MASTER THESIS

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SCRUTINIZING CONSUMER-CITIZEN DUALITY TOWARDS SAFETY AND TRAVEL TIME TRADE-OFFS

A CASE STUDY OF ON-DEMAND MOTORBIKE TAXI IN JAKARTA

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A CASE STUDY OF ON-DEMAND MOTORBIKE TAXI IN JAKARTA

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EXECUTIVE SUMMARY

In many countries, a lot of investments and developments are being made to improve the reliability of public transport services so they can compete with other means of transport, particularly private vehicles (Pojani, 2015). Alphonce, Alfnes & Sharma (2014) discovered the appealing fact that an individual could have duality preferences: as a consumer and a citizen in society. However, in the last decade, apparently most studies only focused on addressing people's individual preferences as consumers rather than as citizens (Alphonce et al., 2014). The definition of citizen preference is considered more complicated, fuzzy and many stakeholders have questioned its efficacy in regulatory practice (Livingstone & Lunt, 2007). In contrast, consumer preference is considerably more straightforward and easier to define. Studying these two perspectives could form a new cutting-edge approach to future developments in the transportation sector.

The latest research, conducted by Mouter, van Cranenburg & van Wee (2017a, 2017b), added a reassuring note in elaborating on the citizen-based choice experiment, as they found that car users in the Netherlands, acting as citizens, are willing to accept longer travel times to reduce their risk of traffic casualties. The different marginal rate of substitutions – as consumers and as citizens – found in the recent study by Mouter et al. (2017a) represent an intriguing topic that should be tested in another domain of transport. Based on this, the author in this research carries out an extensive analysis in applying and testing the concept of consumer-citizen duality in an interesting case study of on-demand motorbike taxi services in Jakarta.

The concept of an on-demand motorbike taxi service is widely accepted by many travelers as it offers faster travel times, cheaper travel costs and flexible characteristics compared to any other public transport modes in Indonesia (Sunarya, 2016). Nevertheless, it has also become a controversial subject due to its (poor) level of safety. This may be because motorbike drivers have a greater chance of undertaking unsafe driving behavior that could jeopardize safety aspects for passengers (Vlahogianni, Yannis, & Golias, 2012). To date, literature that incorporates the concept of consumer-citizen duality mainly in the transport sector is still limited. The scarcity of consumer–citizen-based studies in transportation development research is even more prominent in several developing countries, including Indonesia which is still striving towards a more reliable public transport system. Given the fact that the decision-makers face several dilemmas in acknowledging the on-demand motorbike taxi as a formal means of public transport, this may increase the urgency for research in elaborating consumer-citizen preferences within the context of on-demand motorbike taxis.

This research aims to gain more insight into capturing the duality preferences of on-demand motorbike-users as consumers and as citizens, when they make a trade-off between safety aspects and travel time. The main research question is then constructed to fill certain knowledge gaps related to consumer-citizen duality of users when facing travel time and safety trade-offs, as follows:

> ***"To what extent do the preferences of on-demand motorbike taxi-users differ when they have to make trade-offs between travel time and safety as consumers and as citizens ?"***

To explore to what extent the difference in the marginal rate of substitution between consumer and citizen preferences might vary, the stated choice experiments on prospective respondents, which is on-demand motorbike taxi-users were conducted. In the context of this research, the stated choice experiments were conducted into consumer-based experiments and citizen-based experiment.

Following to this experiment, the author in this research derived the definition of consumer and citizen preferences from two different contexts. First, the role of an individual in the market-based context gave clarity to the author in defining the consumer as a self-interest individual who will reveal their interest based on the allocation of their after-tax income. This definition may suitable to depict the needs of the on-demand motorbike taxi users who desire to gain their self-benefits (i.e. faster, cheaper and safer) when they use on-demand motorbike taxi as their daily transport mode. Second, the definition of the citizen preference in this study was derived from a political context. The author in this research emphasized the definition of the citizen as the individual who put their interest on the society's viewpoints and thus, they will reveal their choices based on previously collected tax by the government. The definition of consumer and citizen preferences used in this study are analogous to the description of consumer and citizen preferences which are found in study by Mouter et al (2017a, 2017b), which empirically confirm that the differences on the individual valuations towards safety and travel time trade-offs depending on their role as a consumer or a citizen.

By defining the consumer-citizen preferences above, this study was proposed to be conducted in three experimental designs, which are two consumer experiments and one citizen experiments. This research adopted the concept of classical consumer experiment which coined by Mouter et al. (2016) since motorbike was undoubtedly known as the dominant mode in transport in Jakarta. Considering this matter, the author intended to calculate the VOT and VOSL for the motorbike taxi which known as the most popular informal public transport in Jakarta. To generate the monetary VOSL and travel time savings, therefore the first consumer experiment included cost attribute in each alternatives. The second consumer experiment was chosen as it was necessary to address the primary research aim of this study, which is to elicit the preferences of individuals trade-offs their safety and travel time as the consumer of mobility. In the third experiment, this study tries to emphasize the experiment that could represent the government policy towards the on-demand motorbike taxi service. By adopting the speed limit regulation, in this experiment, the participants were asked to choose between two policy options which differ regards to the travel times and the accidents impacts that could generate from two different policy options.

To ensure that the selected attributes can be quantified in a realistic value; therefore, conducting a literature review and expert interviews might be essential in designing the relevant choice tasks. This research pinpoints that all of the selected attributes were varied in the four levels to test for the non-linear effects, as shown in below table.

The attributes and attributes levels used in the experiments

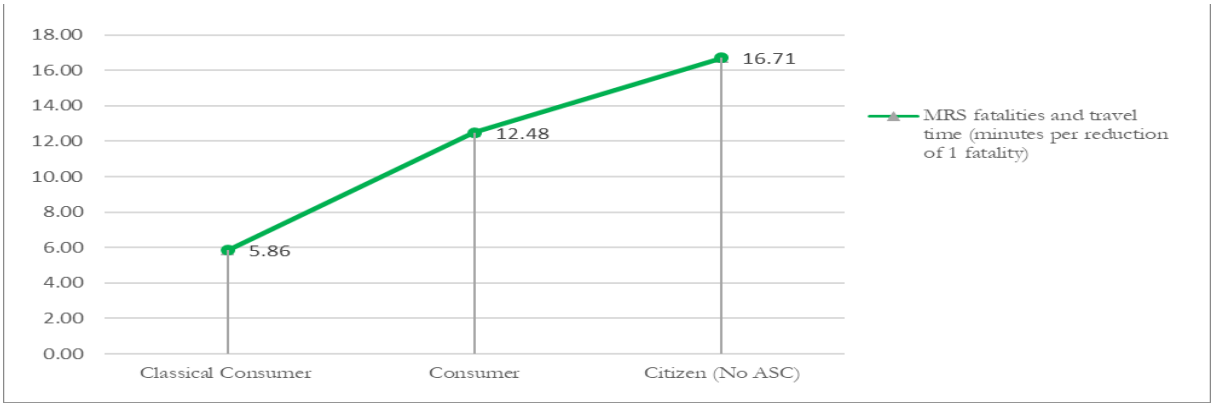
Experiment	Attributes	Level of measurement	Unit of measurement	Proposed Attribute Levels
Consumer Experiment 1	**Travel Cost**	Ratio	IDR per km / EUR per km	IDR 1500 per km (EUR 0,09 per km) IDR 2000 per km (EUR 0,12 per km) IDR 2500 per km (EUR 0,15 per km) IDR 3000 per km (EUR 0,18 per km)
	Travel Time	Ratio	Minutes per trip	20 minutes 35 minutes 50 minutes 65 minutes
	Fatalities	Ratio	Deaths per year	2 deaths per year 4 deaths per year 6 deaths per year 8 deaths per year
	Injuries	Ratio	Injuries per year	8 injuries per year 12 injuries per year 24 injuries per year 36 injuries per year

Consumer Experiment 2	**Travel Time**	Ratio	Minutes per trip	20 minutes 35 minutes 50 minutes 65 minutes
	Fatalities	Ratio	Deaths per year	2 deaths per year 4 deaths per year 6 deaths per year 8 deaths per year
	Injuries	Ratio	Injuries per year	8 injuries per year 12 injuries per year 24 injuries per year 36 injuries per year
Citizen Experiment	**Travel Time**	Ratio	Minutes per trip	20 minutes 35 minutes 50 minutes 65 minutes
	Fatalities	Ratio	Deaths per year	2 deaths per year 4 deaths per year 6 deaths per year 8 deaths per year
	Injuries	Ratio	Injuries per year	8 injuries per year 12 injuries per year 24 injuries per year 36 injuries per year

In this research, the pilot survey and final survey used the same attributes and attributes levels. The only difference was in the pilot survey; the experiments were constructed using orthogonal design. On the other hand, the final experiments were designed using D-efficient design. As mentioned earlier, the pilot survey was designed to generate priors that were used to construct D-efficient design and also as a final test to the attributes and attribute levels.

The data from the final survey were analyzed using Multinomial Logit Model which is commonly known due to its simplicity and its ease of use. Results of the basic MNL model showed that all attributes in the consumer experiments (deaths, injuries, travel time and travel cost) were statistically significant. As a side note: in the citizen experiment, ASC and travel time were found to be insignificant on a 95% confidence level. The insignificant value of the travel time attribute suggests that the travel time attribute was not reliable for use to measure the trade-offs. Following this condition, the ASC attribute was omitted in the citizen experiment as it denoted statistically insignificant value.

The results showed all attributes were statistically significant and all the signs were as expected. Subsequently, the marginal rates of substitution in the consumer experiments ranged between 5.86 minutes and 12.48 minutes of travel time gained to reduce the probability of 1 traffic casualty in the first and second consumer experiment respectively. And, as citizens, the marginal rate of substitution is higher than as consumers, which is 16.71 minutes of travel time gained to reduce 1. Personal characteristics was also included in the MNL model as an interaction effect to test its influence on the attributes. The results found that only a few interaction parameters were significant in all experiments, meaning that the interaction effect does not play a role. To sum up, the results from this chapter answered the main research question that there is indeed a discrepancy between the preferences of an individual as a consumer and as a citizen. The models in this research reinforce the fact that consumers tend to choose the faster option and, on the other hand, citizens tend to prefer the safer option.



The marginal rate of substitution between safety and travel time in the consumer and citizen choice experiments

Following to the model estimation result, the insights and implications in the differences of marginal rate of substitutions between consumer and citizen preferences could be derived. First, the fact that a significant difference between safety and travel time trade-offs was found in the consumer and citizen experiments, can be inferred as one of the empirical evidence in proofing the concept of consumer-citizen duality. This research also corroborates the statement from Mouter et al. (2017a, 2017b) that individuals as the classical consumer will prefer to have smaller travel time gains in reducing the risk to involve in one traffic casualty per year than individuals who put their role as the citizen. Obtaining a similar result with this study may create the generalizable results to other city and other transport modes. Accordingly, this could have a more significant effect on the development of transport research.

Looking further at the behavioral contexts and also at the results of each of the experiments, it can be identified that most of the on-demand motorbike taxi-users, as citizens, value safety most in comparison with other attributes. Nevertheless, as consumers, on-demand motorbike taxi-users tend to demand faster travel times. The results obtained from the previous section can be used to deduce some insights that may have further implications for future policies in dealing with the on-demand motorbike taxi services in Jakarta. More specifically, in designing a legal umbrella that could provide a liability protection not only for the users but also for the drivers. Recently, the Indonesia Constitutional Court has refused to legalize as on-demand motorbike taxis as a means of public transportation. They vigorously argued that motorbike taxis were not a safe vehicle for public transportation in term of its safety. However, the Constitutional Court denoted that online motorbikes can still run even though they are not regulated in the Law No 22/2009 concerning about Road Traffic and Transportation. Besides, the Ministry of Transportation also pointed out that Jakarta Government has a higher power to manage the operation of this means of transport, through, 1) setting minimum tariff for peak and off-peak hour, 2) setting the speed limit regulation during off-peak and peak hour, 3) setting the minimum capacity for registered drivers for every service providers company.

The research outcomes however have some limitations that need to be improved for next research development. *First,* this research used a choice experiment to collect data on a stated preference. This means that respondents were requested to make a choice between two hypothetical situations. The hypothetical choice situations in this case are not actually available in real life, and it is questionable whether the respondents would actually choose the same hypothetical choice situation in real life. Second, this study only applied two hypothetical choice situations in each experiment. In fact, the respondents could opt for other alternatives, for example, in the consumer experiments, the respondents might opt to choose another alternative rather than using an on-demand motorbike taxi. Similarly, in the citizen experiment, only two hypothetical alternatives were presented to respondents. In reality, respondents might choose for the current speed used by drivers on a daily basis.

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1 INTRODUCTION

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INTRODUCTION

In many countries, a lot of investments and developments are being made to improve the reliability of public transport services so they can compete with other means of transport, particularly private vehicles (Pojani, 2015). However, enhancement on the supply side will not necessarily lead to a concomitant increase in the user's level of satisfaction (Fellenson & Friman, 2008). To ensure that the supply side meets with the user's expectations, research about user preferences will provide valuable information in understanding their perceptions and behavior (Johnson & Gustafsson, 2000). Alphonce, Alfnes & Sharma (2014) discovered the appealing fact that an individual could have duality preferences: as a consumer and a citizen in society. The consumer is commonly known as a rational optimizer, who is moved by self-interest, hedonic, and utilitarian attributes (Chitturi, Raghunathan, and Mahajan, 2007). A citizen's preferences, on the other hand, are driven by altruistic interests that may be motivated by a sense of consideration towards the community, for example, social responsibility or environmental responsibility (Berglund & Matti, 2006).

Studying these two perspectives could form a new cutting-edge approach to future developments in the transportation sector. However, in the last decade, apparently most studies only focused on addressing people's individual preferences as consumers rather than as citizens (Crompton, 2008). The definition of citizen preference is considered more complicated, fuzzy and many stakeholders have questioned its efficacy in regulatory practice (Livingstone & Lunt, 2007). In contrast, consumer preference is considerably more straightforward and easier to define. The examination of customer preferences is often done to measure the degree to which individuals are willing to accept (WTA) and willing to pay (WTP) in compensation for a decrease or an increase in the quantity or quality of a product (Corbie, 2017). Nevertheless, focusing solely on this approach may lead to a crowding-out effect that appears as a result of an incorrect intervention in controlling the individual's decision-making process (Berglund & Matti, 2006).

The latest research, conducted by Mouter, van Cranenburg & van Wee (2017a, 2017b), added a reassuring note in elaborating on the citizen-based choice experiment, as they found that car users in the Netherlands, acting as citizens, are willing to accept longer travel times to reduce their risk of traffic casualties. They state that, in the citizen-based experiment, individuals consider government intervention more attractive from a societal point of view if it can improve safety in comparison with the project that generates travel time savings. The different marginal rate of substitutions – as consumers and as citizens – found in the recent study by Mouter et al. (2017a) represent an intriguing topic that should be tested in another domain of transport. Based on this, the author in this research carries out an extensive analysis in applying and testing the concept of consumer-citizen duality in an interesting case study of on-demand motorbike taxi services in Jakarta.

Conducting the consumer and citizen-based choice experiment can be a new exciting approach to measuring the dual roles of individuals in the new domain of transport modes, notably the on-

demand motorbike taxi. To date most consumer-citizen preference studies have been conducted to assess users' preferences regarding new environmental policy (McGregor, 2002; Berglund & Matti, 2006; Pepermans & Rousseau, 2016; Corbie, 2017), and only limited studies have elaborated on these two preferences in transport policy development (e.g. Mouter et al., 2017a). Given this context, it may be interesting to explore whether the differences between citizen preferences and consumer preferences found in car users by Mouter et al. (2017a) also appear in other domains of transport, particularly in on-demand motorbike taxi users. This research investigates whether on-demand motorbike users also have different preferences as consumers and as citizens when making travel time and safety trade-offs. If the differences are found, future studies of other modes, for example, public transport users, therefore could also be conducted. Subsequently, this could have a significant impact on developments in transport research.

1.1 Problem Statement

Taking the preferences of users as consumers and as citizens into account when evaluating the service performance of on-demand motorbike taxis is crucial since this type of service has been proliferating as a prominent industry in Indonesia's congested cities, notably in Jakarta. The concept of an on-demand motorbike taxi service is widely accepted by many travelers as it offers faster travel times, cheaper travel costs and flexible characteristics compared to any other public transport modes in Indonesia (Sunarya, 2016). A study by Jakpat (2016) found that, in 2016, motorbike taxis had reached a 71% market share of DRT modes, followed by car taxis (19%) and the three-wheel taxi/rickshaw (10%). This share shows that the market for on-demand motorbike taxis could be even more prominent in the future. Nevertheless, it has also become a controversial subject due to its (poor) level of safety. This may be because motorbike drivers have a greater chance of undertaking unsafe driving behavior that could jeopardize safety aspects for passengers (Vlahogianni, Yannis, & Golias, 2012).

One of the controversial limelight focused on the on-demand motorbike taxi service related to their reliability in ensuring passengers' safety. Moreover, the Indonesia Government is still hesitant to legalize the operation of on-demand motorbike taxi services, as motorbikes are known to contribute to more than 60% of road traffic accident in Indonesia (Susilo et al., 2015; Transportation statistics of Jakarta, 2016). On the one hand, a legal framework will be useful not only to monitor the driving behavior of drivers but also to control the fare system so that it is not monopolized by service providers. Further investigation into gaining input from the user side is desired in view of this dilemma. For instance, the government could assess relevant policy interventions for operating an on-demand motorbike taxi, based on users' experience of mobility, not only as consumers but also as citizens, specifically by scrutinizing to what extent users are willing to trade-off their travel time with their safety when using on-demand motorbike taxi services.

To date, however, literature that incorporates the concept of consumer-citizen duality mainly in the transport sector is still limited. The scarcity of consumer–citizen-based studies in transportation development research is even more prominent in several developing countries, including Indonesia which is still striving towards a more reliable public transport system. Given the fact that the decision-makers face several dilemmas in acknowledging the on-demand motorbike taxi as a formal means of public transport, this may increase the urgency for research in elaborating consumer-

citizen preferences within the context of on-demand motorbike taxis. These gaps have generated the following problem statement:

> *"The extent to which the preferences of on-demand motorbike taxi-users may vary according to their role as consumers and their role as citizens when making safety and travel time trade-offs"*

To clarify this statement further, the definition of consumer and citizen preferences used for this research is motivated based on various studies, for example Berglund & Matti (2006); Mouter et al. (2017a). This research pinpoints that a consumer is known as a self-interest individual who makes choices based on personal budget in terms of after-tax income or time; and a citizen is defined as an individual who displays preferences on the allocation of collected taxes in either supporting or opposing certain government policy interventions. Additionally, the case study of on-demand motorbike taxis in Jakarta was chosen for this research as the author expects that the results of this study may prove the output found by Mouter et al. (2107a) and may lead to generalizable results to other transport modes or areas. A more detailed description of the case study is provided in chapter four.

1.2 Research Objective

Based on the problem statement given in the previous section, the primary objective of this study is **to gain more insight into capturing the duality preferences of on-demand motorbike-users as consumers and as citizens, when they make a trade-off between safety aspects and travel time.** To achieve this objective, a comprehensive literature review and expert interviews were conducted with representative stakeholders in the on-demand motorbike taxi industry to identify relevant attributes and attribute levels in valuing safety and travel time trade-offs. Subsequently, the stated experiment survey was carried out to test the differences between consumer and citizen preferences when safety and travel trade-offs are made by on-demand motorbike taxi-users. Based on the above research objective, the main research question below is constructed so that this research may be able to fill certain knowledge gaps related to consumer-citizen duality of users when facing travel time and safety trade-offs, as follows:

> ***"To what extent do the preferences of on-demand motorbike taxi-users differ when they have to make trade-offs between travel time and safety as consumers and as citizens ?"***

Considering the time constraints of the study, the main objective proposed in this research is scoped into the following sub-objectives to clarify how the main goal of this research can be reached.

Sub-objective 1: Determine the suitable definition of consumer and citizen preferences in assessing safety and travel time trade-offs of on-demand motorbike taxi-users

To achieve the first sub-objective, a thorough literature review was conducted to find the main differences between the definitions of consumer preferences and citizen preferences. Furthermore, output from this sub-objective will be used as input in determining the relevant attributes and alternatives in each experiment. In this sub-objective, the author will focus on answering the following question: *"What is the definition of consumer and citizen preferences?"*.

Sub-objective 2: Identify the relevant attributes and alternatives to measuring trade-offs between safety and travel time of on-demand motorbike taxi-users

To construct the experiment design, the author identifies the relevant variables (attributes) that influence individuals' preferences when making trade-offs between travel time and safety. As stated previously, the primary goal of this study is to investigate to what extent the preference of on-demand taxi-users might differ if they act not only as consumers but also as citizens. Relevant attributes will be used to design the stated choice experiments. To generate trade-offs between consumers and citizens, this study distinguishes the experiments into a consumer-based choice experiment and a citizen-based choice experiment. In the citizen experiment, the alternatives are formed based on the context of the Jakarta Government's current plan to regulate on-demand motorbike taxi services. To systematically achieve the third sub-goal, the author focuses on examining the following questions:

- *What are the relevant attributes for measuring safety and travel time trade-offs of on-demand motorbike taxi-users?*
- *What are the current policy interventions in controlling the operation of on-demand motorbike taxis?*

Sub-objective 3: Investigate the trade-offs between attributes found in the consumer-based experiment and the citizen-based experiment

The third sub-objective aims to identify the trade-offs of each attribute found in the consumer- and citizen-based experiments, and explore to what extent the difference in the marginal rate of substitution between consumer and citizen preferences might vary. Following that, the author focusses on exploring the following questions.

- *Do the trade-off attributes show a significant result in each experiment?*
- *To what extent does each attribute influence the user's decision to make a choice in the consumer-based experiment and the citizen-based experiment?*
- *How do the safety and travel time trade-offs differ between consumer and citizen preferences?*
- *To what extent do the differences in trade-offs between consumer and citizen preferences found in on-demand motorbike taxi-users vary compared to other studies?*
- *What motives do users give to explain safety and travel time trade-offs ?*

The author addresses the third sub-objective by using the stated choice experiments on prospective respondents, which is on-demand motorbike taxi-users. In this stage, the data were gathered and analyzed using the multinomial logit model (MNL) to give insights about attributes that significantly influence the preferences of citizens and consumers. The models are run using the newest version of Bison Biogeme 2.6.

Sub-objective 4: Provide recommendations for future research on consumer-citizen duality and for policymakers in creating suitable policy for managing on-demand motorbike taxis based on users' preferences.

The author designed the fourth sub-objective to explain implications for future scientific studies and also as input for policy recommendations aimed at respective decision-makers in monitoring the operation of on-demand motorbike taxi services. The author outlines this sub-objective by

focusing on the following question, *"Understanding the trade-offs results found between consumer and citizen preferences, what are the recommendations for future research studies and for policymakers in creating proper regulations for managing the operation of on-demand motorbike taxi services?"*

1.3 Data Requirements

The following data were required in order to conduct this research:

Table 1. 1 Data Requirements

Data	Source
Number of fatalities per year, number of injuries per year, average travel time per trip, average travel cost per trip	**Literature Reviews** **Interviews:** On-demand motorbike taxi providers, Drivers
Policy Interventions of on-demand motorbike taxi	**Literature Reviews** **Grey Literature:** Regulation of on-demand motorbike taxi (speed limit regulations) Law No. 22/2009 (Indonesian Traffic Law) **Interviews:** On-demand motorbike taxi providers Drivers
Consumer – Citizen Preferences	**Self-Distributed Surveys using Survey Gizmo** (Target respondent: On-demand motorbike taxi-users in Jakarta

To collect the necessary data, a self-distributed survey of on-demand motorbike taxi-users was conducted in the chosen scope of an area (Jakarta city). The study used an online questionnaire that was developed by using *"Surveygizmo"* as an online survey tool. The author highlighted that the online survey may provide a flexibility for the survey distribution and the data collection process. In this research, the online questionnaires were also distributed through social media platforms/mailing list group and targeted the Jakarta commuters who use the on-demand motorbike taxi service within a year.

Additionally, to have a direct interaction with the prospective respondents, the author also conducted a face-to-face survey with the on-demand motorbike taxi users. The survey location focused on the areas with a high number of on-demand motorbike taxi-users, such as the business district area, the shopping center area, the university, bus stops, bus terminals and train stations. The prospective respondents may eligible to participate in this research, if they have been using the on-demand motorbike taxi within a year.

1.4 Scientific and Societal Contributions

The findings of this research are expected to provide both scientific and societal relevance. From a scientific point of view, as mentioned earlier, this research is considered as an initial attempt to build on the research of Mouter et al. (2017a) who used a consumer–citizen stated choice experiment approach to investigate consumer–citizen duality preference in the context of car users. Additionally, as mentioned earlier, references to use of the consumer–citizen concept in transport research studies are still scarce. Knowing this condition, this research is trying to close the gap by conducting an extensive analysis of the consumer–citizen duality concept in a different case study of on-demand motorbike taxi services in Jakarta. Previous studies that examined the preferences

of on-demand motorbike taxi-users mostly considered users' preferences as consumers. Therefore, by elaborating on the role of an individual as a citizen, the research proposed in this study may contribute to an empirical evaluation of the operation of on-demand motorbike taxis, not only from a consumer perspective but also from the perspective of citizens. Subsequently, it may add nuances to the research field with citizen-stated choice experiments.

From a societal point of view, this research provides input for the Jakarta Government and for on-demand motorbike taxi providers. As the reader may be aware, the operation of on-demand motorbike taxis in Jakarta is a fascinating issue and one that needs to be addressed from a policy research perspective. The Jakarta Government has adopted the position of reluctance to regulate this means of transport due to the higher risk of accidents caused mostly by motorbikes. The motorbike taxi is a dilemmatic, informal means of public transport that cannot be recognized and legalized quickly due to the higher risk of accidents, yet this means of transportation has now become the most popular in Jakarta. Moreover, the Jakarta Government also needs this means of transport as an alternative solution, owing to the fact that the city of Jakarta does not have adequate public transport capable of accommodating the passengers' level of service comprehensively.

The results of this study will enable Jakarta's policy-makers to understand how users – in their role as consumers and as citizens – examine specific attributes against other attributes and what is the trade-off that needs to be made by policy-makers in assessing one attribute over another. Following that, the finding of this study can be used as action-oriented research that provides the government with input in assessing their policy options in the process of legalizing and controlling the operation of on-demand motorbike taxis within the near future. The Jakarta Government could have massive power in the decision-making process that could reframe the problem and subsequently reframe strategic interventions by emphasizing either the positive traits or the negative traits in the operation of on-demand motorbike taxi services in the Jakarta region.

1.5 Thesis Structure

Figure 1.1 shown in this section sketches the flow of the research and also provides an outline of this thesis. The problem and objective of this research were clarified in chapter 1. Chapter two examines relevant concepts with regard to consumer–citizen duality preferences and reviews the current operation of on-demand motorbike taxi services as one of the Demand-Responsive Transport (DRT) modes. Subsequently, chapter three explains the methodology and methods used to collect and analyze the data required for the research.

Chapter four provides an introduction to the case study area and the current operation of the on-demand motorbike taxi service. Additionally, this chapter also describes potential factors that may affect users' preferences when making safety and travel time trade-offs. In chapter five, the design of stated choice experiment survey are explained. This chapter also describes how the choice experiment was constructed. The findings of the primary data collected by conducting a consumer and citizen experiment are recounted in chapter six. The results are divided into three parts: descriptive analysis, choice model estimation, and qualitative analysis (interviews with the drivers, governments, companies and users).

Chapter seven presents the practical implications based on the findings, including a willingness-to-pay study in addition to the travel time and safety aspects based on the results of the estimated choice model described in chapter six. Lastly, the conclusion is examined in chapter eight by

reviewing what the study did during the six-month project and summarizing all significant findings for future research. This chapter also describes some limitations found during the research analysis and recommends certain actions that could improve the quality of the study.

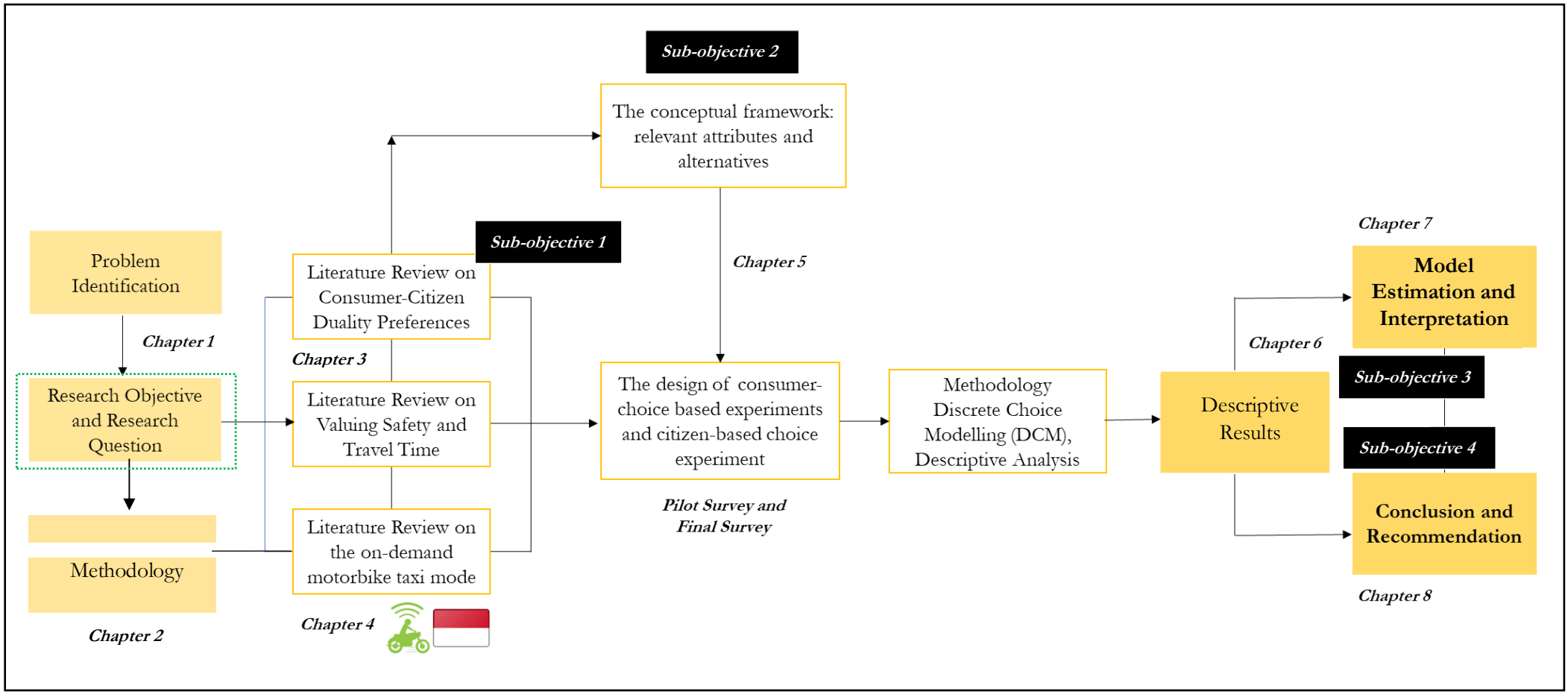


Figure 1. 1 The research flow

2 METHODOLOGY

2

METHODOLOGY

In this chapter, the author discusses the main methodology for this study. Such that, it could comprehensively explain the research workflow from problem definition to research conclusion. The following table shows the step-by-step approach to address each sub-goals which defined in this research.

Table 2. 1 The Research Approaches

Research Objectives		Research Approach
SO1	***Determine the suitable definition of consumer and citizen preferences in assessing safety and travel time trade-offs of on-demand motorbike taxi-users***	**Literature Reviews:** Consumer-Citizen Duality Preferences, Valuing Safety and Travel Time Trade-offs
SO2	***Identify the relevant attributes and alternatives to measuring trade-offs between safety and travel time of on-demand motorbike taxi-users***	**Literature Reviews:** Safety aspects, average travel time, **Grey Literature** Regulation of on-demand motorbike taxi (speed limit regulation) Law No. 22/2009 (Indonesia Traffic Law) **Interviews:** On-demand motorbike taxi providers Drivers The Ministry of transportation The Jakarta Government
SO3	***Investigate the trade-offs between attributes found in the consumer-based experiment and the citizen-based experiment***	**Data Collection:** Stated Choice Experiments (Orthogonal and Efficient Design): Ngene Interviews: users, drivers
		Data Analysis: Descriptive Analysis: SPSS Discrete Choice Modeling: Multinomial Logit Model (tools: Biogeme 2.6)
SO4	***Provide recommendations for future research on consumer-citizen duality and for policymakers in creating suitable policy for managing on-demand motorbike taxis based on users' preferences.***	Model Interpretation and implication to future researches and policymakers Comparison with other study

Considering the above table, section 2.1 clarifies the use of the literature to gain understandings on the concept of consumer-citizen duality. Subsequently, in section 2.2 the discrete choice experiment will be presented to evoke the preferences of on-demand motorbike taxi users when making trade-offs between travel time and safety, by using a stated preference survey as the primary approach. The data analysis approach will be explained further in section 2.3. To conclude the chapter, section 2.4 is presented.

2.1 Use of Literature in the Research

A comprehensive literature review is needed to develop understandings on the concept of consumer-citizen duality preferences for this study, particularly those related to the safety and travel time trade-offs of the on-demand motorbike taxi. Clarifying the state of the art of consumer-citizen duality preferences might be useful as the initial step to conduct the research.

Currently, there are some studies which have examined the duality preferences of consumer-citizen in various sectors, for example Nyborg (2000); Curtis & Mc Conell (2002); Ovaskainen & Kniivilä (2005); Berglund & Matti (2006); Howley, Hynes & O'donogue (2010); Mouter & Chorus (2016), Corbie (2017); and Mouter et al. (2017a). These studies will be useful to give further reviews on the consumer-citizen duality concept and the extent to which the consumer and citizen preference may differ. Furthermore, the second motivation in conducting the literature review is to obtain relevant attributes that are used to elicit the consumer and citizen preferences of car drivers solely on trade-offs between safety and travel time. Some of the relevant studies that can be used for this research are Hess, Orr & Sheldon (2012); Mouter & Chorus (2016); and Mouter, et al. (2017). The conceptualization of consumer-citizen duality needs to be addressed in the first place to elucidate the discrepancies between these two preferences and determine the proper definitions for consumer-citizen preferences used in this study.

Additionally, the study will elaborate on the grey literature which helps the author to gain information about transport safety guideline, current policy report of the on-demand motorbike taxi and Jakarta urban planning documents. The grey literature will provide more insights on how practitioners in relevant sectors specify safety aspects and characteristics of the on-demand motorbike taxi in Jakarta. Such that, it may improve the realism of the attribute levels used in the stated choice experiment as it could help the authors to define the characteristics of on-demand motorbike taxi based on their average travel time, travel cost and travel distances. Also, it could provide some insights to author to define safety attribute, either from the number of accidents involved or other relevant aspects. The grey literature will also be used to understand the current situation of Jakarta, particularly regarding its transport infrastructure development, policy and travel behavior which provoke the author to choose on-demand motorbike taxi in Jakarta as the case study. Detail overview of the case study will be performed further in chapter four.

Lastly, as earlier mentioned, the primary approach of this research is using a stated preference experiment, thereby further explanation of discrete choice modeling and stated preference experiment design would be included briefly in section 2.2. To clearly emphasize the number of attributes that need to be incorporated in this study, some researches which are done in the past will also be useful to refine the most significant factors of users' preference when trade-offs between safety and travel time are held. Those expounded attributes are also the outputs of the literature review and will be described in chapter five.

2.2 Choice Experiment Survey in the Research

The users' preferences data in this research are collected through a choice experiment survey. Commonly, two methods are often used to examine different choice situations, which are: stated preference and revealed preference method. When using the stated preference method, the respondent would be asked to make choices based on a set of hypothetical alternatives. In contrast, in the revealed preference method, the respondent is asked to define their choices based on the real market alternatives. In this study, the stated preference method will be chosen as the main data collection method instead of revealed preference, as it could help the author to limit the choice data and the stated preference method is considerably cheaper and easier to control (Kroes & Sheldon, 1988).

Detail explanation of the stated preference method and more detailed explanation of the motivation to use this method will be described in subsection 2.2.1. Additionally, to verify the realism of each attribute levels, the expert interviews with the relevant stakeholders will also be conducted to clarify the survey setup defined in this research. The explanation of the expert interviews will then be presented in subsection 2.2.3.

2.2.1 Stated Preference (SP) Method

Capturing the individual's behavioral responses to the actions driven by market and government will always be an interesting activity towards a broad spectrum of society (Louviere et al., 2000). Generally, it is apparent that both companies and governments will always be interested in the effect of their newly launched products or new policies on the demand side. Since the response in the society might be changed over the time, the comprehensive market analysis is necessary to capture the individual's preferences and perspectives. A stated preference and revealed preference method are identified as the most used method to elicit the individuals' preferences.

However, compared to the revealed preference method, a stated preference method has more advantages. In the revealed preference survey, the respondents will reveal their preference based on what they did. On the one hand, in the stated preference survey, the respondents will face a set of hypothetical choice situations which specified by the researcher. Heretofore, many scholars have been conducted to give overviews about these two methods, particularly related to its characteristics, advantages, and disadvantages. The revealed preference survey is commonly designed based on the choice alternatives that exist in the real market situations. By conducting the revealed preference survey, the respondents' behavior could be observed through their choices (Hensher, 1994).

However, in the real situation, the alternatives might be complex, and information of the observed behavior may not always be available. For example, in the case of individuals' preference for route choice, the alternatives that need to be taken into account in revealed preference survey might be the whole routes in the network that are possibly complex. A stated preference survey is therefore preferable due to its simplicity, cheaper and faster (Broach, Dill, & Gliebe, 2012; Anderson, 2013). Table 2.2 below displays the different characteristics between revealed preference and stated preference method obtained from various papers.

Table 2. 2 Overview of Stated Preference (SP) and Revealed Preference (RP) Method

Authors	Revealed Preference Method	Stated Preference Method
1 Hensher, 1994	**Advantage:** It could observe what people actually have chosen, therefore it may create a higher probability of valid models if market conditions and policy measures do not change much. **Disadvantage:** the reliability of the RP method might be argued in contexts that could not be observed in the marketplace	**Advantage:** In the SP method hypothetical choice-alternatives can be made, which enables one to construct choice-set variations based on (hypothetical) combinatorial mixes of attributes. Therefore, it leads to a more efficient way to collect choice-data **Disadvantage: There** is a possibility that the responses from the respondent are not consistent with their actual behavior
2 Sanko, 2011, p.9	**a. Preference Information:** The result of actual behavior **b. Alternatives:** Only existing alternatives **c. Attributes:** Measurement error, limited range of attribute levels, possibility of multicollinearity among attributes **d. Choice Sets:** Non-clear **e. Number of responses:** one response per respondent	**a. Preference Information:** Based on the hypothetical situations **b. Alternatives:** Existing and non-existing alternatives **c. Attributes:** No measurement error, extensibility of the range of attribute levels, the collinearity among attributes could be controlled **d. Choice Sets:** Clear **e. Number of responses:** multiple response per respondent
3 Cook et al., 2016	**Methods to value the RP data:** Market price method, Avoided cost method, Replacement cost method, Hedonic pricing method, Travel cost method, Production function method	**Methods to value the SP data:** Contingent valuation study, Discrete choice experiment

The stated preference survey emerges in various ways. It is often used extensively in the public policy and economic context (Louviere et al, 2000). In general, the stated preference survey is used to construct the hypothetical choice situations which shown to the respondents (Train and Wilson, 2008). The attributes in the choice options vary across the experiment to provide a higher variation for the estimation. Although it uses a set of hypothetical choices, yet, the attribute' values obtained from the stated preference survey and revealed preference survey barely oppose against each other (Abraham, McMillan, Brownlee, & Hunt, 2002).

Moreover, as mentioned by Sanko (2001), the stated preference survey allows testing non-existing situations that have not been developed before. This condition is suitable for the encountered situation in the case study area (Jakarta), in which the policy regulation for on-demand motorbike taxi has yet to be fully developed. Another advantage of using stated preference survey is that the author has full control towards the attributes and attribute levels that are used in the survey design. This condition is in line with a study by Molin (2015) who emphasizes that stated preference data is easier to control and more flexible to be applied. Controlling the attributes and attributes could possibly prevent the multicollinearity problems found between attributes which mostly appear in the revealed preference survey (Sanko, 2001; Stinson & Bhat, 2003; Molin, 2005). Moreover, by entirely controlled the survey setup, the author is therefore designed the combination of attributes in a way that the respondents could make trade-offs (Lancsar and Louviere, 2008).

Nevertheless, the disadvantage of the stated preference survey is mostly linked to its reliability. Since the respondents make their choices based on the hypothetical choice situations, there will be a possibility that their responses do not reflect what they do. Sanko (2001) mentions that there are two biases which are caused by stated preference survey, which are 1) the respondents may try to

rationalize their responses based on their actual behavior, 2) the respondents may try to justify their choice to control the alternatives policies. To prevent these issues, therefore, it is necessary to interpret the estimation values of the SP data carefully. Another thing that could be done is by conducting a comprehensive literature review to assure the realism of the defined attributes and attribute levels (Mays and Pope, 2000; Kuper et al., 2008). The descriptions as mentioned earlier about revealed preference and stated preference survey strengthen the motivation of the author to choose the stated preference survey as the primary method for this study. Besides, many studies prefer to use the stated choice experiment as it allows the respondents to make a choice between alternatives easily than to rate alternatives. In result, it will contribute to a more valid of analysis (Molin, 2015)

To estimate the stated preference data, several methods for data analysis can be conducted. As mentioned by Sanko (2001) in table 2.1, there are two types of data analysis, which are the contingent valuation method (CVM) and discrete choice modeling (DCM). The CVM is known as contingent valuation as it describes the information on individuals' behavior when they consider certain hypothetical conditions which may relate to the real situation. As an illustration, the concept of contingent valuation methods in the context of this study, which is consumer and citizen preferences aim to indicate the differences in the individual willingness to pay (WTP) and the differences in the individual willingness to accept (WTA). The CVM is more useful when an ex-ante project evaluation takes into account a wider range of policy initiatives (Whitehead and Blomquist, 2006). Other positive points that could be found in the CVM are their flexibility in estimating the non-market values as well as to prognosticate the individual willingness to pay towards uncertain demand/supply. Several studies which adopted this method, for example, Ovaskainen and Kniivilä (2005); Alphonce, Alfnes & Sharma (2014), Curtis & McConnell (2002), Howley, Hynes & O'Donoghue (2010).

The CVM might be less suitable when various attributes and alternatives are incorporated in the choice set questions (Stevens et al., 2000; Corbie, 2017). Furthermore, the response rates of CVM barely generate the condition where the amount of the individual willingness to pay can be done without taking into account the differences between respondents and non-respondents respond to the WTP value (Corbie, 2017). Given to this condition, the discrete choice modeling (DCM) method might be more relevant in examining the trade-offs between the defined attributes made by the author. Moreover, several studies which elicit the consumer-citizen preferences have opted the DCM as their main approach for data analysis. Further explanation of the DCM approach will be clarified in section 2.3.

2.2.2 Constructing the choice sets

The main purpose of conducting a choice experiment is to determine the effect of various attributes on the individual's choices. As it might be known, people are likely to have a lack of ability in observing their behavior (Jesus, 2018). In result, some people somehow will not give reliable responses when they are asked directly on simple trade-off questions. Therefore, by providing a set of choices will generate a more reliable result on the user's trade-offs (Nisbet & Wilson, 1977).
Given the limited sample and time constraint in conducting a stated preference survey, it is therefore essential to refine the choice sets in the first place. The number of choice sets depends on the number of attributes with various attribute levels. The variation of attribute values defined in the choice sets may play an important role in affecting the significance of the parameters.

Several steps need to be conducted when generating the choice sets,(Choice Metrics, 2018; Molin, 2015). *Firstly,* the author defines the model specification which includes determining the alternatives, the attributes and its values, and model type selection. Other notes that need to be taken into account are whether the attribute is generic or it represents any characteristics of alternatives. Constructing the choice sets can be done through a sequential construction or a simultaneous construction (Molin, 2015). In the sequential construction, the alternatives should be constructed first, and then randomly assign the alternatives to the choice sets. The simultaneous construction on the other hand creates the alternatives and choice sets at the same time. The calculation of the choice sets uses the following equation.

$$\mathbf{L^N}, \textit{ with } \boldsymbol{L} \textit{ is the number of attribute levels, and } \boldsymbol{N} \textit{ is the number of attributes} \qquad (1)$$

Secondly, generating the experimental design. By using Ngene software, the choice sets could be generated by specifying several constraints for example number of alternatives, design type (orthogonal design or efficient design, full factorial design or fractional factorial design). In the stated preference experiment, it is prevalent to reduce the number of choice sets by implementing the fractional factorial design, as the full factorial design may yield too many alternatives which may cause fatigue among the respondents due to the complexity of the choice sets. Nevertheless, the fractional factorial design may fail to ensure the orthogonality between the attributes. Therefore, some scholars implement the orthogonal design when using the fractional factorial design to assure no correlation between the attributes. After obtaining the result derived from Ngene, the next steps are checking the correlation between the main effects also the correlation between interaction effects and main effects (Molin, 2015). Further discussion about choice sets in this study will be explained in chapter five.

Thirdly, constructing the questionnaire. This phase could be conducted after translating the experimental design matrix into choice situations which will be presented to the respective respondents. The questionnaire which will be given to the respondents could be either paper-based or web-based. Additionally, the structure of the questionnaire may consist screening questions, sociodemographic question or additional Likert-scale question to measure the attributes. The relevant socio-demographic variables that often used in the survey for example age, income, gender, expense, working states. The socio-demographic data may also be useful for the model estimation as explanatory variables.

2.2.3 Expert Interviews

To verify the attributes and attribute values used in this research, the author conducts some interviews with relevant stakeholders in the context of on-demand motorbike taxi. The expert interviews are performed during the pilot survey to ensure the realism of choice sets. Klojgaard, Bech, and Sog (2011) state that constructing a stated choice experiment will involve a various process of developing, testing and improving the experiment. In developing the experiment, n interview is thereby required to validate and supplement the research findings.

In addition, Ratilainen (2017) pinpoints that expert interviews are needed in the stated choice experiment for the following reasons, 1) verify the defined attributes used in the stated choice experiment, 2) determine the prior values that will be used for the parameter attributes, 3) develop the choice experiments that will be presented to the prospective respondents. These goals are in accordance with a study from Coast and Horrocks (2007), who explained that the attributes of

stated choice experiment could be derived quantitatively or qualitatively through interviews, group discussions, literature reviews, and expert opinions. Further insights from local stakeholders on the actual performances of on-demand motorbike taxi which are also essential to be implemented. Besides, the local stakeholders will also be asked about their feedback about the realism of attribute values which are previously defined by the author. In ensuring this condition, the expert interviews will target the stakeholders who are familiar with the current operation of on-demand motorbike taxi in Indonesia and also current policies which regulate the Jakarta' transportation planning. In regards to this, the author decides to interview the following actors

a. **A representative from the on-demand motorbike taxi company** in Jakarta who understands comprehensively the current supply and demand of on-demand motorbike taxi operation in Jakarta
b. **A representative from ADO (Association of Indonesia Online Drivers)** who has in-depth information about the performance of on-demand motorbike taxi' drivers in Jakarta, such their average speed using motorbike taxi mode, number of accidents which involve the drivers, and the safety guideline used by the drivers
c. **A representative from the Jakarta Government who experts in explaining the current policy** dilemmas which happen in the operation of on-demand motorbike taxi in Jakarta.

The outputs from these interviews are expected can enhance the realism of choice sets which are tested in the pilot survey. Furthermore, detailed transcript obtained from these interviews will be presented in Appendix (C.2).

2.3 Discrete Choice Modeling (DCM)

Discrete choice modeling (DCM) is known as a statistical approach which is used to observe the user's choices and behaviors. Theoretically, DCM is based on the classical microeconomic theory of consumer behavior which includes the rational choice definition and other assumptions in the context of preference theory (Louviere, Hensher, and Swait, 2000).

Carson, et al. (1994) highlight that at the micro level, individuals make their decisions based on three choices. Firstly, the individuals often choose the most preferred option among a set of alternatives. Secondly, the individuals may decide to buy which depend on the quantity that they could get. Thirdly, the individual may consider how long that they need to wait for purchase correspondingly with how long they need to spend to engage in the activity. According to these concepts, it could be assumed that an individual as a decision maker commonly chooses the alternatives that could give the maximum utility. This situation is the critical underpinning in the random utility theory which stipulates on how individuals make their choices. This section starts with an explanation about random utility theory. Subsequently, the description of model estimation methods and model' fitness measurement will be followed in this section.

2.3.1 Random Utility Theory

Random utility theory is implemented to describe the rule behind the individual's choice among alternatives. The method assumes that a decision-maker generates utility by choosing an alternative in a choice set (Ben-Akiva & Bierlaire, 1999). The random utility is highly linked with the rationality concept which highlights that an individual makes a choice based on an alternative that could give him the highest utility. The utility in each alternative is not only based on the observed attributes

but also depends on the unobserved attributes, unobserved individual's taste variations, measurement errors, and proxy variables (Manski, 1977). Individual's satisfaction towards specific attributes or alternatives may give a positive utility, yet, the dissatisfaction may lead to the disutility values. Horowitz (1994) pinpoints that observed attributes appear in the utility function as explanatory variables. On the one hand, unobserved attributes are known as random variables which represent the uncertainty. Equation 2 below shows the linear-additive of the utility function.

$$U_{i,n} = V_{i,n} + \varepsilon_{i,n} \qquad \textit{(Equation 2)}$$

$$V_{i,n} = f(\beta_k, x_{i,n,k}) = \sum_k \beta_k \cdot x_{i,n,k}$$

where

$U_{i,n}$ = the utility of alternative i for decision-maker n.
$V_{i,n}$ = the systematic (deterministic observed) utility
$\varepsilon_{i,n}$ = the random variable or error term of the utility function.
β_k = the coefficient of attribute k
$x_{i,n,k}$ = the attribute value k of alternative I made by decision-maker n

Clearly, the choice behavior is known as a complex matter. Following that, the probability is conducted to measure the stochastic decisions of an individual (Train, 2003). Even if the systematic utility is highest, alternative may still not be chosen by a specific individual in a particular choice situation, therefore probability is needed to predict choices from an individual. The probability function is expressed in the equation 3 below.

$$P(i \mid C_n) = P(U_{in} \geq U_{jn}, \forall_j \epsilon\, C_n) \qquad \textit{(Equation 3)}$$

The equation 3 displays that the probability of alternative i from choice set C being chosen by individual n is equal to the probability in which its total utility is higher than any other alternatives found in the choice set C (Ben-Akiva & Bierlaire, 1999). Considering the main characteristic of discrete choice model, it is worth to note that only differences in the utility are matter (Train, 2009)

2.3.2 Discrete Choice Modeling Estimation Methods

As mentioned earlier in section 2.2, a number of modeling estimation methods are developed. This section presents a brief overview of the modeling estimation methods which are used in this research, specifically Multinomial Logit (MNL).

Multinomial Logit (MNL) Model

The multinomial logit model is known as the most common approach in the discrete choice model. Many scholars use this model as it is easy to use and interpret. Louviere, Hensher, & Swait (2000) pinpoint that many practitioners use this model because of its appealing features, its simplicity in estimations and its reliability in producing acceptable models. This approach uses a closed form model specification in examining the choice probabilities without complicated formulation of multivariate integration and no simulation required (Hausman & McFadden, 1984). The choice probability formulation applied in the MNL model is shown below.

$$P_{i,n} = P(V_{i,n} + \varepsilon_{i,n} > V_{i,n} + \varepsilon_{i,n}, \forall j \neq i) \qquad \textit{(Equation 4)}$$

$$P_{i,n} = \frac{exp(Vi,n)}{\sum j=1..j\ exp(Vj,n)} \qquad \textit{(Equation 5)}$$

where

$P_{i,n}$ gives the probability that decision-maker n chooses alternative i
$V_{i,n}$ gives the utility of alternative i for decision-maker n.
$V_{j,n}$ gives the utility of alternative j for decision-maker n.

It is apparent that the MNL model is well received because of its simplicity and its ease of use. Nevertheless, it is also widely known that there are potential drawbacks which should be considered when using this model. First, the MNL cannot capture the differences in preferences or the nesting effect. Hence, it leads to the unrealistic substitution patterns as a result of the independence from irrelevant alternatives' (IIA) property (McFadden & Train, 2000). Second, the MNL model does not include people' taste of heterogeneity. It defines that everyone has the same taste, while in fact, tastes differ across people, also within segments. Not capturing this unobserved taste heterogeneity implies ignoring correlations between unobserved utilities of alternatives and similar attributes. The third limitation is that the MNL model cannot capture for panel effects. When you have more than one choice observations per individual, some of the correlations across choices appear because of the taste variations and unobserved factor from an individual (Train, 2009).

2.3.3 Model's Fitness

To measure the model's fitness several approaches can be considered. However, this study will focus on examining the model's fitness by using McFadden's rho squared and also the likelihood ratio statistic (LRS) test. These two approaches are often used to measure how well the model could fit with the data in the discrete choice model (Train, 2009). Equation 6 below shows the formulation of the McFadden's rho squared.

$$\rho^2 = 1 - \frac{LL\beta}{LL0} \qquad \textit{(Equation 6)}$$

Where $LL\beta$ implies to the value of the log-likelihood function at the β estimated parameters and $LL(0)$ represents the value when all the parameters are equal to zero (Train, 2009). The McFadden's rho square test shows that the ρ2 values lie between 0 to 1. The zero value means that the model does not better than no model, whereas if the value is equal to one, it implies that the model is a perfect fit. No specific rule which may represent a good standard for rho-square values, however, many scholars commonly compare two models and assume that a model with a higher value (*the value closer to 1*) is the better one.

In the model estimation results, sometimes a model with lower rho square value could be a better fit than a model with higher rho square value. For example, model A has a smaller number of parameters, as it is generated by constraining parameters of model B. Consequently, the differences of likelihood between these two models may be high enough so that there is an assumption that the better fit of the model B is not just because by coincidence. To test this hypothesis, the likelihood ratio test (LRS) is calculated with the following equation

$$LRS = -2(LL_A - LL_B) \qquad \textit{(Equation 7)}$$

Where LLA and LLB are the log-likelihood of model A and model B respectively. The model B shows a better fit than model A if the LRS value is higher than a threshold associated with the significance level (the critical value of chi-squared (x2) with the appropriate degrees of freedom).

Therefore, the value of the threshold is highly linked with the difference in the number of parameters. Furthermore, the higher value of the threshold is caused by higher difference found in the number of parameters.

2.4 Conclusion

To summarize, the author presents the illustration of the research approaches from the data collection until data analysis. The framework is presented in the following figure.

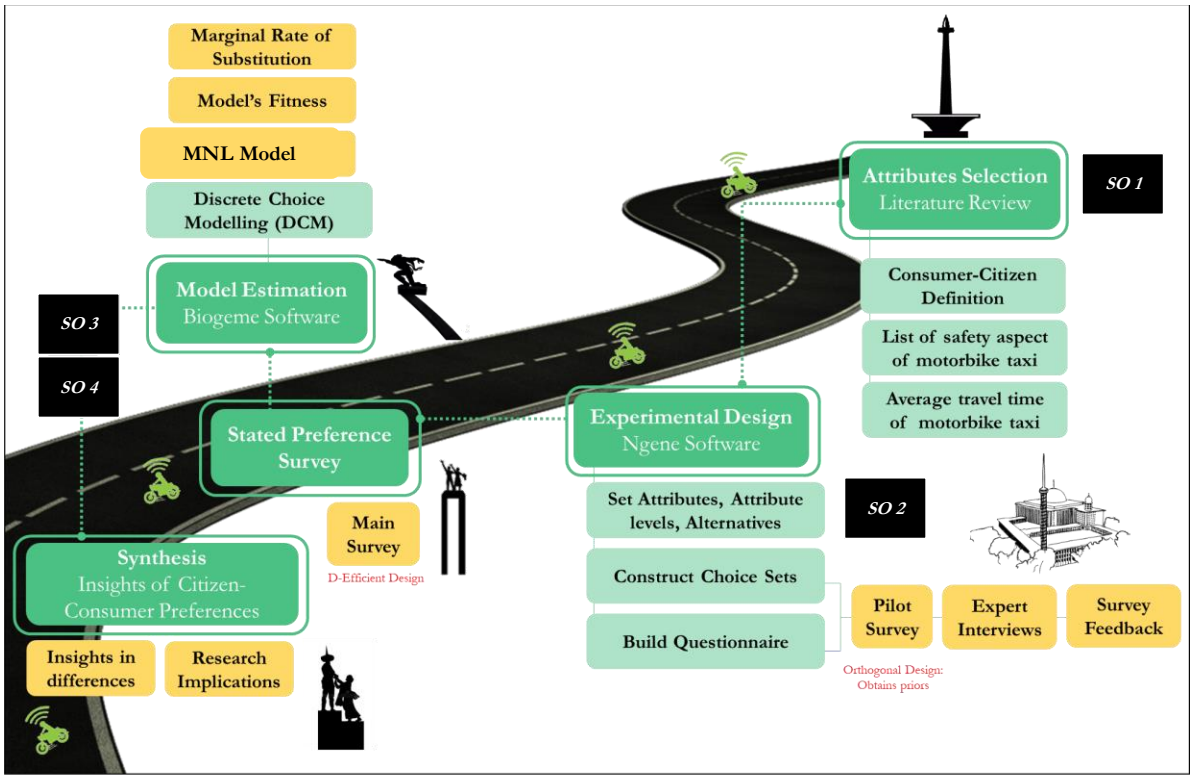


Figure 2. 1 Illustration of the chosen methods

To conduct the consumer-citizen stated choice experiments, the author gathered the information about relevant attributes and attributes values through a literature review, grey literature, and expert interviews. Following that, the author constructed the consumer-citizen experimental designs by using *Ngene Software*. The matrix of choice sets which produced from this software was then used to build the online questionnaire and initially tested in a pilot survey. Obtaining some feedback during the pilot survey, final survey was conducted. The data from the final survey were analyzed using Multinomial Logit Model which is commonly known due to its simplicity and its ease of use. To validate the fitness of the model, the McFadden's rho squared and also the likelihood ratio statistic test were chosen. Following to the model estimation result, the insights and implications in the differences of marginal rate of substitutions between consumer and citizen preferences could be derived.

3

THE CONSUMER CITIZEN DUALITY

3

STATE OF ART ON THE CONSUMER-CITIZEN DUALITY

This chapter explains a concept of consumer and citizen in the context of stated choice preference. Defining these two issues are essential to be addressed before constructing the stated choice experiments. In section 3.1, the author explains the core conceptualization of the consumer and citizen duality preferences. Section 3.2 explains an individual's role in the market-based setting context. Section 3.3 discusses the individual's role in the political context. Section 3.4 describes both concepts as approaches in investigating the trade-offs of safety and travel time in the context of transport sector development. Lastly, in section 3.5 the author concludes this chapter by emphasizing the definition of consumer and citizen preferences that will be used for this study.

3.1 The conceptualization of consumer-citizen duality

Generally, the public choice theory claims that individuals could attain various preferences which depend on a particular context. Vanhonacker, Verbeke, Van Poucke & Tuyttens (2003) strengthen this argument by claiming that individuals may possess their preference as citizens that may contradict those who exhibit their preference as consumers. Additionally, a study by Sagoff (1988) pinpoints that every individual may have two different and possibly conflicting preferences over their social status.

Sagoff (1988) also emphasizes that individuals will concern their preferences (in term of price, taste, and content) based on their own goal when making a purchase. This condition is in line with research by Mouter & Chorus (2016), which mentions that the main characteristic of the consumer experiment is depend on the choices made by respondents as private individuals and their decisions influence their budget (after-tax income). Oppositely, in the citizen experiment, the respondents' after-tax income is not affected by the choices made by the individuals.

The individual's preferences notably are caused by various, yet, interrelated factors. Knowing this argument, the consumer and the citizen could be considered as two sides of a coin, and the individuals can be both from time to time. Based on the above points, many scholars agree that there are two conceptual approaches in differentiating the individual roles as consumers and as citizens. The first approach is by looking at the perspective of individuals in market-based setting and the second approach scrutinizes the individual roles in the political context. These approaches adopt some conceptualizations which are drawn by some scholars (Nyborg, 2000; Ovaskainen & Kniivilä, 2005; Curtis & McConnell,2002).

A study by Corbie (2017) explains that the citizen will not make a purchase decision based on their income but based on the taxpayer's decision. These two arguments may imply that individuals will act more like citizens in showing their social and political judgment rather than their preferences

over consumption. The citizens in the political setting will concern their decision based on the tax, on the other hand, the consumers will specify their choice based on their spending (Mouter & Chorus, 2016).

Examining the consumer-citizen duality preference is interesting to be implemented in every sector specifically in evaluating the transport project development due to many mismatch problems found in the supply side (i.e., the government, the service providers) and demand side (the users). In section 3.2 and 3.3, further description about the role of individuals in the market-based setting and political setting are clarified respectively.

3.2 The role of individuals in the market-based setting

The market-based setting is derived from neoclassical welfare economics concept. Nyborg (2000) states that individual as *homo economicus* (a consumer) always maximizes his/her welfare based on the defined budget constraint. The consumers as individuals always put their self-interest upfront in evaluating public policies which are driven by the government. In the consumer context, the self-interest is the force driving factor that causes individuals do not consider any other options if it does not gives any benefits to them.

The individuals as consumers want the maximum satisfaction mainly when they make trade-offs between level of services, price and more importantly the quality of products. In results, the individuals who have higher resources can obtain more than those who have fewer resources. This conditions might not become a major concern in the pure market economic system, but it might appear as problems in the democratic polity (Berglund & Matti, 2006). On the other hand, the individual who acts as *homo politicus* (a citizen), sees himself or herself in the role of the ethical consumer who prioritizes the social welfare before his/her self-interest.

The definition of citizen preference used by Nyborg (2000) is slightly different from the definition adopted by Mouter et al. (2017). The definition of citizen coined by Mouter et al. (2017) is an individual who reveals his/her preferences in regards to the tax allocation. This definition is in line with Berglund & Matti (2006) who denote that the homo-politicus individuals act based on the altruistic motive for the community, in which they tend to show their concerns to the society, and therefore they are willing to spend their budget to improve the social welfare (McShane & Sabadoz, 2015). Nevertheless, the altruistic motives could also be influenced by rational economic decision, and they are not always related to the non-economic behavior.

Curtis & Mc Conell (2002) observe that altruistic interest appears because of the ethical beliefs of an individual. Curtis & Mc Conell (2002) mention that individuals who have ethical belief will focus on improving the social satisfaction. The conceptual meaning between consumer and citizen will be valuable to measure choices made by individuals if particular frames are given to the individuals. Pointing out the definitions between consumer and citizen preferences above, figure 3.1 shows the summary of consumer and citizen definitions based on the market setting obtained from various works of literature.

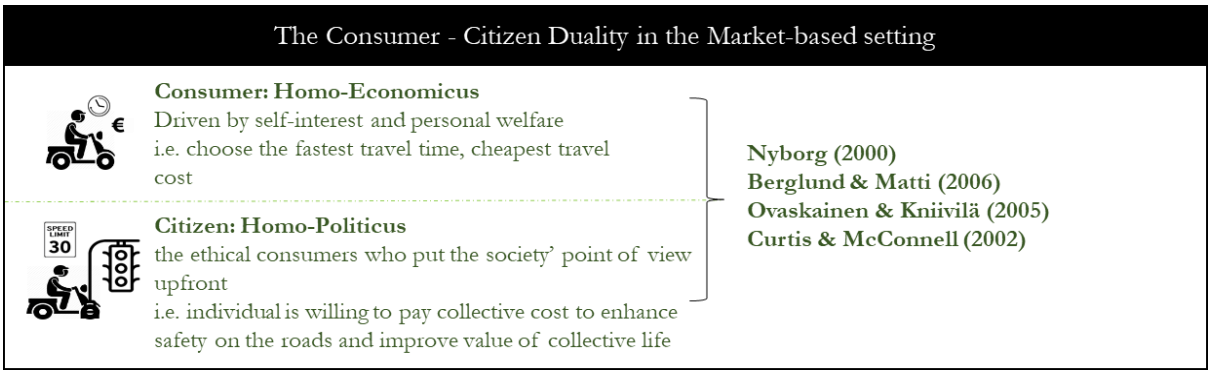


Figure 3. 1 Conceptualization of consumer-citizen preferences in the market-based setting

In the context of the market-based setting, empirically, there are many contingent valuations (CV) which are conducted to measure the preferences of consumers and citizen (as ethical consumers). Curtis & McConnell (2002) mention that the CV method is one of the general approaches in the stated preference which is used to scrutinize the individuals' choices towards the services of private goods and public goods. In their study, they use contingent valuation approach to measure the citizen preference based on the prior research which is initiated by Blamey et al. (1995) and adopt the study from Nyborg (2000) to clarify the altruism consumer. However, as mentioned in chapter two, the study will use the discrete choice modeling instead, as the CV method might be less suitable when the choice sets questions incorporate various attributes and alternatives are (Stevens et al., 2000; Corbie, 2017).

To clarify the difference between consumer-citizen duality concept, some scholars present the following questions to highlight the role of individuals as consumers and citizens in investigating the *willingness to pay* or *willingness to accept* in term of market context, as shown in table 3.1. The response of the questions mentioned in table 3.1 shows how individuals react based on their perspective as consumers and as citizens by evoking their willingness to pay, and subsequently, the discrepancy in preferences between individuals who have the role as consumers and as citizens could be clarified. In the case of Howley et al. (2010), the WTP between individuals as consumers and as citizens do not obtain a significant difference.

The same results are also derived by Curtis & McConnell (2002), who identified that in the market-based setting, the WTP values between self-interest individuals (consumers) and the social citizens are almost similar. These results describe that individuals even at cost, will not spend their money on something they would not willingly pay extra as a consumer. Ovaskainen and Kniivilä (2005) identify that the individual who has a citizen role gave less zero WTP responses and indicated a higher WTP to support the sustainability towards the conservation area. The discrepancy found in the consumer and citizen preferences might be affected by the context of price and also individuals' trust (Harper and Henson, 1999; Toma et al., 2011).

Table 3. 1 Example of Consumer-Citizen Question

Literature	Consumer Context	Citizen Context
Curtis & McConell (2002) **Purpose of the study:** The study was initiated to gain information on preferences for future deer management policies in Maryland. The growing number of deer populations may give benefits to residents of Maryland, nevertheless, it also caused possible damage to the private landscaping, property, crop losses, crop losses, as well as damage to cars from collisions. And, it has led to the spread of Lyme disease among people	*"If you consider only yourself, and not what has happened to your friends or others, would you prefer that there were more deer?" (p.74)*	*"Would you like to see the deer population continue to increase, if you consider the costs and benefits of its growth to the society and environment?" (p.75)*
Howley, Hynes & O'Donoghue (2010) **Purpose of the study:** To estimate the landscape attributes and examine the preferences of an individual as a citizen who prioritizes benefits to others as opposed to a consumer, who is a purely self-interested individual. The aim of this research is to assess to what extent individuals express different preferences, expressed in individual WTP, when adopting a social and personal perspective	*"Bearing in mind the importance or unimportance of conserving traditional landscapes for you personally; if you could be sure that your money would go to landowners for protecting traditional rural landscapes in Ireland only, would you be prepared to pay to support agricultural activities contributing to the protection of the traditional farm landscape as portrayed in Showcard 11?" (p.1526)*	*"Bearing in mind the importance or unimportance of conserving traditional landscapes for society as a whole, if you could be sure that your money would go to landowners for protecting traditional rural landscapes in Ireland only, would you be prepared to pay to support agricultural activities contributing to the protection of the traditional farm landscape as portrayed in Showcard 11?" (p.1526)*

Source: Literature review, 2018

3.3 The role of individuals in the political setting

In the political-based context, the terms of citizen and consumer have emerged in many debates and public discourses. Both definitions are often mentioned and circulated in various political statements, particularly in the context of public service provision. In the political context the consumer-citizen preferences stand as a critical role in understanding the choices of users, and subsequently, it could be input in assessing some incentives that could preserve the quality and promotes equity. Clark & Newman (2007) mention that the distinction of consumer and citizen preferences are often considered as binary questions such as private sector/public sector or community interest/individual interest. Livingstone, Lunt, & Miller (2003) capture the differences of characteristics between consumer and citizen preferences, in term of its vision, motivation, principle, and its purpose for a legal framework, as shown in table 3.2 below.

Table 3. 2 The binary discourse between consumer and citizen preferences

Issues to be captured	Consumer	Citizens
Motivation	Wants	Needs
View of the goods	Individual Level Private Benefits	Social Level Public/Social Benefits
Principle	A matter of choices	A matter of rights (social inclusion)
Planning Vision	Short term focus	Long term focus
Purpose for legal framework	Regulate against detriment Plan to roll back regulation	Regulate for public interest Continued regulation to correct market failure

Source: (Livingstone, Lunt & Miller, 2003, p.16)

Furthermore, Livingstone et al. (2003) express their curiosity whether the citizen preference could influence the regulatory intervention from the government, or in contrary, the market setting could slowly control the citizens' point of views. To understand the individual role in the political background, Clark & Newman (2007) quote a statement from Toni Blair concerning the urge in eliciting the consumer-citizen duality debates, as follows.

> *"In reality, I believe people do want choice, in public services as in other services. However, a choice isn't an end in itself. It is one important mechanism to ensure that citizens can indeed secure good schools and health services in their communities. Choice puts the levers in the hands of parents and patients so that they as citizens and consumers can be a driving force for improvement in their public services. We are proposing to put an entirely different dynamic in place to drive our public services; one where the service will be driven not by the government or by the manager but by the user the patient, the parent, the pupil and the law-abiding citizen."* ***(Blair, 2004, quoted in the Guardian, 24 June 2004, p. 1 and adopted by Clarke & Newman, 2007, page 740)***

Knowing that there are many debates in evoking the citizen-consumer duality preferences, some scholars mentioned that policymakers need to adapt to the market situations. Foster (2005) denotes that the government as regulators and policymakers should learn to rely on the market mechanism and consider the consumer preference in the context of self-regulation or co-regulation.

Many studies are still developed to investigate the fundamental concept in distinguishing the differences between individuals who have a role as consumers and as a citizen in term of political setting. Howley et al. (2010) pinpoint the differences between citizens in the political context with consumers in the market setting. The differences between these two aspects are found in their WTP values. In their research, they clarify that the individuals who act either as consumers or as citizens show their willingness to pay to the landscape conservation context. Howley et al. (2010) assume that the government as the regulator is the critical actor to pay for this improvement by using an existing resource (revenue). The meaning of citizen should be not only based on individualism and market-economic rationality but also need to consider the individual' moral and their sense of responsibility in solving some problems that may impact the collective welfare (Berglund & Matti, 2006).

The finding from these prior studies could strengthen the conceptualization of consumer and citizen preferences which coined by Mouter & Chorus (2016) and Mouter et al. (2017). These studies point out that a citizen is an individual who reveals their preference after the allocation of tax by the government, and a consumer is an individual who reveals their choices based on the

allocation of the after-tax income. As previously mentioned, this definition is slightly different with the concept adopted by Nyborg (2000) as he addresses a citizen in the neoclassical economic theory as an ethical consumer who put their concerns based on the society's expectations. Knowing this argument, Mouter et al. (2017a) create a conceptualization matrix to compare their definition of consumer-citizen duality with Nyborg (2000), as shown in table 3 below.

Table 3. 3 The conceptualization of consumer and citizen preferences by Mouter et al. (2017)

Market-based setting	**Consumer Preferences:** *individuals reveal with their after-tax income on their willingness to pay*	**Self-interest consumer: Example:** An individual chooses the cheapest fare of on-demand motorbike taxi providers without considering the exposure to the risk of accidents	**Ethical consumer: Example:** An individual thinks that faster travel time is the most important attributes for public transport service, however he chooses to safer option instead because it coincides better with his view as a good society
Political-based setting	**Citizen preferences:** *individuals reveal on the allocation of previously collected tax money by the government*	**Self-interested Citizen: Example:** An individual protests against the speed limit regulation coined by the government, while being aware of the potential reductions of risk accidents that are often caused by motorbike mode	**Ethical citizen: Example:** An individual prefers that the government could allocate the previous collected tax money to projects that may benefit society the most
		Homo-economicus (self-interest)	***Homo-politicus*** (social welfare)

The conceptualization of consumer and citizen preferences mentioned above specifically differentiate how individuals allocate their budget into a private and public budget. The individuals are called as ex-ante payer if the allocation of tax is conducted before they contribute to their tax. On the other hand, the individual who allocates their tax money after they paid their tax is known as an ex-post taxpayer (Corbie, 2017). In relating to this condition, several studies also have been conducted to investigate the impact of tax allocation towards individual willingness to pay's choices.

Mouter et al. (2017a) show that individuals have different preferences as consumers and citizens when facing the travel time and safety trade-offs. This discrepancy between these two preferences is shown in the results from the marginal rate of substitutions. The marginal rate of substitution from travel time and safety trade-off in the consumer preferences are less than the results found in the citizen-based experiments. They emphasized that further research will be needed to validate and verify their findings, notably whether the significant differences between consumer and citizen preferences of car users in the Netherlands are also found in other modes of transports.

Additionally, Martinez-Esineira (2006) conducts a contingent valuation survey to measure the WTP of an individual with his/her role as citizen towards wildlife (coyote) conservation and to give insights for the government in considering the policy options on coyote conservation. The study by Martines-Esineira (2006) takes into account the citizens' perspective by correlating the WTP

with after-tax income (own budget), and accordingly, the respondents were asked about the reasonable amount of money that the taxpayers are willing to contribute annually on protecting the wildlife conservation.

Identically, Tienhaara et al. (2015) also examine the different roles of individuals, in the context as a product purchaser and as taxpayer decision in response to the new policy initiatives. The valuation question in product purchasing context, notably will be only asked for the individual who shows their intention to buy Finncattle meat. Set of choices which differ in the price level will be presented to the respondents who express their WTP for Finncattle meat. On the contrary, the valuation question in the taxpayer will be presented to measure the preferences towards the conservation program through an increase of after-tax income. The results of this study found that the WTP for conservation program is mostly driven by taxpayer responsibility in conducting conservation project as a citizen, in contrast, the perceived purchaser responsibility as a consumer motivates the WTP for product purchasing.

By understanding the definition of consumer and citizen preferences which used in the market-based setting and the political based-setting, could help to determine the suitable definition for consumer and citizen preferences particularly to value and measure the safety and travel time trade-off. Section 3.4 the concept of assessing safety and travel time trade-off will also be described further.

3.4 Valuing the safety and travel time trade-offs based on the consumer-citizen preferences

Notably, many transport policy decisions often incorporate trade-offs between safety and travel time. Travel time and safety are identified as the most important variable for transport policy development, mainly in evaluating the passengers' level of services (LOS) and how users perceive their preferences towards the quality of services. In general, public acceptability is often affected by socio-demographic characteristics such as income, gender, and education. Logically, the higher price for the cost, it will lead to lower public acceptance. However for people who generally have a higher value of time perception will accept the charge in any cost (Hamilton, 2011). It will also apply the similar condition for users who value their safety utmost.

Transport economist often examines the societal value of transport policy initiatives by involving the trade-offs between travel time and safety in a Cost-Benefits Analysis method (Mouter, 2017). Van Wee & Rietveld (2013) describe that the main characteristic of the CBA approach is the valuation effect which relied on the consumer's preferences (consumer willingness to pay for the specific effects). In the case of the CBA approach, the value of time (VOT) and the value of statistical life (VOSL) are identified as the common aspect to calculate the consumer willingness to pay.

Mouter et al (2016) explains that the VOT is derived by multiplying the travel time changes with the amount of money that an individual is willing to pay to reduce their travel time (travel time savings). The VOSL, on the other hand, represents the amount of money that individuals are willing to spend for reducing their risk towards premature death (Mouter et al., 2017a). Referring the VOSL and VOT as the amount of money which represent the individuals' willingness to pay from

their after-tax income and also aggregating its changes, lead to some debates by some scholars (Ackerman and Heinzerling, 2002). It also shows the downside in estimating the VOT and VOSL using CBA approach as it uses the normative judgment in their calculation and assumes that each has the same marginal utility (Mouter, 2017).

In estimating the VOT and VOSL, many economists rely on either revealed preference (actual behavior data) or stated preference method which uses the hypothetical choice sets to investigate the individuals' willingness to pay (WTP) and as well willingness to accept (WTA) for a given change in travel time and risk reduction explicitly. As previously mentioned, the individuals' WTP and WTA may differ based on their roles either as a consumer or as a citizen. Ackerman & Heinzerling, (2002), pinpoint that using a citizen-based approach to assess the VOT and VOSL trade-off might be better than using a consumer-based approach. In their study, Ackerman & Heinzerling (2002) confronts the decision from US Government in opposing the banning towards cell phone use in the cars, as they found that individuals who are talking while driving are willing to spend more money to talk than individuals who have higher exposure towards traffic casualties in reducing their risk. They highlight that the consumer values could not ultimately be used as the only standard in initiating some policy interventions as different role as a citizen might be found.

Svensson & Johansson (2010) also emphasize that the fuzzy results in several studies which elicit the WTP for risk reduction appear because of the significant difference between the WTP for private risk reduction and the WTP for public risk reduction. These authors also describe that the self-oriented individuals will obtain a zero difference of WTP between public and risk reductions given to the equal risk reduction. On the contrary, the altruistic individual will earn a higher WTP for public risk reduction, if the individual intends to maximize the public welfare.

Many studies were conducted to specifically examine the trade-off between travel time and safety based on the different roles of preferences. Mouter et al. (2017a) analyze the consumer-citizen duality preferences towards safety and travel time trade-offs by using different framework experiments, as follows.

Experiment 1: classical consumer route choice Mouter et al. (2017a) design the first experiment in similar to the previous Dutch VOSL study conducted by Blaeij (2003) & Rouwendal (2010). In this experiment, the respondents are asked in between two hypothetical routes which differ concerning travel time, number of fatalities on the road per year and toll costs.

Experiment 2: consumer route choice (no costs): To generate the monetary values of a statistical life and travel time savings, these authors, therefore, exclude the cost attributes in the experiments. In the second experiment, Mouter et al. (2017a) focus on evoking the preferences of individuals as consumers of mobility when trade-offs are made.

Experiment 3: referendum-style consumer experiment: The third experiment is almost similar to the second experiment. However, this experiment emphasized that the responses from the respondent will be used as an input for the government in making future decisions regarding the transport investment in the Netherlands. Moreover, in the third experiment status quo alternative was also added.

Experiment 4: citizen route choice: The third experiment is designed almost similar to the second experiment. In this experiment, participants are asked to choose between two routes which differ

in terms of travel time and safety. The only difference from the second experiment is that participants are asked to recommend one of the two defined routes to the government.

Experiment 5: citizen policy options: In the fourth experiment, the respondents are asked to choose between two policy options which differ in terms of minutes of travel time savings for 80,000 travelers and other attributes for fatal accidents reductions per year.

3.5 Conclusion

Battling with various sources which examined the definition of consumer-citizen preferences, the author in this research derived the definition of consumer and citizen preferences from two different contexts. First, the role of an individual in the market-based context gave clarity to the author in defining the role of a consumer. In general, the market-based setting causes the individuals to consider the impact of any interventions to their income budget (Rolfe, 1996; Nyborg, 2000; Berglund & Matti, 2006; Mouter & Chorus, 2016; Mouter et al., 2017a). Besides, the case study used in this research targeted the on-demand motorbike taxi users who commonly concern about faster travel time and cheaper travel cost in choosing the modes of transport for commuting. Following that, the author pointed out the consumer in this research as a self-interest individual who will reveal their interest based on the allocation of their after-tax income. This definition may suitable to depict the needs of the on-demand motorbike taxi users who desire to gain their self-benefits (i.e. faster, cheaper and safer) when they use on-demand motorbike taxi as their daily transport mode.

Second, the definition of the citizen preference in this study was derived from a political context. In the political setting, the individuals may agree towards the personal budget constraint and possibly consider their choices based on the public budget. This condition may illustrate the critical importance in distinguishing the consumer-citizen preferences based on the budget spending, notably in term of private budget and public budget spending. The author realized that incorporating the citizen perspectives might be suitable to investigate on how the users perceive the trade-offs between safety and travel time when using on-demand motorbike taxi. It is because the policymakers in Jakarta are still resisting to legalize the on-demand motorbike taxi service, as this means of transport knowingly contributes to a higher traffic accident which also could jeopardize other road users. Currently, the Jakarta government has been assessing an efficient regulation to control the operation of the on-demand motorbike taxi service, but the final decision has not yet been made. Over the past year, the on-demand motorbike taxi drivers strongly show their protest to the on-demand motorbike taxi service providers as they feel like being mistreated by the service providers in term of a minimum tariff per distance and a minimum order per day. On the other hand, the on-demand motorbike taxi service providers need to survive in a fierce competition for market shares by setting a lower tariff. Including the citizen preference in this research may help the government and the service providers in determining the well-targeted policies to maintain the operation of this means of transport without neglecting the users' needs and also the drivers' interests.

Considering this matter, the author in this research emphasized the definition of the citizen as the individual who put their interest on the society's viewpoints and thus, they will reveal their choices based on previously collected tax by the government. The definition of consumer and citizen preferences used in this study are analogous to the description of consumer and citizen preferences

which are found in study by Mouter et al (2017a, 2017b), which empirically confirm that the differences on the individual valuations towards safety and travel time trade-offs depending on their role as a consumer or a citizen. Table 3.4 below shows the definition of consumer and citizen preferences which adopted to this research.

Table 3. 4 The definition of consumer and citizen roles used for this study

Self-interest consumer (Market-based setting)	Self- Interest Citizen (Political-based setting)
Individuals reveal with their after-tax income on their willingness to pay Example: An individual chooses the cheapest fare of on-demand motorbike taxi providers without considering the exposure to the risk of accidents	**Individuals reveal on the allocation of previously collected tax money by the government** Example: An individual protests against the speed limit regulation coined by the government, while being aware of the potential reductions of risk accidents that are often caused by motorbike mode

By defining the consumer-citizen preferences above, this study was proposed to be conducted in three experimental designs, which are two consumer experiments and one citizen experiments. This research adopted the concept of classical consumer experiment which coined by Mouter et al. (2016) since motorbike was undoubtedly known as the dominant mode in transport in Jakarta. Considering this matter, the author intended to calculate the VOT and VOSL for the motorbike taxi which known as the most popular informal public transport in Jakarta. To generate the monetary VOSL and travel time savings, therefore the first consumer experiment included cost attribute in each alternatives.

The second consumer experiment was chosen as it was necessary to address the primary research aim of this study, which is to elicit the preferences of individuals trade-offs their safety and travel time as the consumer of mobility. In the third experiment, this study tries to emphasize the experiment that could represent the government policy towards the on-demand motorbike taxi service. By adopting the speed limit regulation, in this experiment, the participants were asked to choose between two policy options which differ regards to the travel times and the accidents impacts that could generate from two different policy options.

In compared to the first consumer experiment, the second consumer experiment and the citizen experiment were conducted without cost attribute. The cost-neutral assumption is adopted in these experiments since there is a possibility that respondents will have difficulty in assuming to what will happen with their residual tax money if they choose for the least expensive options. Following that, these two experiments will mainly address trade-offs between safety and travel time. Detail explanation of the experiments will be further discussed in chapter five.

4

THE STUDY CASE JAKARTA

4

THE CASE STUDY: JAKARTA

In this chapter, an explanation of the study case will be presented to introduce the readers to the city's contexts. A brief discussion regarding the city's current conditions and the emerging phenomenon of on-demand motorbike taxi service will be presented to highlight the practical relevance of this study to policymakers and on-demand motorbike taxi providers. The information found in this chapter will be used as inputs to construct the stated choice experiment design in chapter five.

4.1 Overview of Jakarta

Jakarta is known as the capital city of Indonesia and one of the most populous cities in this country. The statistic shows that more than 10 million people are living in Jakarta with an average growth of 1,02 percent per year (DKI Jakarta provincial government, 2016). The rapid urbanization and vast globalization in this city trigger its improvement not only in the infrastructure development but also in the economic growth (Rukmana, 2010). Additionally, it causes the sprawling effects to Jakarta's inner and outer peripheries. Currently, the suburban areas of Jakarta are evolving as the largest metropolitan area in Southeast Asia, which are known as the Jakarta metropolitan area (Jabodetabek). The Jakarta metropolitan area consists of five cities which located in the inner and outer peripheries of Jakarta which are Bogor, Depok, Tangerang, and Bekasi. Jakarta as the core covers 10% Jabodetabek metropolitan area (Susilo et al., 2010; Sunarya, 2016). The illustration of a sprawling effect which appears in Jakarta is shown in the following figure.

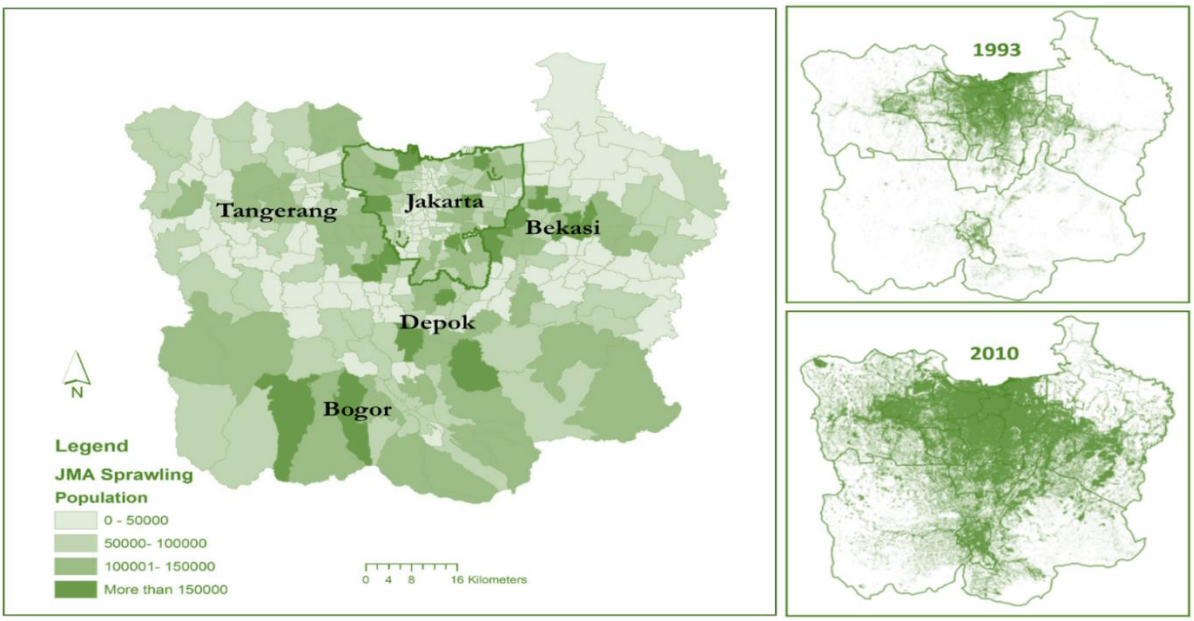


Figure 4. 1 Urban Sprawling in Jakarta Metropolitan Area
Source: Adapted from Sunarya, 2016 and Pravitasari, 2005

The effect of rapid urbanization that occurs in the Jakarta metropolitan area may cause either positive or negative impact. In the positive sides, the urbanization could stimulate the economic growth and its subsequent growth of commercial activities. On the one hand, the adverse effects of urbanization may cause some problems, for example, high unemployment rate, housing shortage, environmental degradation, water scarcity and also transport commuting issues. Rukmana (2010) mentions that the urbanization phenomenon appears in Jakarta is strongly related to traffic congestions. This situation has contributed to the need for sustainable urban mobility and transport policies in Jakarta.

4.1.1 The characteristics of urban mobility in Jakarta

The urban sprawl phenomenon in Jakarta triggers the expansion of housing and industries moving away from the center of Jakarta. Rustiadi et al. (2012) found that in 1972, the average distance between the outskirt area and the city center of Jakarta was 28 km. In 2010 the distance from the outskirt area to the city center was getting further away to 60 km. The high intensity of daily traffic jam which occurs in Jakarta may reflect the poor state of the transportation system in accommodating the daily commuters of Jakarta. Based on the calculation of an economic expert, the severe daily traffic jam causes Jakarta to pay a cost of EUR 2,5 billion every year (Rukmana, 2014).

The number of population in Jakarta in the daytime is higher than during the night time. In the daytime, the number of population in Jakarta is approximately 12 million people, yet at night the number of population decreases to 10 million people (DKI Jakarta provincial government, 2016). It happens because many people who commute to Jakarta (for working trip, education trip or access a better quality of public facilities) live in the suburban areas and thereby, the Jakarta peripheries are often called as "bedroom suburb" (Rukmana, 2014; Pravitasari, 2015). To accommodate the needs of daily commuters, Jakarta has several types of rapid transit system which are Transjakarta BRT and commuter rail (KRL). Jakarta also has other forms of public transport called informal public transport (IPT) which often used as paratransit transport, for example, angkot (microbus), Bajaj (three-wheel taxi), car taxi and ojek (motorbike taxi). Some of these modes do not have fixed routes. Hence, they could board and stop at any point based on the demand of the passengers.

Sunarya (2016) highlights that currently the public transport services which operate in Jakarta are mostly agglomerated in the center of the city. However, the availability of public transport service in this area could not cope with the higher demand from commuters. Thus, many commuters solely rely on the private vehicle usage (e.g., motorbike, car) for their daily trips. The dependency on the motorization trend in Jakarta will be explained in the following subsection.

4.1.2 The Motorization Effect in Jakarta

The private vehicle ownership in Jakarta has been proliferating every year, and consequently, it transforms into a challenge that needs to be tackled by the Jakarta government. As mentioned earlier, the transport development in Jakarta does not match with the growth of population, vehicle ownership and also the travel demand. The road network development in this city only increases 0,01% per year (Transportation Statistic of Jakarta, 2016). Therefore, it could not cope with the growth of private vehicle ownership which has reached approximately 8,1% per year (Transportation Statistic of Jakarta, 2016).

The higher number of motorized vehicle ownership is reasonable to happen in this city, as the cost to buy a motorcycle is made more affordable for the low and middle-income households. Additionally, the cost to own a car is also set more affordable not only for high-income households but also the middle-income segments. The fact that the provision of public transport service in Indonesia is unable to deal with the mobility needs of commuters may also stimulate the motorization trend in Jakarta (Susilo, Santosa, Joewono & Parikesit, 2007). The affordable price to own either a car or motorbike in Jakarta could give benefits to the specific individual, yet it may generate an external cost to the society (Moavenzadeh and Markow, 2007). The private vehicle usage in Jakarta contributes to 70% of total emission to the suburban area of Jakarta (Atabani et al., 2012; Sunarya, 2016) and give a heavy load on the road. Subsequently, the severe traffic congestion could not be avoided (Javid, Okamura, Nakamura, and Wang, 2013).

A study from JICA (2012) explained that the Jakarta and its peripheries (Bodetabek) would have significant growth in vehicle ownership in the next 20 years. Many commuters could save almost 30% of their transportation costs by using their private vehicles rather than public transport modes (Rukmana, 2014). Inevitably, this situation becomes a pull factor for many commuters in Jakarta, particularly for the low-income households to use their private vehicle, specifically motorbike. A study by JICA (2012) finds that 53% of trips in this city are using motorbikes, followed by trips using public transport (27%) and trips using the private car (20%).

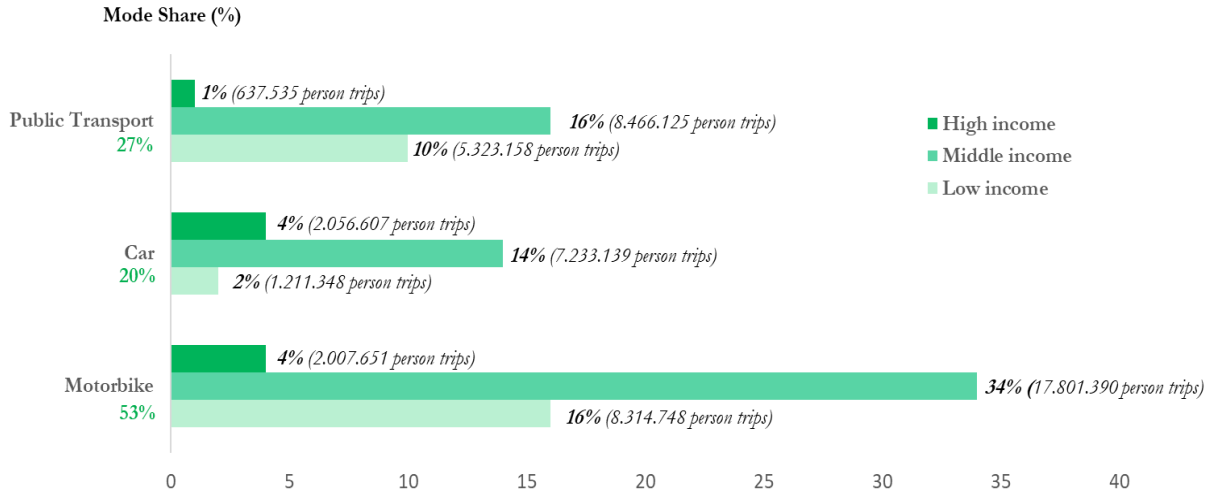


Figure 4. 2 Mode Share in Jakarta
Source: JICA, 2012

Figure 4.2 above depicts an evident condition that the high-income households mostly prefer to use their private vehicle to travel than using public transport, as they perceive the public transport is not reliable enough in term of its accessibility coverage, route coverage, safety, and comfort. If there is no further action in controlling this latent demand, the mode share of the formal public transport modes will be even lower due to the passenger level of service could not be improved (Susilo et al., 2007).

It is clear that the main drivers which motivating the use of motorbike are to reduce travel time during traffic congestion and also to save daily transport cost. Currently, the use of motorbike in Jakarta is not only deemed as a private vehicle but also as informal public transport (known as

ojek/motorbike taxi). The existence of a motorbike taxi in Jakarta has progressed rapidly in the past years as it could provide faster travel time and flexible route mainly during peak hour. However, a motorbike is also widely known as the most risk mode because many road accidents found in Jakarta involve this means of transport. In the following section, the introduction of on-demand motorbike taxi as a new form of informal public transport in Jakarta will be carried out.

4.2 Motorbike taxi in Jakarta

The motorbike taxi (ojek) started to emerge as informal public transport in 1970 due to the Jakarta government banned the operation of three-wheel taxis (Bajaj) and microbuses (bemo) in some protocol roads of Jakarta (Hanggoro 2015; Dina, 2017). Additionally, the rising popularity of motorbike taxi also happens due to the absence of reliable public transport to accommodate the mobility needs of Jakarta commuters who are not accessible by the formal public transport network. Currently, the motorbike taxi is still considered as the gap filler for the public transport system in Jakarta even though there is no legal framework which regulates the operation of motorbike taxi service. In result, it has triggered a dilemmatic situation; in a political setting the motorbike taxi is illegal, yet the demand keeps growing over the time. Businesswise, the operation of motorbike taxi brings opportunity for the market players in developing the motorbike taxi into technology-based service concept. Further explanation about the development of on-demand motorbike taxi in Jakarta will be presented in the following subsections.

4.2.1 Motorbike taxi as a public transport mode in Jakarta

Many people who live in Jakarta always depend on the operation of informal public transport services in supporting their mobility needs (Cervero & Golub, 2007). In a crowded city like Jakarta, the motorbike taxi (*ojek*) has transformed as a basic need for commuters who want to have faster mobility. Compared to other modes, motorbike taxi performs better on its agility to move in the heavily congested road. However, the higher number of motorbike taxi drivers found in every corner of Jakarta has led to several downsides, prominently in the context of safety and cost certainty.

As it might be known, every motorbike taxi drivers have different behavior and driving style, for example driving in slow or fast speed, obeying or violating the traffic rule. The traditional motorbike taxi is operated and owned by an individual, mainly by the driver itself. Hence, it is not equipped with a taximeter, and there is no fixed rate for each trip. Commonly, the price for each trip is determined by the negotiation from the driver and the consumer. The negotiation is likely to be harder if both parties know well with the route to the destination.

The traditional motorbike taxi drivers mostly encroach some empty spaces and use those spaces as their informal stops (*pangkalan*). They are often found nearby the stations, residential locations, shopping malls, office areas to grab their potential customers, as shown in figure 4.3 below. Nonetheless, the motorbike taxi has higher risk exposure towards accidents and less convenience than other modes. Therefore, many motorbike taxi drivers are reluctant to have long ride trips.

Figure 4. 3 Example of the traditional motorbike taxi in Jakarta

JICA (2012) pinpointed that motorbike taxi service often outperforms other formal public transport modes in Jakarta in term of its accessibility, travel speed and also time punctuality. A higher demand towards the use of motorbike taxi becomes an attraction for the market players in developing the technology-based service to motorbike taxi mode specifically in Jakarta as the most populous city in Indonesia. By bringing the concept of on-demand service like Uber, in 2010 the local start-up company, namely Go-jek, launched their first ride-sharing business using motorbike taxi in greater Jakarta (Go-jek Fact Sheet, 2018). This company ran their first service by only having 20 drivers and started to expand their business in 2015 by launching their service in some cities in Indonesia(Go-jek Fact Sheet, 2018). Following their growing market, other start-up companies, such as Grab and Uber also started to launch their on-demand motorbike taxi service in 2015 and 2016 respectively. The emerging market of on-demand motorbike taxi service brings three values to consumers, which are fast, safety and rate certainty. Safety and rate certainty are two values that could address the shortcomings of traditional motorbike taxi service in Jakarta. The new form of on-demand motorbike taxi gives more security and comfortability towards mobility needs of Jakarta commuters. In the past three years, the popularity of on-demand motorbike taxi service increases significantly compared with the traditional motorbike taxi (Bahasa: ojek pangkalan) due to the robust innovation in the technology using on-demand transport service application. This innovation has affected an intense competition not only with the traditional motorbike taxis but also with the taxicabs which are competing for the customers.

Based on interview with Christian Wagey (*the head of representative form Association of Indonesia's Online Driver*), the on-demand motorbike taxi drivers in Indonesia have reached one million drivers in early of 2017 (ADO interview, 2018). This number might be growing vastly in the near future, as the motorbike ownership in Indonesia was found around 105,15 million at the end of 2016 (Central Bureau of Statistic Indonesia, 2016). Comparing to the number of the motorbike mode found in Indonesia, Jakarta contributed to 12,64% of its total[1]. Using this assumption, the author approximated the online motorbike drivers who have been registered in Jakarta are approximately 126.400 units at the end of 2016. Subsequently, this calculation also highlighted the proportion between the on-demand motorbike taxi and motorbike mode in Jakarta is around 1 : 100, knowing

[1] *Central Bureau of Statistic Indonesia (2016) stated that Indonesia had 105,15 million unit of motorbike mode in 2016 and Jakarta contributed to 12,64% of its total or around 13,3 unit of motorbike were found in Jakarta in the same year (Central Bureau of Statistic Indonesia, 2016; Transportation statistics of Jakarta, 2016)*

that the number of motorbike mode in Jakarta was reported around 13,3 million unit in 2016 (*Transportation statistics of Jakarta, 2016).*

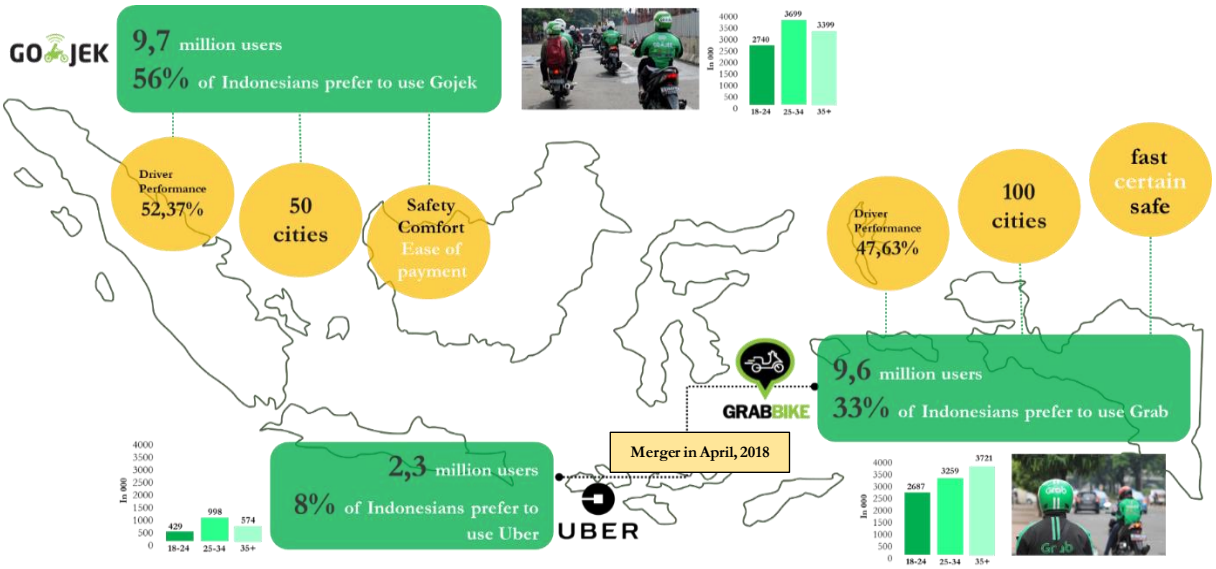


Figure 4. 4 The on-demand motorbike taxi service in Indonesia
Source: Adapted from Kata Data, 2016; Jakpat, 2016

4.2.2 The Determinant factors influencing the use of motorbike taxi service

As mentioned earlier the on-demand motorbike taxi brings many advantages to fulfill the mobility needs of Jakarta commuters mainly during peak hours. The on-demand motorbike taxi service could ensure the passengers to have cheaper transport cost, faster travel time, convenience trips and flexible route. This study is designed to examine the extent to which the Jakarta commuters willing to trade-off their travel time with safety when using on-demand motorbike taxi service. To elicit the preferences of Jakarta commuters, therefore determining the influencing factors to use on-demand motorbike taxi service is necessary. A study by Raco, Raton, Taroreh & Muaja (2018) uses convenience, price, safety and speed as determinant factors which influence the costumers to use on-demand motorbike taxi service in Jakarta.

Additionally, Sunarya (2016) compared the level of service between traditional motorbike taxi service and on-demand motorbike taxi service with the attributes as follows, 1) travel time saving, 2) cost per trip, 3)safety, 4) satisfaction, and 5) waiting time. Hess, Murphy, Le & Leong (2017) conducted a study to estimate the new monetary valuations of travel time and safety in Singapore. They specifically used the following attributes to assess the new monetary valuation in motorbike mode, such as 1) travel time: free flow travel time, travel time when light congestion happens, travel time when heavy congestion occurs; 2) travel cost: the cost which includes parking cost, petrol cost, and ERP cost; 3) safety-related to accidents: fatalities, serious and light injuries per year.

Based on the above studies which examined the performance of motorbike taxi mode, the author used the travel time, safety, and travel cost as the primary attributes for this research, as shown in figure 4.5 below. In this research, the speed variable was chosen as the main policy interventions to test the users' preferences with their role as a citizen. On the side note, in the consumer experiment, the individuals were given two choice alternatives from two different drivers'

characteristics. Further information of the defined alternatives in the consumer and citizen stated choice experiments will be examined in chapter five.

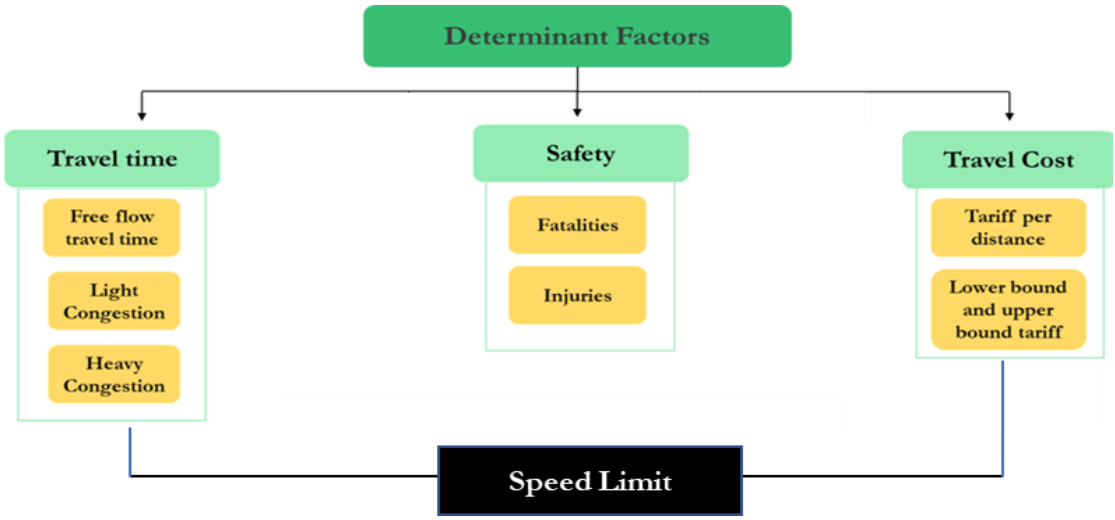


Figure 4. 5 The determinant factor influencing the use of on-demand motorbike taxi service

Travel time parameter will be one of the most critical attributes to value the preference of on-demand motorbike taxi users when they need to make a trade-off with safety aspect. Most of the commuters prefer to use on-demand motorbike taxi because it provides faster travel as motorbike mode can pass through in the heavily congested roads (Karema, 2013). Sunarya (2016) highlighted that the average travel time using on-demand motorbike taxi is approximately 20 minutes for the distance less than 7 km and commuters need to spend around 40 minutes for the average distance of 12,2 km. These conditions may be applied when the road is not heavily congested. When the road is heavily congested, the average travel time might be even longer. On the one hand, Saffan & Rizki (2018) distinguished the average travel time of on-demand motorbike taxi based on the first mile trip (from origin to station) and last mile trip (from station to destination). They emphasized that the average distance for both first mile and last mile trip are around 3,7 km – 4,2 km with an average travel time range between 13-15 minutes. The second determinant factor which is known to have a significant impact towards the use of motorbike taxi is the safety aspect. As it might be known, the motorbikes contribute to more than 60% of road traffic accidents in Jakarta. The road traffic accidents may lead to different severity of impacts from light injuries until catastrophic impact (fatalities). In result, the impact of road traffic accident which is caused by motorbikes is shown in the following figure.

Severy of impact	2013	2014	2015	2016
Total fatalities	**676**	**636**	**591**	**678**
Total Injuries	**4582**	**3735**	**4186.8**	**4042.2**
ligh injuries	1755	1585.8	1612.8	1350
severe injuries	2827	2149	2574	2692
Ratio injuries with fatalitie	**7**	**6**	**7**	**6**
Average ratio per year	**6**			

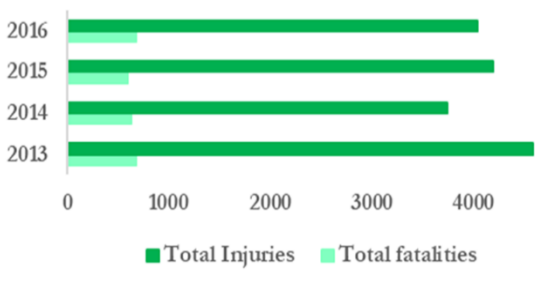


Figure 4. 6 The impact of motorbike accident in Jakarta
(Source: Transportation Statistic of DKI Jakarta, 2016)

In section 4.2.1, the proportion between on-demand motorbike taxi and motorbike in Jakarta is found to be around 1: 100. Assuming to this composition, the author in this research used this proportion to estimate the number of fatalities and injuries for the -demand motorbike taxi as no data which specified explicitly the number of deaths and injuries which involved the on-demand motorbike taxi. Following that, the author estimated that the number of fatalities which involved on-demand motorbike taxi in a year is around six fatalities per year based on the fatalities incidents which involved motorbikes in Jakarta. The number of injuries for motorbikes in Jakarta is found to be six times higher than the rate of fatalities in 2016 as explained in figure 4.6. Deriving this number, the author estimated the number of injuries which involved on-demand motorbike taxi is around 48 injuries per year. Detail information about this attributes will be clarified in chapter five.

The third determinant factor which is used to examine the users' preferences is the transport cost. As it might be known, the total cost that needs to be spent by the on-demand motorbike taxi users varies depending on the distance per km. In April 2018, the government and the service provider set the fare of IDR 2.300 per kilometer (EUR 0.15 per kilometer[2]). The Association of Online Motorbike Driver (ADO, 2018) mentioned that the average cost of using on-demand motorbike taxi for one trip is between IDR 15.000 to IDR 25.000 (EUR 1 – 2 per kilometer). This tariff is equal to IDR 1.500 – IDR 2.500 per kilometer (EUR 0.09 – 0.16 per kilometer.

The last factor that also essential to be used in examining the users' preference of the on-demand motorbike taxi is the speed factor. Speed is often correlated as the critical factor in the road traffic accidents. Many motorbike taxi drivers are often involved in traffic accidents when the road is not too crowded. Therefore they tend to have a higher speed which exceeds the road speed limit. Based on the Indonesia Law No 22 (2009), the maximum allowable speed for the motorbike mode in Jakarta is 50 km per hour in the road nearby with the built-up areas. Nevertheless, on a daily basis, most of the motorbike taxi drivers drive their vehicle with the average speed of 23,8 km per hour to 30,8 km per hour (Jakarta Transport Agency, 2017).

To control the speeding accidents, the on-demand motorbike companies, such as Grab, Gojek, use telematics on its motorbike taxis in Jakarta to monitor the driving behavior of their drivers. Moreover by using telematics system, thereby the on-demand motorbike taxi companies could track the speeding incidents and subsequently improve the safety of its drives and passenger. Most on-demand motorbike taxi drivers in Jakarta solely conscious that they will face a crucial trade-off between travel time and safety. Some trade-offs made by the drivers are profoundly affected by the speed limit, the driving experience and other enforcement conditions, such as weather condition (National Transport Safety, 1999). By driving fast, the possibility to reach the destination in a shorter time will be higher, yet the propensity to involve in a traffic accident may increase as well.

4.2.3 The motorbike taxi legal setting

Up until now, the on-demand motorbike taxi still becomes the most widely used means of transport in Jakarta due to its flexible characteristic. Alonso-Gonzales (2017) found that the combination of the demand responsive transport (DRT) modes and fixed-route PT mode could improve the urban mobility. However, the substantial existence of on-demand motorbike taxi in Jakarta is still not well supported by the regulation system. The Jakarta government still encounter a dilemma whether to reject the concept of the on-demand motorbike taxi or integrate with the public transport network

[2] *The exchange rate for 1 euro is equal to IDR 16.998 per 15th July 2018*

(Sunarya, 2016). This dilemma may happen as the highest level regulation of Indonesian traffic law, which is the article 47 of Law No. 22/2009 does not state the motorbike taxi as one of formal public transport.

Furthermore, last July the Constitutional Court of Indonesia (MK) rejected the petition for judicial review No. 41 /PUU-XVI /2018 which submitted by a number of online motorcycle taxi drivers in Jakarta. This material stated about the request to give a legal umbrella for the operation of on-demand motorbike taxi service. The Ministry of Transportation argues that actually there is no legal opportunity for the central government to issue regulations that legalize on-demand motorbikes as public transportation (tirtonews, 2018). However, the Jakarta Government may still have an opportunity to be able to arrange the on-demand motorbike taxi service with a basis for maintaining order and security, and not in the context of transportation. For example, the Jakarta Government could form regulations that limit the number of motorbike taxi vehicles operating in Jakarta area to keep business competition healthy and prevent polemic.

4.3 Conclusion

This chapter discussed the operation of the on-demand motorbike taxi in Jakarta as the case study in this research. Currently, this means of transport is deemed as the gap filler for the public transport system in Jakarta as it could accommodate the mobility needs of Jakarta commuters. Nevertheless, there is no legal framework which regulates the operation of motorbike taxi service up until now. In result, it has triggered a dilemmatic situation; in a political setting the motorbike taxi is illegal, yet the demand keeps growing over the time. This research intends to reveal the preferences of Jakarta commuters in trading-off their safety and travel time using on-demand motorbike taxi, and the output of this research is expected to become a gap filler in addressing the dilemmatic situation. To elicit the preferences of Jakarta commuters, therefore determining the influencing factors to use on-demand motorbike taxi service is necessary. The author defined several attributes that may valuable to assess the preferences of on-demand motorbike taxi users, as follow:1) travel time, 2) travel cost, 3) safety-related accidents, 4) driver's speed. These four determinant factors will be quantified by establishing their unit of measurement and their ranges. Detailed information of this step will be explained in chapter five.

5

DESIGN OF THE DISCRETE CHOICE

5

DESIGN OF DISCRETE CHOICE EXPERIMENT

This chapter pinpoints the design of the stated preference experiment which aims to investigate the extent to which the users will have different preferences as consumers and as citizens when they make a travel time and safety trade-off. The first phase of the consumer and citizen stated preference experiment was constructing the choice sets of a pilot study. Subsequently, the results obtained from the pilot study were used to design three main experiments in this research. The outputs for these experiments were analyzed further using discrete choice modeling (DCM) as mentioned earlier in chapter two. Detailed analysis and model estimation are then presented in chapter six and chapter seven. To elucidate the process of designing the stated preference experiment, section 5.1, firstly discusses the design choices, specifically in determining the alternatives, attribute and attribute levels. Section 5.2 shows the process of generating the consumer-citizen experiments, and to sum up, section 5.3 highlights the design of the final surveys.

5.1 Alternatives, Attributes, and Level Selection

Based on the information obtained from the literature review, it is apparent that there are several attributes which can be used to elicit the consumer and citizen preferences of on-demand motorbike taxi users when they make trade-offs between safety and travel time. However, to limit the research scope, this research will only elaborate the relevant attributes which presumably have a more significant influence in evoking the users' preferences. Additionally, applying too many attributes in the stated preference experiment may result in too many choice tasks, and consequently, it may exhaust the respondents because too many tasks are presented. Likewise, too many attributes and levels may cause respondents to ignore some items mentioned in the experiment (Sanko, 2001).

5.1.1 Attributes and levels selection

Several considerations were taken into account to determine the attributes and its values for this research. *Firstly, the attributes preferably have been used in relevant previous studies. This condition is desirable* to improve the relevancy and comparability of this research to other prior studies (Hensher et al., 2009). *Secondly,* the attributes have a more significant possibility to be chosen if the output from previous studies shown intriguing results. Hence, this research may create more insights to the transport development sector. *Thirdly,* the attributes should suitably represent the context for this study, which is the use of on-demand motorbike taxi service. By applying the above conditions, the attributes used for this research may bring the practical and scientific aspects of this research. The chosen attributes are determined based on the significance of the selected attributes to this research, and also the occurrence of attributes are being used in literature.

This research incorporated four main attributes, which are travel time, travel cost, fatalities, and injuries. These four attributes[3] have obtained significant results from the prior studies, yet, further research might be useful to give nuances to this attributes. The first three attributes, which are travel cost, travel time and fatalities were often used to value the safety and travel time trade-offs. On the other hand, compared to the other three attributes, fewer studies were found to use injuries in the experiments. Nevertheless, this attribute was selected by the author as motorbike mode has a higher propensity for accidents which often leads to injuries (87% of traffic accidents cause injuries[4]).

As previously stated, chapter four mentioned that speed was also identified as the determinant factors in influencing the user's preferences towards the use of on-demand motorbike taxi. However, the author decided to use the speed factor as the alternative interventions particularly for the citizen experiments (the third experiment). This notion occurred because the traffic accidents in Jakarta mostly involve motorbikes. The DKI Jakarta provincial government (2016) reported that reckless driving behavior of the drivers is known as the primary factor causes an accident (for example driving too fast, do not obey the traffic signs).

By presenting two different speed limit regulations to on-demand motorbike taxi users, this research may evoke the users' preference towards on-demand motorbike taxi, and therefore the behavioral change from the drivers may happen as intended. Further explanation of speed regulation as alternative interventions will be shown in sub-section 5.1.2. Examining the attributes from various approaches (literature review, grey literature, and interviews) may useful in ensuring the relevancy of the selected attributes towards the aim of the research. After selected the relevant attributes, the author defined the characteristics of its attributes to determine the appropriate values. The characteristics of each attribute strongly rely on the context of this study which is on-demand motorbike taxi service. Detailed components of each attribute are described below.

Table 5. 1 Characteristics of attribute values used in the experiments

Attributes	Characteristic of Attribute values
Travel Time	**The travel time values were identified based on the average, minimum and maximum travel time using on-demand motorbike taxi service during peak hour.** Chapter 4 mentioned that the average travel time using on-demand motorbike taxi is approximately 20 minutes (for the distance less than 7 km) and 40 minutes (for the average distance of 12,2 km). These values were used as inputs to determine the attribute level of travel time parameters,
Travel Cost	**The travel cost values were determined based on the minimum and maximum fare per kilometer which are implemented currently.** Based on the data obtained from the interviews with the service providers, drivers and ADO, the minimum fare of on-demand motorbike taxi is IDR 1500 per kilometer (EUR 0.1 per km) during the off-peak hour, and the maximum fare is IDR 3000 per kilometer (EUR 0.2 per km) during peak hour

[3] *From the practical point of view, the four attributes are identified as the most important values that need to be presented to the users at the first place as it represents the objectives of the on-demand motorbike taxi service provider, which are fast, safe, and certainty (Gojek, 2018).*

[4] *Based on the Transportation statistic of Jakarta (2016), motorbike modes contribute to more than 60% of road traffic accident in Jakarta, this lead to 4.042 people are found injured in 2016 (total injuries in the road traffic accidents are 6.737 people)*

Fatalities	**Some prior studies (Mouter et al., 2017; Niroomand, 2016) defined the value of fatalities based on the number of fatalities per year on the route. However, this type of data is not available in Jakarta. Therefore the author assumed the value of fatalities based on the probability of fatal accidents which may jeopardize both drivers and passengers in a year.** As explained in chapter four, the average fatalities which involved motorbike in a year were found to be more than 600 accidents from 2012-2016 (Transportation Statistic of Jakarta, 2016). To identify the number of incidents which involved motorbike taxi, the author used the proportion between the number of motorbike taxis and motorbikes in Jakarta which is 1:100[5]. By using this proportion, the author estimated the number of fatalities per year which involved motorbike taxi in a year is around six fatalities per year. Additionally, a study by Machcus, Wicaksana, and Djakfar (2013) found that the average number of motorbike accidents in arterial roads with the average length of 3 km – 4 km is around 6 – 8 fatalities per year. In related to the on-demand motorbike taxi service, most of the commuters use this type of modes as transit mode to the nearest station/bus stop with an average distance of 3,7 km – 4,2 km (Saffan & Rizki, 2018). Hence, the author determined the average number of fatalities using on-demand motorbike taxi into six fatalities per year.
Injuries	**The injuries parameter represents the impact of the accident which leads to small and severe injuries.** In chapter four, it was mentioned that the number of injuries which involve motorbike mode in a year are found to be six times higher than the fatalities rate (Transportation Statistic of Jakarta, 2016). Therefore the values of injuries parameter that will be used in this research are equivalent to the values of fatalities.

To determine the value of the attribute levels, the author adopted some considerations from Sanko (2001). Firstly, the attribute levels which will be presented to the potential respondents (on-demand motorbike taxi users) should be rational and acceptable. A study by Molin (2015) mentioned that respondents could handle the relatively complex choice task, as long as the alternatives are easily imagined and represent the real market conditions. Secondly, the levels of each attribute should relate with the current state when using on-demand motorbike taxi service (respondent's experience). Thirdly, the values defined in the attributes should assure the trade-offs situation between attributes are presented and cover wide-ranging valuations for all respondents.

To ensure the rationality of the values attached to the attributes, the maximum plausible levels should not more than four attribute levels (Molin, 2015). Additionally, the attribute levels were set to be balanced, so that it will appear equally along the choice tasks. The author also emphasized that dominant choice tasks should be avoided, since the dominance effect may cause unrealistic situations. Taking an example of a transportation case, apparently, the travel time and travel fare

[5] *Central Bureau of Statistic Indonesia (2016) stated that Indonesia had 105,15 million motorbikes in 2016 and Jakarta contributed to 12,64% of its total or around 13,3 million motorbikes were found in Jakarta in the same year (Central Bureau of Statistic Indonesia, 2016; Transportation statistics of Jakarta, 2016). Using this assumption, the author approximated the online motorbike drivers who have been registered in Jakarta are approximately 126.400 units at the end of 2016, as there are approximately one million drivers of on-demand motorbike taxi in Indonesia (ADO interviews, 2018). Therefore, the registered drivers in Jakarta is around 126.400 drivers in 2016. Following to this number, it leads to an approximate proportion of 1:100 (126.400 units : 13.300.000 units) between motorbike taxis and motorbikes in Jakarta.*

are highly correlated. A condition with faster travel time may result in higher travel cost and oppositely. Therefore, if the choice set shows a situation with faster travel time and cheaper travel cost, then it may appear as a dominant scenario. Additionally, the dominant alternatives in the choice sets may cause many non-traders responses in the experiment. If there are many dominance situations in the choice task; this may cause the respondent not to answer logically and thoughtfully. Hence, it may decrease the reliability of the data which are presented to the respondents. To ensure that the selected attributes can be quantified in a realistic value; therefore, conducting a literature review and expert interviews might be essential in designing the choice tasks mentioned. This research pinpoints that all of the selected attributes were varied in the four levels to test for the non-linear effects, as shown in table 5.2 below.

Table 5. 2 The attributes and attributes levels used in the experiments

Experiment	Attributes	Level of measurement	Unit of measurement	Proposed Attribute Levels
Consumer Experiment 1	**Travel Cost**	Ratio	IDR per km / EUR per km	IDR 1500 per km (EUR 0,09 per km) IDR 2000 per km (EUR 0,12 per km) IDR 2500 per km (EUR 0,15 per km) IDR 3000 per km (EUR 0,18 per km)
	Travel Time	Ratio	Minutes per trip	20 minutes 35 minutes 50 minutes 65 minutes
	Fatalities	Ratio	Deaths per year	2 deaths per year 4 deaths per year 6 deaths per year 8 deaths per year
	Injuries	Ratio	Injuries per year	8 injuries per year 12 injuries per year 24 injuries per year 36 injuries per year
Consumer Experiment 2	**Travel Time**	Ratio	Minutes per trip	20 minutes 35 minutes 50 minutes 65 minutes
	Fatalities	Ratio	Deaths per year	2 deaths per year 4 deaths per year 6 deaths per year 8 deaths per year
	Injuries	Ratio	Injuries per year	8 injuries per year 12 injuries per year 24 injuries per year 36 injuries per year
Citizen Experiment	**Travel Time**	Ratio	Minutes per trip	20 minutes 35 minutes 50 minutes 65 minutes
	Fatalities	Ratio	Deaths per year	2 deaths per year 4 deaths per year 6 deaths per year 8 deaths per year
	Injuries	Ratio	Injuries per year	8 injuries per year 12 injuries per year 24 injuries per year 36 injuries per year

In this research, the pilot survey and final survey used the same attributes and attributes levels. The only difference was in the pilot survey; the experiments were constructed using orthogonal design. On the other hand, the final experiments were designed using D-efficient design. As mentioned earlier, the pilot survey was designed to generate priors that were used to construct D-efficient design and also as a final test to the attributes and attribute levels. A detailed model of the pilot survey and final survey will be presented in section 5.2 and 5.3 respectively.

5.1.2 Alternatives Selection

As mentioned earlier, this research is conducted to gain more insights in capturing the duality preferences of on-demand motorbike users as consumers and as citizens, when they make a trade-off between safety aspect and travel time. A different set of experiments were constructed to distinguish the consumer and citizen viewpoints when making safety and travel time trade-offs.

In the consumer experiment, individuals tend to consider their welfare without considering the social values that may happen in the future. The author designed two concepts of consumer experiments. Firstly, by involving the transport cost and secondly, by excluding the transport cost. The first consumer experiment represents the neoclassical economics theory (consumer preferences in the market-based setting), in which individuals will reveal their choice based on the allocation of after-tax income. To generate the monetary value of statistical life (VOSL) and travel time savings, therefore it is necessary to include the cost as a relevant attribute in the consumer experiments. In this case, the respondents were asked to choose between two drivers from different companies who differ based on the travel time, number of fatalities per year, number of injuries per year, and cost per distance.

Since the primary aim of this research is to evoke how users are making a travel time and safety trade-off as a consumer of mobility, thus in the second consumer experiment, the travel cost attribute was excluded, as the cost of the two driver alternatives did not differ. All of the consumer experiments were using unlabeled alternatives. The unlabelled alternatives were created to prevent the bias responses from the respondents by only knowing the name of the service provider or the driver in this context.

The citizen experiment, on the other hand, was defined as labeled alternatives as each alternative were formed based on the speed limit regulations. As earlier mentioned in chapter four, the Constitutional Court of Indonesia has rejected the petition to legalize the operation of the on-demand motorbike taxi in the last July. However, the Ministry of Transportation emphasized that the Jakarta Government could control the operation of on-demand motorbike taxi by regulating the number of the on-demand motorbike taxi which operate in Jakarta. Elaborating the citizen preference in this research may essential to help the Jakarta Government in assessing the new alternative interventions to improve the safety of on-demand motorbike users. One of the interventions that could be done by the Jakarta government is by implementing speed limit regulation towards the operation of on-demand motorbike service. Based on the grey literature and interviews with the respective stakeholders, the citizen experiment was built by using two alternative interventions, which are speed limit of 30 km per hour and a speed limit of 50 km per hour. Knowing the fact that specific policy intervention was used as the alternatives, therefore, the alternative specific constant will be used to calculate the model estimation.

5.2 Generating the Experimental Design

This section explains some steps in generating the experimental design. In the first phase, a pilot survey was initially performed using orthogonal design to obtain prior values which will be used to create the main experiments using D-efficient design at the end.

5.2.1 First Experimental Design: Pilot Survey

Chapter two explained several steps in constructing the choice experiment. Firstly, the author defined the model specification which started from determining the alternatives, the attributes, and its values. After identifying the model specification, the next step is generating the choice sets for the pilot study. The pilot study was conducted to ensure the rationality of the choice tasks and obtained a prior value for the final experiment.

Ngene software was used to construct the experimental design of pilot surveys (Appendix A1). All experiments were built using orthogonal design, and all attributes were known to have attribute level balance. By definition, an orthogonal design, it is assumed that no interactions are present between the primary attributes in an alternative and therefore sets prior values to zero (Choice Metric, 2018). By using the attributes and attribute levels as shown in table 5.3, the 16 choice sets were sequentially constructed by applying the fractional factorial design. Full factorial designs were not feasible to be conducted as it causes too many choice situations. For example in the first consumer experiment, the choice sets will be 4^4 or equal to 256 choice sets. On the other hand, the second consumer experiment and citizen experiment were identified to have 81 choice sets (3^4) if the full factorial design were applied.

Although fractional factorial designs were used for experiments, yet, the probability of trivial choice sets (dominant alternatives) is still exist. Sanko (2011) mentioned that the ratio of trivial choice sets in full factorial and fractional factorial design almost similar. The dominant alternatives found in the choice sets may lead to unreliable data. An overview of choice sets in the first consumer experiment with trivial (dominance) scenario is shown in the following table.

Table 5. 3 Choice sets of consumer experiment 1 in the pilot study

Choice situation	Driver from company A				Driver from company B				Trivial
	alt1.cost	alt1.time	alt1.deaths	alt1.injuries	alt2.cost	alt2.time	alt2.deaths	alt2.injuries	
1	1500	20	2	12	1500	35	8	24	Trivial (Dominance)
2	2500	65	6	12	2000	20	4	48	
3	2000	50	8	12	1500	20	2	12	Trivial (Dominance)
4	2500	20	6	48	2000	65	4	12	
5	1500	20	8	36	3000	65	2	24	
6	2000	65	2	24	3000	65	8	48	Trivial (Dominance)
7	2500	50	4	24	3000	35	4	12	
8	1500	35	8	24	1500	50	6	48	
9	3000	65	8	48	1500	65	4	36	Trivial (Dominance)
10	2000	20	4	48	2500	20	8	36	Trivial (Dominance)
11	2500	35	2	48	2500	65	6	12	Trivial (Dominance)
12	1500	65	4	12	3000	20	4	48	
13	1500	65	2	36	3000	20	8	24	
14	2500	35	4	24	2000	50	6	36	
15	2000	35	6	36	3000	20	6	24	
16	3000	50	2	48	1500	50	8	12	

In the pilot study, the dominance choice sets were not presented to the respondents, as the response from respondents may be apparent. However, by removing the trivial choices the

orthogonality is reduced, and subsequently, the correlation between the main effect might be shown with the potential problems for the analysis (Choice Metrics, 2018; Molin, 2015; Sanko, 2001). Although it leads to some problems, yet it may result in small risk compared to the simplification of choice task situations presented to the respondents. Further overview of choice sets for all experiments which were performed in the pilot study is shown in Appendix A2.

5.2.1.1 Pilot Study Result

The experimental data for the pilot survey was collected through a web-based survey (Surveygizmo). The link of the pilot survey questionnaire was shared with the potential respondents who are willing to participate in the pilot survey. Forty-five respondents did the pilot survey with fifteen respondents were assigned to each experiment. The data obtained from the pilot study was Analyzed using the MNL Model in Biogeme software and the model file specification of each experiment for the pilot study could be seen in Appendix A3. The results obtained from the MNL estimations were used as the prior values for main surveys. The overview of utility parameters from the pilot study are presented in table 5.4 below.

Table 5. 4 The utility parameter values in the pilot survey

	MNL (only attributes)								
Context	**Experiment 1 - Classical Consumer Choice**			**Experiment 2 - Consumer Choice (no cost)**			**Experiment 3 - Citizen Experiment**		
Rho Square			**0.255**			**0.056**		**0.088**	
Estimates	**Value**	**SE**	**t-value**	**Value**	**SE**	**t-value**	**Value**	**SE**	**t-value**
βdeath	-0.41	0.112	-3.67	-0.289	0.111	-2.6	-0.333	0.138	-2.41
βinjuries	-0.0714	0.0251	-2.85	-0.0267	0.016	-1.66	-0.0179*	0.0137	-1.31*
βtravel time	-0.0537	0.016	-3.35	-0.0106*	0.0122	-0.86*	-0.0719	0.0204	-3.53
βtravel cost	0.00014*	0.00047	0.31*						

*Note: * was found not statistically significant*

As shown in table 5.4 above, the coefficient for travel cost was not significant, and the sign of the value was not as expected (*should be a negative sign*). However, compared to another parameter the value of the travel cost parameter is the smallest. Additionally, even though the sign of travel cost is positive, yet it has the smallest value for the maximum impact of utility compared to other parameters. Therefore, the prior was adjusted to a slightly negative value, which is -0.00014. This situation has also been conducted by Molin & Blange (2016) when he found the unexpected sign in the travel time parameter (0.16) during the pilot study. Hence, he made a slight adjustment from 0.16 to -0.1 and used the new value for prior in the efficient design.

In table 5.4, some parameters also identified were not significant, for example, travel time in the second consumer experiment and injuries in the citizen experiment. The smaller number of respondents might become the reason that these parameters were not significant or the parameter apparently may not influence the users' preference. Nonetheless, the estimation coefficients found in this pilot study were used as priors in the final survey design.

5.2.1.2 Pilot Study Feedback

Overall, the respondents could understand clearly the descriptions in the introduction section and the screening section. Some respondents mentioned that the choice situations quite understandable, yet, they thought that in consumer experiments the choice situations are quite a lot. Also, the illustrations which were shown in the questionnaire were too small. Heretofore, some

respondents suggested enlarging the font in the picture illustration. Additionally, it was found that some respondents who did not fulfill the requirement in the screening question were still able to continue the survey. It may occur because the logical routing applied in the questionnaire link was wrong. Lastly, the author realized that during the pilot study, the experiments were not assigned randomly to the respondents, the author determined the respondents for each experiment based on the question which asked the respondent about the most influencing factor towards the use of on-demand motorbike taxi. By using this logic, the bias responses from respondents may occur. Therefore, in the final survey, the author used the randomized system to assign the experiments.

5.2.2 Final Experimental Design: Final Survey

The final experiment design was conducted to construct the final survey. The final survey design was generated based on the improvement feedbacks suggested by the respondents who participated in the pilot study and also expert interviews with the respective stakeholders. One of the suggestions mentioned that there are too many choices tasks which are in the pilot study. Therefore, in the final survey, the choice situations which are presented to the respondents were reduced. One of the solution to address this matter is by using blocking in constructing the experimental design. As previously described, the final survey was created by using D efficient design, because it can produce more reliable parameter estimates even though the sample is smaller (Rose & Bliemer, 2010). The reliable parameter could be obtained because the D efficient design gathers a maximum amount of choice levels by minimizing the standard error.

Similar to the pilot study, the D-efficient design was constructed by using Ngene software (Appendix B1). The attributes and attribute levels used in the pilot study was not changed in the final survey. Therefore, it also resulted in 16 choice sets in a fractional factorial design setting. The only difference was the author used blocking in the final survey which divided choice situations into two blocks. Each block represented eight choice sets, and therefore the respondents in the final survey only need to response eight choice tasks in each experiment. Unlike, the orthogonal design, the trivial question (dominant alternatives) were barely found in the consumer experiments. However, in the citizen experiment, some of the unrealistic combinations of choice situations were still found in the design.

As an example, in the citizen experiment, two alternative interventions of speed limit regulation were applied in the design. The first alternative used the speed limit regulation of 30 km per hour, and the second alternative used speed limit of 50 km per hour. The first alternative was mostly affiliated with slower travel time but safer. Contrarily, the second alternative intervention resulted in faster travel time yet higher risk exposure. Some choice set scenarios found in the citizen experiment shown an opposite situation. Hence, to avoid the unrealistic and dominant alternatives, some scenarios were not presented to the respondents. For example, an overview of the choice sets in the second consumer experiment and citizen experiment applied in the final survey are described in the following table.

Table 5. 5 Choice Sets in the Consumer Experiment 2

Choice situation	Driver from company A			Driver from company B			Block
	alt1.time	alt1.deaths	alt1.injuries	alt2.time	alt2.deaths	alt2.injuries	
1	20	8	12	35	2	24	2
2	50	6	36	65	2	48	2
3	50	8	24	35	2	24	2
4	35	8	36	50	8	24	2
5	20	4	48	65	6	12	1
6	35	2	24	50	6	36	1
7	35	2	36	20	8	12	2
8	65	2	48	50	8	36	2
9	20	6	12	65	4	48	1
10	65	4	48	20	6	12	1
11	50	2	24	35	8	36	2
12	65	6	12	20	6	48	1
13	35	4	24	50	2	36	2
14	50	8	36	35	4	24	1
15	20	4	48	65	4	12	1
16	65	6	12	20	4	48	1

Table 5. 6 Choice Sets in the Citizen Experiment

Choice situation	Driver from company A			Driver from company B			Block	Trivial
	alt1.time	alt1.deaths	alt1.injuries	alt2.time	alt2.deaths	alt2.injuries		
1	65	6	36	50	2	48	1	
2	20	8	48	65	6	24	2	Trivial (Dominance)
3	35	4	24	20	6	36	2	
4	20	8	12	65	4	36	2	Trivial (Dominance)
5	50	6	36	35	8	12	2	
6	50	6	36	20	6	24	2	
7	20	8	48	65	2	12	1	Trivial (Dominance)
8	35	4	24	20	8	48	2	
9	35	8	12	50	4	24	1	Trivial (Dominance)
10	65	2	12	35	4	24	2	
11	50	2	48	50	2	12	1	Trivial (Dominance)
12	50	2	48	35	8	48	1	
13	35	4	36	20	8	12	1	
14	65	4	24	50	6	36	1	
15	65	2	12	35	2	48	1	
16	20	6	24	65	4	36	2	Trivial (Dominance)

Detail explanation about choice sets for all experiments in the final survey are presented in Appendix B2

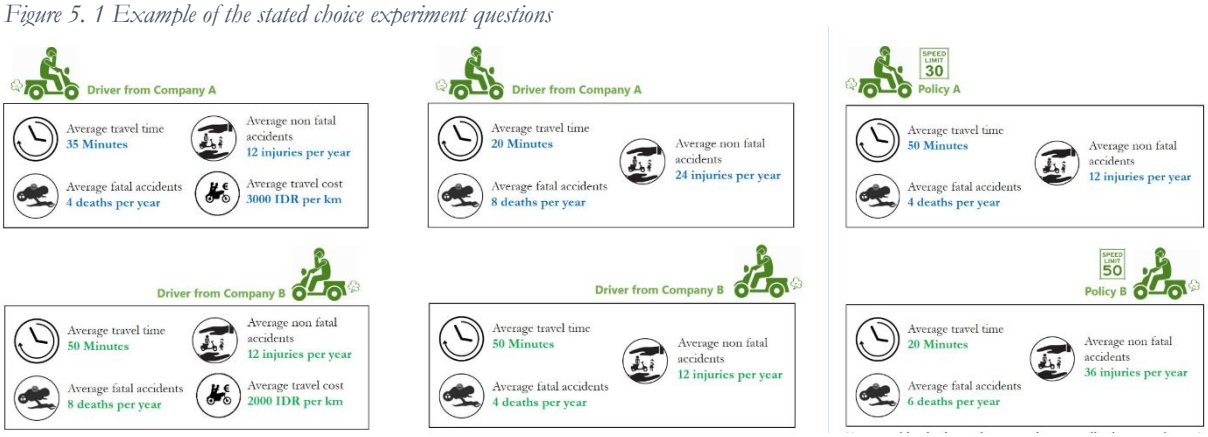
5.2.3 Constructing the questionnaire

After constructing the choice sets using Ngene software, the next phase that has been done by the author was translating the design matrix into choice situations which will be presented to the respective respondents. The choice matrix obtained from Ngene software was developed into a set of questions which examined the socio-demographic characteristic, travel patterns and survey feedback. Following the objectives of this study, the structure of the questionnaire in each experiment was presented into four section. First, the screening questions which aimed to examine the eligibility of the respondent. In this section, the respondents were asked whether they used the on-demand motorbike taxi service within a year. Those who stated never used this type of modes were not eligible to be a respondent in all experiments.

Second, the questionnaire was presented about the stated choice experiment questions. The questions were designed to elicit the preference of on-demand motorbike taxi users as consumers and as citizens when safety and travel time trade-offs are made. In the consumer experiments (consumer experiment 1 and consumer experiment 2), respondents were asked to examine their preferences on eight choices conditions in considering the fastest or safest options. On the other hand, in the citizen experiment, the respondents were asked about two alternative interventions (in this case the speed limit regulations) that can be used as recommendations to the government in regulating the operation of on-demand motorbike taxi was. In the citizen experiment, the questions were derived subsequently by asking the respondents whether they favored either the fastest or the safest options and the lines of reasoning behind their choices.

Third, the sociodemographic and travel pattern questions which aimed to understand the characteristic of on-demand motorbike taxi users in Jakarta and how the characteristics may affect the choice responses. Additionally, in the last phase, some questions about survey feedback were also presented to the respondents.

Figure 5. 1 Example of the stated choice experiment questions



Consumer Experiment 1 **Consumer Experiment 2** **Citizen Experiment**

5.3 Conclusion

This chapter outlines the design steps that were used to construct the experimental survey in the three final surveys. First, this chapter defined the attributes, attributes levels, and alternatives which are deemed suitable to be implemented in consumer and citizen experiments. The consumer experiments will be two unlabelled alternatives whereas the citizen experiment will elaborate two-speed limit policies as the alternatives, which are speed limit of 30 km per hour and the speed limit of 50 km per hour. The three experiments will use the same attributes and attribute levels, and only additional cost attribute will be added in the first consumer experiment to investigate the willingness to pay from the consumers in reducing the risk of fatalities and reduce the travel time.

A pilot study was initially conducted to validate the realism of the attributes and attribute levels. Additionally, the pilot survey was also initiated to obtain prior values which will be used to generate the main survey using D-efficient. The efficient design was preferred as it can produce more reliable parameter estimates even though the sample is smaller (Rose & Bliemer, 2010). Additionally, the reliable parameter could be obtained because the D efficient design works to gather a maximum amount of choice levels by minimizing the standard error. In chapter six the detailed results about respondent characteristics will be explained further

6

DESCRIPTIVE RESULTS

6

DESCRIPTIVE RESULTS

The main objective of this chapter is to clarify the respondent characteristics and the choice exploration made by the respondents. Subsequently, the results obtained from this chapter will be incorporated to provide clarity for the assumptions and decisions used for the model estimation process which presented further in chapter seven.

6.1 Sample Characteristics

The experiment data used SurveyGizmo as a tool to conduct a web-based survey. The final link was spread through social media platforms and mailing list group from 7th of May until 26th of May 2018. To achieve the target sample, the author posted the survey link to some communities in Jakarta. Apart from sharing the link via social media platforms, the experimental data was also collected on a face-to-face survey where people were asked to participate in the survey. The face-to-face survey was conducted in several strategic locations, where the on-demand motorbike taxi users often are found, for example in the shopping mall area, stations and bus stop.

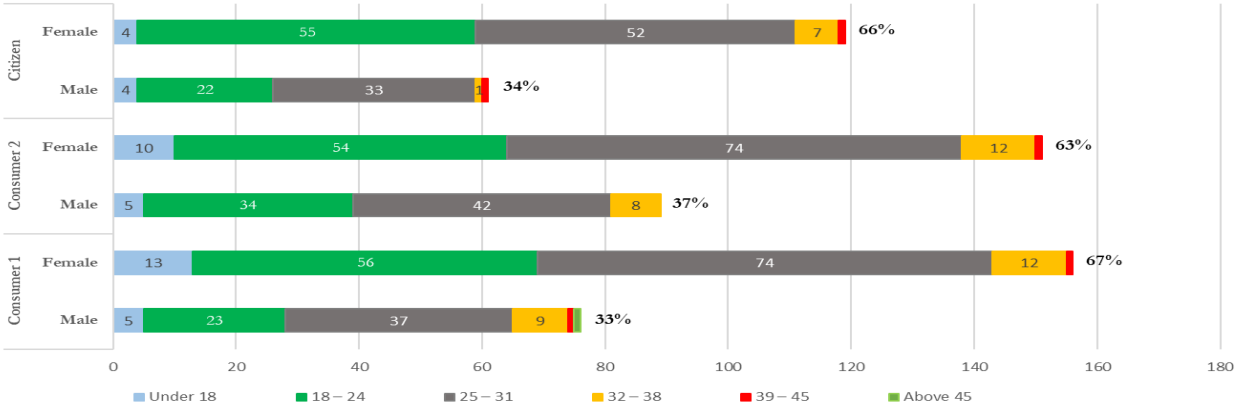
During the survey, 882 responses were gathered. However, based on the data cleaning process, only 652 respondents who were found eligible and had entirely completed the online survey. This means that 232 responses contain missing answer and will be excluded in the survey. In result, it leads to a completion rate of 70,3% for the first consumer experiment, 74% for the second consumer experiment, and 79,6% for the citizen experiment. The lower completion rate in the first consumer experiment may happen due to additional attribute (travel cost) was added. Consequently, it may affect confusion among some respondents because the choice situations were more intricate, and thus they did not finish the survey entirely.

Table 6. 1 Overview of survey completion rate

Experiments	Responses	Eligible Respondents	Completed Response
Consumer Experiment 1	330	238	232 (70,3%)
Consumer Experiment 2	326	243	240 (74 %
Citizen Experiment	226	206	180 (79,6%)

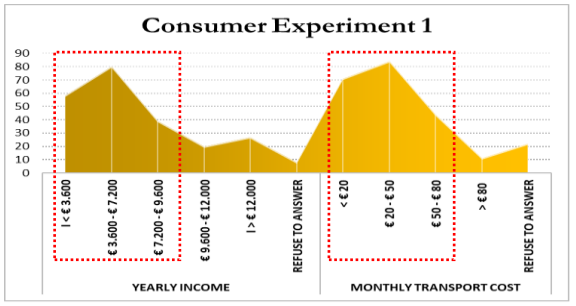
Based on the completed responses which are found in each experiment, more than 60% of respondents who use the on-demand motorbike taxi are female. A higher number of respondents are dominated by females since females owning a private vehicle are smaller than males in Jakarta, and thus they tend to use public transportation instead (Sunarya, 2016). Besides, the majority of respondents who use on-demand motorbike taxi are ranging in age between 18 to 31 as illustrated in figure 6.1. This characteristic may represent the market segmentation of on-demand motorbike taxi users in Jakarta which mostly are in the working age. Furthermore, people in those age range tend to adapt to technology quickly. It is also interesting to note that the respondents in this survey mostly use the on-demand motorbike taxi not only for working trips but also for educational trips and other trips such as shopping trips as shown in figure 6.2. This condition may represent that

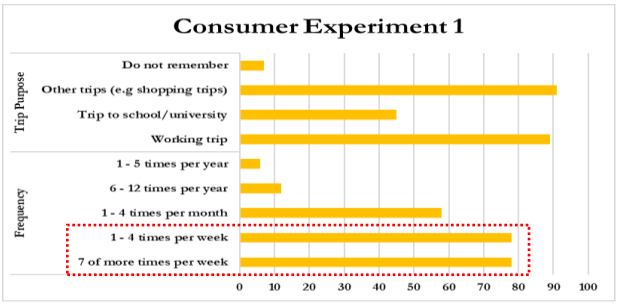
the existence of the on-demand motorbike taxi in Jakarta has played a more prominent role in accommodating the mobility needs of Jakarta commuters. Furthermore, as shown in figure 6.2, most of the respondents who participate in this survey are known as frequent users who presumably have more experiences in understanding the driving behaviors of the drivers. Therefore, their choice preferences may bring valuable insight in evaluating the current operation of on-demand motorbike taxi service in Jakarta.

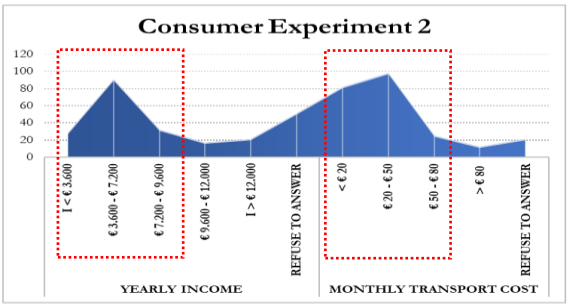


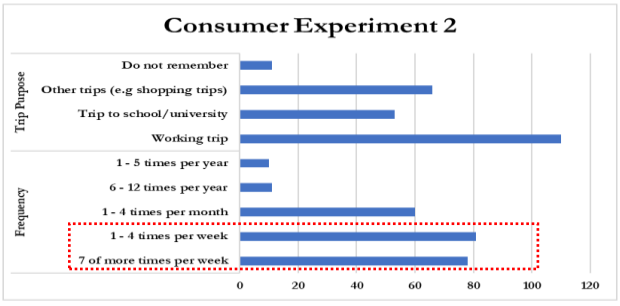
Note: Based on study by Sunarya (2016), proportion of male and female users of on-demand motorbike taxi in Jakarta 65% : 35% with the average age of 28 years old

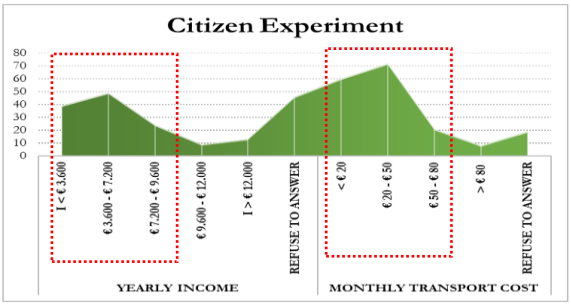
Figure 6. 1 Sample Characteristics based on gender and age

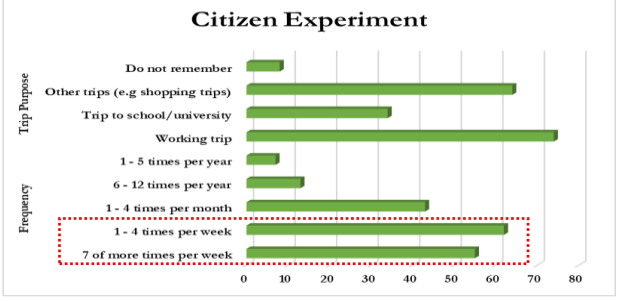












Note: the average daily cost using on-demand motorbike taxi is around 2,34 euro (or equal to 46,7 euro per month)

Figure 6. 2 Sample Characteristics based on yearly income and monthly transport cost

Figure 6. 3 Sample Characteristics based on travel behavior characteristics

The figure 6.3 depicts the distribution of the incomes and transport cost from the respondents in each experiments. It is worth to note as well that most of the respondents in each experiment are classified as middle-income households, with the average monthly transport cost range between 20 to 50 euro per month. In this research, the author determined the transport cost question based on the monthly expenses which spent for fuel cost, parking cost, toll road, public transport cost, but excluding vehicle instalments or public transport subscriptions.

Taking a look in figure 6.1, 6.2, and 6.3, apparently, the user's characteristics between the three experiments did not vary significantly. However, it could not be neglected that socio-demographic characteristics may become one of the influential factor affecting choice of an individual in using the on-demand motorbike taxi as their daily transport. Study by Train (2009) corroborates that the socio-demographic data may affect the differences in the utility by correlating this variables with the attributes in the alternatives. Heretofore, in section 6.2, the correlation between socio-demographic characteristics and the users' perceptions towards on-demand motorbike taxi service will be presented.

6.2 Correlation between socio-demographic characteristics with user's perception

A Pearson's correlation matrix was generated using SPSS software to investigate correlations between socio-demographic characteristics and user' perception towards safety and travel time aspects. As shown in Appendix D.1, it is apparent that gender, income, and age have a significant correlation with travel time, safety, and travel cost aspect of the first consumer experiment. In this experiment, the correlation between income and safety exhibits a negative correlation (-0,247), which emphasizes that the safety aspect might be less critical than travel time for the high-income earners. Similarly, the significant correlation between safety and income was also clarified in the second consumer experiment. These findings are actually in line with the previous studies which revealed that as a consumer, the high-income households consider travel time as one of the essential variables in term of economic context; thereby, they prefer spending more money to have a higher value of time (Dargay & Ommeren, 2005).

Further, in the second experiment, the significant correlation (-0,246) was also found between safety and the frequency of using on-demand motorbike taxi service. This correlation means that the frequent users of on-demand motorbike taxi also perceive safety as the most influential attribute in affecting their preference to use on-demand motorbike taxi for their daily commuting. Correspondingly, the strong negative correlation between these two variables (-0,263) was also identified in the citizen experiment. It is notable that frequent users have more knowledge about the main characteristics of on-demand motorbike taxi service. Hence, exploring their perspective might be valuable to improve the current operation of on-demand motorbike taxi in Jakarta. Following the above findings, it could be assumed that the socio-demographic characteristics may have influenced the users' choices. Therefore, this is preferable to be conducted to test the effect of the personal characteristic in the interactions with the attributes.

6.3 Choice Exploration

In this section, the description of the respondent's answers towards the choice situations tested in the consumer and citizen experiments will be presented in the following sub-section.

6.3.1 The most influential attributes

Identifying the utmost influential attributes based on consumer and citizen perception can be used as an input in analyzing the safety and travel time trade-offs of on-demand motorbike taxi service. Based on the survey experiments, it is interesting to note that safety attribute is perceived as the most influential attribute by respondents either in the consumer experiments or the citizen experiment. The safety attribute in this context is affiliated with the exposure towards risk accidents, such as traffic casualties or injuries. The overview of the most influential attributes based on the respondents' perceptions which are derived from the Likert-scale question is presented in figure 6.4 below.

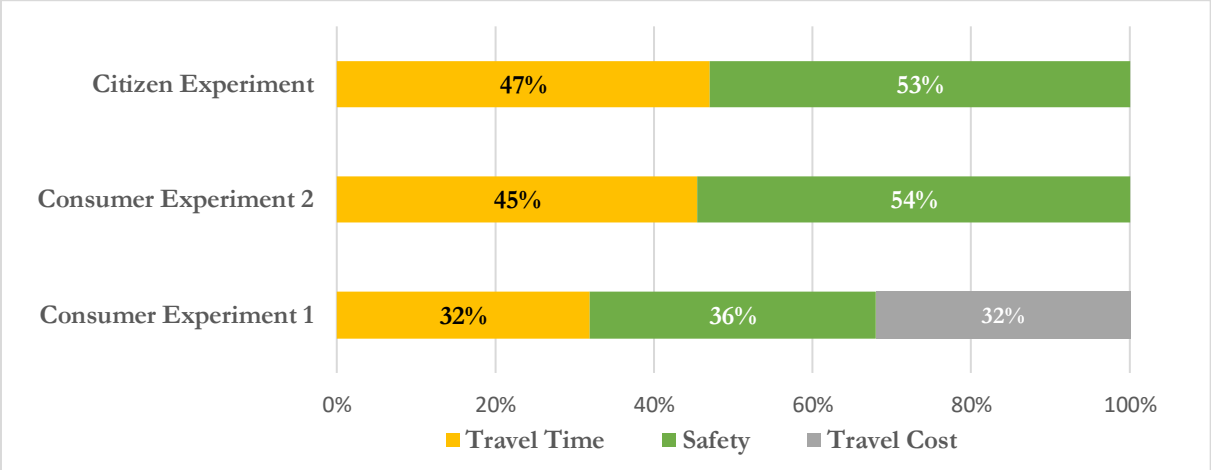


Figure 6. 4 The most influential attributes

Out of three experiments, the percentage of respondents who perceive safety as the most essential attribute is found smallest in the first consumer experiment. It may appear because the first consumer experiment included the travel cost as an additional attribute. Most of the respondents who participated in the first consumer experiment consider travel time and travel cost equally important. Considering the above result, it indicates that respondents mostly consider the safety aspect in the first place either when they put their viewpoints as a consumer or a citizen. Thus, there might be a possibility that the proportion of respondents who choose the safest option in the choice sets will be higher. To verify to what extent this attributes may influence users' preference, the utility contributions of the attributes in the consumer-citizen experiments will be further examined in chapter seven.

6.3.2 The Choice Responses

The distribution of given answers for each context description is shown in figure 6.5 below. Molin (2015) emphasized that a question is regarded to have a dominant alternative when the answers are distributed more than 85% towards of the alternatives. On the other hand, if the given answers of a question are distributed almost equally, for example between the range of 35% to 65%, it is labeled as a balanced alternative. Based on the response per choice task by respondents, the distributions of the chosen alternative in each choice sets are clarified. Out of three experiment, it is found that the first

consumer experiment (exp 1) has the most dominant responses compared to the second consumer experiment (exp 2) and the citizen experiment (exp 3) as shown in the following figure. This suggests that the contexts of citizen-consumer preferences which represented in the experiments indeed influence the user's decisions. The users in their role as consumers or citizens will show their tendency to choose a particular alternative in a given choice task under the contexts of safety and travel trade-offs as the main focus of this research

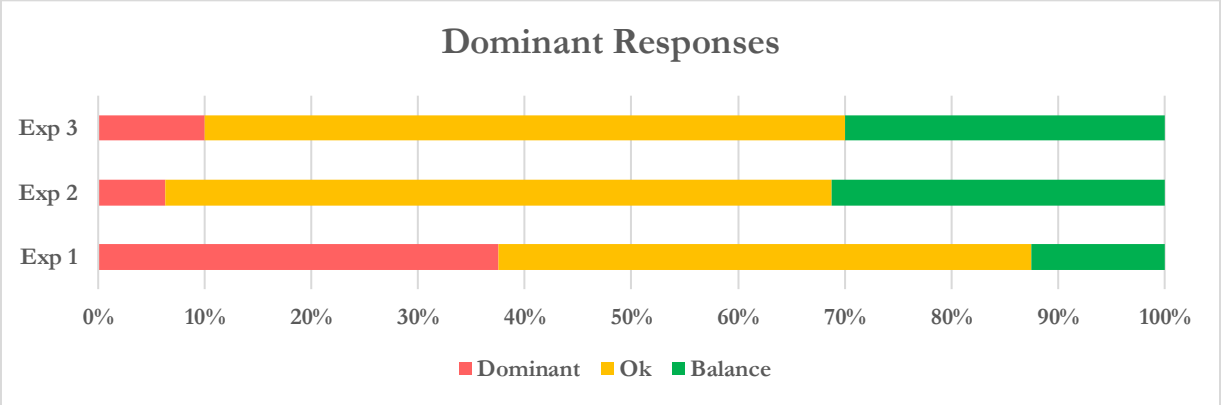


Figure 6. 5 Dominance in Answer

The author ranked the most chosen choice situations from the safest to least safe options to clarify the response distributions in each choice situations. Overall, the descriptive result in the choice exploration indicates that most of the respondents in every experiment more likely sensitive towards the safest options. This result is actually in accordance with the descriptive analysis presented in the previous section, which shows safety as the essential attributes in using the on-demand motorbike. However, the output from this descriptive analysis may not be entirely accurate, further study using discrete choice modeling method is needed to gain more profound insights in capturing the users' preferences, and therefore trade-offs can be inferred. The ranking distributions for each experiment are presented in figure 6.6, figure 6.7 and figure 6.8 respectively. In the below figure, the yellow beam represents the alternative with the safest combination. On the other hand, the red beam shows alternative with the fastest combination.

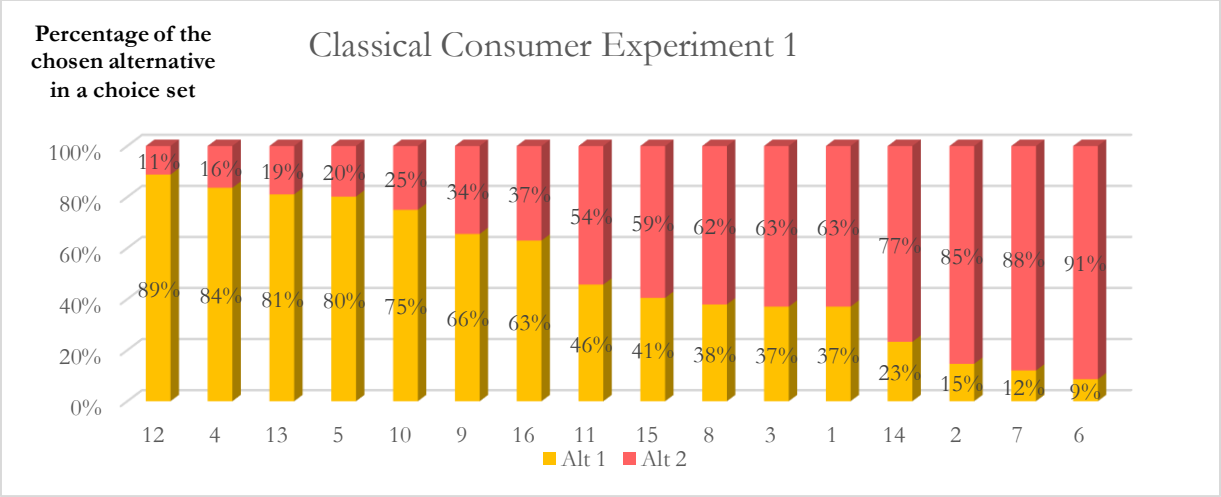


Figure 6. 6 Ranking Distribution of the first consumer experiment (classical consumer experiment)

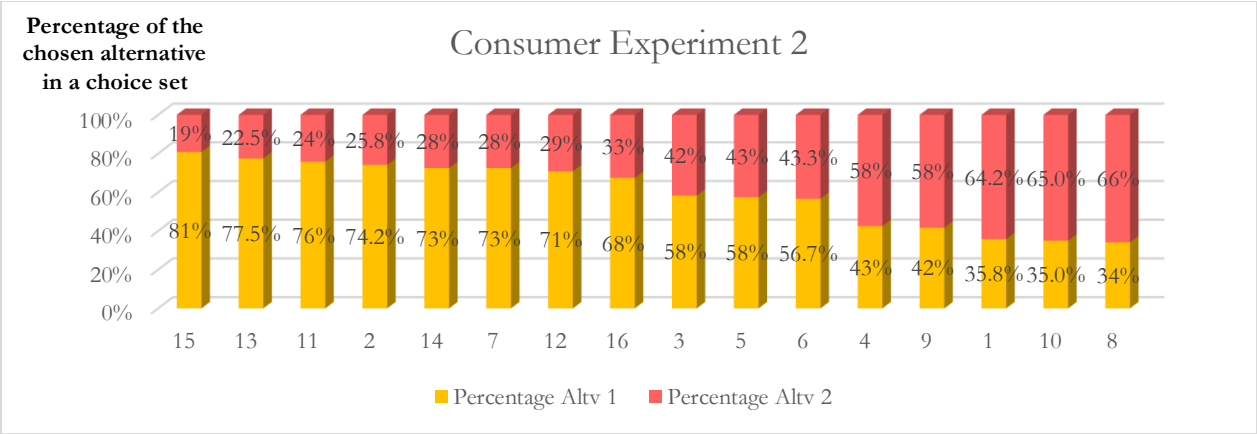


Figure 6. 7 Ranking Distribution of the second consumer experiment

Compared to the first consumer experiment and the citizen experiment, it is apparent that the second consumer experiment have the fewer dominant alternative. In the second consumer experiment, the alternative 1 in the choice set 5 is distinguished as the best combination choice for the respondents, as it gives 45 minutes travel time savings with least accident impacts compared to the alternative 2. Lastly, the responses from the citizen experiment highlight an apparent results, that most of the respondents prefer to choose the safer option with the speed limit regulation of 30 km per hour for the on-demand motorbike taxi drivers, as shown in the figure 6.8 below

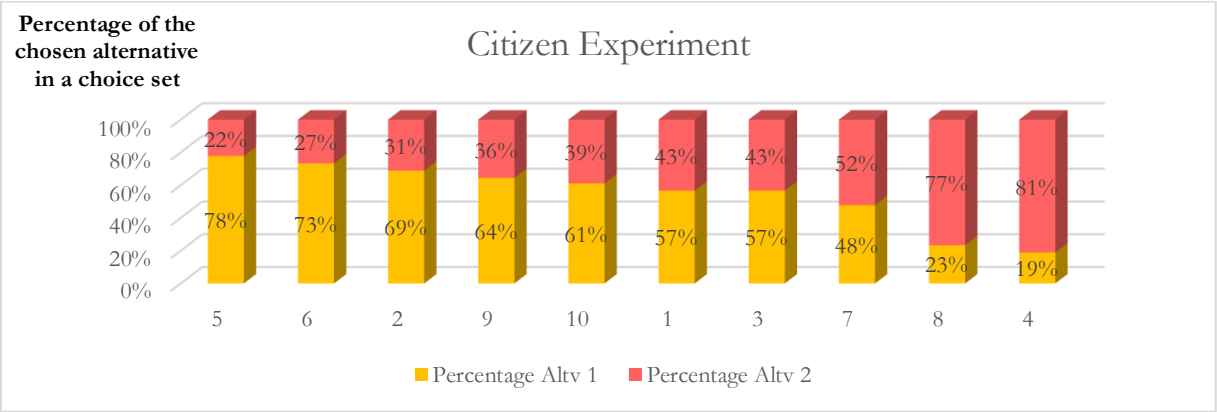


Figure 6. 8 Ranking Distribution of the citizen experiment

6.4 Conclusion

This chapter summarizes the descriptive results which are obtained in the stated choice experiments. This chapter describes the completion rate for three experiments in this study, which are 70,3% for the consumer experiment 1, 74% for the consumer experiment 2 and 79,6% for the citizen experiment. Majority of the respondents in the three experiment are female users, which actually in accordance with study by Silalahi (2017). Additionally, this chapter also highlighted a Pearson correlation matrix between socio-demographic characteristics with their perceived preferences towards safety, travel time, travel cost. This chapter also presented the exploration of choices which were made by the respondents in each experiment. Based on the choice explorations, it is found that most respondents in each experiment tend choose the safest alternative in their decisions

7

MODEL ESTIMATION AND INTERPRETATION

7

MODEL ESTIMATION AND INTERPRETATION

This chapter is intended to answer the third and the fourth sub-research questions of this research. Examining these sub-research questions may help to address the main research question of this study which is *"To what extent do the preferences of on-demand motorbike taxi-users differ when they have to make trade-offs between travel time and safety as consumers and as citizens?"*. Discrete choice models were applied to derive the values and a discussion is subsequently conducted on the outcomes of this research. To clarify the model estimation results, first, section 7.1 briefly recaps the MNL model specifications used for each experiment. Then, in section 7.2 the MNL model estimation results for three experiments are clarified. Section 7.3 presents the effect of socio-demographic characteristics in the model. Section 7.4 provides explanations for the consumer-citizen duality when safety and travel time trade-offs are made. Section 7.5 presents a discussion of the model and of policy implications. Lastly, section 7.6 provides a conclusion.

7.1 MNL Model Specification

As mentioned earlier in chapter 2, the multinomial logit model is known as the simplest and most widely used discrete choice model which allows for a straightforward interpretation of the marginal rate of substitution (Train, 2009). Although this model is suitable for gaining insight into the main attributes, nevertheless, it neglects the taste heterogeneity across individuals. This condition may affect a low model fit as it ignores the correlation between unobserved utilities of alternatives with similar attributes. This section presents the model specifications for the consumer experiment and the citizen experiment. All three experiments adopt similar attributes and attribute levels to ensure consistency in the empirical comparisons. The only difference is that an additional cost variable was added in the first consumer experiment. This was done because the main characteristic of a *consumer experiment* is seen when individuals make their choice based on their after-tax income (Fuguitt and Wilcox, 1999; Mouter and Chorus, 2016). A detailed model specification for the three experiments is provided in table 7.1 below.

Table 7. 1 Model parameter specification for all experiments

	Classical consumer experiment	Consumer Experiment	Citizen Experiment
ASC_A	-	-	β_0 (alternative specific constant for speed limit 30 km per hour)
BETA_DT	β_1 (deaths)	β_1 (deaths)	β_1 (deaths)
BETA_IJ	β_2 (injuries)	β_2 (injuries)	β_2 (injuries)
BETA_TT	β_3 (time)	β_3 (time)	β_3 (time)
BETA_TC	$\beta_{4(cost)}$	-	-

This study expects a negative sign for travel time, death, injury in each experiment, which means that the increasing value for these attributes may result in a decreasing value for the respondent's utility of an alternative. Additionally, the negative sign is also expected to be derived in the classical consumer experiment, which is in accordance with the results from previous studies (Hess, Bierlaire & Pollak, 2005; Mouter et al., 2017). On a different note, the positive sign is expected to be found in the Alternative Specific Constant (ASC_A) for a speed limit regulation of 30 km per hour. As the reader may know, in a highly densely populated area like Jakarta, the average speed of an on-demand motorbike taxi is around 23,8 km per hour to 30,8 km per hour (Jakarta Transport Agency-BPTJ, 2017. Additionally, using this speed may prevent on-demand motorbike taxi-drivers from driving in a reckless manner. Following this condition, it is assumed that respondents will more familiar with the current speed of 30 km per hour and thus will show a positive attitude towards this alternative. The attributes defined in table 7.1 are then combined into the following utility functions which are implemented for the consumer and citizen experiments.

Classical Consumer Experiment

$$U(alt\_1) = BETA\_TT * time_1 + BETA\_DT * death_1 + BETA\_IJ * injury_1 + BETA\_TC * cost_1 \quad (1)$$

$$U(alt\_2) = BETA\_TT * time_2 + BETA\_DT * death_2 + BETA\_IJ * injury_2 + BETA\_TC * cost_2 \quad (2)$$

Consumer Experiment (no cost)

$$U(alt\_1) = BETA\_TT * time_1 + BETA\_DT * death_1 + BETA\_IJ * injury_1 \quad (3)$$

$$U(alt\_2) = BETA\_TT * time_2 + BETA\_DT * death_2 + BETA\_IJ * injury_2 \quad (4)$$

Citizen Experiment

$$U(policy\_1) = ASC\_A + BETA\_TT * time_1 + BETA\_DT * death_1 + BETA\_IJ * injury_1 \quad (5)$$

$$U(policy\_2) = BETA\_TT * time_2 + BETA\_DT * death_2 + BETA\_IJ * injury_2 \quad (6)$$

7.2 MNL Model Estimation Results

The results from MNL models are derived in this section. All models from each experiment were estimated using Bison Biogeme software which was developed by Bierlaire (2016).

7.2.1 Estimation Results

The results of the estimated models for each experiment are shown in table 7.2. In these results, all coefficients from the two consumer experiments obtained the expected signs and are statistically significant on a 95% confidence interval. This means that these values were obtained not by mere chance and that all attributes in the consumer experiments may affect the choice behavior of the on-demand motorbike taxi-user.

However, in the citizen experiment, it was identified that the travel time and ASC_A variable are not statistically significant. Additionally, the value of ASC_A displays a counterintuitive sign, meaning that the on-demand motorbike taxi-users – as citizens – reveal a negative attitude towards the speed limit regulation of 30 km per hour. Based on information from the expert interviews, the author expected that the on-demand motorbike taxi users show their preferences towards the speed limit alternative of 30 km per hour, since in a peak hour, the average speed of the on-demand motorbike taxi is around 23 km per hour to 30 km per hour. Taking into account the insignificance value and the counterintuitive sign, the ASC indicator was then omitted in citizen experiment. Although elaborating the alternative specific constants (ASCs) in the utility functions may improve the model fit and the explanatory power, however, it does not statistically define a better model. Thus, statistically speaking, the citizen preference in this research will be conducted without ASC

attribute. Table 7.2 presents the estimation results between the experiments using MNL model, including the citizen experiment without ASC.

Table 7. 2 The Estimation Results using basic MNL Model

Context	Experiment 1 - Classical Consumer Choice			Experiment 2 - Consumer Choice (No cost)			Experiment 3 - Citizen Experiment (ASC)			Experiment 3 - Citizen Experiment (No ASC)		
Number of respondents	232			240			180			180		
Number of observations	1856			1920			900			900		
Null Likelihood	-1286			-1331			-623.83			-623.83		
Final Likelihood	-1229			-1239			-570.96			-571.11		
Likelihood Ratio Test	115			183			105.752			105		
Rho Square	0.045			0.069			0.085			0.085		
Adjusted Rho Square	0.042			0.067			0.078			0.08		
Estimates	**Value**	**Standard Error**	**Robust t-value**	**Value**	**Standard Error**	**Robust t-value**	**Value**	**Standard Error**	**Robust t-value**	**Value**	**Standard Error**	**Robust t-value**
ASC_A							-0.138	-0.138	**0.57**			
βdeath	-0.098	0.017	**-5.79****	-0.156	0.013	**-12.49****	-0.272	0.0324	**-8.39****	-0.264	0.028	**-9.06****
βinjuries	-0.007	0.003	**-2.25****	-0.008	0.002	**-3.75****	-0.012	0.00386	**-2.99****	-0.012	0.004	**-3.04****
βtravel time	-0.017	0.002	**-6.82****	-0.013	0.002	**-6.88****	-0.01	0.0106	**-0.96**	-0.016	0.004	**-4.01****
βtravel cost	-0.00030	0.00004	**-7.4****									

*** significant on a 95% confidence level*

The robust t-value of death and travel time attributes in each experiment mostly exhibit a high value, meaning that these parameters were estimated with a higher accuracy. The travel time parameter in the first consumer experiment is -0.017 which indicates that when travel time increases by 1 minute, utility will decrease by 0.017 utilities. Accordingly, the travel cost value also exhibits a statistically significant sign with value of -0,0003, if it is converted to 1 euro[6]; this value reveals that when transport costs increases by 1 euro, utility will decrease by 0.003 utilities. On the other hand, the mean parameter value of -0.098 in the death parameter indicates a utility contribution of -0.098 for each increase in 1 fatalities.

Accordingly, the mean parameter of injury is -0.017 which reveals a utility contribution of -0.017 for each increase in 1 injuries. In comparison with the fatalities attribute, the injuries attribute signifies a lower value for all experiments, meaning that individuals, whether they are in a consumer role or a citizen role, prefer to avoid the fatalities impact than to avoid the injuries impact. This result is in accordance with the study by Niroomands & Jenkins (2016).

As presented in table 7.2, the adjusted Rho Squares for the first consumer experiment (classical consumer), the second consumer experiment and the citizen experiments are 0.042, 0.67 and 0.08, which actually implies a low model fit. These values explain the level of uncertainty that could be reduced by the model. For example, in the citizen experiment, the adjusted rho square of 0.08 denotes that this model is able to decrease the uncertainty level by approximately 8% compared to the model with all zeros. It should not be neglected that a low value of adjusted rho square in the consumer and citizen experiments represents that the model's ability to predict is still arguable. However, it is important to note that the main focus of this research is not for prediction model but more for social scientific testing. Following that, obtaining a lower value of adjusted rho square

[6]*Current exchange rate of 1 EUR equal to 16926 IDR*

will not be a problem on the grounds that all attributes in each experiment are highly significant, therefore these attributes can be used to measure the trade-offs of the users.

7.2.2 The Utility Contributions of the Attributes

The importance of the attribute values to the utility of an alternative could be explored further by using utility contribution. Utility contribution is calculated from the value of each attribute multiplied by the range in the attribute levels (range between maximum and minimum attribute levels). The utility contribution calculated is shown in table 7.3 below.

Table 7. 3 The Utility Contribution

Estimates	Attribute Levels		Values			Utility Contribution		
	Min	Max	Consumer Exp 1	Consumer Exp 2	Citizen Exp	Consumer Exp 1	Consumer Exp 2	Citizen Exp
βdeaths	2	8	-0.0978	-0.156	-0.264	**-0.587**	**-0.936**	**-1.584**
βinjuries	12	48	-0.0066	-0.008	-0.012	**-0.236**	**-0.288**	**-0.421**
βtravel time	20	65	-0.0167	-0.012	-0.016	**-0.585**	**-0.437**	**-0.553**
βtravel cost	1500	3000	-0.0003			**-0.453**		

Looking further at the utility contribution value, the injuries variable is identified as the least important attribute found in every experiment, followed by travel time and travel cost (only in the first consumer experiment). On the other hand, the death variable is found as the highest value which contributes to the utility in all experiments. These results apparently concur with some studies that highlight safety as the most influential attribute in the utility contribution (Kyriakidis et al., 2015; Overakker, 2017). Moreover, as explained earlier in chapter six, safety is also perceived as the most influential aspect based on the respondents' standpoints.

7.2.3 Trade-offs between safety and travel time of on-demand motorbike taxi users

The significant attributes presented in the previous section are used to measure the marginal rate substitution for each experiment, with the following function

$$MRS_{x,y} = \frac{\frac{\partial V}{\partial x}}{\frac{\partial V}{\partial y}} = \frac{\beta x}{\beta y} \quad (7)$$

This function is implemented to test the marginal rate of substitution (MRS) between fatalities (deaths) and travel time, MRS between risk of injuries and travel time, VOT and VOSL (only for the classical consumer experiment). In this section, the author used the Delta formula[7] to estimate the standard errors for the marginal rate of substitution among attributes in this research. Daly, Hess, de Jong (2012) pinpoint that the simple simulation of standard error may not

[7] *Standard error* $\left(\frac{\beta 1}{\beta 2}\right) = \sqrt{\left(\frac{\beta 1}{\beta 2}\right)^2 \left(\frac{\omega 11}{\beta 1^2}\right) \left(\frac{\omega 22}{\beta 12^2}\right) - 2\left(\frac{\omega 12}{\beta 1 \beta 2}\right)}$ *(Daly et al., 2012)*
Where βk is the parameters, ω is the individual element

comprehensively cope the value of a coefficient ratio, considering this matter, obtaining standard error using Delta method will be used instead.

Table 7.4 pinpoints the marginal rates of substitution between safety and travel time in all experiments.

Table 7. 4 Marginal Rates of Substitution of The On-demand Motorbike Taxi Users

Marginal Rate Substitution	Experiment 1 - Classical Consumer Choice			Experiment 2 - Consumer Choice (no cost)			Experiment 3 - Citizen Experiment		
	Value	Standard Error	t-value	Value	Standard Error	t-value	Value	Standard Error	t-value
βdeath/βtravel time	5.86	1.02	-5.27	12.48	1.02	-11.75	16.71	1.79	-9.49
βinjuries/βtravel time	0.39	0.22	5.01	0.64	0.22	1.87	0.74	0.36	0.92
βtravel time/βtravel cost	55.30	7.55	7.23	NA					
βdeath/βtravel cost	323.84	55.96	-5.77	NA					
βinjuries/βtravel cost	21.69	9.54	-2.17	NA					

significance of a 95% confidence interval ***significance on a 90% confidence interval***

The above table indicates that when individuals follow their viewpoint as consumers, the marginal rate of substitution is lower than when they follow their preference as citizen. The marginal rates of substitution of individuals in consumer role is found to be 5.86 minutes and 12.48 minutes of travel time gained to reduce the probability of 1 traffic casualty per year in the first and second consumer experiments respectively. When individuals act as citizens, the marginal rate of substitution is higher than as consumers, which is 16.71 minutes of travel time gained per reduction of 1 traffic fatality per year. The results of the marginal rates of substitution between fatalities and travel time in this research coincide with the earlier study of Mouter et al. (2017).

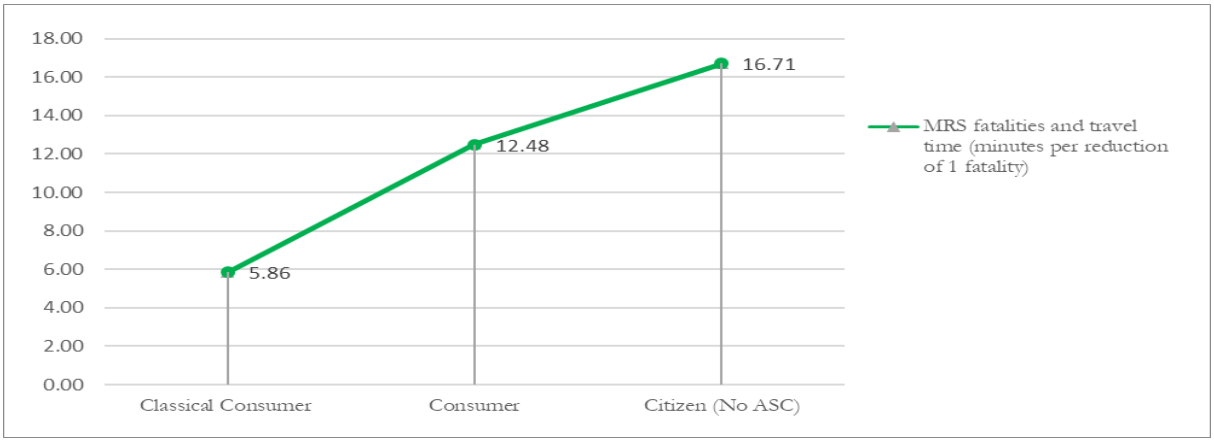


Figure 7. 1 The Comparison of trade-offs between fatalities and travel time in all experiments

The value of the marginal rate of substitution between fatalities and travel time of individuals who act as consumers is indeed smaller than that of individuals who emphasize their role as citizens. This study postulates that, as a consumer, an individual tends to choose the fastest option, while contrarily, an individual who has a preference as a citizen generally chooses the safest alternative. Additionally, it is interesting to note that the differences of the marginal rate of substitution are found to be larger between the classical consumer experiment and the citizen experiment than between the second consumer experiment and the citizen experiment. Looking at this result, the

author investigated several motivations that may trigger the higher differences of the marginal rate of substitution are found between the classical consumer preference and citizen preference.

First, the classical consumer experiment in this study presented the role of the individual as a rational optimizer consumer who driven by their intrinsic motivation to the extent they might not care about the travel time and safety impact unless they get the financial benefits by doing such things. Considering this matter, the first consumer experiment was tested using cost attribute to evoke the preferences of users as the self-interest consumer. As a rational optimizer, the on-demand motorbike users are reluctant to trade-off their safety with their travel time unless they could obtain monetary incentives (*crowding out effect*). This may motivate the reason why users in the first consumer experiment are only willing to have lower travel time gains to reduce one fatality per year and thus the higher differences of MRS between consumer and citizen preferences are found (crowding out theory). This condition is in accordance with study by Berglund & Matti (2006) which mentioned that the monetary incentives/interventions may crowd out the intrinsic motives of the self-interest consumer.

Second, the smaller differences of MRS between the second consumer experiment and the citizen experiment may exemplify the individuals as ethical consumers who have a moral responsibility to the public's point of view without neglecting their self-benefit. Therefore, they were willing to undertake a longer travel time in order to reduce the risks towards traffic accident per year.

7.2.4 Trade-offs between injuries and travel time

The injuries variable was also incorporated in this research, as the motorbike mode contributes most to road traffic accidents that cause a higher number of injuries and fatalities recorded per year. However, as identified earlier in section 7.2.2, in this survey the injuries variable had the least importance in affecting the decision-making process of an individual. Compared to the marginal rate of substitution in the fatalities parameter, the on-demand motorbike taxi-users – who act either as consumers or citizens – are only willing to have less than 1 minute of travel time gained to reduce the probability of 1 traffic injuries per year

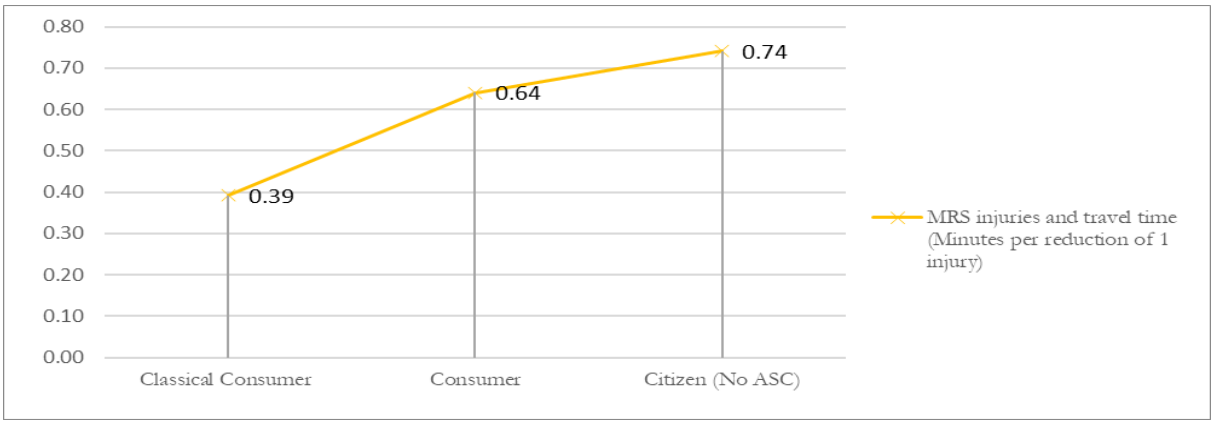


Figure 7. 2 The Comparison of trade-offs between injuries and travel time in all experiments

Additionally, as shown in table 7.4, differences in the marginal rate of substitution between injuries and travel time when individuals are in their roles as a consumer and a citizen are also small. The lower variance in the marginal rate of substitution may be due to the smaller importance of the injuries variable and in the citizen experiment the marginal rate of substitution between injuries

and travel time is not statistically significant, so these attributes could not entirely be used to measure the trade-offs.

7.2.5 Marginal rate of substitution between travel time and travel cost

Other interesting findings that can be derived from this research are the calculation of the marginal rate of substitution between travel time and travel cost (*Value of Time*), and also deaths and travel cost (*Value of Statistical Life*) in consumer experiment 1. The marginal rate of substitution between travel time and travel cost denotes a VOT with a range of IDR 23.000 per hour to IDR 33,000 hour (equal to 1.41 - 2.01 EUR per hour). This value is obtained from the following equation.

$$VOT^{8} = \frac{\frac{\partial V}{\partial TT}}{\frac{\partial V}{\partial TC}} = \frac{\beta TT}{\beta TC} \quad (8)$$

To validate the estimation of VOT derived from this study, the author compared the estimated VOT with the current VOT of public transport and private vehicles in Jakarta mainly during peak hour. The comparison of the VOT is presented in table 7.5.

Table 7. 5 The Value of Time Comparison

Estimation	IDR/HOUR	EUR/HOUR
VOT calculation	**23,225 - 33,178**	1.41 - 2.01
VOT private vehicle - motorcycle in Indonesia (Ambarwati,2017)	**32,876**	1.99
VOT PT in Indonesia (Ambarwati,2017)	**23,448**	1.42

Based on the above table, it could be concluded that the VOT result obtained from this research is in accordance with the current VOT in Indonesia. Additionally, based on this finding, it is apparent that, compared to other formal public transport in Jakarta, the transport costs of using this type of mode for short distance trips (less than 15 km) are relatively high compared to other formal public transport in Jakarta. However, many people still prefer to use the on-demand motorbike taxi because it offers the fastest travel time option during the daily traffic jams that occur in Jakarta.

7.2.6 Marginal rate of substitution between fatalities/injuries and travel cost

The Value of Statistical Life (VOSL) is the last marginal rate of substitution which was conducted in the first consumer experiment (classical consumer). The average willingness to pay for each user per trip to reduce fatalities/ injuries when using on-demand motorbike taxi was derived from study by Niroomands & Jenkins (2016) with the following equation (9) and (10).

$$VRR_f = VOSL = \frac{\beta DT}{\beta TC} \; x \; \frac{AAVKM}{fatalities\ per\ year^{9}} \quad (9)$$

$$VRR_{ij} = V_{Injuries} = \frac{\beta IJ}{\beta TC} \; x \; \frac{AAVKM}{injuries\ per\ year^{10}} \quad (10)$$

[8] *The unit of travel time will be changed from minutes to hours; Beta Travel time multiplied by 60. Additionally, the unit of travel cost will be changed from IDR/km to IDR (with assumption the average distances of on-demand motorbike taxi are from 7 km to 10 km; cost/distance attribute will be multiplied by the average distance range*

[9] *The probability of fatalities which involved motorbike taxi service is 6 fatalities per year*

[10] *The probability of injuries which involved motorbike taxi service is 36 injuries per year*

In this research, the author defined the average annual vehicle kilometers traveled (AAVKM) is generated by multiplying the total distance when traveled using on-demand motorbike taxi by year[11]. Based on the above, the willingness to pay of the on-demand motorbike taxi-users as consumers are around IDR 280.662 (EUR 17) for a reduction in 1 fatality per year and IDR 3.132 (EUR 0.19) for a reduction of 1 injury per year.

7.2.7 Comparison Statistical Difference

In this section, a t-ratio test was implemented to examine to what extent the attributes estimates differ significantly between the experiments on a 95% confidence interval. The author used the equation 9 to calculate the differences of the marginal rate of substitution between consumer experiment and citizen experiment, as follow

$$\textbf{t-ratio between } MRS_A \textbf{ and } MRS_B = \frac{MRSA - MRSB}{\sqrt{SE\_MRSA^2 + SE\_MRSB^2}} \quad (11)$$

Where MRS_A is the marginal rate of substitution *(between fatalities/injuries and travel time)* for the consumer experiment and MRS_B is the marginal rate of substitution *(between fatalities/injuries and travel time)* for the citizen experiment. Following to the above equation, table 7.6 shows the statistically significant differences between the marginal rates of substitution among the attributes in the consumer experiment compared with the citizen experiment.

Table 7. 6 Comparison t-ratio test of the marginal rates of substitution values

	Classical Consumer vs Citizen	**Consumer vs Citizen**
	t-ratio	**t-ratio**
βdeath/βtravel time	-5.26**	-2.05**
βinjuries/βtravel time	-0.89	-0.25

As shown in the above table, the direction of the marginal rate of substitution differences between fatalities and travel time in consumer and citizen experiments are as expected, and significant. In the context adopted in this research, this result implies that the individuals in their role as classical consumers prefer to have lower travel time gains to reduce the risk of 1 fatality per year than the individuals who act as citizens (t-ratio = -5,26). Meanwhile, the difference of marginal rate of substitution between the second consumer experiment and the citizen experiment shows a lower t-ratio in comparison to the classical consumer (t-ratio = -2.05). This value implies that individual in their role as the classical consumer tends to maximize their self-benefits, in comparison to the individuals who act as the consumer in the second experiment.

The differences in the marginal rate of substitution between injuries and travel time however are not significant for the classical consumer with citizen experiment (t-ratio = -0.89); and the same holds for the second consumer experiment and citizen experiment as well (t-ratio = -0.25).

7.3 The Effect of Personal Characteristics

Every individual has different preferences when assuming their role as a consumer or as a citizen. The aim of this section is to examine to what extent different socio-demographic characteristics

[11] *The author used the assumption that average distance traveled using motorbike taxi is around 10 km per trip and assume that the users use this mean of transport only during weekday (260 days) for work-based trip and home-based trip (2 trips in a day). Subsequently, the AAVKM per user is 10 km x 260 days x 2 or equal to 5200 km traveled per year*

have an effect on factors that influence an on-demand user's preferences as a consumer and as a citizen. The personal characteristics were obtained from general questions in the questionnaire. The interaction between personal characteristics and the main attributes were checked one by one to identify significant parameters. Table 7.7 highlights the interaction between defined personal characteristics and the main attributes in each experiment.

Table 7. 7 Interaction Effect of Personal Characteristics

	Classical Consumer Experiment				Consumer Experiment			Citizen Experiment		
	Travel Time	Deaths (Fatalities)	Injuries	Travel Cost	Travel Time	Deaths (Fatalities)	Injuries	Travel Time	Deaths (Fatalities)	Injuries
Gender										
Male	0.0024	**0.0681***	0.0095	-0.000118	0.00374	0.01	0.0022	**-0.0236***	0.02	-0.007
Female	**-0.00821***	-0.0558	**-0.012***	0.000091	**-0.00682****	-0.0279	-0.0035	0.013	**-0.0772***	0.0016
Frequency										
Frequent User	0.00551	**0.105****	**0.0113***	**-0.000196****	**-0.00663****	**-0.0482***	-0.0018	0.000	**-0.116***	0.0033
Non Frequent User	-0.0081	-0.1090	0.0134	0.0002	0.0048	0.03	0.0001	-0.008	-0.025	-0.0068
Income										
low income	-0.013	**-0.221****	**-0.0323****	0.00023	-0.000917	0.032	-0.0080	0.00358	-0.001	0.0125
middle income	0.0005	0.0369	0.0025	-0.00003	-0.00455	**-0.0497***	0.0011	0.0003	0.0229	0.0061
high income	0.0085	**0.151****	**0.0206****	-0.00004	0.00208	-0.049	0.0027	-0.0094	**-0.147****	**-0.0205****

significance of a 95% confidence interval ****significance on a 90% confidence interval***

As can be seen from the above table, only a few interaction parameters were found to be significant in all experiments. For example, female users in the first consumer experiment and the second consumer experiment indicate their high sensitivity to faster travel time, as represented from their negative values of -0.008 and -0.006 respectively. Contrarily, in the citizen experiment, female users are more sensitive to the risk of traffic casualties as shown by the negative parameter of -0.077. In view of these values, it can be inferred that individuals may perceive different preferences as consumers and citizens when using the on-demand motorbike taxi service. Other highlights that could be obtained from the interaction effect between personal characteristics and the main attributes are described as follows:

a. Frequent users in their role as consumers tend to consider not only the risk of fatalities but also the travel cost (in the first consumer experiment) and travel time (in the second consumer experiment). However, when they indicate their preferences as citizens, they are consistently concerned about reducing the risk of traffic casualties, and thus choose the safest option.
b. Low-income households in the first consumer experiment are more sensitive to reducing exposure to traffic fatalities and injuries. These conditions are represented by the negative values of -0.221 and -0.032 respectively.
c. In the first consumer experiment, high-income earners tend to be less sensitive towards the probability of fatal accidents. On the contrary, in the citizen experiment, high-income households are known to be more concerned about reducing the risk of accidents when they use an on-demand motorbike taxi.

7.4 Explanations of the Consumer – Citizen Duality in the safety and travel time trade-offs

Earlier it was stipulated that individuals will have different values as consumers and as citizens when making trade-offs between safety and travel time. This section specifically explores the line

of reasoning behind consumer-citizen duality when respondents make safety and travel time trade-offs. Although the consumer-citizen duality concept was developed in various transport contexts, only limited studies have been conducted to empirically scrutinize the motivation of individuals in making safety and travel time trade-offs (Mouter and Chorus, 2016; Mouter et al., 2017).

First, motivations generated from responses in the questionnaires are classified into several behavioral contexts. Statements obtained from respondents are then coded based on the relevant behavior context. As a result, it was recorded that only 492 respondents out of 652 respondents were found to give further motivations in terms of how they value they trade-offs. In the results, the 492 statements were classified into the following behavioral contexts:

a. Respondents behave according to their cognitive intuition in order to reduce uncertainty towards travel times
b. Respondents perceive safety as being more important than travel time in general
c. Respondents give high valuation to safety and they perceive that the government has a duty to prioritize the safety of users

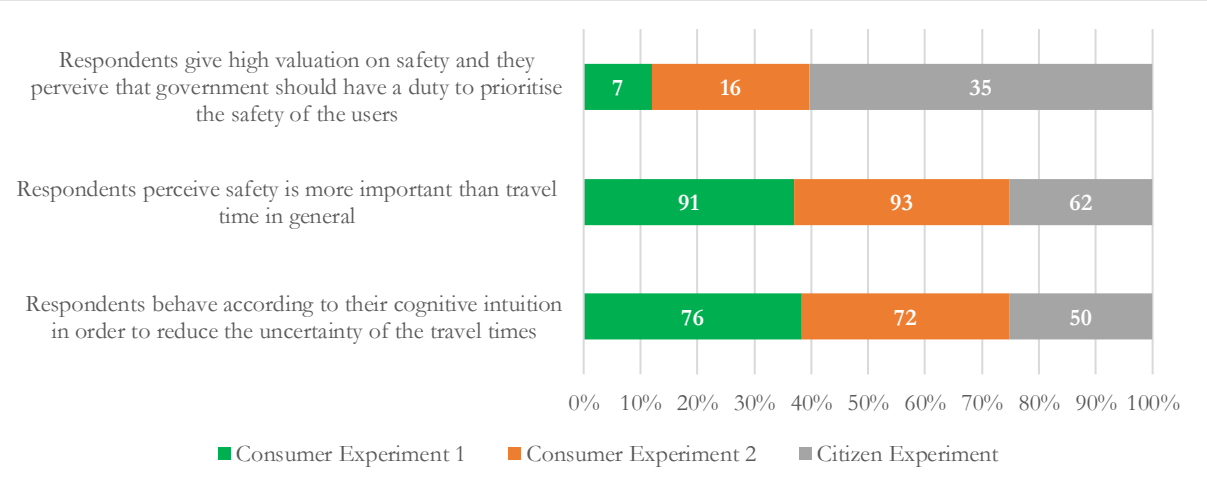


Figure 7. 3 Number of responses per behavioral contexts

It is apparent that most respondents in the consumer experiments consider using the on-demand motorbike taxi because it offers a faster travel time, and they have already considered the risk of exposure to traffic accidents by using their cognitive intuition to control the risk, for example, by informing the on-demand motorbike taxi-drivers to ride at a certain speed or perhaps to drive in a safe manner. In the following paragraph, some examples of the first motivation for explaining the respondents' trade-offs are presented.

> *"Travel time is the most important attribute of the online motorbike taxi platform, since I need to go to one point to another in a timely manner"*
>
> *"I use the online motorbike taxi service because I expect to arrive at my destination faster than with any other public transport mode"*
>
> *"During the rush-hours of traffic, it will be more efficient to use the motorbike taxi"*

"Safety aspects could be controlled by the online motorbike taxi-driver by conducting regular maintenance in respect of motorbike conditions. In addition, the passenger may also order the driver to drive safely and obey the traffic regulations"

"During peak hours, many commuters consider fastest travel time as the most important attribute in choosing between public transport options. That is why many consumers choose to use the online motorbike taxi rather than a car taxi or a bus. But safety aspects also need to be considered. Looking at some choice tasks mentioned previously, if the difference in time is only 10-15 minutes between A and B drivers and a higher level of safety is found when using driver A, thus I will choose driver A instead. But if the difference is 30 minutes and the safety level is lower, I might consider a driver with a shorter travel time (if the gap is high) even though the level of safety is also low."

The first motivation explains how an individual will behave according to their cognitive intuition in order to reduce uncertainty regarding travel times when using an on-demand motorbike taxi. This statement pinpoints that individuals – as consumers – view their choices based on their self-interest to maximize their personal benefits. This condition is reflected by the higher number of responses obtained from the consumer experiments. Furthermore, the first explanation also emphasizes that users – as consumers – may perceive the risk of traffic accidents using an on-demand motorbike taxi as more controllable because they believe that all drivers of on-demand motorbike taxis are more reliable than conventional motorbike taxis. Additionally, this type of mode has a tracking system that can be monitored by the service provider if drivers drive in a reckless manner.

The second behavioral context describes the motivation of an individual who considers safety as more important than travel time when they act in their role as a citizen. The majority of respondents mentioned that using an on-demand motorbike taxi is relatively flexible in compared to other public transport in Jakarta. Therefore, they could easily manage the travel time if they want to have a faster travel time, for example by telling the driver the shortest route or by not travelling during peak hours. Additionally, they believe that the risk of accidents will cause more costs than the risk of being late. Therefore, knowing this condition, users as citizens might be more sensitive to safety than to travel time. Some examples showing the motives of respondents in this context are described as follows.

"It's best if I can have safe trip with a shorter travel time. However, if I have to choose, I don't mind a longer travel time compare to suffering an accident"

"Better safe than quick. Safety is first, and then time and then price"

"For me, working as I do in such a big city like Jakarta, time is my main priority, but from all other views, safety is the most important of all aspects. So, this is our task: how to manage our time and execute safety first for myself and for other users of online transport"

"Even in a hurry people need to pay attention to the safety of other road users and try to minimize the probability of involvement in traffic accidents"

"I prefer online motorcycle taxi-drivers who can drive safely and can read road situations (traffic jam or not), because it must be admitted that the safety aspects of online motorcycle taxi services are still lacking. The majority of online motorcycle taxi-users still focus on the aspect of speed (arrived at the destination), but I prefer the safety aspect instead."

In the previous section, it was mentioned that the safety attribute shows a higher utility contribution compared to other attributes in each experiment. Following that, the third motivation is explained to describe the motivation of the on-demand motorbike taxi-users who have higher valuation of safety. Additionally, the third statement points out the importance of the distribution of responsibility between the supply side (government and the supply provider) and the demand side (the users). The following paragraph describes some motivations provided by respondents who give a higher value to safety.

> *"The ability to drive safely with a punctual travel time is needed to overcome the severe traffic congestion that happens in Jakarta. Therefore the government and the motorbike taxi provider need to consider safety certainty, not only for passengers but also for drivers"*

> *"Enforcement regulations on safety management aspects to improve the service to online motorbike taxi-users"*

> *" I prefer safety mostly because I need my whole living body upon arriving at my destination rather ending up as dead meat"*

> *"By using a motorcycle taxi I could have faster travel time than with a car taxi. However, it could be neglected that accidents involving two-wheeled vehicles are more common in Jakarta, therefore government regulations are needed to guarantee the operation of an online motorbike taxi service"*

> *"The safety aspect is very important. However, if the travel time has to be longer due to prioritizing safety, it is a matter that must be considered by the driver and the online motorbike taxi-user. Because driving safely involves not only drivers and passengers, but everyone who is on the road. If life is at risk, then time is not an important matter."*

> *"I recommend that the government selects the route with the fewest traffic deaths. It's better to arrive late at your destination than to arrive on time in your grave. What do a few minutes of travel time matter compared with a human life?"*

Looking at these statements, evidently, the majority of respondents believe that the government should play a role in ensuring the safety of road-users by providing a legal framework which regulates the operation of on-demand motorbike taxi services. This behavioral context was developed based on the assumption that an individual will assign more values towards safety than travel time when individuals adopt their role as citizens rather than as consumers. Furthermore, the third motivation also verifies the findings of Mouter et al. (2017) and Lindhjem et al. (2011) who emphasize that individuals as consumers may be reluctant to reveal their high willingness to pay to improve road safety, however, when they act as citizens, they will show a positive attitude by putting higher values on safety.

7.5 Research Implications

First, the fact that a significant difference between safety and travel time trade-offs was found in the consumer and citizen experiments, can be inferred as one of the empirical evidence in proofing the concept of consumer-citizen duality. This research also corroborates the statement from

Mouter et al. (2017a, 2017b) that individuals as the classical consumer will prefer to have smaller travel time gains in reducing the risk to involve in one traffic casualty per year than individuals who put their role as the citizen. Obtaining a similar result with this study may create the generalizable results to other city and other transport modes. Accordingly, this could have a more significant effect on the development of transport research.

Looking further at the behavioral contexts and also at the results of each of the experiments, it can be identified that most of the on-demand motorbike taxi-users, as citizens, value safety most in comparison with other attributes. Nevertheless, as consumers, on-demand motorbike taxi-users tend to demand faster travel times. The results obtained from the previous section can be used to deduce some insights that may have further implications for future policies in dealing with the on-demand motorbike taxi services in Jakarta. More specifically, in designing a legal umbrella that could provide a liability protection not only for the users but also for the drivers. Recently, the Indonesia Constitutional Court (MK) has refused to legalize as on-demand motorbike taxis as a means of public transportation. They vigorously argued that motorbike taxis were not a safe vehicle for public transportation in term of its safety. However, the Constitutional Court denoted that online motorbikes can still run even though they are not regulated in the Law No 22/2009 concerning about Road Traffic and Transportation. Besides, the Ministry of Transportation also pointed out that Jakarta Government has a higher power to manage the operation of this means of transport, through, 1) setting minimum tariff for peak and off-peak hour, 2) setting the speed limit regulation during off-peak and peak hour.

The preferences of the on-demand motorbike taxi users as consumers and citizens can be essential to helping the Jakarta policymakers to examine these policies. For example, the results which obtained from the classical consumer experiment can be interpreted as an input for the Jakarta policymakers and the service providers in determining the suitable tariff for both users, drivers and also the service providers. Meanwhile, the results which marked in the citizen experiment, can be an essential input in determining the operational procedure for the on-demand motorbike taxi service, for example in relate to the speed limit regulation and also the maximum jobs that should be done by the on-demand motorbike taxi drivers within a day.

The findings derived from the citizen experiment highlight the marginal rate of substitution for 16 minutes of travel time gained to reduce the risk of one casualty per year. Also, it was found that most of the on-demand motorbike taxi-users are more sensitive to the fatalities attribute, as represented by a high negative value obtained for this attribute. It means that users, in their role as citizens, are likely to prefer the safest option. Additionally, compared to the 50 km per hour speed limit regulation, the 30 km per hour speed limit regulation could give a higher reduction in the number of fatalities per year if the marginal rate of substitution of the citizen preference is incorporated. If the 30 km per hour speed limit regulation is adopted for the on-demand motorbike taxi service, several justifications and a set of criteria need to be elaborated by the government and by on-demand motorbike taxi service providers.

In the previous section, some respondents also revealed their behavioral motivation in responding to the safety and travel time trade-offs using on-demand motorbike taxi. Some of them showed their trust to the drivers by using their cognitive intuition and thus expect for faster travel using this means of transport. They stated *that "Safety aspects could be controlled by the online motorbike taxi-driver by conducting regular maintenance in respect of motorbike conditions. In addition, the passenger may also order*

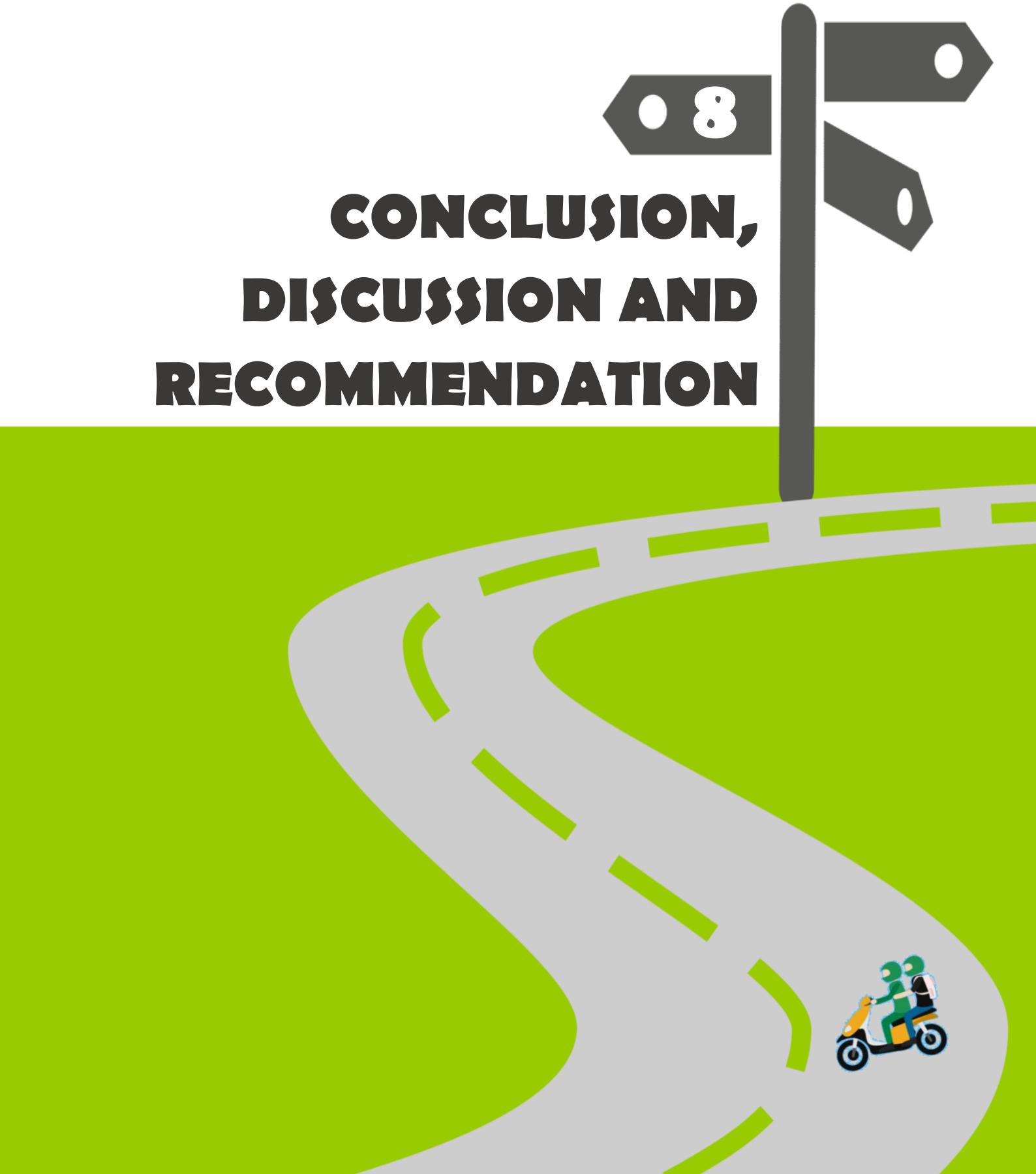
the driver to drive safely and obey the traffic regulations". Considering this matter, it is really important for the service providers in setting a proper safety procedure for the drivers, including the maximum jobs that need to be done per day, as some drivers complained about a strict requirement for the maximum jobs and found to be overworked which may harm the safety of the passengers.

7.6 Conclusion

This chapter recapped the results of the model estimation which were examined by means of MNL model estimation. This chapter also investigated the motivation of on-demand motorbike taxi-users in making trade-offs, particularly in clarifying the initial findings which stipulated that – as consumers – users always choose the fastest option, and conversely, – as citizens – users always choose the safest option. Results of the basic MNL model showed that all attributes in the consumer experiments (deaths, injuries, travel time and travel cost) were statistically significant. As a side note: in the citizen experiment, ASC and travel time were found to be insignificant on a 95% confidence level. The insignificant value of the travel time attribute suggests that the travel time attribute was not reliable for use to measure the trade-offs. Following this condition, the ASC attribute was omitted in the citizen experiment as it denoted statistically insignificant value. The results showed all attributes were statistically significant and all the signs were as expected. Subsequently, the marginal rates of substitution in the consumer experiments ranged between 5.86 minutes and 12.48 minutes of travel time gained to reduce the probability of 1 traffic casualty in the first and second consumer experiment respectively. And, as citizens, the marginal rate of substitution is higher than as consumers, which is 16.71 minutes of travel time gained to reduce 1 fatality. Personal characteristics was also included in the MNL model as an interaction effect to test its influence on the attributes. The results found that only a few interaction parameters were significant in all experiments, meaning that the interaction effect does not play a role. To sum up, the results from this chapter answered the main research question that there is indeed a discrepancy between the preferences of an individual as a consumer and as a citizen. The models in this research reinforce the fact that consumers tend to choose the faster option and, on the other hand, citizens tend to prefer the safer option. In the light of these results, the research implication should be deemed as a fundamental building block in establishing the concept of consumer and citizen preferences to future development of transport sector.

8

CONCLUSION, DISCUSSION AND RECOMMENDATION



8

CONCLUSIONS, DISCUSSION AND RECOMMENDATIONS

Prior to this research, most studies only elaborated on the consumer perspective when examining a user's preference towards the level of service of public transport. This research argued that incorporating citizen preferences can be a better proxy for policy-makers in evaluating the public transport development project based on societal viewpoints. Based on this assumption, this research was initiated to evaluate the emerging phenomenon of on-demand motorbike taxi services, notably in Jakarta. This means of transport is undoubtedly known as one of the most used modes among all other public transport modes in Jakarta. Yet it has also become a controversial subject because of its (poor) safety record. Knowing this issue, the results of this study give further insights for policy-makers and for service providers for improving on-demand motorbike taxi services, based not only on the consumer's standpoint but also on the citizen's point of view. To highlight all findings, firstly, this chapter outlines the main conclusion of this study by addressing the sub-research questions as defined in this research. Secondly, section 8.2 presents a discussion of the results, followed by section 8.3 which describes recommendations that could be implemented to improve the empirical findings of this study for future research and for society.

8.1 Conclusions

The objective of this research was ***"to gain more insight into capturing the duality preferences of on-demand motorbike users as consumers and as citizens, when they make a trade-off between safety aspect and travel time"*** . By using this objective, the results presented can be used for future research, particularly in exploring consumer-citizen duality in respect of other transport modes. These preferences were evoked through the design of the discrete choice experiment. To summarize the process of this research, the sub-objective are addressed sequentially in the following section.

8.1.1 Definition of the Consumer – Citizen Duality

This section answers the first sub-goal for this study, as follows:

Sub-objective 1: Determine the suitable definition of consumer and citizen preferences in assessing safety and travel time trade-offs of on-demand motorbike taxi-users

To answer the first sub-objective, a literature review was conducted to define the core conceptualization of consumer and citizen preferences which are suitable for this research. Apparently, in the transport sector field, there has been an on-going debate in distinguishing the role of individuals as consumers and as citizens. Considering various sources which examined the

definition of consumer-citizen preferences, the author in this research derived the definition of consumer and citizen preferences from two different contexts. *First*, the role of an individual in the market-based context gave clarity to the author in defining the role of an individual ***as a self-interest consumer who will reveal their interest based on the allocation of their after-tax income***. The author inferred that this definition may suitable to depict the needs of the on-demand motorbike taxi users who desire to gain their self-benefits (i.e. faster, cheaper and safer) when they use on-demand motorbike taxi as their daily transport mode. Following from this definition, the consumer experiment was classified into two type of experiments, i.e. the classical consumer experiment that involves the cost attributes to measure the respondent's willingness to pay and a second consumer experiment that was designed without the cost attribute, thereby allowing the respondents to focus only on choosing between two alternatives which differ in terms of travel time and safety.

Second, the definition of the citizen preference in this study was derived from a political context. The author realized that incorporating the citizen perspectives might be suitable to investigate on how the users perceive the trade-offs between safety and travel time when using on-demand motorbike taxi. Including the citizen preference in this research may help the government and the service providers in determining the well-targeted policies to maintain the operation of this means of transport without neglecting the users' needs and also the drivers' interests. Considering this matter, the author referred the definition of the citizen as the individual who put their interest on the society's viewpoints and thus, they will reveal their choices based on previously collected tax by the government

These two context helped the author to understand the critical importance in distinguishing the consumer-citizen preferences based on the budget spending, notably in term of private budget and public budget spending.

8.1.2 Selection of the Relevant Factors to Measure On-Demand Motorbike Taxi Preferences in relation to Safety and Travel time Trade-offs

This section addressed the second sub-objective which states as follow

Sub-objective 2: Identify the relevant attribute and alternative to measure trade-offs between safety and travel time of on-demand motorbike taxi-users

The relevant factors to measure trade-offs between safety and travel time of on-demand motorbike taxi-users were derived through a study of the literature, grey literature and also by expert interviews to verify the validity of the factor used to design the experimental survey. Examining the attributes from various approaches was essential to ensure the relevancy of the selected attributes in respect of the aim of the research. Based on this process, three main attributes used for this research were travel time, fatalities and injuries. Fatalities and travel time have been used by several studies to measure safety and travel time trade-offs. On a different note: compared to the other three attributes, fewer studies were found that used injuries in the experiments. Injuries were incorporated in this research as the author found 87% of accidents which involve the motorbike mode result in injuries. Additionally, as mentioned earlier, the travel cost was also incorporated in the first consumer experiment to measure the respondents' willingness to pay in trade-off with

their safety and travel time. Furthermore, the additional transport cost attribute was incorporated to follow the concept of classical consumers in a market-based setting.

After selecting the relevant attributes, the author defined the characteristics of the attributes to determine the appropriate values. The characteristics of each attribute rely strongly on the context of this study which involves on-demand motorbike taxi services. A grey literature search took place and experts interviews were conducted to verify the realism of the values for each attribute.

8.1.3 The Results of the Trade-Offs in the Consumer and Citizen Experiments

This section addresses the third sub-objective which is as follows:

Sub-objective 3: Investigate the trade-offs between attributes found in the consumer-based experiment and the citizen-based experiment

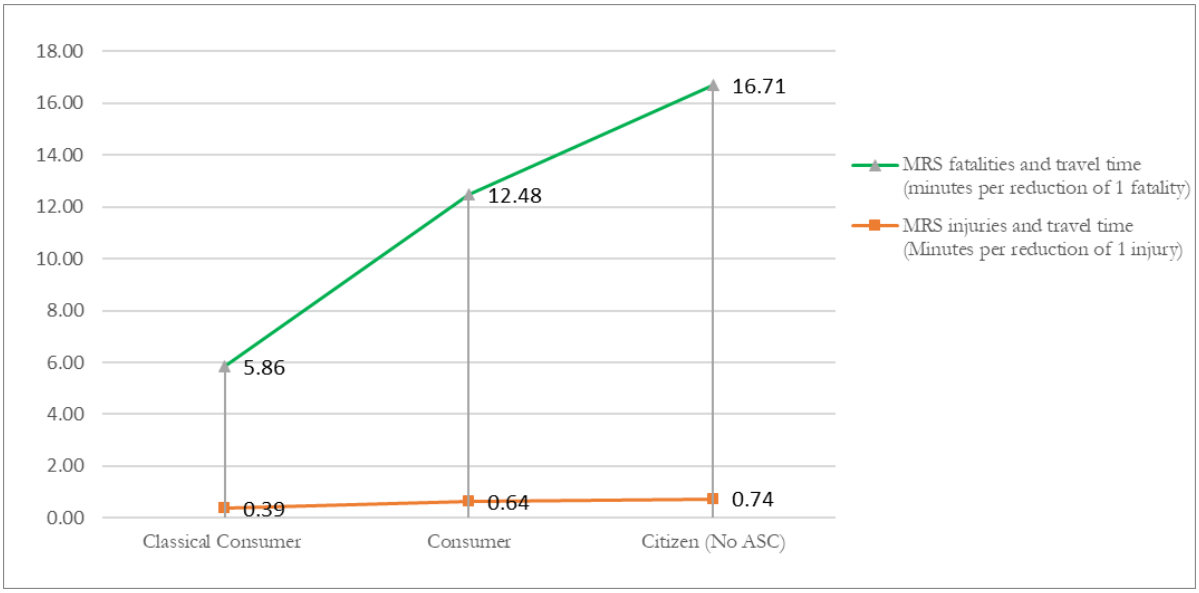
The results from each experiment display information about a certain attribute that significantly influences the preferences of an individual in their roles as a consumer and as a citizen when trade-offs are made. Based on the model estimation conducted in chapter seven, all attributes in the consumer experiments exhibit a highly significant value and expected signs. However, in the citizen experiment, the travel time and ASC_A variable show statistically insignificant result and the value of ASC_A reveals a counterintuitive sign, meaning that on-demand motorbike taxi-users – as citizens – reveal a negative attitude towards the 30 km per hour speed limit regulation. Therefore the ASC indicator was then omitted from citizen experiment 3. Excluding the ASC from the citizen experiment caused all attributes in the citizen experiment to be statistically significant on a 95% confidence level. Consequently, the trade-offs between safety attribute and travel time for all experiments could be derived. Figure 8.1 illustrates the comparison of the marginal rate of substitution between fatalities and travel time, and also between injuries and travel time, for all experiments. Other interesting findings from these results relate to the impact of fatalities and injuries on users' preferences. The fatalities attribute shows a higher negative value than the injuries attribute in all experiments. This means that most respondents probably prefer to avoid fatalities rather than to avoid injuries, whether they are acting as a citizen or as a consumer. The values of fatalities and injuries were also found to be higher in the citizen experiment (-0.264 and -0.012 respectively), which strengthen the hypothesis that individuals as citizens tend to choose the safest option with the lowest probability of involvement in a traffic accident. The summary of the model estimation and the illustration of the marginal rate of substitution are presented in table 8.2 and figure 8.1 respectively.

Table 8. 1 The model estimate results for all three experiments.

Marginal Rate Substitution	Experiment 1 - Classical Consumer Choice			Experiment 2 - Consumer Choice (no cost)			Experiment 3 - Citizen Experiment		
	Value	Standard Error	t-value	Value	Standard Error	t-value	Value	Standard Error	t-value
βdeath/βtravel time	5.86	1.02	-5.27**	12.48	1.02	-11.75**	16.71	1.79	-9.49**
βinjuries/βtravel time	0.39	0.22	5.01**	0.64	0.22	1.87**	0.74	0.36	0.92**
βtravel time/βtravel cost	55.30	7.55	7.23**	NA					
βdeath/βtravel cost	323.84	55.96	-5.77**	NA					
βinjuries/βtravel cost	21.69	9.54	-2.17**	NA					

significance of a 95% confidence interval

Figure 8. 1 The Comparison of Marginal Rate of Substitution for All Experiments



Looking at the above table, the message conveyed is that individuals who put the role of a consumer have different marginal rates of substitution in comparison with individuals who put the role of a citizen. As a consumer, an individual is only willing to accept additional travel time of about 5,86 to 12,48 minutes per reduction of 1 casualties on the road per year. Conversely, an individual who acts as a citizen is willing to have a longer additional travel time to avoid the risk of a road traffic accident.

Compared to the marginal rate of substitution between fatalities and travel time, the variance in the marginal rate of substitution between injuries and travel time is found to be smaller. This may be due to the lesser importance of the injuries variable. Furthermore, the marginal rate of substitution between injuries and travel time is not statistically significant in the citizen experiment, therefore the injuries attribute is not entirely reliable for comparing the trade-off between consumers and citizens.

8.2 Discussions

This section discusses several aspects of the research. Firstly, a comparison of this research with findings that were identified in the literature was described in section 8.2.1. Secondly, aspects that are related to the survey questionnaire are discussed in section 8.2.2. Thirdly, the discussion of the model used is clarified in section 8.2.3. Fourthly, development in society that might affect the results of this research are presented in section 8.2.4. Fifthly, discussion about driver's controllability that might be useful to evoke the users' preferences will be presented in section 8.2.5. Lastly, possible limitations that may hinder the process of this research are discussed in section 8.2.6.

8.2.1 Comparison of the research with the literature

To the best of the author's knowledge, apparently no study has been established to specifically scrutinize the consumer-citizen duality of on-demand motorbike taxi-users when making trade-offs between safety and travel time. Most studies of on-demand motorbike taxis were conducted only to analyze users' preferences as consumers. Therefore, in order to make a scientific comparison, this research only elaborated on several attributes that influence the preferences of

motorbike taxi-users as consumers. The comparison focused on comparing the sign values of attributes, as presented in the table 8.2.

Table 8. 2 Comparison of the results from this research with results found in literature

Attributes	Literature Reviews			This Research	
	Author	Sign Value	Methods & Ouputs	Sign Value	Methods
Fatalities	Niroomands & Jenkins (2016) Case: Cars/Motorbikes	(-) 0.131	Stated Choice Experiment, DCM: MNL model Output: VOSL	(-) 0.098, (-) 0.156, (-) 0.27	Stated Choice Experiment, DCM: MNL model Output: VOSL. MRS (travel time and fatalities)
Injuries	Niroomands & Jenkins (2016) Case: Cars/Motorbikes	(-) 0.083	Stated Choice Experiment, DCM: MNL model Output: WTP	(-) 0.007, (-) 0.002, (-) 0.012	Stated Choice Experiment, DCM: MNL model MRS (travel time and injuries)
Cost per distance	Abdillah & Octavia (2016) Case: On-demand Motorbike Taxi	(-) 0.013	Method: Conjoint Analysis Output: WTP	(-) 0.0003	Stated Choice Experiment, DCM: MNL model Output: VOSL. VOT
Travel Time	Abdillah & Octavia (2016) Case: On-demand Motorbike Taxi	(-) 0.069	Method: Conjoint Analysis Output: WTP	(-) 0.017, (-) 0.013, (-) 0.016	Stated Choice Experiment, DCM: MNL model Output: VOT, MRS (travel time and injuries), MRS (travel time and fatalities)
Value of Time	Ambarwati (2017) Case: Motorbike	1.99 Eur	Method: Mode Choice Approach, Income Approach Tools: Omnitrans Output: VOT	1.41 Eur – 2.01 Eur	Stated Choice Experiment, DCM: MNL model Output: VOT,
Marginal Rate of Substitution)	Mouter et al., (2017a, 2017b) Case: Car drivers	Consumer : 2.71; 2.53; 5.43 (minutes per reduction of 1 fatalities) Citizen: 10.73; 16.31 (minutes per reduction of 1 fatalities)	Stated Choice Experiment, DCM: MNL model. ML Model	Consumer : 5.86; 12.48 (minutes per reduction of 1 fatalities) Citizen : 16,71 (minutes per reduction of 1 fatalities)	Stated Choice Experiment, DCM: MNL model. ML Model

The above table shows that the results obtained from this research are realistic enough to be compared with other studies. Additionally, the results summarized in the table is probably suitable for verifying the findings with individuals in their role as consumers.

Furthermore, as observed in table 8.2, the differences of trade-offs between consumer and citizen found among on-demand motorbike taxi-users are smaller than the results found for car drivers found in the Mouter et al. (2017) study. This result may prove the stigma that on-demand motorbike taxi-users, unlike car drivers, are not entirely able to control their safety. Additionally,

the fact that the differences in the marginal rate of substitution are found between consumer and citizen preferences, therefore this research may become empirical evidence in proofing the duality concept of consumer and citizen preference. Following this condition, future studies of other modes or another area may also be conducted in order to give nuances on transport research developments. On the hand, different from a study by Mouter et al. (2017), the author in this research incorporated injuries as another attribute for the safety aspect. However, the results showed that the difference of marginal substitution between consumer and citizen when making injuries and travel time trade-offs are significantly indistinguishable (t-ratio = -0.89/ -0.25).

8.2.2 The Survey Design

An efficient design was adopted in this research to generate an experimental design. In order to conduct the efficient design, priors need to be determined for each attribute. Priors are essential for ensuring the robustness of the experimental design (Walker et al., 2016). In view of this, a pilot study was first conducted. The pilot study was conducted for all experiments and 15 respondents for each experiment were found to be eligible to participate in the pilot study. During the pilot study, the author realized that the respondents were not assigned randomly to the experiments, the author determined respondents for each experiment based on the question that asked the respondent about the most influencing factor on the use of an on-demand motorbike taxi. By using this logic, bias responses from respondents may occur. Therefore, in the final survey, the author used a randomized system to assign respondents to experiments. All data obtained in the pilot study were analyzed using a simple MNL model to generate the priors. All attributes except cost revealed an expected value, as the cost attribute shows an counterintuitive sign. Referring to the study of Blange (2016), the prior was adjusted to a slightly negative value, i.e. -0.00014. The final surveys resulted in 16 choice situations for each experiment. However, applying sixteen choice tasks to one respondent might cause the respondent fatigue and bias responses would be more likely to happen. Therefore, blocking is implemented in each experiment. An additional cost attribute that was added in the first consumer experiment may have increased the intricacy of the choice experiment as alternatives in the first consumer experiment were unlabeled.

Furthermore, in the citizen experiment, two speed limit policies were defined as labelled alternatives, where policy A represented the 30 km per hour speed limit regulation and policy B denoted the 50 km per hour speed limit regulation. Following from these, the combination attributes in policy A should represent the situation of a safer trip with a longer travel time and *vice versa* for the consumer experiment (faster but riskier). These constraints were implemented in the Ngene to generate a suitable experimental design. However, irrational combinations were still found in this experiment, for example, a faster travel time and higher fatalities combination in policy A. Hence, to ensure the realism of the choice-set alternative, six scenarios were not presented to the respondents.

8.2.3 The Model Used in the Experiment

This research only used the MNL model to estimate the attributes' main effects and also the interaction effects with personal characteristics. Although this model is fairly simple and easy to use, it does assume homogeneity in preferences. Moreover, panel effects were not taken into account in the model. Therefore, the possible solution for improving heterogeneity in the MNL model is through the interaction effect. Undoubtedly, the heterogeneity limitation found in MNL could be partly removed by incorporating a number of socioeconomic variables; however, the

assumption of independence of irrelevant alternatives (IIA) of the error term is still violated by the model. Therefore, the MNL results could be biased and unreliable (Hensher et al., 2005). To address this issue, the mixed logit model can be considered for an advance solution, as it could overcome the main limitations of the MNL model. First, differences in preferences can be captured with an MNL model, which means that mixed logit does not inappropriately postulate the IIA property. Second, an MNL model is suitable for capturing taste heterogeneity. Finally, the panel effects of the model can be included (Train, 2003). Another model that could be considered for taking heterogeneity into account is the latent class model. Future research could incorporate a latent class model to investigate the segmentation of on-demand motorbike taxi-users when an individual assumes the role of a consumer and when an individual assumes the role of a citizen, by elaborating on household preferences and consumer-citizen preferences.

8.2.4 The Impacts of Trend and Developments in Society on the results

As the reader may know, the Jakarta Government is currently still assessing the legalization of on-demand motorbike taxi services. The current planning to include on-demand motorbike taxis as a form of public transport in Jakarta will take place by means of revising Law No. 22/2009. When motorbike taxis have been accommodated by law, there is a real possibility that the Jakarta Government will set minimum standards for safety, for example, a maximum passenger capacity, a maximum speed limit, and a minimum rate per distance. When these conditions are applied in the operation of an on-demand motorbike taxi service, the preferences of users may also change. For example, if the speed limit regulation is implemented, some respondents, as consumers, may prefer to choose another form of public transport that can offer a faster travel time than this means of transport.

8.2.5 The Driver's controllability

Many users of on-demand motorbike taxi understand that this means of transport have contributed to higher number of traffic accidents in Jakarta road. However, they still persist to use this service because it provides a more reliable travel time in comparison to other formal public transport in Jakarta. Additionally, individuals who have a role as consumers tend to maximize their self-benefit during commuting , in this case, some of the users demand for faster travel time or either cheaper transport cost. They realized that probability to involve in traffic accidents that may lead to fatalities and injuries is higher, however some users believe that the traffic accidents could be highly controlled by both drivers and user. This condition was strengthen by the behavioral responses which shown by the respondents. This research classified several behavioral response that may provide a clarity in explaining the motivation of the on-demand motorbike taxi user in making a safety and travel trade-offs.

One of the behavioral response that may suitable to be discussed in the context of driver's controllability is on how respondents behave according to their cognitive intuition in order to reduce uncertainty towards travel times. As earlier mentioned, some respondents confessed that on-demand motorbike taxi service has been accommodating the needs of Jakarta commuters by providing a flexible order system. Such that, the users can easily schedule their time to travel and they could easily communicate their concerns if the drivers are found to drive recklessly.

8.2.6 Research Limitations

Stated Preference Data Collection method

This research used a choice experiment to collect data on a stated preference. This means that respondents were requested to make a choice between two hypothetical situations. The hypothetical choice situations in this case are not actually available in real life, and it is questionable whether the respondents would actually choose the same hypothetical choice situation in real life.

Only two alternative choices presented

As mentioned earlier, this study only applied two hypothetical choice situations in each experiment. In fact, the respondents could opt for other alternatives, for example, in the consumer experiments, the respondents might opt to choose another alternative rather than using an on-demand motorbike taxi. Similarly, in the citizen experiment, only two hypothetical alternatives were presented to respondents. In reality, respondents might choose for the current speed used by drivers on a daily basis.

Capturing unobserved factors

Furthermore, context attributes were not elaborated on in this research. Context attributes can be represented from characteristics of the preference or choice task itself, and from environmental features. Possible context factors that can be used are, for example, weather conditions (rain or no rain), individual characteristics (in a hurry or not in a hurry). Individuals might choose a different transport mode either as a consumer or as a citizen when it is raining, as the risk of an accident during rain is higher on a motorbike taxi in comparison with a car taxi or another form of public transport in Indonesia.

8.3 Recommendations

This section contains an overview of proposed recommendations for further scientific research and for society and also address the fourth sub-objective for this research, as follow

> ***Sub-objective 4: Provide recommendations for future research on consumer-citizen duality and for policymakers in creating suitable policy for managing on-demand motorbike taxis based on users' preferences.***

8.3.1 Scientific Research

The following is a list of recommendations that could address some limitations of the findings in this study:

a. **Elaborate unobserved alternatives and attributes in the stated choice experiments**

As mentioned earlier, this research only adopted two alternatives for each experiment. Therefore future research can be conducted by incorporating the status quo that could represent the current condition of on-demand motorbike taxi-users when using this means of transport. The author believes that including other alternatives in each experiment could result in a new dimension for safety and travel value.

b. **Expand research with context factors for each respondent to measure intra-person variations**

This research clearly used only one conditional context for the respondents. In reality, the same respondents could make different choices in a different context. Knowing this condition, the

author recommends some context situations that could be included in each experiment. First, the author believes that adding the weather condition context could increase the marginal rate of substitution between fatalities and travel time. Other elements that may also suitable for implementation in this case are elaborating on the characteristics of driver behavior (normal speed, slow speed and fast speed) in the consumer experiments. Adding this context could test the sensitivity of individuals in their consumer role and in the role of citizen towards two defined speed limit regulations. Additionally, the availability of safety equipment provided by drivers can also be used as a context to measure trade-offs as a consumer and as a citizen.

c. Ensure the Heterogeneity of preferences

This research was intended to gain insight into investigating the preferences of on-demand motorbike taxi-users in their roles as consumers and citizens. On this basis, therefore, this research focused on examining the main effects of the attributes by applying a basic MNL model. The author recommends that future research could be conducted using latent class analysis to elicit the specific preferences of users when in their role as consumers and in their role as citizens. By adopting the latent class analysis in the models, further insight could be derived by assessing household characteristics with consumer and citizen preferences

d. Investigate whether this research is also applicable to other modes and other cities similar to Jakarta

This research proposed to test the findings of a previous study by Mouter et al. (2017) that investigated consumer and citizen duality when making safety and travel time trade-offs. The results obtained from this research clearly displayed similar results to those of the study by Mouter et al. (2017), which highlighted that individuals as citizens would rather have higher travel time gains to reduce the risk of fatal accidents than individuals as consumers. It is worth noting that this research mainly focused on targeting on-demand motorbike taxi-users as respondents, while the study by Mouter et al. (2017) focused on examining the trade-offs of car drivers in Netherlands. Given this context, therefore, future studies of other modes, for example, public transport users, could also be conducted. Subsequently, this could have a more significant effect on the development of transport research.

8.3.2 Society

Recommendations for Providers of On-Demand Motorbike Taxi Services

Regarding the marginal rate of substitution between death and cost per distance, as well as the marginal rate of substitution between travel time and cost per distance in the first consumer experiment, it was found that users were willing to incur an additional cost (per distance) for IDR 55 (0.004 euro per km) to reduce 1 minute of their travel time. Moreover, if on-demand motorbike taxi service providers could improve their level of service by reducing the risk of 1 fatality in a year, users would be willing to spend a total of IDR 280.662 (EUR 17) for a reduction in 1 fatality per year and a total cost of IDR 3.132 (EUR 0.19) for a reduction in 1 injury per year

This result may give further insight for service providers in setting their minimum tariff per distance, as many drivers protest that the tariff per distance is too low and they demand improvements in the additional tariff per distance. Currently, the average tariff per distance for an on-demand motorbike taxi is around IDR 2,300 per km, which is equal to 0.15 euro per km (ADO

interviews, 2018). However, drivers want to force the government and service providers to increase the tariff to IDR 3,000 per km (equal to 0.20 euro per km), based on the willingness to pay of users in their role as consumers. Increasing the tariff to IDR 3,000 per km is not deemed feasible for either the service providers or the users.

In addition, it is a fact that most users place more value on the safety attribute than on travel time. Therefore, it is necessary that the providers of on-demand motorbike taxi services in Indonesia improve safety quality and ensure that all drivers operate the motorbikes in a safe manner. Furthermore, to monitor the driving behavior of on-demand motorbike taxi drivers, the on-demand motorbike companies (such as Grab, Gojek) should ensure that all drivers use a telematics system on their motorbikes. Using a telematics system will enable on-demand motorbike taxi companies to track speeding incidents and subsequently improve the safety of their drivers and thus also of the users.

Additionally, based on the response from several respondents, they reveal that they trust the driving skills of the on-demand motorbike taxi service, and therefore, they still prefer this means of transport, even though the probability to involve in traffic accidents might be higher using this means of transport. Knowing this condition, it is essential for the service providers in setting a proper safety procedure for the drivers, including the maximum jobs that need to be done per day, as some drivers complained about a strict requirement for the maximum jobs and found to be overworked which may harm the safety of the passengers.

Recommendations for the Jakarta Government

The results of this research provides some insight for the Jakarta Government in relation to assessing the current operation of on-demand motorbike taxis as an informal means of public transport in Jakarta. More importantly, the marginal rates of substitution obtained from this research may provide the Jakarta Government with information for setting a minimum standard for the operation of this means of transport once the legal framework for on-demand motorbike taxis had been finalized. There are some recommendations that could be taken into account for the Jakarta Government to improve the current operation of this means of transport.

1) Setting a minimum tariff for all service providers

One of the controversial limelight that still becomes the hot topic by the on-demand motorbike taxi drivers is about their protest in increasing the minimum tariff (per km). Due to a healthy market competition between the service providers, the minimum tariff (per km) of this means of transport currently was set to IDR 2300 per km (ADO interview, 2018). However, this tariff does not give any satisfaction to the drivers, and they still insist on increasing the minimum tariff per km to IDR 3000 – IDR 4000 per km (EUR 0.2 per km-EUR 0.25 per km), and to demand the legalization process of the on-demand motorbike taxi, so that the service providers will not monopolize the price. To cope with this issue, this research gives a fresh perspective in investigating the preferences of on-demand motorbike taxi as a consumer of mobility and as a citizen of mobility. The output from this research suggested that the users who act as the rational optimizer consumers are still willing to accept the tariff adjustment with maximum additional cost per distance to IDR 325 per km, which resulted to maximum IDR 2500 per km (EUR 0.15 per km) as a suitable minimum tariff based on what consumers perceive. In a light of these conditions, the Jakarta Government may become a bridge for the service providers and the drivers in mediating and setting the reasonable

tariff without neglecting the drivers' welfare and the consumers' needs. Apart from the issue of minimum tariff negotiations between applicator companies and the drivers, however, the central government must provide certainty in addressing drivers' welfare issues in a ride-sharing business.

2) Defining maximum speed limits during peak and off-peak hours

Obtaining the results based on consumer and citizen experiments, it is found that most users with their role as ethical consumers and citizen put higher travel time gains to reduce to the probability to involve in 1 traffic accidents (which leads to fatality/injury) per year. Following that, setting the speed limit regulation of 30 km per hour has higher benefits for users, mainly in reducing the risk of fatalities per year based on a citizen's point of view. The speed limit regulation of 30 km per hour may also be suitable to be implemented during peak hours situation, as the average road speed in Jakarta during peak hour is around 23,8 km hour to 30, 8 km per hour. Nevertheless, if the speed limit regulation of 30 km per hour was to be regulated for on-demand motorbike taxi service, the government will also need to evaluate several justifications and a set of criteria, for example, justification regarding the traffic flow, the time of day for implementing the regulation, justification of road characteristics, and more importantly on how to monitor this proposed alternative during its implementation. As being said, the Jakarta government, therefore, needs to define relevant carrot and stick policies, incentives, and disincentives in establishing this proposed regulation.

The involvement of the Jakarta Government to re-evaluate the current operation of the on-demand motorbike taxi is evidently essential as this means of transport has been growing significantly within the past two years. Many downsides that need to be addressed for example, the oversupply condition, the drivers' welfare, safety related issues and legal umbrella to protect the drivers and also the users. Furthermore, the response of the behavioral motivation from the users highlight that majority of respondents believe that the government should play a role in ensuring the safety of road-users by providing a legal framework which regulates the operation of on-demand motorbike taxi services. This behavioral context was developed based on the assumption that an individual will assign more values towards safety than travel time when individuals adopt their role as citizens rather than as consumers. Furthermore, the third motivation also verifies the findings of Mouter et al. (2017) and Lindhjem et al. (2011) who emphasize that individuals as consumers may be reluctant to reveal their high willingness to pay to improve road safety, however, when they act as citizens, they will show a positive attitude by putting higher values on safety.

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A.1

NGENE SYNTAX - PILOT SURVEY

This appendix provides an overview of both the design and results of the pilot survey. Ngene was used to create a design for the discrete choice experiment and the resulting ten choice tasks per experiment.

Consumer Experiment with cost involved

```
design
;alts = alt1, alt2
;rows = 16
;orth= seq
;model:
U(alt1) = tc*A[1500,2000,2500,3000]+ tt*B[20,35,50,65]+ dt*C[2,4,6,8]+ ij*C[12,24,36,48]/
U(alt2) = tc*A+ tt*B+ dt*C+ ij*D
$
```

Consumer Experiment without involved

```
design
;alts = alt1, alt2
;rows = 16
;rows = 16
;orth= seq
;model:
U(alt1) = tt*A[20,35,50,65]+ dt*B[2,4,6,8]+ ij*C[12,24,36,48]/
U(alt2) = tt*A+ dt*B+ ij*C
$
```

Citizen Experiment

```
design
;alts = alt1, alt2
;rows = 16
;orth = seq
;require:
alt1.A > alt2.A,
alt1.B <= alt2.B,
alt1.C <= alt2.C
;model:
U(alt1) = tt*A[20,35,50,65]+ dt*B[2,4,6,8]+ ij*C[12,24,36,48]/
U(alt2) = tt*A[20,35,50,65]+ dt*B[2,4,6,8]+ ij*C[12,24,36,48]
$
```

A.2

CHOICE SITUATIONS – PILOT SURVEY

Consumer Experiment 1

Choice situation	Driver from company A				Driver from company B				Trivial
	alt1.cost	alt1.time	alt1.deaths	alt1.injuries	alt2.cost	alt2.time	alt2.deaths	alt2.injuries	
1	1500	20	2	12	1500	35	8	24	Trivial (Dominance)
2	2500	65	6	12	2000	20	4	48	
3	2000	50	8	12	1500	20	2	12	Trivial (Dominance)
4	2500	20	6	48	2000	65	4	12	
5	1500	20	8	36	3000	65	2	24	
6	2000	65	2	24	3000	65	8	48	Trivial (Dominance)
7	2500	50	4	24	3000	35	4	12	
8	1500	35	8	24	1500	50	6	48	
9	3000	65	8	48	1500	65	4	36	Trivial (Dominance)
10	2000	20	4	48	2500	20	8	36	Trivial (Dominance)
11	2500	35	2	48	2500	65	6	12	Trivial (Dominance)
12	1500	65	4	12	3000	20	4	48	
13	1500	65	2	36	3000	20	8	24	
14	2500	35	4	24	2000	50	6	36	
15	2000	35	6	36	3000	20	6	24	
16	3000	50	2	48	1500	50	8	12	

Consumer Experiment 2

Choice situation	Driver from company A			Driver from company B			Trivial
	alt1.time	alt1.deaths	alt1.injuries	alt2.time	alt2.deaths	alt2.injuries	
1	20	2	12	35	6	48	Trivial (Dominance)
2	65	6	12	50	2	48	
3	50	4	12	50	8	36	Trivial (Dominance)
4	35	8	12	50	6	24	
5	20	8	24	50	4	12	
6	65	4	24	20	2	12	Trivial (Dominance)
7	50	6	24	20	6	36	
8	35	2	24	20	4	48	
9	65	8	48	35	4	36	Trivial (Dominance)
10	20	4	48	65	2	36	
11	35	6	48	65	8	48	Trivial (Dominance)
12	50	2	48	35	8	12	
13	65	2	36	65	6	12	
14	20	6	36	20	8	24	
15	35	4	36	65	4	24	
16	50	8	36	35	2	24	

Citizen Experiment

Choice situation	Driver from company A			Driver from company B			Trivial
	alt1.time	alt1.deaths	alt1.injuries	alt2.time	alt2.deaths	alt2.injuries	
1	20	2	12	35	2	24	Trivial (Dominance)
2	65	4	24	50	6	24	
3	50	4	12	20	6	36	
4	35	8	12	65	4	24	Trivial (Dominance)
5	20	8	24	65	8	48	Trivial (Dominance)
6	65	6	12	50	8	36	
7	50	8	36	35	6	48	
8	35	2	24	20	4	48	
9	65	8	48	65	2	36	Trivial (Dominance)
10	20	4	48	20	2	12	Trivial (Dominance)
11	35	6	48	50	4	12	Trivial (Dominance)
12	50	2	48	35	4	36	
13	65	2	36	50	2	48	
14	20	6	36	65	6	12	Trivial (Dominance)
15	35	4	36	20	8	24	
16	50	6	24	35	8	12	

A.3

MODEL SPECIFICATION - PILOT SURVEY

Consumer Experiment 1

```
//Survey result 19-MAY-2018-2018
//Consumer experiment no cost
// Logit modeldRI
// Two alternatives: Driver from company A, Driver from company B
// SP data

[ModelDescription]
"Example of a logit model for a transportation mode choice with 2 alternatives:"
"Alt1"
"Alt2"

[Choice]
Choice

[Beta]
// Name Value  LowerBound UpperBound  status (0=variable, 1=fixed)
BETA_TT              0              -1000.0    1000.0       0
BETA_TC              0              -1000.0    1000.0       0
BETA_DT              0              -1000.0    1000.0       0
BETA_IJ              0              -1000.0    1000.0       0


[Utilities]
// Id Name  Avail  linear-in-parameter expression (beta1*x1 + beta2*x2 + ... )
 1    Alt1   one              BETA_TT * time_A   + BETA_TC * cost_A          +
BETA_DT * deaths_A          + BETA_IJ * injuries_A
 2    Alt2       one          BETA_TT * time_B   + BETA_TC * cost_B          +
BETA_DT * deaths_B+ BETA_IJ * injuries_B

[Expressions]
one              = 1

[Model]
$MNL
```

A.3

MODEL SPECIFICATION - PILOT SURVEY

Consumer Experiment 2

/Survey result 19-MAY-2018-2018
//Consumer experiment no cost

[Choice]
Choice

[Beta]
// Name Value LowerBound UpperBound status (0=variable, 1=fixed)
BETA_TT 0 -1000.0 1000.0 0
BETA_DT 0 -1000.0 1000.0 0
BETA_IJ 0 -1000.0 1000.0 0

[Utilities]
// Id Name Avail linear-in-parameter expression (beta1*x1 + beta2*x2 + ...)
1 Alt1 one BETA_TT * time_A + BETA_DT * deaths_A + BETA_IJ * injuries_A
2 Alt2 one BETA_TT * time_B + BETA_DT * deaths_B + BETA_IJ * injuries_B

[Expressions]
one = 1

[Model]
$MNL

A.3

MODEL SPECIFICATION - PILOT SURVEY

Citizen Experiment

```
//Survey result 19-MAY-2018-2018
//Citizen experiment

[Choice]
Choice

[Beta]
// Name Value  LowerBound UpperBound  status (0=variable, 1=fixed)
ASC_A                   0         -1000.0     1000.0         0
BETA_TT                 0         -1000.0     1000.0         0
BETA_DT                 0         -1000.0     1000.0         0
BETA_IJ                 0         -1000.0     1000.0         0

[Utilities]
// Id Name  Avail  linear-in-parameter expression (beta1*x1 + beta2*x2 + ... )
  1     Policy1              one                 ASC_A * one + BETA_TT * time_A             +
BETA_DT * deaths_A          + BETA_IJ * injuries_A
  2     Policy2    one              BETA_TT * time_B    + BETA_DT * deaths_B        + BETA_IJ
* injuries_B

[Expressions]
one                 = 1

[Model]
$MNL
```

B1

NGENE SYNTAX - FINAL SURVEY

Consumer Experiment 1

```
design
;alts = alt1, alt2
;rows = 16
;eff = (mnl,d)
;con
;block = 2
;model:
U(alt1) = tc[-0.000144]*A[1500,2000,2500,3000]+ tt[-0.0537]*B[20,35,50,65]+ dt[-0.410]*C[2,4,6,8]+ ij[-0.0714]*C[12,24,36,48]/
U(alt2) = tc*A+ tt*B+ dt*C+ ij*D

$
```

Consumer Experiment 2

```
design
;alts = alt1, alt2
;rows = 16
;eff = (mnl,d)
;con
;block = 2
;model:
U(alt1) = tt[-0.0106]*A[20,35,50,65]+ dt[-0.289]*B[2,4,6,8]+ ij[-0.0267]*C[12,24,36,48]/
U(alt2) = tt*A+ dt*B+ ij*C
$
```

Citizen Experiment

```
design
;alts = alt1, alt2
;rows = 16
;orth = seq
;require:
alt1.A > alt2.A,
alt1.B <= alt2.B,
alt1.C <= alt2.C
;model:
U(alt1) = tt*A[20,35,50,65]+ dt*B[2,4,6,8]+ ij*C[12,24,36,48]/
U(alt2) = tt*A[20,35,50,65]+ dt*B[2,4,6,8]+ ij*C[12,24,36,48]
$
```

B.2

CHOICE SITUATION – FINAL SURVEY

Consumer Experiment 1

Choice situation	alt1.a	alt1.b	alt1.c	alt1.d	alt2.a	alt2.b	alt2.c	alt2.d	Block
1	1500	65	2	36	3000	20	8	24	1
2	1500	20	8	36	3000	65	2	24	1
3	2500	20	6	48	2000	65	4	12	1
4	3000	20	8	24	1500	65	2	36	1
5	2000	35	6	36	2500	35	4	12	2
6	3000	50	8	12	2500	50	6	36	2
7	3000	65	2	24	1500	20	8	36	2
8	2500	50	4	48	2000	35	6	24	2
9	2000	35	6	24	1500	50	2	48	2
10	2500	35	4	24	2000	50	6	36	1
11	2500	65	6	12	2000	20	4	48	1
12	1500	50	8	12	3000	35	2	48	2
13	1500	65	4	12	3000	20	4	48	1
14	3000	50	2	48	1500	35	8	12	1
15	2000	35	4	36	2500	50	8	24	2
16	2000	20	2	48	2500	65	6	12	2

alt1.a	Cost_A
alt1.b	Travel time_A
alt1.c	Fatalities_A
alt1.d	Non fatalities_A
alt2.a	Cost_B
alt2.b	Travel time_B
alt2.c	Fatalities_B
alt2.d	Non fatalities_B

B.2

CHOICE SITUATION – FINAL SURVEY

Consumer Experiment 2

Choice Sets

Choice situation	alt1.a	alt1.b	alt1.c	alt2.a	alt2.b	alt2.c	Block
1	20	8	12	35	2	24	2
2	50	6	36	65	2	48	2
3	50	8	24	35	2	24	2
4	35	8	36	50	8	24	2
5	20	4	48	65	6	12	1
6	35	2	24	50	6	36	1
7	35	2	36	20	8	12	2
8	65	2	48	50	8	36	2
9	20	6	12	65	4	48	1
10	65	4	48	20	6	12	1
11	50	2	24	35	8	36	2
12	65	6	12	20	6	48	1
13	35	4	24	50	2	36	2
14	50	8	36	35	4	24	1
15	20	4	48	65	4	12	1
16	65	6	12	20	4	48	1

alt1.a	Cost_A
alt1.b	Death_A
alt1.c	Injuries_A
alt2.a	Cost_B
alt2.b	Death_B
alt2.c	Injuries_B

B.2

CHOICE SITUATION – FINAL SURVEY

Citizen Experiment

Choice situation	alt1.a	alt1.b	alt1.c	alt2.a	alt2.b	alt2.c	Block	Remarks
1	65	6	36	50	2	48	1	
2	20	8	48	65	6	24	2	Not realistic, travel time A > travel time B
3	35	4	24	20	6	36	2	
4	20	8	12	65	4	36	2	Not realistic, travel time A > travel time B
5	50	6	36	35	8	12	2	
6	50	6	36	20	6	24	2	
7	20	8	48	65	2	12	1	Not realistic, travel time A > travel time B
8	35	4	24	20	8	48	2	
9	35	8	12	50	4	24	1	Not realistic, travel time A > travel time B
10	65	2	12	35	4	24	2	
11	50	2	48	50	2	12	1	Not realistic, travel time A > travel time B
12	50	2	48	35	8	48	1	
13	35	4	36	20	8	12	1	
14	65	4	24	50	6	36	1	
15	65	2	12	35	2	48	1	
16	20	6	24	65	4	36	2	Not realistic, travel time A > travel time B

alt1.a	Cost_A
alt1.b	Death_A
alt1.c	Injuries_A
alt2.a	Cost_B
alt2.b	Death_B
alt2.c	Injuries_B

C.1

FINAL QUESTIONNAIRE

THE CLASSICAL CONSUMER EXPERIMENT

(EXAMPLE QUESTION IN CHOICE SET)

Scrutinizing the preference of on-demand motorbike taxi user towards safety and travel time trade-off in Jakarta

Stated Preference Experiment

Rizqi Luthfiana Khairu Nisa

MSc. Transport, Infrastructure and Logistics

SCRIPTING GUIDELINES IN RED -

INTRODUCTION SECTIONS

Dear Prospective Survey Participant,

My name is Rizqi Luthfiana Khairu Nisa, I am a master student of Transport, Infrastructure and Logistics at the Delft University of Technology. Currently, I am conducting a research study as part of my master degree requirements. This research study is conducted to investigate your preference in choosing two proposed alternatives when you trade off your travel time and safety in your daily trip using on-demand motorbike taxi service (for example Go-Ride, Grab-bike, etc). Ten choice questions will be given to examine your preferences in using this means of transport.

By agreeing to participate in the study, you will have a consent to include your responses in the data analysis of this study. Your participation in this research study is strictly voluntary, and you may choose not to participate without fear of penalty or any negative consequences. The results of this survey will not be shared with third parties and will only be used for the academic research.

The survey will take you approximately 5-10 minutes to complete. The survey asks you to identify your preference in choosing two proposed alternatives when you trade off your travel time and safety in your daily trip using on-demand motorbike taxi service (for example Go-Ride, Grab-bike, etc).

Participation in this study will give you a chance to draw a 50.000 IDR top up voucher to your on-demand motorbike taxi account. There will be 50 top-up vouchers are provided for the lucky draw, so don't miss your chance. Lastly, if you would like to know further information about this study, please contact me at rizqiluthfianakhairunisa@student.tudelft.nl

SCREENING QUESTIONS

A1 What is your age?
1: Under 18
2: 18 – 24 50
3: 25 – 3139 – 45
4: 32 – 38
5: 39 - 44
6: Above 45

A2 Have you ever used the on demand motorbike taxi service (*read Bahasa: Ojek online, not traditional ojek*) within a year?
SHOW SCREEN – STOP IF 2 IS CHOSEN
SINGLE CODE
1: Yes
2: No

A3 How often do you travel using the on demand motorbike taxi service?
SHOW SCREEN – CHECK THE CONSISTENCY WITH THE QUESTION A2
STOP IF 6 IS CHOSEN
SINGLE CODE
1: 7 of more times per week
2: 1 - 4 times per week
3: 1 - 4 times per month
4: 6 - 12 times per year
5: 1 - 5 times per year
6: Never

The eligible respondent is able to go to the next section

STATED CHOICE EXPERIMENT

D1 Consumer Experiment

The on-demand motorbike taxi is known as the most popular means of informal public transport in Jakarta. The rising popularity of the on-demand motorbike taxi in Jakarta happens because of its flexible characteristics, such as door-to-door service, ability to run through traffic and narrow alleys, and is always available 24 hours a day.

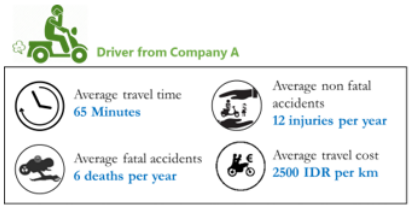
In this experiment, you will imagine having a trip using on-demand motorbike taxi service in Jakarta city during peak hours (6.30 - 9.30 or 16.00 - 19.00). Based on your experience using on-demand motorbike taxi, this research will examine your preferences and willingness to pay as a user when you make a trade-off between travel time and safety using this means of transport. You will be asked to choose between two alternatives of on-demand motorbike drivers from two different companies based on the following attributes

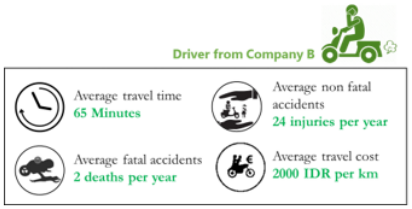
1. **Travel time of your trip**
2. **Travel cost of your trip**
3. **Number of fatal accidents (deaths per year) among passengers/drivers**
   The fatal accidents will lead to the serious injuries and deaths. Type of motorbike accidents can be crossing collisions with other modes, collisions while turning right/left, rear-end collision, collisions with roadside structures, and others
4. **Number of non-fatal accidents (injuries per year) among passengers/**
   The non-fatal accidents may result injuries or vehicle damage without injuries.

Other point that should be noted that the company A and company B are assumed to have the same number of drivers and trips. With these conditions, therefore we would like to find out to what extent your preferences consider the above attributes when making a safety and travel time using the on-demand motorbike taxi service.

Choice Set 1

Choose one of these options that suit your preferences best!





If you could only choose between the two driver options from different on-demand motorbike taxi provider, which driver would you choose

- ○ Driver from Company A
- ○ Driver from Company B

C.1

FINAL QUESTIONNAIRE

THE SECOND CONSUMER EXPERIMENT

(EXAMPLE QUESTION IN CHOICE SET)

Scrutinizing the preference of on-demand motorbike taxi user towards safety and travel time trade-off in Jakarta

Stated Preference Experiment

Rizqi Luthfiana Khairu Nisa

MSc. Transport, Infrastructure and Logistics

SCRIPTING GUIDELINES IN RED -

INTRODUCTION SECTIONS

Dear Prospective Survey Participant,

My name is Rizqi Luthfiana Khairu Nisa, I am a master student of Transport, Infrastructure and Logistics at the Delft University of Technology. Currently, I am conducting a research study as part of my master degree requirements. This research study is conducted to investigate your preference in choosing two proposed alternatives when you trade off your travel time and safety in your daily trip using on-demand motorbike taxi service (for example Go-Ride, Grab-bike, etc). Ten choice questions will be given to examine your preferences in using this means of transport.

By agreeing to participate in the study, you will have a consent to include your responses in the data analysis of this study. Your participation in this research study is strictly voluntary, and you may choose not to participate without fear of penalty or any negative consequences. The results of this survey will not be shared with third parties and will only be used for the academic research.

The survey will take you approximately 5-10 minutes to complete. The survey asks you to identify your preference in choosing two proposed alternatives when you trade off your travel time and safety in your daily trip using on-demand motorbike taxi service (for example Go-Ride, Grab-bike, etc).

Participation in this study will give you a chance to draw a 50.000 IDR top up voucher to your on-demand motorbike taxi account. There will be 50 top-up vouchers are provided for the lucky draw, so don't miss your chance. Lastly, if you would like to know further information about this study, please contact me at rizqiluthfianakhairunisa@student.tudelft.nl

SCREENING QUESTIONS

A1 What is your age?
1: Under 18
2: 18 – 24 50
3: 25 – 3139 – 45
4: 32 – 38
5: 39 - 44
6: Above 45

A2 Have you ever used the on demand motorbike taxi service (*read Bahasa: Ojek online, not traditional ojek*) within a year?
SHOW SCREEN – STOP IF 2 IS CHOSEN
SINGLE CODE
1: Yes
2: No

A3 How often do you travel using the on demand motorbike taxi service?
SHOW SCREEN – CHECK THE CONSISTENCY WITH THE QUESTION A2
STOP IF 6 IS CHOSEN
SINGLE CODE
1: 7 of more times per week
2: 1 - 4 times per week
3: 1 - 4 times per month
4: 6 - 12 times per year
5: 1 - 5 times per year
6: Never

The eligible respondent is able to go to the next section

STATED CHOICE EXPERIMENT

D2 Consumer Experiment (no cost involved)

The on-demand motorbike taxi is known as the most popular means of informal public transport in Jakarta. The rising popularity of the on-demand motorbike taxi in Jakarta happens because of its flexible characteristics, such as door-to-door service, ability to run through traffic and narrow alleys, and is always available 24 hours a day.

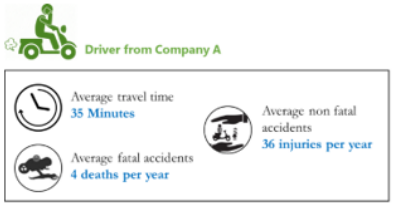
In this experiment, you will imagine having a trip using on-demand motorbike taxi service in Jakarta city during peak hours (6.30 - 9.30 or 16.00 - 19.00). Based on your experience using on-demand motorbike taxi, this research will examine your preferences and willingness to pay as a user when you make a trade-off between travel time and safety using this means of transport. You will be asked to choose between two alternatives of on-demand motorbike drivers from two different companies based on the following attributes

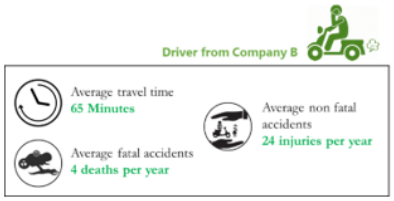
1. **Travel time of your trip**
2. **Number of fatal accidents (deaths per year) among passengers/drivers**
   The fatal accidents will lead to the serious injuries and deaths. Type of motorbike accidents can be crossing collisions with other modes, collisions while turning right/left, rear-end collision, collisions with roadside structures, and others
3. **Number of non-fatal accidents (injuries per year) among passengers/drivers**
   The non-fatal accidents may result injuries or vehicle damage without injuries.

Another point that should be noted that the company A and company B are assumed to have the same number of drivers and trips. With these conditions, therefore we would like to find out to what extent your preferences consider the above attributes when making a safety and travel time using the on-demand motorbike taxi service.

Choice Set 10

Choose one of these options that suit your preferences best!





If you could only choose between the two driver options from different on-demand motorbike taxi provider, which driver would you choose

- ○ Driver from Company A
- ○ Driver from Company B

C.1

FINAL QUESTIONNAIRE

CITIZEN EXPERIMENT

(EXAMPLE QUESTION IN CHOICE SET)

Scrutinizing the preference of on-demand motorbike taxi user towards safety and travel time trade-off in Jakarta

Stated Preference Experiment

Rizqi Luthfiana Khairu Nisa

MSc. Transport, Infrastructure and Logistics

SCRIPTING GUIDELINES IN RED -

INTRODUCTION SECTIONS

Dear Prospective Survey Participant,

My name is Rizqi Luthfiana Khairu Nisa, I am a master student of Transport, Infrastructure and Logistics at the Delft University of Technology. Currently, I am conducting a research study as part of my master degree requirements. This research study is conducted to investigate your preference in choosing two proposed alternatives when you trade off your travel time and safety in your daily trip using on-demand motorbike taxi service (for example Go-Ride, Grab-bike, etc). Ten choice questions will be given to examine your preferences in using this means of transport.

By agreeing to participate in the study, you will have a consent to include your responses in the data analysis of this study. Your participation in this research study is strictly voluntary, and you may choose not to participate without fear of penalty or any negative consequences. The results of this survey will not be shared with third parties and will only be used for the academic research.

The survey will take you approximately 5-10 minutes to complete. The survey asks you to identify your preference in choosing two proposed alternatives when you trade off your travel time and safety in your daily trip using on-demand motorbike taxi service (for example Go-Ride, Grab-bike, etc).

Participation in this study will give you a chance to draw a 50.000 IDR top up voucher to your on-demand motorbike taxi account. There will be 50 top-up vouchers are provided for the lucky draw, so don't miss your chance. Lastly, if you would like to know further information about this study, please contact me at rizqiluthfianakhairunisa@student.tudelft.nl

SCREENING QUESTIONS

A1 What is your age?
1: Under 18
2: 18 – 24 50
3: 25 – 3139 – 45
4: 32 – 38
5: 39 - 44
6: Above 45

A2 Have you ever used the on demand motorbike taxi service (*read Bahasa: Ojek online, not traditional ojek*) within a year?
SHOW SCREEN – STOP IF 2 IS CHOSEN
SINGLE CODE
1: Yes
2: No

A3 How often do you travel using the on demand motorbike taxi service?
SHOW SCREEN – CHECK THE CONSISTENCY WITH THE QUESTION A2
STOP IF 6 IS CHOSEN
SINGLE CODE
1: 7 of more times per week
2: 1 - 4 times per week
3: 1 - 4 times per month
4: 6 - 12 times per year
5: 1 - 5 times per year
6: Never

The eligible respondent is able to go to the next section

STATED CHOICE EXPERIMENT

D3 Citizen Experiment

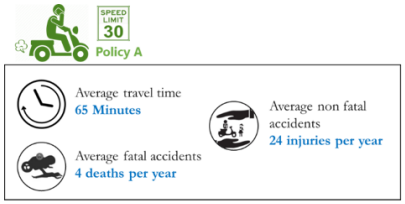
The on-demand motorbike taxi is known as the most popular means of informal public transport in Jakarta. The rising popularity of the on-demand motorbike taxi in Jakarta happens because of its flexible characteristics, such as door-to-door service, ability to run through traffic and narrow alleys, and is always available 24 hours a day. In this experiment, you will imagine having a trip using on-demand motorbike taxi service in Jakarta city during peak hours (6.30 - 9.30 or 16.00 - 19.00).

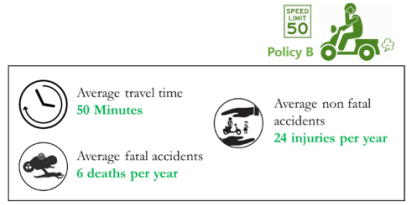
Based on your experience using on-demand motorbike taxi, this research will examine your preferences when you make a trade-off between travel time and safety using this means of transport. In this experiment, you will be asked to choose between two policy options initiated by the government to manage the operation of on-demand motorbike taxi in Jakarta. The two-speed limit regulations are 30km/hour and 50 km/hour, with different conditions based on the following attributes

1. Travel time of your trip
2. Number of fatal accidents (deaths per year) among passengers/drivers on the specific route
The fatal accidents will lead to the serious injuries and deaths. Type of motorbike accidents can be crossing collisions with other modes, collisions while turning right/left, rear-end collision, collisions with roadside structures, and others
3. Number of non-fatal accidents (minor injuries per year) among passengers/drivers on the specific route
The non-fatal accidents may result minor injuries or vehicle damage without injuries.

With the above conditions, therefore we would like to find out to what extent your preferences consider the above attributes when making a safety and travel time using the on-demand motorbike taxi service.

Choice Set 1
Choose one of these options that suit your preferences best!





If you could only choose between the two policy interventions of on-demand motorbike taxi operation, which policy option would you recommend to the government?
○ Policy A
○ Policy B

When using the on-demand motorbike taxi how important are the following attributes?

Travel time
(Least Important) 1 ——— 5 *(Most Important)*

Safety
(Least Important) 1 ——— 5 *(Most Important)*

Travel Cost (only in experiment 1)

(Least Important) 1 ——— 5 *(Most Important)*

Speed (only in experiment 3)
(Least Important) 1 5 *(Most Important)*

Motivate your choice

HOUSEHOLD QUESTIONS

B1 Record gender
SINGLE CODE
1: Male
2: Female

B2 Working status
1. Entrepreneurship
2. Employee
3. Freelancer
4. Unpaid workers
5. Unemployed due to the academic purpose
6. Retired
7. Unemployed and currently seeking for jobs
8. Unemployed and not seeking for jobs (ex: students, housewife)

B3 Income per month
1. Under 2,500,000 IDR
2. 2,500,000 – 5,000,000 IDR
3. 5,000,000 – 7,500,000 IDR
4. 7,500,000 – 10,000,000 IDR
5. Over 10,000,000 IDR
6. Do not know

B4 Expense on transportation per month.

Transportation expense includes fuel cost, parking cost, toll road, public transport cost and/or tip. Excluding: vehicle instalments, PT subscriptions and maintenances
1. < 250.000 IDR
2. 250.000 - 750.000 IDR
3. 750.001 - 1.250.000 IDR
4. 1.250.001 - 1.750.000 IDR
5. 1.750.000 IDR
6. Do not know

B5 What is your main mode for your trip in the daily basis?

SCRIPTER: SINGLE CODE

1. Private motorcycle
2. Online Motorbike taxi (Grab, Gojek)
3. Traditional Motorbike taxi
4. Private car
5. Bus
6. Train
7. Taxi (Blue Bird, Express, etc)
8. Online car taxi (Grab, Gojek)
9. Others, specify

VEHICLE OWNERSHIP
C1 How many available motorized and non motorized vehicles are there in your household?

NUMERIC ONLY

a. Private Car ☐☐
b. Private Motorcycles ☐☐
c. Bicycles (please exclude bicycle for below 10 years old) ☐☐

C2 Choose one from the list below which suits the characteristic of your daily trip using on demand motorbike taxi

SCRIPTER: SINGLE CODE

1: Trip to workplace
2: Trip to school/university
3: Shopping Trip/Leisure Trip
4: Other Trips
5: Non-work trip
6: Do not remember (INTERVIEWER: DO NOT READ)

LUCKY DRAW

Do you wish to participate in the draw?
Any contact information we need to collect from you to participate in the draw will be stored separately from your answers to the survey questions and will be deleted once the draw is complete

1. Yes
2. No

(If Yes, shown this data form)
Thank you for participating in this survey, we would like to offer you a chance to enter a draw to get a 50,000 IDR top-up voucher of Grabpay/Go Pay account. To facilitate this, please provide us with the following contact information:

Please note that your name and contact information will remain completely confidential and will not be linked with any of your survey answers.

C.2

EXPERT INTERVIEWS

C.1. ADO (Association of Indonesian Online Drivers)
Christiansen Wagey - Head of Association of Indonesian Online Drivers

1. What is ADO?

This organization is established as a mediator to deliver the aspiration of online drivers in Indonesia. The development of this association is triggered by a conflict between the local government of Jakarta and online drivers which occurred in July 2016. The local government initiated an action to ban the operation of online transportation while in fact, the legal basis that restricts online transportation was not finalized yet. The local government of Jakarta insisted that the operation of on-demand motorbike taxi in Jakarta could not comply some requirements for online transportation based on the Ministry of Transportation's Regulation *(Permenhub)* No 32 the year 2016 on Transportation Mode for People with Motorized Vehicles Outside the Trajectory. To tackle this issue, the latest activity that we have done was conducting a protest about three things on the 10th of July 2017: (1) re-assess the implementation of *Permenhub;* (2) ADO demands for the lifting of online transportation ban and (3) re-evaluate the policy that harms drivers' rights. One of the biggest mission of ADO now is to push the government to accommodate the revision of Ministry of Transportation's Regulation *(Permenhub)* No 32 the Year 2016. Mr. Yansen mentioned that this was done not to oppose the government, but to seek justice for the drivers' welfare

2. How many online motorbike taxi drivers that hold membership in ADO?

More than 20.000 drivers. At first, ADO was only using Facebook to promote their activity and through that, many people join us spontaneously. It is growing in number because almost every day we got an invitation to promote ADO to the communities that have not join us and/or educate them about the regulation. In fact, there are many online drivers that do not know ADO's existence yet. The one who does not know mostly individual driver *(traditional motorbike taxi)* coming from rental company so they do not really think about the driver's rights, only focus on generating their personal income.

3. How is the legal aspect of this type of transportation mode?

As it might be known, the Ministry of Transportation only legalized the operation of online car taxi in Indonesia through *Permenhub* No 108/2017, on the other hand the operation of on-demand motorbike taxi in Indonesia has not yet recognized. Therefore, the main mission of ADO is now focused on lobbying the Government to include the motorbike taxis as well. There are some points carried by ADO when they have a meeting with Ministry of Transportation at the end of 2016, which are

- Minimum fare to protect the drivers
- Quota for online drivers recruitment
- All the registered motorbike taxi units should have vehicle registration certificate (*STNK*) under legalized corporation (like a Limited Liability Company (LLC) for example)

For two-wheels vehicles (motorbike taxis), currently ADO is involved in the legalization process of this mode as now they are still considered informal public transport (IPT). In early 2017, ADO was invited for a meeting with the Fifth Commission of the House of Representative to voice their intention in legalization of online motorbike taxi. After that meeting, Mr. Puji, General, the Director of Land Transportation at the Ministry of Transportation said that there will be a limited

D.1

PEARSON CORRELATION MATRIX

Correlations

		Travel Time	Age	Safety	frequency	Income	Gender
Travel Time	Pearson Correlation	1	-,085	,048	,020	,019	,005
	Sig. (1-tailed)		,096	,227	,379	,387	,471
	N	240	240	240	240	240	240
Age	Pearson Correlation	-,085	1	-,053	,029	-,020	,056
	Sig. (1-tailed)	,096		,207	,329	,379	,195
	N	240	240	240	240	240	240
Safety	Pearson Correlation	,048	-,053	1	-,246**	-,247**	,005
	Sig. (1-tailed)	,227	,207		,000	,000	,472
	N	240	240	240	240	240	240
frequency	Pearson Correlation	,020	,029	-,246**	1	,078	-,052
	Sig. (1-tailed)	,379	,329	,000		,114	,210
	N	240	240	240	240	240	240
Income	Pearson Correlation	,019	-,020	-,247**	,078	1	-,044
	Sig. (1-tailed)	,387	,379	,000	,114		,251
	N	240	240	240	240	240	240
Gender	Pearson Correlation	,005	,056	,005	-,052	-,044	1
	Sig. (1-tailed)	,471	,195	,472	,210	,251	
	N	240	240	240	240	240	240

**. Correlation is significant at the 0.01 level (1-tailed).

Correlations

		Travel Time	Age	Safety	frequency	Income	Gender
Travel Time	Pearson Correlation	1	-,022	,051	-,032	-,131*	-,040
	Sig. (2-tailed)		,729	,430	,624	,042	,534
	N	240	240	240	240	240	240
Age	Pearson Correlation	-,022	1	-,181**	,185**	,000	-,072
	Sig. (2-tailed)	,729		,005	,004	,998	,269
	N	240	240	240	240	240	240
Safety	Pearson Correlation	,051	-,181**	1	-,263**	-,103	-,042
	Sig. (2-tailed)	,430	,005		,000	,110	,518
	N	240	240	240	240	240	240
frequency	Pearson Correlation	-,032	,185**	-,263**	1	,114	,059
	Sig. (2-tailed)	,624	,004	,000		,078	,362
	N	240	240	240	240	240	240
Income	Pearson Correlation	-,131*	,000	-,103	,114	1	,049
	Sig. (2-tailed)	,042	,998	,110	,078		,447
	N	240	240	240	240	240	240
Gender	Pearson Correlation	-,040	-,072	-,042	,059	,049	1
	Sig. (2-tailed)	,534	,269	,518	,362	,447	
	N	240	240	240	240	240	240

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Correlations

		Travel Time	Age	Safety	frequency	Income	Gender
Travel Time	Pearson Correlation	1	-,022	,051	-,032	-,131*	-,040
	Sig. (2-tailed)		,729	,430	,624	,042	,534
	N	240	240	240	240	240	240
Age	Pearson Correlation	-,022	1	-,181**	,185**	,000	-,072
	Sig. (2-tailed)	,729		,005	,004	,998	,269
	N	240	240	240	240	240	240
Safety	Pearson Correlation	,051	-,181**	1	-,263**	-,103	-,042
	Sig. (2-tailed)	,430	,005		,000	,110	,518
	N	240	240	240	240	240	240
frequency	Pearson Correlation	-,032	,185**	-,263**	1	,114	,059
	Sig. (2-tailed)	,624	,004	,000		,078	,362
	N	240	240	240	240	240	240
Income	Pearson Correlation	-,131*	,000	-,103	,114	1	,049
	Sig. (2-tailed)	,042	,998	,110	,078		,447
	N	240	240	240	240	240	240
Gender	Pearson Correlation	-,040	-,072	-,042	,059	,049	1
	Sig. (2-tailed)	,534	,269	,518	,362	,447	
	N	240	240	240	240	240	240

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

D.2

DOMINANT RESPONSES IN CHOICE SITUATIONS

Consumer Experiment 1

Choice-Exp 1	Experiment 1		Percentage		Choice Situations							
	Altv 1	Altv 2	Altv 1	Altv 2	Alternative 1				Alternative 2			
1	27	89	23%	77%	2500	65	6	12	2000	20	4	48
2	97	19	84%	16%	2500	20	6	48	2000	65	4	12
3	73	43	63%	37%	1500	20	8	36	3000	65	2	24
4	14	102	12%	88%	3000	20	8	24	1500	65	2	36
5	87	29	75%	25%	1500	65	4	12	3000	20	4	48
6	10	106	9%	91%	1500	65	2	36	3000	20	8	24
7	17	99	15%	85%	2500	35	4	24	2000	50	6	36
8	44	72	38%	62%	3000	50	2	48	1500	50	8	12
9	43	73	37%	63%	3000	50	8	12	1500	50	2	48
10	76	40	66%	34%	3000	65	2	24	1500	20	8	36
11	53	63	46%	54%	2500	50	4	48	2000	35	6	24
12	103	13	89%	11%	2000	35	6	24	2500	50	6	36
13	93	23	80%	20%	2000	35	4	36	2500	50	8	24
14	94	22	81%	19%	2000	20	2	48	2500	65	6	12
15	47	69	41%	59%	1500	50	8	12	3000	35	2	48
16	43	73	37%	63%	2000	35	6	36	2500	35	4	12

Consumer Experiment 2

Choice-Exp 2	Experiment 2		Percentage		Choice Situations					
	Altv 1	Altv 2	Altv 1	Altv 2	Alternative 1			Alternative 2		
1	43	77	36%	64%	65	6	12	20	4	48
2	89	31	74%	26%	35	2	24	50	6	36
3	50	70	42%	58%	20	4	48	35	4	24
4	51	69	43%	58%	65	6	12	20	6	48
5	69	51	58%	43%	20	6	12	65	4	48
6	52	68	43%	57%	65	4	48	20	6	12
7	33	87	28%	73%	50	8	36	65	6	12
8	79	41	66%	34%	20	4	48	65	4	12
9	70	50	58%	42%	20	8	12	35	2	24
10	78	42	65%	35%	50	6	36	65	2	48
11	29	91	24%	76%	50	8	24	50	2	36
12	85	35	71%	29%	65	2	48	50	8	36
13	93	27	78%	23%	50	2	24	35	8	36
14	87	33	73%	28%	35	4	24	20	8	12
15	97	23	81%	19%	35	2	36	50	8	24
16	39	81	33%	68%	35	8	36	35	2	24

D.3

DOMINANT RESPONSES IN CHOICE SITUATIONS

Consumer Experiment 3

Choice-Exp 3	Experiment 3		Percentage		Choice Situations					
	Altv 1	Altv 2	Altv 1	Altv 2	Alternative 1			Alternative 2		
1	51	39	57%	43%	65	6	12	20	4	48
2	62	28	69%	31%	35	2	24	50	6	36
3	51	39	57%	43%	20	4	48	35	4	24
4	17	73	19%	81%	65	6	12	20	6	48
5	70	20	78%	22%	20	6	12	65	4	48
6	66	24	73%	27%	20	8	12	35	2	24
7	43	47	48%	52%	50	6	36	65	2	48
8	21	69	23%	77%	50	8	24	50	2	36
9	58	32	64%	36%	65	2	48	50	8	36
10	55	35	61%	39%	50	2	24	35	8	36

	Exp 1	Exp 2	Exp 3
Dominant	38%	6%	10%
Ok	50%	63%	60%
Balance	13%	31%	30%

D.3

BIOGEME SYNTAX

Consumer Experiment 1

```
[ModelDescription]
"Example of a logit model for a transportation mode choice with 2 alternatives:"
"Alt1"
"Alt2"

[Choice]
Choice

[Beta]
// Name Value  LowerBound UpperBound  status (0=variable, 1=fixed)
BETA_TT              -0.0537              -1000.0     1000.0       0
BETA_TC              -0.000144            -1000.0     1000.0       0
BETA_DT              -0.410               -1000.0     1000.0       0
BETA_IJ              -0.00714             -1000.0     1000.0       0


[Utilities]
// Id Name  Avail  linear-in-parameter expression (beta1*x1 + beta2*x2 + ... )
 1     Alt1    one                BETA_TT * time_A    + BETA_TC * cost_A          +
BETA_DT * deaths_A          + BETA_IJ * injuries_A
 2     Alt2        one            BETA_TT * time_B    + BETA_TC * cost_B          +
BETA_DT * deaths_B+ BETA_IJ * injuries_B


//[PanelData]
//Id

[Expressions]
one              = 1

[Model]
$MNL
```

D.3

BIOGEME SYNTHAX

Consumer Experiment 2

```
//Survey result 19-MAY-2018-2018
//Consumer experiment no cost

[Choice]
Choice

[Beta]
// Name Value  LowerBound UpperBound  status (0=variable, 1=fixed)
BETA_TT             -0.0106         -1000.0     1000.0      0
BETA_DT             -0.289          -1000.0     1000.0      0
BETA_IJ             -0.0267         -1000.0     1000.0      0



[Utilities]
// Id Name  Avail  linear-in-parameter expression (beta1*x1 + beta2*x2 + ... )
 1     Alt1    one                 BETA_TT * time_A    + BETA_DT * deaths_A       + BETA_IJ
* injuries_A
 2     Alt2       one              BETA_TT * time_B    + BETA_DT * deaths_B       + BETA_IJ
* injuries_B

//[PanelData]
//Id

[Expressions]
one             = 1


[Model]
$MNL
```

D.3

BIOGEME SYNTHAX

Citizen Experiment

```
//Citizen experiment

[Choice]
Choice

[Beta]
// Name Value  LowerBound UpperBound  status (0=variable, 1=fixed)
ASC_A           0                       -1000.0         1000.0                  0
BETA_TT                 -0.0719                                         -1000.0     1000.0        0
BETA_DT                 -0.0179                                 -1000.0     1000.0        0
BETA_IJ                 -0.333          -1000.0     1000.0        0

[Utilities]
// Id Name  Avail  linear-in-parameter expression (beta1*x1 + beta2*x2 + ... )
  1     Policy1             one             ASC_A * one + BETA_TT * time_A          +
BETA_DT * deaths_A          + BETA_IJ * injuries_A
  2     Policy2    one             BETA_TT * time_B    + BETA_DT * deaths_B        + BETA_IJ
* injuries_B

//[PanelData]
//Id

[Expressions]
one             = 1

[Model]
$MNL
```

D.3

BIOGEME SYNTHAX

Consumer Experiment 1
Example Interaction with Frequent User

```
[Choice]
Choice

[Beta]
// Name Value  LowerBound UpperBound  status (0=variable, 1=fixed)
BETA_DT                 -0.410                  -1000.0  1000.0    0
BETA_TT                 -0.0537                 -1000.0  1000.0    0
BETA_TC                 -0.000144       -1000.0  1000.0    0
BETA_IJ         -0.00714        -1000.0  1000.0    0

//Interaction
BETA_TT_frequser  0                             -1000.0  1000.0    0
BETA_DT_frequser        0                       -1000.0  1000.0    0
BETA_IJ_frequser  0                             -1000.0  1000.0    0
BETA_TC_frequser  0                             -1000.0  1000.0    0


[Utilities]
// Id Name Avail linear-in-parameter expression (beta1*x1 + beta2*x2 + ...)
1 Alt1 av1  BETA_TT * time_A + BETA_DT * deaths_A + BETA_TT * time_A     +  BETA_IJ  *  injuries_A  +
BETA_TC * cost_A
2 Alt2 av2 BETA_TT * time_B + BETA_DT * deaths_B    + BETA_DT * deaths_B + BETA_IJ * injuries_B + BETA_TC *
cost_B

[GeneralizedUtilities]
1 BETA_TT_frequser * time_A * frequser
+ BETA_DT_frequser * deaths_A * frequser
+ BETA_IJ_frequser * injuries_A * frequser
+ BETA_TC_frequser * cost_A * frequser
2 BETA_TT_frequser * time_B * frequser
+ BETA_DT_frequser * deaths_B * frequser
+ BETA_IJ_frequser * injuries_B * frequser
+ BETA_TC_frequser * cost_B * frequser

[Expressions]
av1             = 1
av2                     = 1


[Model]
$MNL
```