Urban Travel Behaviour: A Cross-country Comparison

Eleni Mantouka[1,2], PhD Candidate, Alexandros E. Papacharalampous[1], Ismini Stroumpou[1], Léonie Heydenrijk[3], PhD Candidate, Sanmay Shelat[3], PhD Candidate, Pablo Chamoso Santos[4], Joan Guisado-Gámez[5], PhD, Evangelos Mitsakis[6], PhD, Viktoriya Degeler[3], PhD, Eleni I. Vlahogianni[2], PhD, Josep Lluís Larriba-Pey[5], PhD

[1]AETHON Engineering Consultants, 25 Em. Benaki Str, 10678 Athens Greece

[2]National Technical University of Athens, 5 Iroon Polytechniou Str, Zografou, 15773 Athens Greece

[3]Delft University of Technology, Stevinweg 1 Str, 2628 CN Delft Netherlands

[4]BISITE Research Group, Edificio Multiusos I+D+I, University of Salamanca, Calle Espejo 12, 37007 Salamanca, Spain

[5]Universitat Politècnica de Catalunya, Jordi Girona 1-3, 08034 Barcelona, Spain

[6] Centre for Research and Technology Hellas – CERTH, 6th km Charilaou-Thermi Rd, Thermi, 57001 Thessaloniki Greece

Extended Abstract

The amount of travel modes available to the urban traveller in the modern transportation system can be overwhelming; a traveller can use private modes (car, motorcycle and bicycle), public transport (bus, metro, train etc.), "Mobility as a Service"-MaaS (taxi, Uber) or a multimodal combination. To model the decision of travellers, one has to determine the factors that affect mode choice. Those factors, can be categorized as follows [1], [2]:

- User – related factors (gender, age, socio-economic status, namely level of education, occupation, personal income etc.)
- Trip – related factors (cost, travel time, number of transfers etc.)
- Service – related factors (level of service affected by the availability, reliability, comfort, safety, etc. and users' perception on the service).

Travelers evaluate the alternatives available to them in order to choose one travel mode over another, aiming to optimize their trips for various objectives (e.g., cost and time). Researchers have used several methodological approaches to quantify this decision-making process, with the utility function being the most widely used. Utility theory is famous for its forecasting power and its simplicity, although it assumes that individuals are perfectly informed and that given a set of alternatives, decision-maker will always choose the best; the alternative with the maximum utility [3]–[5] .

Mode choice modelling has recently regained the attention of researchers due to the increase of MaaS systems. MaaS broaden the range of the available modes of transport for the traveller [6], [7]. Services, such as car-sharing and car-pooling, are constantly being promoted to urban travellers, since they affect network conditions positively (i.e.,

less cars on the road) and have proven to be a more environmentally friendly way of travelling [8], [9]. In this complex and chaotic transportation network, understanding travel behaviour and predicting travel demand is of paramount importance.

A significant question that arises is what the differences in the way residents of different cities choose to travel in urban transportation networks are. More specifically, whether the structure, level of service or other features that may vary between each country's transportation systems affect mode choice. In addition, most of previous research attempts do not account for affective factors such as the perception for service (flexibility, reliability, comfort, etc.), risk, traveller's happiness, anxiety, as well as tolerance to network changes.

The aim of this paper is to analyse mode choice behaviour through research of the aforementioned factors; user-related, trip-related, service-related and affective/emotional factors. Furthermore, another goal of this paper is to compare how people choose to perform their everyday trips and understand the differences of urban travel behaviour across countries. The specific analysis includes all available means of transport, both private modes and public transport, as well as walking.

Data to be used for the analysis were collected through a questionnaire survey which took place in three major European countries (Greece, The Netherlands and Spain). The questionnaire survey took place both on site and online resulting in 1800 answered questionnaires. The questionnaire consisted of 4 parts and 27 questions.

The first part aimed at identifying respondents' mobility profile; respondents were asked about their usual trip, trip purpose, travel mode, number of trips per trip purpose, number of transfers, work time flexibility, public transport pass possession and attitude towards MaaS. Respondents were also asked to determine the level of happiness they experience during their usual trip using a 5-point scale, where 1 represents very unhappy and 5 represents very happy. Then, respondents were asked about their tolerance regarding changes of network and service conditions (e.g., traffic congestion, road accident, strike, etc.). Again, respondents answered using a 5-point scale, where 1 represents not tolerant and 5 represents very tolerant. Lastly, respondents were asked to state their estimation on the possibility of the occurrence of any unexpected event (e.g., road closure, vehicle damage) during their usual trip using a 5-point scale (1 represents not possible and 5 represents certain).

In the second part of the questionnaire, travellers were asked about factors which affect choosing their usual travel mode, while in the third part they were asked to assess the system (namely mode of transport) that they usually use. Factors that were considered in these parts of the questionnaire are cost, travel time, availability, accessibility, flexibility, safety, security and comfort. Moreover, supplementary factors were also examined such as live information provision by the system's operator and weather conditions. Respondents were asked to rate the significance of these factors on a 5-point scale ranging from extremely important to not important at all. Finally, the last part of the questionnaire included the socio-demographic characteristics of the respondents (gender, age, personal, income, home location, household size, occupation, etc.) and questions concerning their attitude towards social media.

Preliminary results indicated that demographic characteristics of the traveller, as well as predetermined factors such as car ownership are of great importance in the decision-making process concerning travel mode. Furthermore, although urban transportation systems have different characteristics among the three countries, findings revealed that the majority of factors affecting travel mode choice are the same among residents of different countries. Moreover, it appears that the existence of MaaS, such as car-sharing and car-pooling, significantly influences travel mode choice. Finally, findings revealed that emotional factors, which are here expressed through happiness and users' tolerance, are of significant importance for choosing between the various travel modes.

Future research will focus on creating a model that includes all the factors that affect travel happiness. More specifically, the goal is to identify the choices of the users that lead to the maximization of happiness that someone experiences during their trip. This model will be then incorporated in the My-TRAC application, which is the final product of My-TRAC European project. The application will be able to provide improved and personalized recommendations to the user that optimize their travel happiness while incorporating network dynamics.

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