A new approach to understand modal and pedestrians route in Portugal

Ana Paula Barros[a]*, Luis Miguel Martínez[b], José Manuel Viegas[b]

[a] Instituto Superior Técnico, Universidade de Lisboa, Avenida Rovisco Pais, nº1, 1049-001 Lisbon, Portugal
[b]International Transport Forum, Paris, France

Abstract

The present paper aims at examining which factors interfere on the choices people make of modes of transport or path (when walking), take into account four variables groups: geometrics, syntactic, land use and transportation accessibility. For that purpose, an online questionnaire was applied to formulate a Discrete Choice Model in two parts: mode choice and path choice for walking trips. The findings showed that factors such as safety, comfort and urban form contribute significantly to the choice of path. For the choice of car as transport choice, the most determining factors were: weather (rain, strong sun, cloudy) and periods of the day (night), both of which are examples of factors that are not controllable; and economic elements (the presence of paid parking lot) and the displacement time (total displacement time and time of access to the car).For the choice of bicycle, the main factors were the presence of cycle lanes and bicycle parking. Based on these findings, it was possible to conclude that the car is the transport mode with greater natural preference, followed by walking and finally bicycle.

Keywords: Mode choice; walk path choice; walking and biking.

1. Introduction

Nowadays, interest in pedestrian environments has grown due to the dissemination of the sustainable mobility paradigm in urban areas, which has been encouraging the use of non-motorizes modes. Walking has become an

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* Corresponding author. Tel.: +55-6183016116;
E-mail address: anapaulabgb@gmail.com

important transport alternative for short trips in urban areas, thus requiring a deeper analysis of how citizens value the quality of their walking environments.

Several studies have been analyzing walkability in recent years, normally focusing on: (a) physical activity and health(Frank et al. 2006; Giles-Corti 2006; Leslie et al. 2005; Owen et al. 2004)(Frank et al. 2006; Giles-Corti 2006; Leslie et al. 2005; Owen et al. 2004)(Frank et al. 2006; Giles-Corti 2006; Leslie et al. 2005; Owen et al. 2004); (b) creating a pedestrian environment index(Clifton et al. 2007; Krambeck & Shah 2008)(Clifton et al. 2007; Krambeck & Shah 2008)(Clifton et al. 2007; Krambeck & Shah 2008); (c) behavioral models to understand walking as a transport alternative; and (d) urban form impacts in the pedestrian environment(Dieleman et al. 2002; Greenwald & Boarnet 2001; Handy 1996; Lee & Moudon 2006; Schlossberg et al. 2006).

Nonetheless, there is still a lack of consensus on travel behavior modeling on how to assess the effect of physical pedestrian environment design, land use and road traffic in the mode choice process of users regarding their nearby pedestrian infrastructure.

The integration, under the same analysis, of different measures of grid design along with physical attributes of pedestrian infrastructure like sidewalk width, slope or presence of tress, road traffic characterization, land use and activity data is fundamental to fully understand the choice of users in favor of walking.

The paper aims at discussing which factors are relevant for choosing transport modes (motorized or non-motorized) and path (of pedestrians) for different types of displacements and context conditions (i.e. weather). In order to carry out this analysis a questionnaire about urban environment was made available online in four languages, enabling participants from all around the world to partake, allowing assessing of the factors that influence walkability. Although the questionnaire was applied online for every country, the data collected had a greater attrition in Portugal, being the most represented country in the sample with 1,600 answers to the stated preference's section (599 respondents), 75% of which were residents of Lisbon. This collected data was then applied into a Discrete Choice Model (DCM), including a simultaneous choice of mode and walking path, introducing a significant innovation in the literature (ref). This analysis enabled us to evaluate which factors influence the choices made by Portuguese people – more specifically the residents of Lisbon – in terms of transport modes and walking path.

The organization of this study is as follows. After this brief introduction we will present a small literature review focusing on the representative works that has been published about discrete choice modelling applied to pedestrian behavior and the relation of different factors with walkability; afterwards, the methodology will be described, covering both the data collection process and the estimation of the DCM and the discussion of the results; the paper ends with some brief conclusions and further developments. Here introduce the paper, and put a nomenclature if necessary, in a box with the same font size as the rest of the paper. The paragraphs continue from here and are only separated by headings, subheadings, images and formulae. The section headings are arranged by numbers, bold and 10 pt. Here follows further instructions for authors.

2. Literature Review

Literature regarding walking behavior and mode choice, focusing in non-motorized modes has been profuse. We can classify the literature in three research streams in the area: first, researchers that have focused on understanding environmental factors influence the path choice of pedestrians (Reckert and Golob, 1976; Williams, 1977; Schwanen and Mokhtarian, 2005; Whalen, Páez and Carrasco, 2013); secondly, authors that tried to assess the impact of urban form in non-motorized modes (Cervero and Duncan, 2003; Guo and Ferreira Jr, 2008); and lastly urban studies that have focused on the effect of morphological and syntactic aspects, using Space Syntax indices (Medeiros and Holanda, 2010).

In order to analyze users' preferences for displacements (motorized and non-motorized transport), initially, it is worth understanding the functioning of market logic for an individual who needs to make use of a service (or, in the case of research, a space). It is necessary to analyze a set of alternatives available and select the one(s) whose attribute(s) provides highest level of satisfaction. According to Ben-Akiva and Lerman (1985) (1989), the choice results from a procedure performed by the individual which includes the following elements:

(a) The decision maker ('who' – the respondents of the questionnaire)