

Perception of Passenger Waiting Times in Public Transport

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Abstract — It is generally known that passengers perceive waiting times to be longer than they actually are. Based on existing literature, this thesis investigates the geographical locations of the previous study areas as well as providing an overview of influence factors on waiting time perception have already been discussed. The contribution of the present paper to this topic lies in the investigation of another level of waiting time perception, as it studies how passengers think they perceive waiting time. For this purpose, a stated preference survey was conducted. Results show that passengers think the activities they are involved in while waiting have the strongest influence on their waiting time perception, followed by a clever site selection and stop amenities. Neither the Mann-Whitney-U-test nor an ordered logit model identified large differences between participant characteristics groups such as gender, age, education level, frequency of public transport use or access to a car.

Keywords — *Waiting time, Perception, Geographical Location, Influence Factors, Passenger Characteristics*

I. INTRODUCTION

Waiting time is an important factor in influencing passenger satisfaction concerning service quality in public transportation [1]. Therefore, it is important for traffic agencies to understand passengers' waiting time perception to improve their image and to increase ridership. The simplified and general research question on which the study focuses on is:

How do passengers perceive waiting times?

To address the topic of waiting time perception, the study is structured in three parts. It starts with an elaborated literature review with the two research questions:

What factors do influence passengers' perceived waiting time at stops and how is the perception affected by each factor?

How does the perception differ from actual waiting time and how does it vary across the world?

For the second part of the study, a survey was conducted to answer the following two research questions:

How do passengers think different factors will have an influence on their perceived waiting time?

How passengers think they perceive waiting time and how does it differ from perceived waiting time on site?

To conclude the topic, both parts (literature and survey) are combined to make some general recommendations about how stops should be designed in order to minimize perceived waiting time.

II. RELATED LITERATURE

Over 23 studies were reviewed. Special focus is placed on the location of the conducted surveys, what ratios of perceived versus actual waiting time were found, if measured, and which factors have an influence on waiting time perception.

A. Geographical Location

Most of the surveys took place in the U.S. and in Europe, accompanied by some more recent surveys in Asia. It is difficult to draw any worldwide conclusions about different perceptions of waiting time. Only eleven studies in six countries, provide a comparison between actual and perceived waiting time. In addition, there are large variations within one country itself. Generally, people tend to overestimate waiting time, whereas no country specific trend can be found.

B. Factors Influencing Perceived Waiting Time

Already a large number of possible factors influencing waiting time perception have been investigated. These factors concern the transit service, infrastructure at stops, passenger characteristics and trip characteristics. Most of the factors are covered by one to three studies selected for this review. The factor real-time information stands out as it has already been investigated in 14 studies of this literature review and 12 of them show that providing real-time information can significantly reduce perceived waiting time [2].

III. METHODOLOGY

A. Survey Process

The survey was conducted online. It consists of three parts. Participants had to spontaneously name three factors thought to influence their waiting time perception. Further, some participant characteristics were asked, such as gender, age, education, frequency of public transport use and car access. Then participants were asked to evaluate a list of factors about how they think these factors will influence their perceived waiting time on a five-level scale from "greatly shorten" to "greatly lengthen". The factors found in the literature review served as basis for this process.

B. Sample Characteristics

Overall, 126 people took part at the survey. Gender and education are fairly evenly distributed, whereas people with car access and who use public transport more than three times a week dominate the sample. Concerning age, nearly half of the participants are between 20 and 25 years old whereas the rest of the sample is fairly evenly distributed between 14 and 80 years.

C. Data Processing

To analyse the data, four different methodologies are used. To analyse free choice factors, their number of nominations is registered. To rank the evaluations of the factors list, a numerical scale from -2 to +2 is assigned to the ordinal scale of “greatly shorten” to “greatly lengthen”. To identify differences between participant groups, a Mann-Whitney-U-test is conducted [3] and an ordered logit model with the following independent variables is generated [4]: gender, age, education, frequency of public transport use and car accessibility.

IV. RESULTS

A. Ranking of Free Choice Nominations and Factors List

All factors asked to be evaluated in the survey are listed in Fig. 1. They are sorted by their absolute averages, which corresponds to their importance of influencing waiting time perception. The error bars indicate the average plus and minus the standard deviation.

Considering the distribution of the factors, activities people do while waiting seem to be most important, followed by temperature and weather conditions. Stop infrastructure is ranked in the middle, while the lower ranks are occupied by trip characteristics, which describe when and why a trip is undertaken.

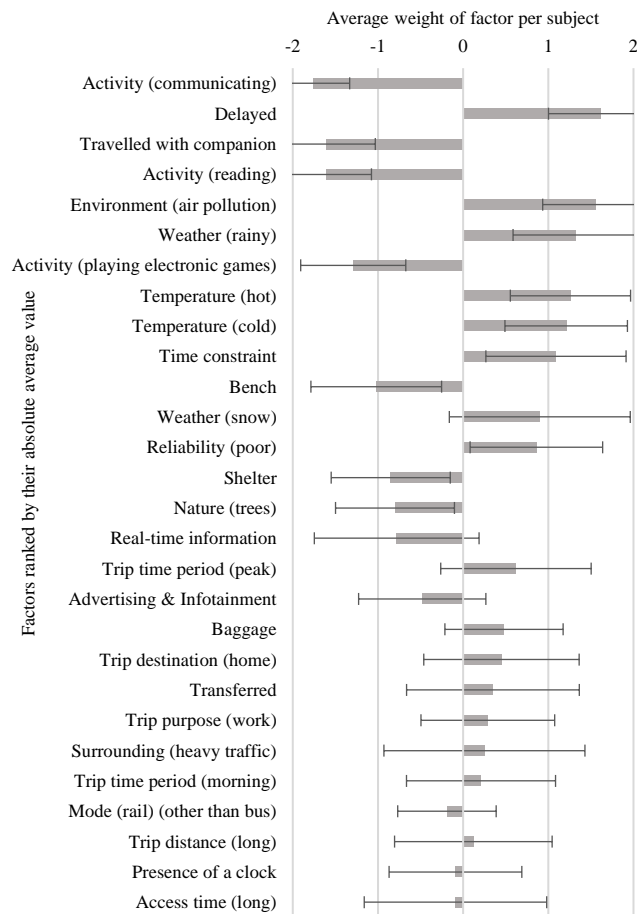


Fig. 1. Factors list sorted by their absolute averages

A comparison of the free choice nominations with the factors list in Fig. 1 shows that the spontaneously named choices are reliably represented in the predefined factors list. In addition, the factor "observe people/environment" should also be considered.

B. Factors List for Different Participant Groups

Among the members of the participant groups (gender, age, education, frequency and car access) only small deviations in the averages of the factors can be observed. The Mann-Whitney-U-test detects few significant differences in the evaluating behaviours.

A significant ordered logit model with at least one significant independent variable can be generated for five factors, therefore the number of significant dependencies according to the ordered logit model is small. Most of the findings of this model coincide with the ones of the Mann-Whitney-U-test. The general trends of the different evaluating behaviours can be confirmed by considering the averages for different participant groups.

C. Comparison Study vs. Literature

The findings of 19 out of 28 factors of this study coincide with the majority of reviewed literature. Those factors which show divergent results appear near the end of the ranking in Fig. 1. Therefore, the factors passengers think they perceive differently than they actually would at stops, are of less importance.

V. RECOMMENDATIONS

In order to minimize perceived waiting time, the following recommendations to traffic agencies can be made:

- Support passengers in the activities they are inclined to do while waiting, such as reading or using the mobile phone.
- Choose a clever site for bus stops. Especially avoid air pollution and attach importance to an exciting surrounding, so that passengers have something to observe.
- Provide amenities such as shelters, benches or real-time information.

VI. REFERENCES

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