ANALYSIS OF MOBILITY IN THE VALENCIA METROPOLITAN AREA THROUGH DISCRETE CHOICE MODELS. PROPOSAL TO IMPROVE THE METROPOLITAN PUBLIC TRANSPORT NETWORK.


1. BACKGROUND
The growth of the population in Valencia over the last decades has led to the overcrowding of the urban nucleus of the city and to the expansion of the Metropolitan Region. However, the public transport network does not expand at the same rate as the city does: connections between metropolitan municipalities are scarce and the use of the private vehicle is often necessary.

2. PUBLIC TRANSPORT NETWORK
Starting from the centre of the city, the public transport network in Valencia runs through radial corridors which are not linked one another; thus, municipalities located at different corridors are left with almost no connections between them. Nowadays, the best option for solving this mobility problem lays on the implementation of new suburban bus (Metrobús) lines linking metropolitan nucleuses with substantial mobility flows.

3. PUBLIC TRANSPORT DEMAND
The majority of trips in Valencia and is Metropolitan Region are made by private vehicle (41.3%) and by foot (40.9%), followed by public transport (13.4%). Only 7.7% of the 13.4% public transport share corresponds to the suburban bus, so the modal split of Metrobús in relation to all modes of transport is 1.05%. Its low percentage of use suggest that the service is not attractive enough. For this reason, before implementing any new Metrobus line, the variables that determine the choice of transport should be analysed.

4. ANALYSIS OF ROUTES ONLY CONNECTED BY METROBÚS
It has been made an analysis of the routes with no public transport connections other than Metrobús with the aim of understanding how the different characteristics of population and how the nature of the trips being made have an influence in the decision of choosing to travel with the private vehicle or with Metrobús.

5. MODEL SPECIFICATION: THE LOGIT MODEL
For transforming the observed attributes \( x \) into a statistical expression, a discrete choice Logit model has been developed using Mplus in order to obtain the probability of a person of choosing to travel by Metrobús.

\[
P(\text{Metrobús}) = \frac{1}{1 + e^{-V_{\text{Metrobús}}}}
\]

\[
V_{\text{Metrobús}} = \beta_0 + \sum \beta_k x_k
\]

6. ESTIMATION OF THE DISCRETE CHOICE LOGIT MODEL
After various iterations with Mplus, relevant variables have been identified (P-value<0.1). Our final objective is to come up with a tool that a transport company could use to make technical decisions for implementing new bus lines. Thus, we select the variable that shows a pure technical nature; the relative price that an individual would have to pay for using the private vehicle against the alternative of travelling by Metrobús (DIFCOST).

7. APPLICATION FOR IMPLEMENTING A NEW METROBÚS LINE
Two unconnected axes at the southern zone of the Metropolitan Region of Valencia have been identified. The East axe has wide industrial estates (IE) and a large commercial area that attract a great number of people. We have decided to set up here a new suburban bus line.

The following solutions have been proposed:

An economical analysis of both solution has been made:

<table>
<thead>
<tr>
<th>Solution</th>
<th>Revenue of the Service (€)</th>
<th>Contributions DUE to Deficit (€)</th>
<th>Total Costs of the Service (€)</th>
<th>Operations Results (€)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>238,746.50</td>
<td>40,712.50</td>
<td>279,459.00</td>
<td>0.00</td>
</tr>
<tr>
<td>2</td>
<td>116,544.50</td>
<td>149,531.73</td>
<td>266,076.23</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Solution 1 has been chosen as it provides better economic results.