SUMMARY

Eindhoven, as heart of the Brainport region, is gaining more interest of businesses settling in the region, resulting in a population growth of the city itself as well. The vision of the city is to densify, which means that new residential buildings will be constructed within the ring road, increasing the pressure on its traffic network even further. However, parallel to these developments, the EU norms obligate the city to reduce its greenhouse gasses, in order to limit global warming. Since the mobility sector is contributing significantly to these greenhouse gasses, this is an area of focus for the municipality of Eindhoven.

So, the challenges for Eindhoven are in twofold: on the one hand the city needs to stay accessible and attractive for its (future) residents, businesses and visitors, but on the other hand, the share of sustainable transportation needs to increase, reducing the greenhouse gasses. The ambition of the city is to create a multimodal traffic network in order to keep the city and its economic high priority locations well-accessible. The focus is therefore on well-connecting the various modalities and making the switch from private car towards sustainable and shared-mobility as convenient as possible. Mobility as a Service (MaaS) seems promising in being part of the solution. This new mobility concept offers a tailormade and demand-responsive mobility package arranged via one application. The concept is user-centric and focuses on the service of providing its users with the most convenient (co-modal) travel alternatives according to their preferences. The users can plan, book and pay their trip within the MaaS application and the application also provides them with the necessary tickets and service. Being able to offer these modalities, MaaS has its implications in the built environment as well, in the form of mobility hubs where the shared-mobility is located. Insights in the preferences regarding these hubs in the MaaS context is limited and therefore this research focusses on these hubs in the context of Eindhoven.

The aim of this research is therefore to obtain more insights in the determinants influencing travelers' decisions to switch to more sustainable (shared-)mobility alternatives and the willingness to use the hubs. Resulting in the main research question: '*Which factors can influence visitors' inclination to switch to sustainable (shared) mobility for their visit of Eindhoven city center (in transition towards MaaS)?*' In order to answer this research question, a Stated Choice experiment has been conducted. Respondents were provided with their personalized travel alternatives towards Eindhoven city center. These varied from: i) car, ii) car to hub and transfer to bus iii) car to hub and transfer to shared-bike iv) public transportation and walk v) public transportation and transfer to shared-bike, and when applicable, vi) (e-)bike. These alternatives were presented in a complete overview including travel times, waiting times, parking tariffs, travel costs and facilities, similar to a MaaS platform. The 'push' factor of increased parking tariffs in the city center has been included in the study for encouraging more sustainable mode choice behavior.

The target group for the research were visitors of the Eindhoven city center, which have been recruited by means of a travelers panel in the South of the Netherlands, by the network of the municipality of Eindhoven and Eindhoven University of Technology, and personal network. All in all, the data of 375 respondents was used for the analyses of which 259 respondents lived further than 10 kilometers from Eindhoven city center. In order to obtain an extensive understanding of the data, several discrete choice models: Multinomial Logit models, Mixed Logit models, and Latent Class models were estimated. Moreover, several scenarios have been sketched (both planned and hypothetical) based on these results, to obtain more insights in the combination of variables. The scenarios split the respondents up into two groups: one group of people living within 10 kilometers from the center and the other group living further away. The first group seems not to be the target group for the hubs as they do not prefer using them, which makes sense due to the distance. The other group does seem to have interest in using the hubs.

The results of the estimations provide an understanding of the determinants of mode choice behavior in the Eindhoven context. Overall can be concluded that respondents prefer alternatives without a transfer (public transportation + walk or private (e-)bike). In order to make the alternatives including a transfer more interesting, the waiting time for the bus should be short by operating the busses on a frequent schedule. Therefore it is important that the hubs are located near the HOV lines of Eindhoven, which already serve at a quite frequent schedule. Moreover, the travel times by bus and bike from the hub negatively affect these alternatives as well. However, in general the bus remains the most preferred 'last mile' transport mode from the hub. People having a working purpose; the group between 30 and 50 years old; and people living in villages seem especially sensitive to the increased travel times. People over 50 years old on the other hand seem less sensitive to the travel times.

Regarding the facilities at the hub, no indication has been found that these affect the hub usage in this sample. Which is also the case for the travel costs of the bus or bike from the hub. However, the costs for using a bike after public transportation seem to affect the choice for this alternative. Other financial incentives appeared to have an effect on people's willingness to use the hubs. The parking tariffs at the hub seem to influence its usage, and can even create unintended effects. A free hub also attracts people living within 10 kilometers of the city center that would otherwise possibly use the bike or public transportation, and are therefore not the target group for the hub. It is therefore not recommended to make the hub free of charge.

Since the aim for Eindhoven is to increase the share of sustainable transportation (public transportation and private (e-)bike) towards the city center, it is recommended to increase the parking costs in the city center. This 'push' measure results in the highest share of sustainable transportation. In order to have the most effective deployment of the hubs in combination with the use of public transportation and cycling this is recommended. The results of the scenarios show that the planned hub at Genneper Parken seems to be a good location in terms of travel time. The location closer to the city center, near the ring road seems only to have limited effect on its usage, and as these locations would also result in more traffic near the ring road, this is not desired. For the use of the bike from the hub, the location at the ring road would be better since this has a shorter cycling time, but possibly other measures, such as making the cycling routes convenient or providing shared e-bikes, would have the preferred effect as well. In general, also a strong preference has been found for using the private (e-)bike for trips towards Eindhoven city center as well. Therefore, the strategy of the municipality of focusing on making the infrastructure more friendly for slow traffic is positive. The municipality of Eindhoven can use the knowledge obtained in this study as underpinning for their strategy regarding hubs and increasing the share of sustainable transportation towards Eindhoven.