

18th Euro Working Group on Transportation, EWGT 2015, 14-16 July 2015,
Delft, The Netherlands

Valuation of travel attributes for using automated vehicles as egress transport of multimodal train trips

M.D. Yap^{a,b,*}, G. Correia^a, B. van Arem^a

^a Delft University of Technology, department Transport & Planning, Delft, the Netherlands

^b Goudappel Coffeng, Deventer, the Netherlands

Abstract

In the recent years many developments took place regarding automated vehicles (AVs) technology. In fact AVs are expected to become available on the market in the next decades. It is however unknown to which extent the share of the existing modes will change as result of AVs introduction. To the best of our knowledge this study is the first where traveller preferences for AVs are explored and compared to existing modes. Thereby its main objective is to position AVs in the transportation market and understand the sensitivity of travellers towards some of their attributes. Because there are no fully-automated vehicles currently on the market, we apply a stated preference choice experiment where we explore the role of classic instrumental variables such as different travel time components and travel cost. In our study we focus on positioning AVs in the context of last mile transport at the activity-end in multimodal train trips. We can conclude that first class train travellers on average prefer using an automated vehicle as egress transport between train station and final destination, compared to using other egress modes. Second class train travellers on average prefer the use of bicycle and bus/tram/metro as egress mode instead of automated vehicles. Especially for first class train passengers, implementing AVs as last mile transport therefore has potential. Second, sensitivity of travellers for in-vehicle time is considerably higher for an automatically driven AV, compared to a manually driven AV. As consequence, the willingness-to-pay for a certain travel time reduction in an automatically driven AV is considerably higher, compared to a manually driven AV. Despite theoretical advantages of using travel time more efficiently in an automatically driven AV, it might be that psychological concepts, like attitudes, play a role here. Since automated driving is a very new and innovative way of transportation, the classic instrumental attributes like travel time might not tell the whole story.

© 2015 Published by Elsevier B.V. This is an open access article under the CC BY-NC-ND license

(<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Peer-review under responsibility of Delft University of Technology

Keywords: automated vehicle; cybercar; last mile transport; preferences; stated choice

* Corresponding author. Tel.: +31 (0)6 22807934.

E-mail address: MYap@Goudappel.nl

1. INTRODUCTION

In the recent years many developments took place regarding automated vehicles (AVs) technology. In fact AVs are expected to become available on the market in the next decades. It is however unknown to which extent the share of the existing modes will change as result of AVs introduction. To the best of our knowledge this study is the first where traveller preferences for AVs are explored and compared to existing modes. Thereby its main objective is to position AVs in the transportation market and understand the sensitivity of travellers towards some of their travel attributes. Because there are no fully-automated vehicles currently on the market, we apply a stated preference choice experiment where we explore the role of classic instrumental variables such as travel time or cost. In our experiment, we also indicate automated vehicles as ‘cybercars’. We use the last mile trips between a train station and travellers’ final destination as the object of our study. In multimodal train trips, a relatively high disutility is caused by the access and egress. Hence we hypothesize that by providing AVs as egress mode we may improve the attractiveness of multimodal rail trips and expect a modal shift to the train+AV combination. AVs hereby contribute to improving door-to-door transportation. In our study we thus focus on positioning AVs in the context of last mile transport in multimodal train trips.

2. METHODOLOGY

2.1 Alternatives and attributes

Multimodal public transport trips consist of three stages: access, main part and egress. We define a multimodal PT trip in this paper as a trip where more than 1 mode is used, using a public transport mode for the main part of the trip. For each stage different alternatives are available, such as walking, cycling, private car or PT (bus/tram/metro: BTM) for access; train, metro, tram or bus for the main stage; and PT (BTM), cycling or walking for the egress part. For all these stages different attributes - like in-vehicle time, waiting time, travel costs – are relevant for multimodal mode choice. The high number of possible combinations of mode alternatives and attributes makes it complex to incorporate all those combinations in one stated choice experiment in a manageable way. Capturing the attribute sensitivity for all these combinations would lead to a high number of choice sets provided to each respondent, leading to a too high complexity task for the respondent, or it would require a very large sample of respondents.

In order to reduce this complexity, in our study we focus only on multimodal PT trips where trains are used in the main stage. Besides, we only consider trips going from an origin next to the home-end of a trip to a destination in the activity-end. As Hoogendoorn-Lanser et al. (2006) indicate, there are differences in availability, knowledge and use of multimodal trip alternatives between the home-end and activity-end of a trip. Therefore it is important to explicitly distinguish home-to-activity trips from activity-to-home trips, since attribute sensitivities can be different on each direction of the trip. We then only considered the automated vehicle as egress transport from the train station to the activity-end of the trip. The sensitivity to attributes of the AV as access transport from the home-end origin to the train station is not explored in this study. Furthermore, we clustered attributes and attribute levels for the access and main stage of the multimodal trip together, which means that we provided respondents with attributes and attribute levels for the access and main stage of the trip together, whereas attributes for the egress stage of the trip are mentioned separately (Figure 1). This clustering is in line with our scope of exploring the sensitivity to AV attributes on the egress stage of the trip only. This also means that different modes for the access stage of the trip are not explicitly mentioned in our study (Figure 2). This allows the reduction of the number of alternatives and attributes in the stated choice experiment.

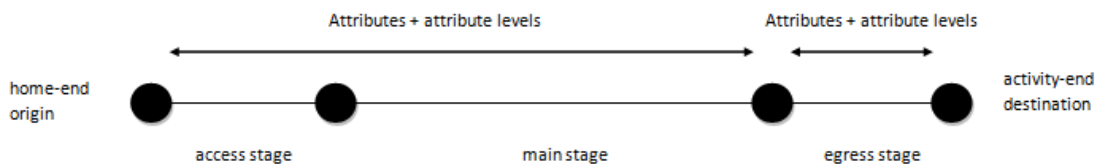


Figure 1. Clustering of attributes for access and main stage of trip; separate attributes for egress trip stage.

Download English Version:

<https://daneshyari.com/en/article/1106856>

Download Persian Version:

<https://daneshyari.com/article/1106856>

[Daneshyari.com](https://daneshyari.com)