIFICATION OF LAND USE TYPES IN CONNECTION WITH ACCESSIBILITY

Publishable summary

Coordinator:

Professor Andree Woodcock,
Coventry University
tel.:+44 (0)2476 158349,
a.woodcock@coventry.ac.uk

Author:

ZHAW, COVUNI, SIGNOSIS,
ITENE, JAREKS, TERO
Contact:
Alberto Castro, Zürich University
of Technology (ZHAW)
tel.: + 41 (0) 589344710
alberto.castrofernandez@zhaw.ch

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Purpose and methodology

The goal of this deliverable is twofold:

1. To increase the understanding of the relationship between land use and accessibility of public transport and;
2. To explore the relevance of accessibility issues to the overall travel satisfaction of public transport users

In order to achieve these goals, this deliverable undertook an expert survey that collected the opinion of researchers, consultants and technicians of public authorities and public transport companies.

Structure

- Section 1 introduces the field of study
- Section 2 includes a state of the art of the connections between land use, accessibility and travellers' satisfaction.
- Section 3 describes the methodology as well as the results of the expert survey.
- Section 4 summarizes the most relevant findings of the deliverable and their implications.

Results

44 experts participated in the survey. The respondents estimated firstly the level of influence that land use variables have on accessibility (Figure 1). According to the opinion of the survey respondents, increasing population density contributes to improved accessibility by slightly reducing travel distance by public transport (-0.07 as average in a scale from -3 to +3) and moderately reducing travel costs (-0.23). In contrast, increasing density may also produce negative effects on accessibility by increasing travel times (0.57, the highest reported impact). Finally, increasing street network connectivity rates may lead to higher levels of accessibility due to shorter trips, but it can cause moderate increases in travel costs (0.28) and in travel times (0.53).

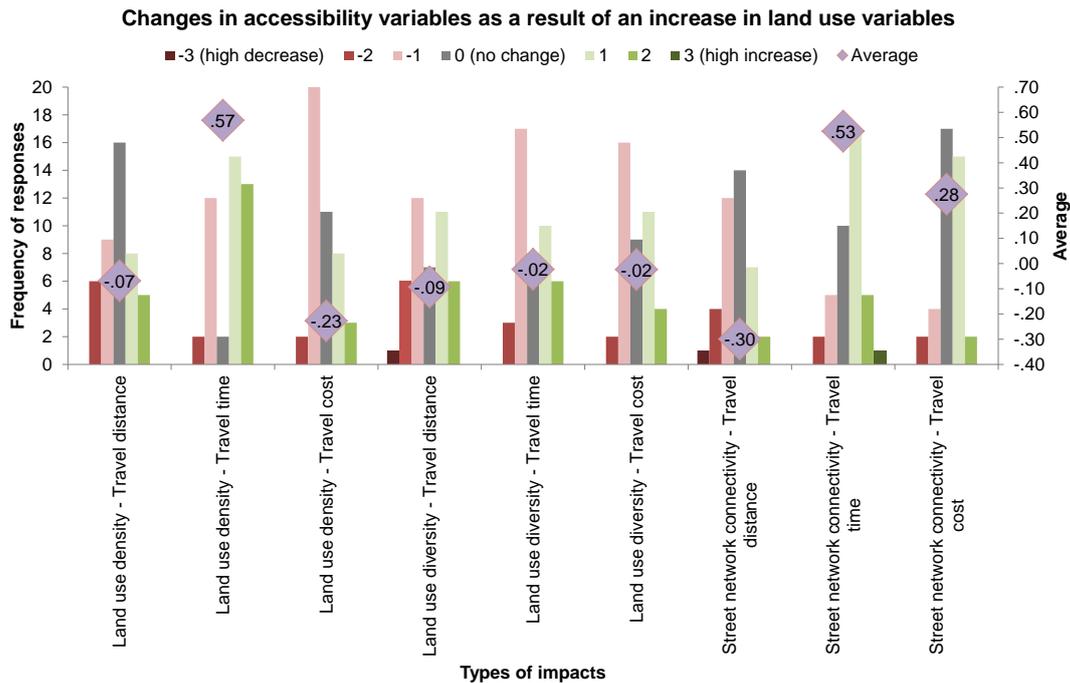


Figure 1 Impact of increasing land use variables on accessibility by public transport

Classifying the survey results by professional activity of the respondents, some differences can be identified (Figure 2). For instance, researchers claim that population density contributes to reducing travel distances by public transport at a higher degree than the average; other professionals such as workers of public authorities and public transport companies think, instead, that population density is actually associated with longer travel distances. Likewise, if only the researchers' responses were analysed, the assessed impact of land use density and diversity on reducing travel costs, as well as the impact of land use diversity and street network connectivity on reducing travel distance, would be bigger than if considering all stakeholders' responses. In contrast, researchers mitigate the effect of population density on travel time, as well as street network connectivity on travel time and cost.

Changes in accessibility variables as result of an increase in land use variables sorted by professional activity of the respondents

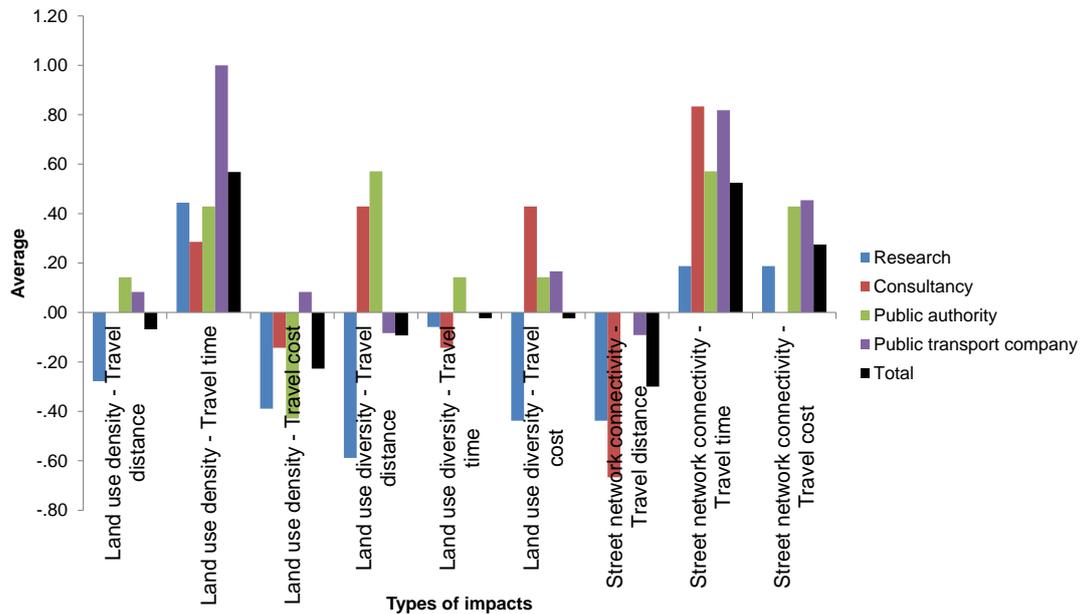


Figure 2 Impact of increasing land use variables on accessibility by public transport ranging from -3 (high decrease), 0 (no change) and 3 (high increase) and sorted by professional activity of respondents

Survey participants were asked to assess the influence of accessibility by and to public transport in terms of distance, time and cost on overall travel satisfaction of passengers. Accessibility by public transport involves variables of the public transport trip itself, while accessibility to public transport refers to previous stages of the journey, i.e. distance, time or cost required to reach a public transport station from the passengers' origin point. Figure 3 shows that figures slightly differ when comparing the average assessed impacts between these two groups of accessibility variables. Travel cost of public transport trips as well as the associated stages of the journey to reach public transport is, according to survey respondents, the most influential factor of travellers' satisfaction (negative values: -2.07 and -2.02 respectively). Travel time by public transport (-2.00) and to public transport (-1.93) also has a negative impact on satisfaction, while distance covered by public transport (-1.02) and to stations and stops are considered less influential (2.02 respectively). The assessment of the relationship between accessibility and satisfaction seem to be similar among different professional activities of the responders.

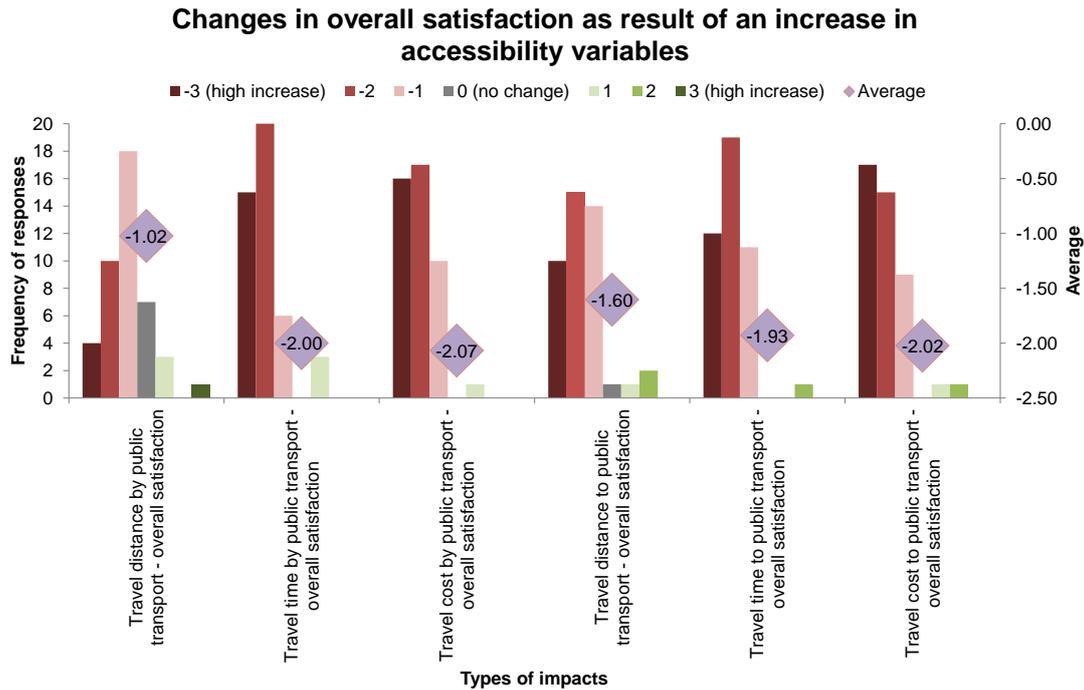


Figure 3 Impact of increasing accessibility variables on overall satisfaction of public transport users

Implications

Figure 5 summarizes the results of the expert survey.

Absolute average values of assessed impacts of accessibility on satisfaction are - in general - higher (ranging from -1.02 to -2.07 in a scale from -3 to 3) than the impacts of land use on accessibility (ranging from -0.02 to 0.57). The reason for this is not necessarily that the impact size is higher, but actually that the respondents do not agree on the answer. The extreme divergence of opinion follows in some cases a nearly normal distribution with extreme opposite responses, resulting in a low average value. Therefore, the different stakeholders (researchers, consultants, public authority and public transport company stakeholders) interviewed in this expert survey seem to agree more on the consequences for, than on the reasons of, accessibility by public transport.

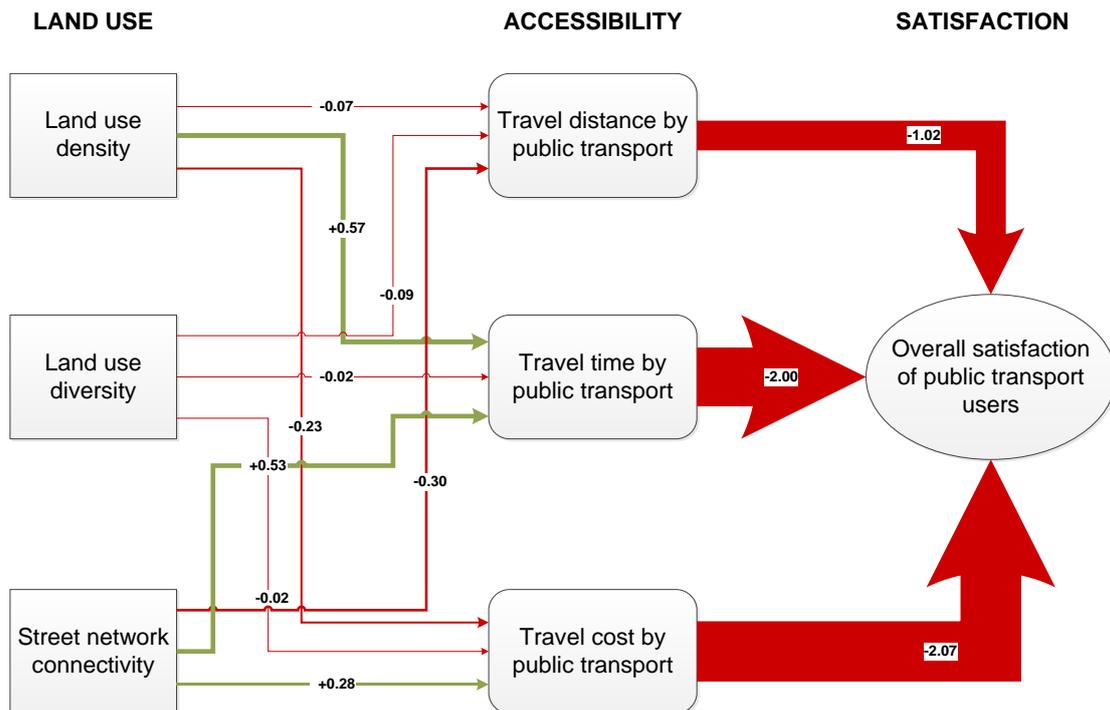


Figure 5 Summary of assessed impacts in a scale from -3 to 3, where a positive values means that an increase of a factor leads to an increase of the second one and negative value means that increase of a factors leads to a decrease of the second one. Thickness of arrows is proportional to the impact size

Taking into account the aforementioned assessment of impacts public transport satisfaction could be partly predicted by means of accessibility levels and land use features (Table 1).

- Since according to the survey responders travel time and travel cost are the most determinant accessibility variables changing satisfaction of public transport users, a low 4-way intersection density might contribute to high travel satisfaction.
- Low population density may reduce travel times even more, but with the inconvenience of increasing travel costs. Both low 4-way intersection density and low population density produce a counter effect increasing travel distance by public transport.
- Changes in land use diversity may contribute positively to increase accessibility in terms of distance, time and cost but might be less effective than land use density and street network connectivity.

High satisfaction				
Land use features		Impact on accessibility by public transport		
Variables (indicators)	Notes	Affected variables that contribute to increase satisfaction		
Low street network connectivity (4-way intersection density)	Counter effect on travel distance		Short travel time	Low travel cost
Low land use density (population density)	Counter effect on travel distance and cost		Short travel time	
High land use diversity (mix residential-job)	Lower impact size	Short travel distance	Short travel time	Low travel cost

Table 1 Land use features that may lead to higher levels of satisfaction of public transport users

The results of this deliverable will be used as theoretical support by the Deliverable D6.5, which will provide recommendations for decision makers to increase travel satisfaction by minimizing land use negative impacts.