1 Introduction

People mainly travel to participate in activities. The commute trip (to work, education, etc.) is generally the most commonly scheduled and realised trip purpose. Also, commute trips have temporal and geographic regularity. Thus, they cross a lot the transportation network, since they are concentrated in time (peak hours) and space (near work and home locations). The commute decision is a crucial and an important one with a considerable amount of their lives commuting from home and work. Today in European countries the average trip length by car is about 13.5 km per adult per day, while 20-30% of all these trips are for commuting purposes, according to EEA. Even though cars are mainly used for longer and longer trips, they are still the predominant means for local transport (about 80% of all trips made by car are less than 20 km, and 60% are less than 10 km). At the same time, the commuting journeys made by private car increased more than the ones made by public transport. According to EEA, while 59% of all trips are made by car, when commuting, this percentage rises to 77% (EEA, 2016).

2 Literature review

2.1 Travel behaviour

Commuting behaviour and mode choices have been heavily studied for decades using a wide range of methodological approaches. The most used study for predicting the mode choice is the Utility Theory (UT), which is based on the rational choice theory. That is, in a given set of transportation modes, given the characteristics of the individual and the situation, the person will choose the mode with the highest overall utility. However, many studies of commuting behaviour have shown that this is not always the case, and that other factors such as social and cultural factors, habit, and convenience also play a role. Therefore, in recent years, there has been a growing interest in using other theories to explain commuting behaviour, such as Prospect Theory, which takes into account the psychological and affective aspects of decision-making, and the Theory of Planned Behaviour, which focuses on the role of attitudes, subjective norms, and perceived behaviour control in shaping intentions and behaviour.

2.2 Commuting

In the last decades, urban areas worldwide have become more automobile-dominated and less sustainable. Urban journeys tend to become longer, since most capital cities, where the population has gathered, have turned into megalopolises. Many people, who work in capital cities often face the most lengthy journey times to and from work by public transit. Therefore, this situation, called urban congestion, has lead to the use of a wide range of transportation modes to get from home to work and back. Today in European countries the average trip length by car is about 13.5 km per adult per day, while 20-30% of all these trips are for commuting purposes, according to EEA. Even though cars are mainly used for longer and longer trips, they are still the predominant means for local transport (about 80% of all trips made by car are less than 20 km, and 60% are less than 10 km). At the same time, the commuting journeys made by private car increased more than the ones made by public transport. According to EEA, while 59% of all trips are made by car, when commuting, this percentage rises to 77% (EEA, 2016).

3 Methodology

3.1 Procedure and participants

In our study we will conduct an online survey with participants from Athens. The online survey will be in Greek forms which will be sent to possible participants through email and social network (Facebook, Instagram). The target is to gather at least 200 answers. The target number of participants as well as the number of scenarios at will be the described in the following section, was determined by the literature. Omre (2010) suggest the pooling of choices by choosing all scenarios, 310 respondents, each of whom is asked to make eight choices, thus producing a total of 1,600 choice observations.

3.2 Survey design

Analysis of how travel decisions, like mode choice decisions, take place can be predicted by specific trip characteristics (attitudinal attributes) or personal characteristics (attitudinal attributes) which require granular and aggregated data as individual travel and personal behaviour, as well as statistical test tools. Regarding the trip characteristics, Stated Preferences experiments are used widely today to determine the independent influence of relevant factors on the decisions made by individuals facing a choice situation, like the mode choice one.

The methods used to design a statistically robust Stated Preferences experiments have been developed considerably since such experiments were first introduced to the field of transportation research nearly 40 years ago (Louviere, Hensher, & Swait, 2000). The experimental design of choice experiment involves the planned manipulation of attribute levels to yield a statistically relevant output.

The methodology used in this paper derives from state-of-the-art practices in commuter and mode choice research and it includes the following three stages.

1. Defining the choice problem
2. Defining important alternatives and attributes
3. Defining the experimental design of SP survey

3.3 Analysis strategy

In this study we will use Multinomial Logit to analyse the results of the survey, but we will also check and juxtapose the MNL outcomes with other analytical methods like mixed logit. Also we will check if there are differences in the results when using clustering groups instead of taking into account individual data. The categorisation of user will be done using k-means based on their personal information.

4 Stated preferences survey experimental design

4.1 Situational - trip characteristics

When setting up a Stated Preferences survey, first of all the choice problem should be developed and refined. In order to increase the realism of the Stated Choice experiment for the respondent, there was a need to find alternative and actual trips. Therefore, a focus group discussion was realised to cope with the problem studied and to assist in addressing the universal but finite list of alternatives to be used and the realistic attributes to be assigned for each alternative.

4.1.1 Focus group outcomes

A focus group discussion was conducted in Athens in December 2018. The objectives were to find aspects of transportation modes and services that could act as attractive or repulsive factors, to identify important attributes characterising the commute trip that may be used in the Stated Preferences survey, and to identify potential attitudinal aspects that could be included in the Stated Preferences survey also. The main findings of the focus groups discussion are the following:

• All participants commute to work
• All participants own a car, but not everyone is using it.
• Most of the participants use a car for their commute (as drivers or passengers) while the rest use PT and specifically metro, in combination with bus sometimes.
• The participants who use a car for their daily commute spend 15-60 minutes for their trip.
• The participants who use PT spend more than one hour for their commute.
• Some of the participants who use the car would not change it with any other mean of transport despite the circumstances. Most of them thought would change if PT there was an accessible stop near their home and/or free of charge.
• Finally, the most important attributes related to their trip were the travel time and cost, followed by some attitudinal factors such as environmental friendliness, security, reliability, flexibility, and comfort.

4.2.1 Implementation of Discrete Choice methods in the Stated Preferences survey

The data collected from the focus group were incorporated into a Discrete Choice experiment to create a realistic choice situation for the survey participants. Based on the information selected from the focus groups, one hypothetical scenario was created to the survey. "You have a subscription (or urban area) and you have to commute to and from work every day. You have availability to private car, as well as access to public transport and softer means of transport like bike are available. Considering that all the other attributes were the same, each mode offers the following scenarios: (high time cost: 10 euros) and environmental friendliness (high, medium, low) and you are aware of the levels of these attributes before you make the decision which mode you will choose." Then the users where presented with choice sets with 5 choice sets; postulating that cognitive burden is increased as the number of choice sets goes beyond a certain threshold. Thus, in our study 16 scenarios have been developed and were divided into two groups.

4.2.2 Attitudinal - personal characteristics

Another component of our survey apart from the situational characteristics, are the attitudinal characteristics of the user. The scope of the latter is to gather information based on users' personal preferences with regard to commuting characteristics and correlate them to the situational aspects of their trips, so as to find if there can be any correlation between travel and mode choice behaviour. The characteristics that have been captured from our survey are the following.

5 Conclusions

In this paper, we focus on the commute trip and specifically to the mode choice of commuters. After having reviewed most of the theories related to choices, Utility Theory, Prospect Theory and Theory of Planned Behaviour and the ways that are used to extract and predict the users choices, we have developed a Discrete Choice experiment in order to find out which factors are affecting commuters mode choice.

The Discrete Choice experiment we realised using a Stated Preferences Survey in order to create a concrete framework for our Stated Preferences Survey, we conducted a focus group in Athens with 10 participants. The data collected from the focus group were incorporated into the stated choice experimental design to create a realistic choice situation for the survey participants.

The list of alternative modes of transportation that could be used for commuting is quite long, and includes at least 15 alternatives for the SP survey, a universal but finite list of all the existing alternatives fail to be complete. That is why we decided to extract from the focus group discussion a set of 16 scenarios divided into two groups of 8. Using an SP survey, the respondents are expected to choose the alternative that maximises their net utility and to form a preference order for the mode alternative that provides the highest utility for them. The data that will be retrieved from the SP survey will be analysed using an MNL and a mix logit model.

6 References


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TRANSPORT MODE ON: How to set a discrete choice survey to predict commuters’ mode preferences

9th INTERNATIONAL CONGRESS on TRANSPORTATION RESEARCH IN GREECE TRANSPORT 4.0: From Research to Implementation