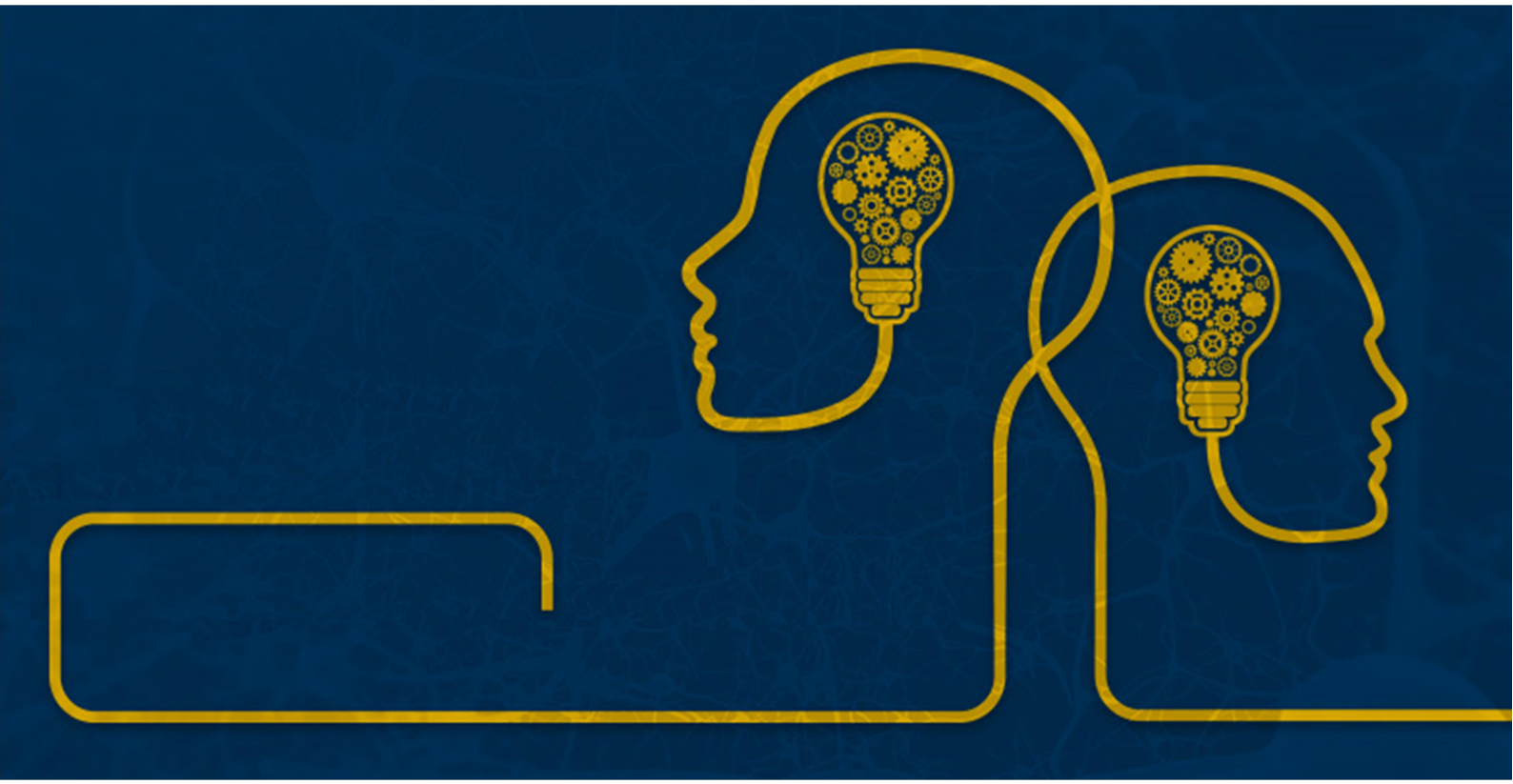
Decision-Making in Participatory Value Evaluation



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Decision-Making in Participatory Value Evaluation

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Preface

This report is written as the final deliverable that is submitted for the master Management Of Technology (MOT) at Delft University of Technology, faculty of Technology, Policy and Management. I would like to use this opportunity to thank the people that were involved in helping me complete this research.

First of all I would like to thank my graduation committee, who were always available when I needed them. My first supervisor Gerdien helped me to stay focused on the bigger picture. Your knowledge about framing and research in general helped me greatly. You dedicated time and effort in helping me finalise this master thesis within the set time.
I would like to thank my second supervisor Niek for letting me research "your" PVE method. Your interesting lectures about social cost-benefit analysis inspired me to explore the possibilities for this thesis. Your feedback on the project and help with setting up the three versions of the PVE were much appreciated.
I am also very thankful for the experience, feedback, and inspiration, Hans provided as the chairman of my committee. Your thoughts on this research and the ability to place it within the bigger societal picture contributed towards a more interesting outcome for me personally.
I would like to thank the three interviewees for their input and time, the interviews allowed me to gain an interesting insight into the world of policy-making and politics. A special thanks to Executive Officer of the Municipality of Delft Mrs. Huijsmans, your cooperation allowed for an extra insight into policy-making on the highest level of a municipality.

Furthermore, I would like to thank head of MOT, Robert Verburg. The shown confidence in all students, including me, that he puts forward in his personal conversations is much appreciated.
I would like to thank Perry Borst for his help with the online coding of the PVE and putting up with my demands and time constraints.
Last but not least I would like to thank Jolanda Berbee, who made the planning process feel like a breeze, which worked uplifting and efficient.

Delft, March 28, 2019

Summary

In this report the potential effect of framing on the decision-making process in participatory value evaluation is researched. Participatory Value Evaluation, PVE, is a method of evaluating citizens preference targeted towards public projects and their budget. For instance, PVE can measure the preference of citizens when allocating alternative infrastructure projects with a set budget.

A gap in knowledge is found in the decision-making process of the method. The validity of participatory value evaluation is potentially affected by cognitive bias effects such as framing. The main question of this research is: Is there a measurable difference in outcome of the decision-making process between emphasis-framed alternatives within the participatory value evaluation method? The used method is a between-subject design, laboratory experiment. Three versions of the same basic PVE are constructed. A control version with neutral descriptions of the potential projects, and two framed versions through the structure of one-sided emphasis framing. A convenience sample of 181 participants is used, with each version of the PVE receiving roughly 60 participants. The three versions of the PVE were kept exactly the same with exception of the framed descriptions. A difference between the groups is shown to be significant on a project level in six out of six tested projects. Concluded is that, in general, emphasis-framing has an effect on the decision-making in PVE. The effect of framing is argued to have a limitation. When participants feel strongly about a certain topic, the frame influences the outcome less, this is known as issue importance. Recommendations to further research are made, as a method for mitigating the influence within PVE can be researched. The impact of overall presentation of different projects, in terms of framing with images, or extensive project descriptions, can be researched.

Expert interviews were conducted, to gain insight in how the PVE method is perceived by policy-makers. The overall consensus is that PVE is a useful method of involving citizens. The PVE can be used by policy-makers as an advisory tool. Framing within PVE, is unwanted when testing the preferences of the citizens. However, it might be useful to emphasise the importance of certain projects. Therefore, it is argued that the use of framing should be an ethical consideration.

Contents

1

Introduction

In the late twentieth century, participatory budgeting, a method of public sector project allocation became increasingly more popular as it incorporated citizen preference in public budgeting. Traditionally this citizen preference is measured as part of a social cost-benefit analysis. In a social cost-benefit analysis, the goal for researchers is to take all social costs and benefits for society as a whole into account (Boardman, Greenberg, Vining, & Weimer, 2017). Social benefits and social cost are monetised and, if needed, compounded back to present day values. Finally, total benefits minus total cost give the net social benefit of the project. In this manner different alternative projects can be compared according to their net social benefit. Monetising benefits and cost get increasingly more complex when it represents intangible factors such as potential lives saved, because of added security measures or the value citizens allocate towards a reduction in travelled time because of a new highway.

Within cost-benefit analysis this value of citizen preference is generally measured through their willingness to pay. Willingness to pay, WTP, is the amount of money the citizen is willing to pay for the proposed change in commodity, or for example reduction in travelled time, (Randall, Ives, & Eastman, 1974). However, the method of WTP as a value evaluation tool for hypothetical money, governmental funds, and personal money can potentially result in wide variations (Knetsch & Sinden, 1984), mainly due to difference in personal wealth and preference.

A different method of incorporating citizen preference is known as participatory budgeting, this involves citizens actively in the process of public budgeting. The citizens ideally form a sample group that represents the population. Through a process of interviews and group meetings the proposed alternatives are introduced and the citizens can actively participate in the allocation of these

alternatives. The advantage of this method is the direct involvement citizens have in the decision-making process within the controlled framework of alternatives and total budget. The disadvantage of using this method in practice is the time-consuming and cost-inefficient nature of interviews and group meetings. Validity can be an issue as well, as participants can influence each other or can be influenced by the provided information.

Participatory value evaluation, PVE, is a new method of value evaluation that can potentially mitigate the disadvantages that exist in participatory budgeting through a different data collection method. PVE uses an online tool to replace the interviews and focus group meetings of traditional participatory budgeting. This allows for a consistent framework where participants can share their preferred allocation of alternative projects in a more time- and cost-efficient process of data collection. While existing research on PVE focused on scope and general feasibility, there is no research towards the internal measurement or bias within the tool. When the PVE does not measure the participants preference correctly it could make the method, in the current form, unusable and obsolete.

This leads to the following research problem: The validity of participatory value evaluation is potentially affected by cognitive bias effects such as framing. Cognitive bias is the effect where rational decision-making is influenced by effects created in the mind based on shown information or general input (Haselton, Nettle, & Murray, 2015). The framing effect, a cognitive bias, is founded in decision-making and shows different connotations evoked through the choice of words, as language can have an impact on value judgements (De Bruijn, 2017). For PVE this means how alternatives are described can possibly lead to unintentional biased choices of participants. There is a measurable change in preference when alternatives are framed in different ways (Tversky & Kahneman, 1981). Since there is no existing empirical research on the effects of framing on decision-making in participatory value evaluation. This research intends to fill this knowledge gap since framing can potentially influence the outcome and consequently degrade the overall effectiveness of the PVE when the presented information is biased.

This research is executed through the following research question:
Is there a measurable difference in outcome of the decision-making process between emphasis-framed alternatives within the participatory value evaluation method?

To isolate the effect of framing, a single blind, randomly assigned, between-subject design, laboratory experiment is proposed within the setting of PVE. Where three groups will be tested, A

group with positively framed alternatives, a control group, and a group with negatively framed alternatives. In addition to the experiment, policy-makers will be interviewed to find out what their take is on the PVE method as a whole, framing in the PVE, and how they would use the results.

2

Literature Review

The literature review will consist of three main parts. First, literature surrounding Cost-benefit analysis and Participatory Value Evaluation, PVE, is researched. Second, the decision-making process is briefly discussed. Finally, the concept of framing is discussed in general and in the context of PVE to arrive at the knowledge gap that exists.

2.1 Cost-Benefit Analysis

Cost-benefit analysis, or CBA, is a method of analysis that provides consistent evaluation in terms of cost and benefits. Cost-benefit analysis is a widely accepted decision-making tool on projects in the public sector, for example infrastructure projects executed by the government (Drèze & Stern, 1987). Within the process of cost-benefit analysis, social costs and benefits get monetised and compounded back over time into their respective net present value. The net social benefits of a project show whether benefits outweigh costs and allow for different alternative projects to be compared. The process of monetising can be complex, especially for the more intangible benefits or costs of a project. Reduction in time travelled because of an infrastructure project, for example, is monetised through the principle of willingness to pay.

Willingness to pay is used to derive preferences of individuals and values these preferences in a monetised form. The concept started with the attempt of (Becker, DeGroot, & Marschak, 1964) to measure the utility of money. Since then, willingness to pay grew into a widely accepted measure for value evaluation, used in social-cost benefit analysis, public sector project evaluation, and even health-care applications (Gafni, 1998).

2.2 Value Evaluation Methods

Limitations to willingness to pay do however exist as for instance personal wealth can influence the amount of allocated funds. A different approach on the measure of citizen utility is the use of participatory budgeting. Participatory budgeting is a method where citizens work together in allocating governmental resources and/or funds from a set of alternative proposed projects (Walczak & Rutkowska, 2017). Within participatory budgeting citizens are informed and give their opinion through group interviews and/or public forums. This input is used in the decision-making process by governmental agencies when dealing with the public sector.

Participatory budgeting became increasingly more popular in early 1990's in Latin America, Consequently, Europe followed in the early 2000's (Sintomer, Herzberg, & Röcke, 2012). In Latin America the popularity of this decision-making method is linked to a growing need for transparency in governmental policy that the method provides. More participatory budgeting will legitimise governmental policy (Shah, 2007). A by-product of this evaluation method is the social informative aspect. Citizens are informed on public policy when given an insight in possible alternative projects and budgeting considerations (Sintomer et al., 2012)(Dartée, 2018).

Traditionally the use of participatory budgeting is as an option more time consuming compared to the method of willingness to pay because of the collection and processing of data. It can provide, however, a more reliable solution for the public sector as citizens can, in theory, allocate funds of the government opposed to allocation based on personal wealth. The quality of data in participatory budgeting is relatively high because of the consequential nature of the method even without the budget being binding. Citizens tend to show their true preference when the outcome is consequential (Zawojska & Czajkowski, 2017). The influence of citizens is higher compared to a traditional public sector decision-making process where the influence of citizens is limited to a democratic vote for a general policy (Walczak & Rutkowska, 2017).

2.3 Participatory Value Evaluation

In an effort to overcome the downsides of participatory budgeting, Mouter, Koster & Dekker introduced Participatory Value Evaluation, PVE, an online tool for citizens to access and participate in a more cost effective, a less biased, and a less time-consuming participatory budgeting method (Mouter, Koster, & Dekker, 2017).

Within the PVE method, participants can indicate their preference online among pre-described alternatives. The method is executed within the framework of a website. Participants can log in

to the website where descriptions of alternative projects are shown together with a total allocated budget. Within the descriptions social benefits and costs are included. Based on these descriptions, citizens can form an opinion about the alternatives and can allocate the total budget towards multiple alternatives until the maximum budget is exceeded. Finally, when satisfied with their choices, the preference of the participant is sent in.

Four known reports comprise existing research towards the participatory value evaluation method. The initial research in 2017 tested the proof of concept of participatory value evaluation focused in the regional scope of the transport region of Amsterdam (Mouter et al., 2017). Research on the national level followed in 2018 in commissioned by the Ministry of Infrastructure and Water Management. Where participants were asked to give their preference allocating long-term investment towards water safety of rivers in The Netherlands (Mouter, Koster, Dekker, & Borst, 2018). Additionally, two case studies have been finalised through master thesis projects. The first was a case study that generated a methodology for designing a PVE while aimed at the scope of a neighbourhood in the city of Nijmegen (Pak, 2018). The second case study tested the method at the municipal level for the city of The Hague (Dartée, 2018). The existing research focused on a clear methodology in the design of PVE and tests the PVE method in different context scopes, national, regional, and municipal. Empirical research towards the validity of the PVE method does not currently exist. In other words, how well does the PVE method measures what it intends to measure.

A key factor in participatory budgeting is a non-biased opinion of participants as this can influence their decision-making process. Group interviews and meetings to discuss traditional participatory budgeting can unintentionally influence participants through stakeholders, researchers, and other participants. Within PVE, external factors like group meetings with stakeholders are largely eliminated, internal factors of the method however can still influence the participants. These internal factors, in this case factors within the PVE tool that can influence the participant, have an effect on the outcome of the intended study and are known as cognitive bias in psychology. Cognitive bias is the effect where rational decision-making is influenced by effects created by the mind based on shown information or general input (Haselton et al., 2015).

2.4 Decision-making

The process of decision-making is discussed extensively in literature, as the process of decision-making often presents itself to be less complex then it really is.
While the seemingly simplistic task of making a decision can be diluted to be; identifying the problem, selecting the possible alternatives bound by certain constraints (criteria), and finally picking the best of these alternatives. Reality, often, is more complex because for example not all consequences, constraints and possible implementation methods can be known in advance.

Many styles and streams of decision-making methods exist. When looking at cost-benefit analysis, the economic choice model described previously in part 2.1 of this report, the economic decision-making process of "Rational Choice Theory" is used. A decision is made after a complete list of benefits and costs is made.
Within PVE an addition to this theory is made through the Multiple Discrete-Continuous Extreme Value Model (MDCEV). This model implies that participants make both a discrete and a continuous choice at the same time (Bhat, 2008). The continuous choice is focused on the budget, what is the remaining overall budget and how is it allocated. The discrete choice revolves around the choice for specific projects from the total list of projects (Mouter et al., 2018).
This theory acts on the narrative that purely rational and calculative made actions contribute towards making a decision, every other action is actively ignored (Scott, 2000). This theory is criticised as it does not take into account emotional, or irrational decision-making. An example of this is the Brexit campaign led by political parties in the United Kingdom in 2016. The promotional campaigns were based on emotion versus rational analysis, which led to the unexpected vote for the United Kingdom to leave the European Union (Chen, 2019).

Behavioural economics, a field of study where psychology and economics meet, studies human behaviour and psychological factors in economic decision-making. This behavioural economics stream claims that rationality in decision-making is never complete but bounded (Kahneman, 2003).
Decision-making is consequently done through bounded rationality. Behavioural economics is criticised by opponents claiming it is not a unified theory but the results are a collection of observations. Claimed is that natural experiments will always move towards rational decision-making through the process of learning and competition.
The bounded rationality mentioned by behavioural economists causes decision-making to be af-

fected by incomplete information.
Furthermore, decision-making is affected through heuristics according to Tversky and Kahneman (Tversky & Kahneman, 1974). Heuristics are principles people rely on to make decisions in uncertainty and can be compared to rules of thumb. While determining different uncertain outcomes and probabilities is a complex task, heuristics can make this process more easy and quick but can lead to systematic errors. In the book "Thinking, Fast and Slow" (Kahneman, 2011) describes that the use of heuristics are not perfect. When a decision is made under uncertainty, and heuristics are used to mitigate the complexity, it is possible errors slip in such as cognitive biases. Examples of these cognitive biases are framing, priming and anchoring.

Framing is the effect where text can implicitly give judgement or value by focusing on positive or negative words or connotations. For example, the same data can be shown as 40 percent positive or 60 percent negative. Priming effects, where association of certain prime words can affect the perception of readers for periods of time (Kahneman, 2011). Anchoring is another documented effect where a different starting point or initial statement can give direction to a perceived opinion of the reader (Tversky & Kahneman, 1974). More cognitive bias effects exists and can affect the decision-making process in different ways.

When relating this back to the Participatory Value Evaluation method, cognitive biases can affect decision-making both external and internal of the PVE. External factors to the PVE can be described as for instance, something on the radio while participating in the PVE, or a newspaper article that primes the participant beforehand. Internal factors are cognitive bias factors that influence the participant through text or visual effects within the PVE itself. For this research the scope is directed towards the framing effect since framing can be focused on the information within the PVE Tool, where other cognitive biases might affect rational decision-making externally of the PVE tool.

2.5 Framing

The framing effect is founded in decision-making and shows different connotations evoked through the choice of words, as language can influence value judgements (De Bruijn, 2017). For PVE this means how alternatives are described can possibly lead to unintentional biased choices of participants. There is a measurable change in preference when alternatives are framed in different ways (Tversky & Kahneman, 1981).

Framing effects can roughly be categorised in two streams of literature, equivalency framing and emphasis framing (Druckman, 2001a). Equivalency framing examines difference in preference after a positive or negative version of an equivalent statement. For instance, 90 percent positive feedback versus 10 percent negative feedback. A clear choice can be made to communicate 90 percent positive feedback when, for example a marketing advertisement for a consumer product is created. The statement 90 percent positive feedback can influence the potential customer to perceive this as positive information. When the focus of the statement is turned around towards a negative statement it can influence the customer accordingly. A statement like, there is 10 percent negative feedback about this consumer product, can influence the potential customer to think about the negative feedback when confronted with the product. The same information is shown in different ways much like the well-known optimist versus pessimist example: Is a glass half full or half empty.
Equivalency framing is a subtle version of framing as readers can easily overlook the frame to be positive or negative when trying to comprehend the overall information given. Subtle differences in context can influence the choice or risk taken by the participant (Bless, Betsch, & Franzen, 1998). Even when participants do reflect upon the fact that a positively framed question is equivalent to a negatively framed question the influencing effect of framing still holds (Frisch, 1993).

In emphasis framing, certain alternatives or parts of a decision are emphasised. This can affect decision-making as the emphasised parts can be perceived to be more important. Emphasised framing can be executed in two ways. First, one-sided framing, where the positive factors are communicated while the negative factors are ignored. Second, two-sided framing, where both positive and negative aspects are communicated with a strong emphasis on either positive or negative factors. (De Vries, Terwel, & Ellemers, 2016). One-sided framing actively ignores the positive, or negative, factors that exist to implicitly influence the reader.
The approach one-sided emphasis framing takes, can be transferred in a very mechanical structural way to create experiments with different manipulated groups. In the article of (Nelson, Clawson, & Oxley, 1997) ”Media framing of a civil liberties conflict”, two different versions of media coverage is researched surrounding the same Ku Klux Klan rally. In the first version, the television station chose to frame the coverage of the rally into a free speech frame. The rally was covered with the message that no matter the ideology of the KKK, they at least have their right to freedom of speech and thus to hold a public rally in the city. In the second version of the experiment, the television station framed the rally to be an issue of public order, since the public KKK rallies attract

protesting groups that seek confrontation.
Participants to the study were exposed to one of both versions and were asked questions on their tolerance towards public rallies organised by the KKK. The tolerance towards these rallies was higher for the participants that were exposed to the freedom of speech version of the experiment versus the public order version of the experiment. It is important to understand that emphasis framing does not give false information in an effort to influence an opinion, it merely highlights an aspect of the truth while it ignores another (Nisbet, 2009). Emphasis framing can be perceived as manipulative by participants when the positive or negative side of description is highlighted or left out (De Vries et al., 2016).
Furthermore, when the source of the information is expected to be non-biased, for instance in PVE, emphasis framing can cause the information to be perceived as illegitimate (De Vries, 2017). Framing in general is usually perceived to be negative as it implies that the general preference of people can be manipulated in a direction and is based on random choice (Chong & Druckman, 2007).
There is no existing empirical research for the potential moderating effect framing has on participatory value evaluation while it is important to design a PVE that measures participants true value. When frames affect the decision-making in PVE it essentially becomes a worthless value evaluation method as the outcome does not reflect the true opinion of the participants. It is therefore argued that when framing affects decision-making in PVE it is important to acknowledge this and mitigate the effect.
The lack of existing research can be identified as a gap in knowledge. This research intends to fill this existing gap in knowledge by researching the framing effect within PVE.

The framing effect, in general, is moderated by issue importance (Lecheler, de Vreese, & Slothuus, 2009). This means framing is less effective when individuals feel strongly about a certain subject that is framed. Overall, literature mentions that certain predispositions, like beliefs and values, affect how strongly someone feels about a certain subject or issue (Boninger, Krosnick, Berent, & Fabrigar, 1995). Three main reasons for this are mentioned in the article by (Lecheler et al., 2009). When an issue is highly important for someone, the corresponding attitude is easily accessible by the brain. This attitude is a combination of emotion and a mental state of mind that is built by experience, literature, beliefs and values. A frame that is focused on a highly importance issue is affected by this attitude.
Second, when a issue is important for someone, this makes them gather more information in terms of volume and accurateness. When this issue is framed, the frame is weighed against this informa-

tion, making the frame less effective.
Finally, when an highly important issue is discussed, it is more likely to attract behaviour that is consistent with the corresponding attitude (Boninger et al., 1995). This means the attitude affects the decision-making process more compared to less important issues. (Lecheler et al., 2009).

The literature review surrounding framing shows a distinction between equivalency framing and emphasis framing. The structural approach shown by (De Vries et al., 2016) and (Nelson et al., 1997), where emphasis framing is used, is deemed highly suitable for research within PVE. The different policy options described in the method can be displayed neutrally, positive, or negative. One-sided framing, where the emphasis on positive or negative is exclusively shown, is a mechanical manipulation that can be controlled in different experiment groups.

3

Research Objective

To elaborate on the objective of the proposed research, the scientific and societal relevance is discussed. Within the scientific relevance the research gap is identified, and shown is why the proposed research contributes towards the improvement and the overall research of participatory value evaluation. The societal relevance shows the purpose of the proposed research in context of society. Finally, both scientific and societal relevance are combined in the deliverable when the proposed research is finalised.

3.1 Scientific Relevance

The proposed research contributes towards the development of participatory value evaluation. Since it was introduced in 2017, research focused on the general applicability of the new method of participatory budgeting. The introduction in 2017 tested the proof of concept of participatory value evaluation focused in the regional scope of the transport region of Amsterdam (Mouter et al., 2017). Research on the national level followed in 2018 in commissioned by the Ministry of Infrastructure and Water Management (Mouter et al., 2018). Two master theses contributed towards the research with case studies focused on a municipal level (Pak, 2018)(Dartée, 2018). With initial research finalised, there is no empirical research towards the validity of participatory value evaluation. In other words, how well does PVE measures what the method intends to measure? Derived from participatory budgeting, PVE measures the value of citizens towards different alternatives financed by a public entity. However, in traditional participatory budgeting, information is gathered through group interviews and informative meetings. Within PVE, information is gathered through an online framework where alternatives are described for participants to evaluate. How these alternatives are perceived through cognitive biases can possibly impact the validity of the measurement

tool. The proposed research adds to the overall research towards PVE as a new method for participatory budgeting since there is no empirical research on the effect of framing on participatory value evaluation. This effect is important to research as it can potentially influence the outcome and consequently degrade the overall effectiveness of the PVE. When framing affects the decision-making in PVE, the method for evaluating values is effectively worthless in the current state, as in that case, the true opinion of participants can be influenced by the measuring method itself. The overall intention of the participatory value evaluation method is to objectively measure the value of participants. This objectivity might be affected by the framing effect and therefore needs to be researched and, if necessary, mitigated.

3.2 Societal Relevance

The relevance for society is the overall research towards a new system of value evaluation combined with participatory budgeting. The method can potentially represent a public input factor for governmental entities towards allocating public projects with direct involvement of the specific community or society. Traditional methods to achieve this are not implemented widespread because of their time-consuming and cost inefficient nature. Because of the innovative, online, method the information is shared and the data is gathered, the PVE tool can be used in a less expensive, more time-consuming and potentially less biased, frame-less way. A PVE method without strong frames can make the value evaluation more ethically acceptable as the public will not be steered towards a direction. It is important for the society as a whole that the participatory value evaluation is a reliable tool for testing their preference.

The method can, potentially, increase the involvement of citizens in the allocation of public projects. This involvement can synchronise the activities of the public sector with preference of the society. However, while the direct involvement of citizens in the allocation of public projects increases public participation, PVE does not represent a holy grail in democratic decision-making. For instance, participation, for citizens, can be viewed as a virtue by some and a burden by others. Besides this, when participation is asked for too many different PVE's the virtue of democratic involvement can become a burden.

3.3 Management Of Technology

Management of Technology graduates learn to explore and understand how firms can use technology to design and develop products and services that contribute to improving outcomes, such as customer satisfaction, corporate productivity, profitability and competitiveness. For this thesis and research, the government acts as the involved corporation, while the innovation process of PVE is the focal point. This is executed with primal links to decision-making and framing as put forward in the MOT curriculum as well as scientific methods and techniques that link to Research Methods and Preparation for Masters Thesis.

4

Research Issues

The literature study and the research objective have generated a gap in existing knowledge and research problem. The research gap shows that empirical research does not exist for the effect that cognitive bias and thus framing has on participatory value evaluation. The problem that this research is focused on revolves around the fact that there is no empirical research to show the validity of participatory value evaluation is negatively affected by how alternatives within PVE are described. It is however important to mitigate potential biases within the PVE method to ensure a trustworthy measurement. To close this gap in knowledge and find a solution to this problem, proposed is to test the framing effect within PVE to identify its significance towards the method of PVE and add to the overall research of participatory value evaluation.

4.1 Research Question

The proposed research will answer the following research question:

Is there a measurable difference in outcome of the decision-making process between emphasis-framed alternatives within the participatory value evaluation method?

Before this question can be answered a context for the tested PVE must be identified to present an interesting case for participants. The current PVE must be adapted to be able to test emphasis framing. Finally, alternative projects created from the chosen context have to be framed with a neutral description, a positive element and a negative element to be able to create different emphasis frames. This will be elaborated on in the research methodology part of this report.

5

Research Method

The research method used to answer the research question relates to the causal relationship that is researched. This relationship is researched in an experimental setting. The causal relationship focuses on the decision-making process within participatory value evaluation and how the cognitive bias effect framing influences this. The causal diagram, shown below in figure 5.1, identifies how the concept of framing has a possible moderating effect on the causal relation between participatory value evaluation and project and budget allocation which represents the decision-making process through participatory value evaluation.
Within the PVE method participants can form their opinion based on three main pieces of information. A description of the different policy options, a comparison of the price to other projects in relation to the overall budget, and can they can compare specific attributes of the policy. These attributes can be described as effects the specific project will have and is shown as a numerical figure in a table. For example, a potential new bridge can reduce travel time with 3 minutes per trip, while another project will reduce the travel time with 5 minutes per trip.

The main description of the project is displayed in written text and the budget and attributes will be shown in numerical values. The part that will be manipulated in terms of framing will be the description of the policy options, while the attributes and the budgeting will remain the same for all tests.

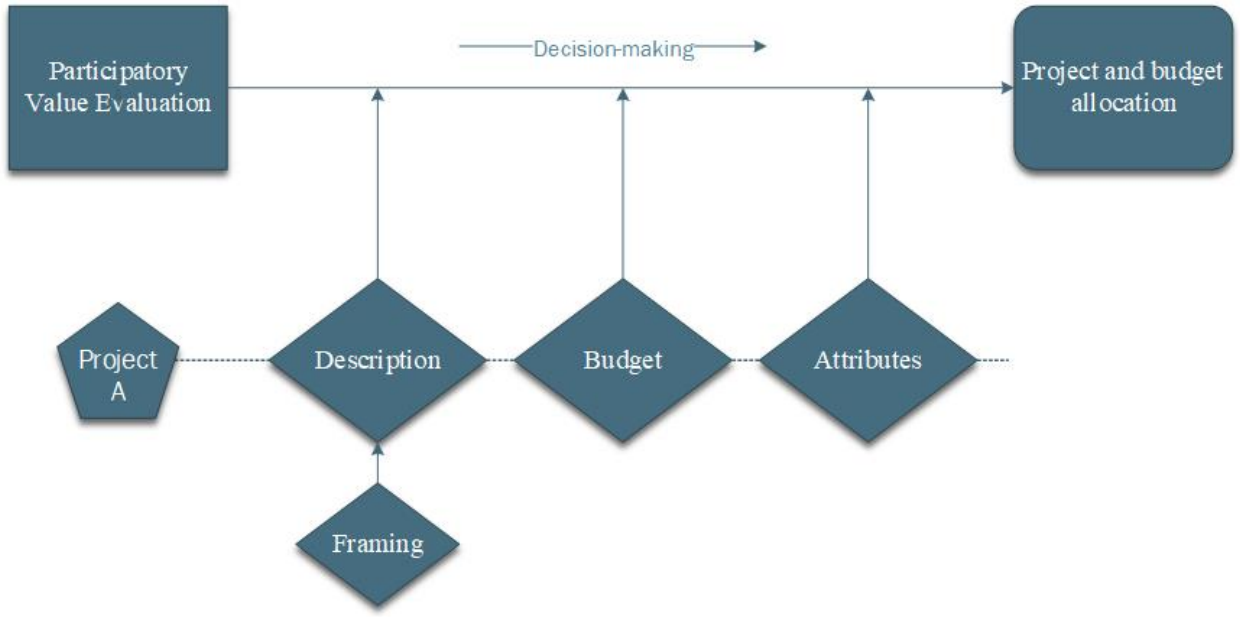

Figure 5.1: Causal diagram

A quantitative approach is used as a causal relationship is analysed through numerical data, provided by the existing participatory value evaluation method. When testing framing through an experiment in PVE the setting is controlled to prove causality. This controlled setting, where different frames can be manipulated and tested, is executed in a laboratory environment to ensure a controlled constant environment for the participants.

5.1 Laboratory Experiment

Framing can be tested through a, quantitative, laboratory experiment setting to ensure high internal validity when testing. In the case of cognitive bias effects this means the context of the test is ideally not something the respondents have knowledge about or have formed an opinion on.

Laboratory experiments have low external validity as it is difficult to generalise a causal relationship tested in a lab experiment to a real-world setting where more effects might impact the results (Levy, 1997). Since the PVE method is used in an online setting, and the experiment can be conducted in an adapted version of the PVE, the adaptation to a real-world setting will achieve similar results. The framing effect is a concept that is also researched in multiple settings, both real-world and lab experiment research exists. For example a larger scale real-world setting is successfully applied in a natural experiment in a Swiss referendum (Bütler & Maréchal, 2007).

To research the effect of framing on PVE, an effort is made to isolate the effect. When isolating the framing effect it does not exclude other effects to have implicit influence on written text. For instance, other known cognitive bias effects such as the priming effect, anchoring, or the halo effect can influence decision-making. In the design of the experiment it is important to minimise these effects and use a control group with no included frames. This control group will implicitly show the other cognitive bias effects as well when the appropriate sample size is used.
Therefore it is chosen to randomly assign participants, single blind, to not inform them there are multiple versions up front. All this is done in three between-subject design groups where every aspect of the alternatives is kept the same except for the framing, to be able to show an effect in the results that can be explained by framing only.
The between-subject design is used because of the single time participants fill in the PVE. The participants can only partake once since the condition, or frame, of the experiment works implicitly in the experiment. When the experiment is filled out twice, the subject might be primed by the first experience. This priming effect is unwanted as it might influence the outcome of the experiment.

The PVE is split into three versions, or groups that can be manipulated. Every version will contain the same six possible projects. These projects are all in the context of the use of bicycles in an urban environment. Three of the projects focus on traffic safety while three others relate to public nuisance.
In the first version of the experiment the projects are described neutrally and both a positive and a negative side of the project is mentioned. This version of the PVE will act as the control group.
In the second version, all the projects will receive the same neutral description. However, the three traffic safety projects will only mention the positive side of the project and leave out the negative aspect, while the three public nuisance projects will only mention the negative aspect and fail to mention the positive side of the project. The other aspects of the PVE like the budget and the attributes will remain the same for all versions.
The third version receives the reverse manipulation. The three traffic safety projects are manipulated to have only the negative side mentioned where the three public nuisance projects are shown with only the positive aspect.
A graphical version of the groups is shown below in figure 5.2. The groups get tested and subsequently the results are analysed to show if there exists difference between the groups. In the figure the blue projects of the control group are neutrally framed. The green projects are framed positive and the red projects are framed negative.

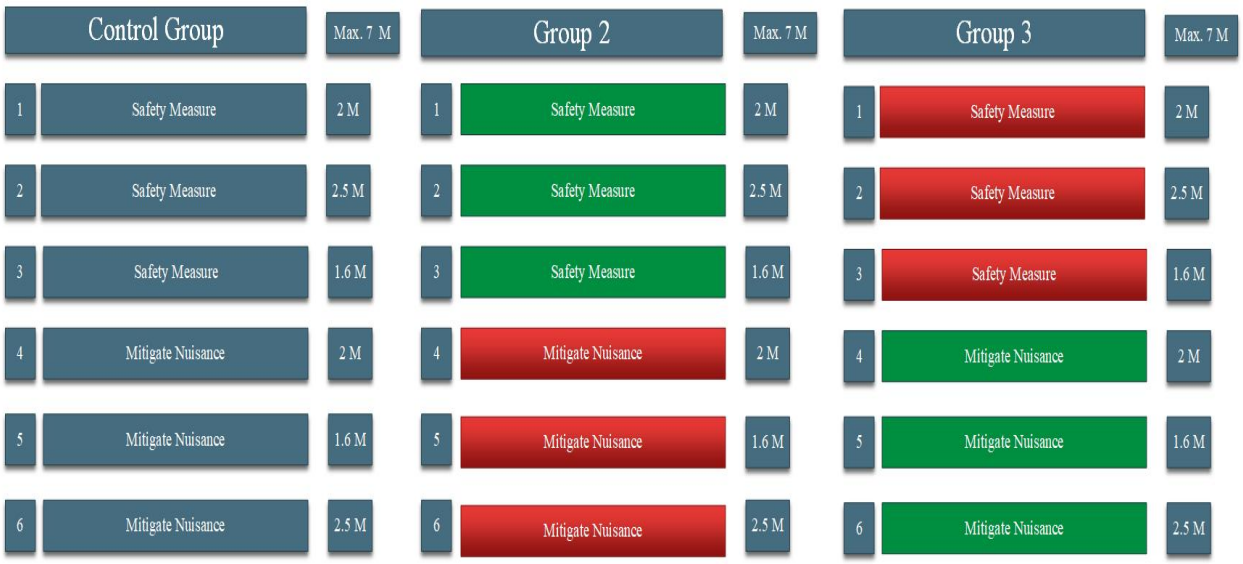

Figure 5.2: Between-subject framing test

The experiment is designed to let participants choose between a trade-off that is reflected in different possible projects. The chosen trade-off, that is elaborated upon in part 6.2.1 of the report, is the trade-off between safety and mitigating public nuisance within the general context of the PVE.

The data is collected through the system of PVE which can be described as a survey style data collection method where information is provided to the participant, their preference is stored after which general questions, for instance, gender, age, and, education can provide additional information for analysis. The test can be analysed through analysis of variance in SPSS to show if there is a difference between groups followed by a post-hoc method to analyse what this possible difference means. The data is interpreted in conclusions and evaluated on reliability and validity. The process is reported and future possible research is proposed.

5.2 Expert Interviews on Decision-making in PVE

In addition to the laboratory experiment, expert interviews are conducted. The expert interviews are focused on policy-makers that are active within the used context of bicycle policy.
These policy-makers can share important insights in the use of PVE in general and in how they think about framing within this method. Where the existing research surrounding PVE is focused on the participants and their opinion about the method, these interviews will focus on the policy-makers.

For further research it is important to know how policy-makers feel about the method and how it ranks compared to other/traditional methods of citizen participation.
Furthermore, if the PVE method is used, how do these experts will treat the results? Is the outcome binding for new policy or is treated as an advice for the policy-maker?
How will participants be picked, is everyone able to fill out the PVE or is a sample group preferred?
Furthermore, are there big problems with the basic set-up of the method and how do these experts feel about framing in the PVE. Different experts are targeted, mainly on a municipal level as this fits the context of bicycle policy in the best way.

6

Participatory Value Evaluation

When creating a PVE it is important to have a clear overview of basic elements within the method. For example it is important to understand how the data is collected and what the important factors are within the decision-making process of participants.
The PVE is introduced through a introduction and a research explanation page. Basic information concerning the overall duration is shared combined with the explanation why the specific research is important. This is followed by an instruction page with a instructive video attached, where the basic functions are explained and the budget constraint is introduced. The main overview screen shows all projects, the current budget and allows for different ranking options. An example of the main overview screen is shown below in figure 6.1.

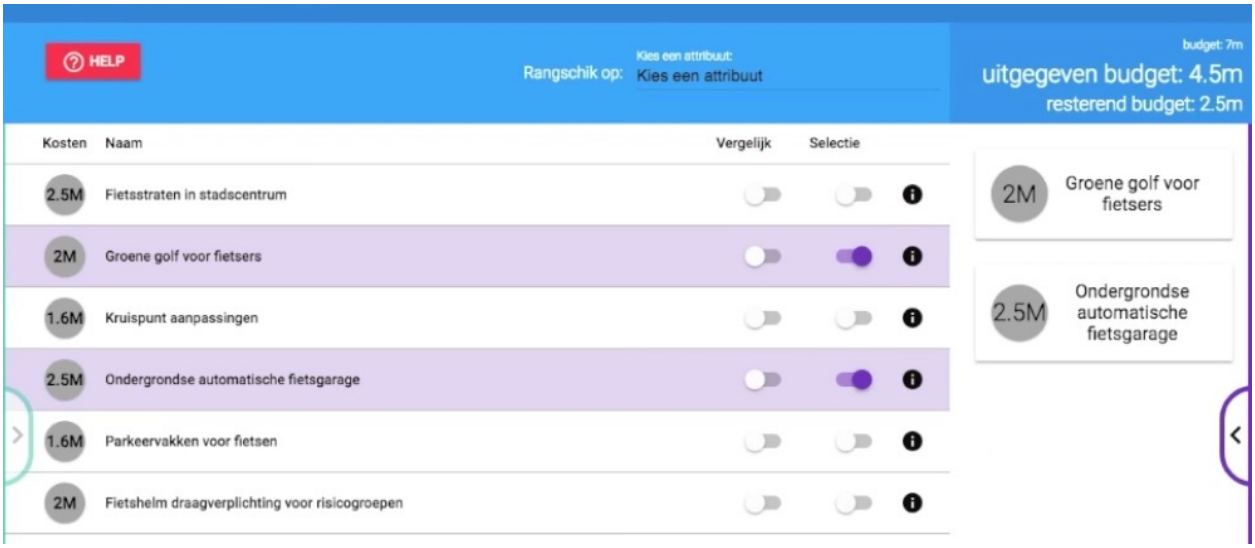

Figure 6.1: Main overview screen

When the participant is satisfied with the chosen projects the Final Choice Overview page shows the projects, the remaining budget and the different attributes. Finally, when the choice is send in a questionnaire starts to allow for extra motivation and information for analysis. When the questionnaire is over, the participant is thanked for their contribution.

6.1 Basic Design of the PVE Method

The three defining parts in PVE design are; the budget, the attributes and the project descriptions. These three basic parts have a potential effect on the decision-making process of participants. In the main screen of the PVE a list of different projects is shown with their respective costs attached. The total budget constraint is shown in the main screen as well and represents the total sum that can be spend on different projects.

Each project can be selected from the list where an informative screen is shown containing a description of he project through written text accompanied with the attributes that represent the effectiveness of the project. These attributes are shown as numerical figures in a table. For example, a highway project may have attributes concerning beneficial travel time in minutes, but can also affect the quality of fresh air through pollution numbers. The same attributes are listed for all projects to be able to compare them in effectiveness. Below in figure 6.2 this is shown schematically.

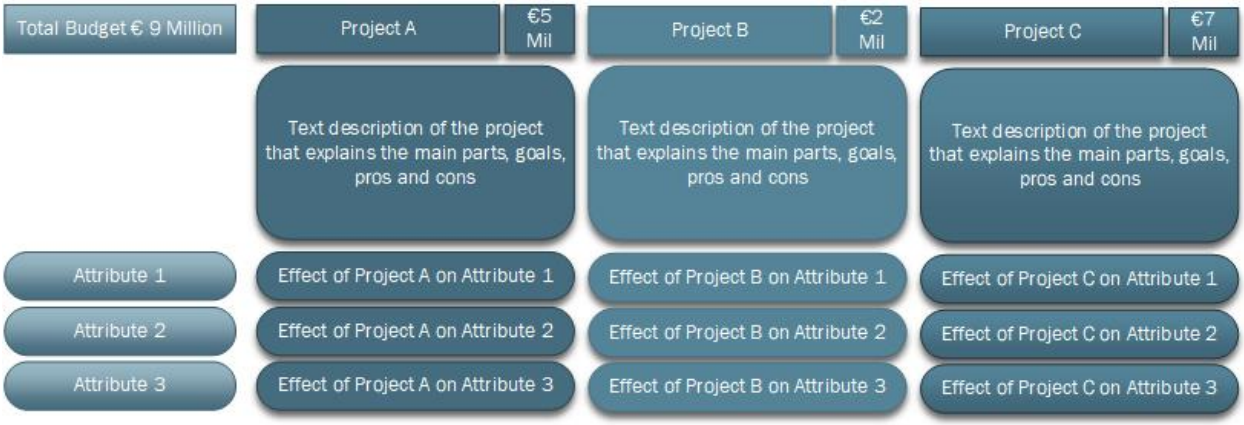

Figure 6.2: Schematic design

6.1.1 Data Collection

Since the start of development in 2017, the innovative aspect of participatory value evaluation, over general participatory budgeting, has been the overall framework and the data collection method. Where participatory budgeting collects data from participants through face-to-face meetings, focus group discussions, and interviews, the method of informing participants is more standardised and constant. The information that lacks a basic collection method in an online setting, is the ability to motivate choices. To overcome this, the motivational data is collected after the selection process in a short questionnaire.
The PVE method collects three versions of data:

- Quantitative session data
- Quantitative questionnaire answers
- Qualitative questionnaire answers

The choices participants make, are stored in qualitative session data. After the selecting the projects and allocating the budget, a small questionnaire is presented with a range of questions that help analyse the session data further in statistical analysis. The data from the questionnaire is both quantitative and qualitative. A number of questions is focused towards general information data like age, gender and education. Other quantitative data will be gathered through a 5-point Likert scale. Qualitative data is used in the questions that ask for specific motivations.

6.1.2 Decision-making Process in PVE

The decision-making process in PVE was briefly mentioned in the literary research part of this report, section 2.4. The decision participants make depends on how much value they allocate towards budget, attributes or project description.
The decision in the method can be made differently through different styles of decision-making. A magnitude of different styles in decision-making exist, the decision balance sheet style for instance refers to a list of pros and cons the participant makes. When the list is completed a decision is made, this is a style based on rationality. Satisficing, refers to the style where the participants looks at alternatives until a certain degree of satisfaction is achieved. A third possible style might be optimising, where the maximum effectiveness is searched for. Many more styles are described in theory, and in practise a combination of styles can be identified. (Klein, Orasanu, Calderwood, & Zsambok, 1993)

As explained in the literary research, in reality the decision-making process in PVE tends to be a combination of multiple styles together with the Multiple Discrete-Continuous Extreme Value Model, where a continuous factor is budget and the discrete factor is project based (Bhat, 2008). Furthermore, too many possible projects can lead to less efficient decision-making as cognitive abilities of participants restrict how many variables can be compared (Mouter et al., 2018) (Dartée, 2018). This affects the construction of PVE, in previous research the maximum amount of projects tends to be between ten and sixteen.

6.2 Construction of a PVE

The construction of a PVE is an iterative process where different projects, attributes and budgets are chosen within the overall research context. Sophie Pak researched a method for designing a PVE in her 2018 master's thesis: The participatory value evaluation method: an application to the transition towards zero natural gas use at the local level of the neighborhood hengstdal in Nijmegen (Pak, 2018).

Below in figure 6.3 this method is shown in a step-by-step overview. For this particular research, the method is partially followed, since the incorporation of framing within PVE forced the design to be adaptable and iterative throughout the design process. The sixth step of the method for designing a PVE is left out since the calculation of effects on constraints and attributes was specific for the research of Sophie Pak and does not apply to this design of a PVE.

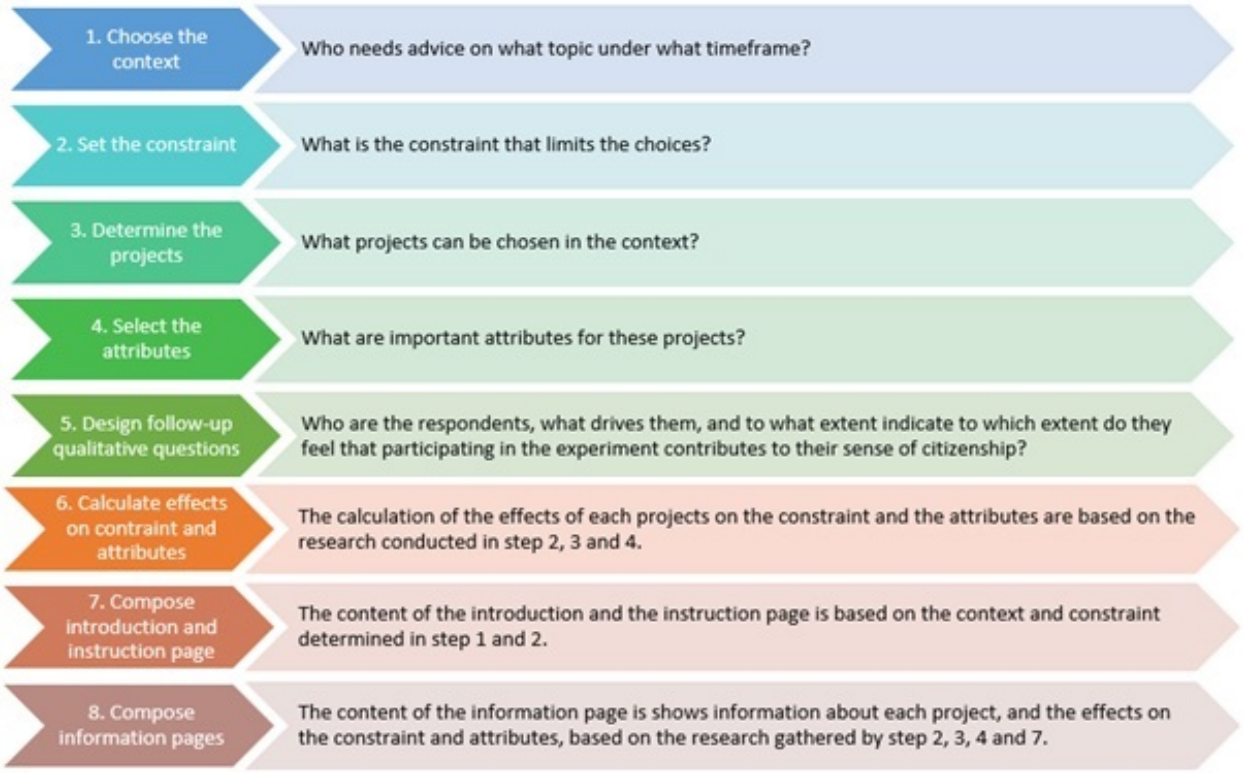

Figure 6.3: Method for designing a PVE (Pak, 2018)

6.2.1 Context: The Use of Bicycles in an Urban Environment

The design of the PVE method is normally intertwined with the context of a particular problem. When the literary research leads to a specific knowledge gap, the research problem dictates the context of the PVE. Because the current research problem is focused on improving the overall method, namely test a possible effect of framing, consequently the context is not connected through the research problem.

A context can therefore be determined based on other factors. When testing framing the context of the experiment is ideally not something the respondents have knowledge about or have formed an opinion on. Previous knowledge can influence the decision-making process as informed participants might not read the complete framed version of the description. However, when conducting research under a set time-constraint this ideal situation is not always possible, furthermore these potential differences in decision-making will be visible within the control group as well.

The context of the PVE for this research is: The use of bicycles in an urban environment.

In 2017, an article in the online newspaper ”The Correspondent” was written about the PVE method. In this article the PVE method was explored and suggested was to adapt it towards re-

search concerning bicycle policy (Verkade, 2017). 400 people showed interest in participating in a study surrounding this context. To be able to approach these people, as well as students from the TU Delft, the bicycle policy context is chosen. Data collection and finding participants for research can be difficult, especially within a time-constraint. This convenience sample will still show a possible framing effect since a control group is used. However, the sample group already has a highlighted interest in bicycle policy and/or PVE since they volunteered themselves for a study surrounding this context.

The use of bicycles in an urban environment is an engaging subject within Dutch society. With the urban areas in The Netherlands becoming more and more densely populated (CBS, 2019b), while the use of bicycles is actively encouraged by Dutch government because of the impact on the environment and the beneficial health consequences.

The increased use of bicycles leads to several problems in an urban area. These problems mainly concern three categories; traffic safety, traffic flow, and bicycle parking. Many different projects exist to tackle problems with bicycle use in the urban environment, different cities and countries tend to test innovative projects on effectiveness. From this pool of different innovations a selection of projects can be made to function in the context case of this research, when it fits within the constraints of the PVE.

It is important to note the decision is made to test the experiment in the Dutch language. Non-native language in an experiment can impact the group sample as not everyone is willing to participate. Furthermore, testing a textual based cognitive bias effect as framing can be hindered when influenced by a non-native language that might have an effect on how the text is perceived in terms of comprehension by participants.

6.2.2 Set the Constraints

The constraints of the PVE method are generally in line with the overall budget that the involved governmental entity has reserved for the PVE. In this case the PVE is set in a fictitious city and no municipality is involved. Therefore, the constraint of the budget is based on the amount of projects involved and the display of realism within this number.

Where literature of previous PVE projects tends to limit the overall projects between 10 and 16, this might affect the decision-making process of participants. In an effort to see whether framing affects the decision-making process in PVE it is argued that for this research it is not useful to cloud participants judgements with an extreme pluriformity in projects. This can lead to the maximum in cognitive abilities mentioned by (Mouter et al., 2018) when too many variables need to be compared. Very few project options, for instance two, might lead to an obvious manipulation

of the projects in terms of frames. The constraint on the number of projects is set to be six for this research, as it considers arguments for both too few and too many project options.

Within the constraint for six project options the total budget can be set to be seven million euro. Generally, within a PVE the budget prohibits the participant to choose all available projects. Because of the fictitious nature of this PVE, the choice is made to limit the maximum amount of chosen projects in terms of budget. This limit is set to three, half of the total of six projects.
The total budget of 7 million euro is based on these three different projects, making the average amount of cost per project 2.3 million euro. This 2.3 million is, when researching possible projects, a reasonable amount to use in this experiment.

6.2.3 Projects

Six projects are selected from a list of possible project options. The projects were selected based on category. As explained in paragraph 6.2.1, three basic categories of problems exist within urban bicycle use in The Netherlands; traffic safety, the lack of flow in traffic, and bicycle parking. In an effort to manipulate decision-making, the frames are attached to projects with a sharing category. Three projects concern traffic safety and three other projects concern public nuisance, a combination of traffic flow and bicycle parking.
Three versions of the PVE can be created, a neutral version, a version framed towards traffic safety, and finally a version that is framed towards public nuisance.

The projects that are chosen all exist and are innovations to cope with either safety or public nuisance. To allow for differentiation the projects are not all chosen to fit typical bicycle enthusiasts.

Traffic safety projects:

- The requirement to wear a helmet for specific groups
- Intersection adaptation for safety
- Bicycle boulevards

Public nuisance projects:

- Green wave for traffic flow
- Temporary bicycle parking

- Underground automated bicycle garage

The requirement to wear a helmet for specific groups

The requirement to wear a helmet on a bicycle is accepted in different countries of the European Union like Germany or France as it increases safety and lowers the chance of severe head injury. In the Netherlands, bicycle enthusiasts tend to be against this type of regulation.
The specific groups mentioned in the project are; children below 12 years of age, race-cycling, e-bikes, and mopeds.

Intersection adaptation for safety

Problematic intersections, in terms of safety, get redesigned to act as priority intersections for bicyclists where no traffic lights. This option is popular within different municipalities as it uses accident data to identify problematic intersections.

Bicycle boulevards

Bicycle boulevards are streets, mainly in city centres, where bicyclists are considered to be the main users and cars are ”guests”. The maximum speed is often downgraded to increase safety, and the road intended for bicyclists is broadened. This project opts to construct bicycle boulevards in city centres to increase the overall safety.

Green wave for traffic flow

The innovative system of green wave for traffic flow is called Light Companion. This system builds a strip of LED lights in the bicycle lane. This lane shows a green light that moves towards the traffic light at a certain speed. When the cyclist matches the speed of the LED light, he/she can pass through the traffic light without stopping.

Temporary bicycle parking

Through markings on the ground in busy urban areas, special temporary parking spots for bicycles can be created. The bicycle can be parked for a certain amount of hours. This creates more parking spots in tightly designed areas, like city centres, during peak visiting hours. The amount of time a bicycle is parked can be checked by parking enforcement employees in multiple ways. furthermore, through this method the amount of falsely parked bicycles will be brought down.

Underground automated bicycle garage

The automated, underground, bicycle garage is a innovative concept from Japan. The old Dutch

city centres are not designed for the amounts of bicycles citizens want to park during peak hours. An underground parking garage can help utilise the lack in parking space. The bicycle is offered to the machine at street level, a robotic system takes the bike down and parks it in a free space. This project is however relatively expensive, for the sake of this PVE a small experimental version is opted with fewer parking places compared to the full version.

6.2.4 Attributes

Through the attributes, the participant can compare the effects of the projects to each other. A list of general effects for all projects is made after which the effects for every project are identified. Six general attributes are chosen for this particular PVE. The first attribute is cost. The cost of projects and the overall budget are also a continuous factor in decision-making according to the MDCEV model of (Bhat, 2008). Large fluctuations in costs per project might influence decision-making and thus have an effect on how framing is tested in this particular experiment.

With three projects focused on traffic safety and three on public nuisance the choice is made to give the same values to three safety projects compared to three public nuisance projects to start with a level playing field for potential frames. The average cost of 2.3 million euro per project, see part 6.2.2, and a maximum of three possible projects to choose from the total of six, can lead to the following option; Project costs 2 mil, 2.5 mil, and 1.6 mil. The most expensive safety project and public nuisance project will cost 2.5 million euro, the middle one of both will cost 2 million euro, and the cheapest project for both safety and public nuisance will cost 1.6 million euro. With a constraint budget of 7 million in total, a maximum of three projects can be chosen by the participant.

The other general attributes to compare projects with each other are; Reduction of severe accidents [percent], Extra bicycle parking spots [number amount], Change in car travel time [minutes per trip] , Change in bicycle travel time [minutes per trip], Overall effect on bicycle usage [percent].

An overview for all projects and attributes is shown below in table 6.1. Important to note is that the numbers are based on true numbers as much as possible, supplemented with fictitious numbers when necessary because the projects take place within a fictitious city.

Table 6.1: Attribute table

	Bicycle Helmet	Bicycle Boulevards	Intersections	Green Wave	Temporary Parking	Underground Garage
Cost	€ 2 Mil	€ 2.5 Mil	€ 1.6 Mil	€ 2 Mil	€ 1.6 Mil	€ 2.5 Mil
Reduction of severe accidents	52%	30%	8%	0%	0%	0%
Extra bicycle parking spots	0	0	0	0	120	40
Change in car travel time	0	[+1 min/rit]	[+1 min/rit]	0	0	0
Change in bicycle travel time	0	[-2 min/rit]	[-3 min/rit]	[-4 min/rit]	0	0
Overall effect on bicycle usage	-5%	[+3%]	[+1%]	[+2%]	-1%	0

6.2.5 Follow-up Questions

Follow-up questions after the PVE are asked in an effort to analyse the group sample in terms of basic information, decision analysis, and motivation for choices made. Fourteen questions are asked, the first three focus on basic information:

Q1: What is your gender?
Male/Female
Q2: What is your age?
Q3: What is your education level?
Primary school/ High school/ MBO/ HBO/ WO

The next eight question focus on information that can be used to analyse the choices made by the participant.

Question four and five focus on how many times a bicycle is used by the participant. This gives insight in how invested they might be in the overall subject, the so called issue importance discussed in the literary part of this report, part 2.5. A daily bicycle user is more likely to have formed an opinion on bicycle policy compared to a participant that never uses a bicycle (Lecheler et al., 2009). These questions help to identify these specific participants and can show differences in choices made.

Q4: How often do you use the bicycle as a means of transportation?
Never/ Yearly/ Monthly/ Weekly/ Daily
Q5: How often do you use the bicycle for your commute to work?
Never/ Yearly/ Monthly/ Weekly/ Daily

Question six and seven focus explicitly on traffic safety and public nuisance. In the experiment this is done implicitly as three projects address safety and three projects address public nuisance. The answers to these questions might show a potential difference between the stated preference and the outcome of the experiment as put forward in contingency valuation literature by (Mitchell & Carson, 2013).

Q6: To what extent do you agree with the following statement?: It's necessary to increase bicycle traffic safety in relation to the current state of traffic safety
Strongly disagree/ Disagree/ Neutral/ Agree/ Strongly Agree
Q7: To what extent do you agree with the following statement?:It's necessary to create more parking possibilities for cyclists
Strongly disagree/ Disagree/ Neutral/ Agree/ Strongly Agree

Questions eight, nine, and ten are asked to show if participants that might have been biased because of their own experience are influenced through the manipulation of the frame, the so called selection bias of the sample is tested (Heckman, 1979). An expected result, for instance, is that people who park their bicycle in the city centre are interested in projects that address problems concerning bicycle parking.
Electric bicyclists are targeted in question nine because of the first project. In this project, electric bicycle users are forced to wear a helmet. Therefore it is interesting to see if electric bicyclists choose this project when framed positively. Road bike users are addressed in question ten and represent a second group that is forced to wear a helmet when the first project is implemented. However, contrary to the electric bicyclists, this group generally wears a bicycle helmet for their own safety even when it is not mandatory.

Q8: How often do you park your bike in a city centre?
Never/ Yearly/ Monthly/ Weekly/ Daily
Q9: How often do you use an electric bicycle?
Never/ Yearly/ Monthly/ Weekly/ Daily
Q10: How often do you use a road(race)bike?
Never/ Yearly/ Monthly/ Weekly/ Daily

The eleventh question of the questionnaire tries to show the influence of the budget on the decision-making process. As different people tend to have different styles of decision-making, the effect of budget based decisions can be analysed through this question. (Klein et al., 1993) (Bhat, 2008).

Q11: Were the costs of the different options decisive in making your decision?
Strongly disagree/ Disagree/ Neutral/ Agree/ Strongly Agree

The final three questions relate to framing and are open questions to allow for motivation. Questions twelve and thirteen address one-sided framing as the result can show whether the participants perceived the shown information as illegitimate (De Vries, 2017).

Q12: Did you get the feeling you were steered towards a decision in any way, shape, or form within the project descriptions, if yes/no, why?
Q13: Did you feel sufficient information was given to make a well-considered choice between the different options?
Q14: Do you have any further questions and/or comments regarding this research?

6.2.6 Compose Introduction and Instruction Pages

The final step, before the project descriptions are made, is to complete the general information pages. Like mentioned at the start of this chapter, this PVE is introduced through a introduction and a research explanation page. Basic information concerning the overall duration of the experiment is shared, combined with the explanation why this specific research is important. This is succeeded by an instruction page with a instructive video attached where the basic functions are explained and the budget constraint is introduced. When the PVE and questionnaire are completed, a final page is shown where the participants are thanked and informed the experiment might have contained frames in text to influence the decision-making process. The constructed pages can be found in Appendix A of this report.

6.2.7 Description of Projects

The descriptions of projects for this PVE are manipulated through frames. The process of describing the projects is therefore discussed in the framing chapter of this report.

7

Framing

In this chapter, emphasis framing is explained and the manipulation of descriptions for different projects of the PVE is shown.

7.1 Emphasis Framing in Context

Like discussed in the literary part of the report, the framing effect is founded in decision-making and shows different connotations evoked through the choice of words, as language can influence value judgements (De Bruijn, 2017). A difference between equivalency framing and emphasis framing is shown where equivalency framing is deemed more subtle. The more extreme version of framing is one-sided framing. A one-sided frame emphasises a positive or negative aspect and leaves out the other side, this can be executed in a mechanical way. Two-sided framing shows both positive and negative effects but creates an emphasis effect on one of both. How strong this emphasis effect is depends on the frame. An overview is shown below in figure 7.1.

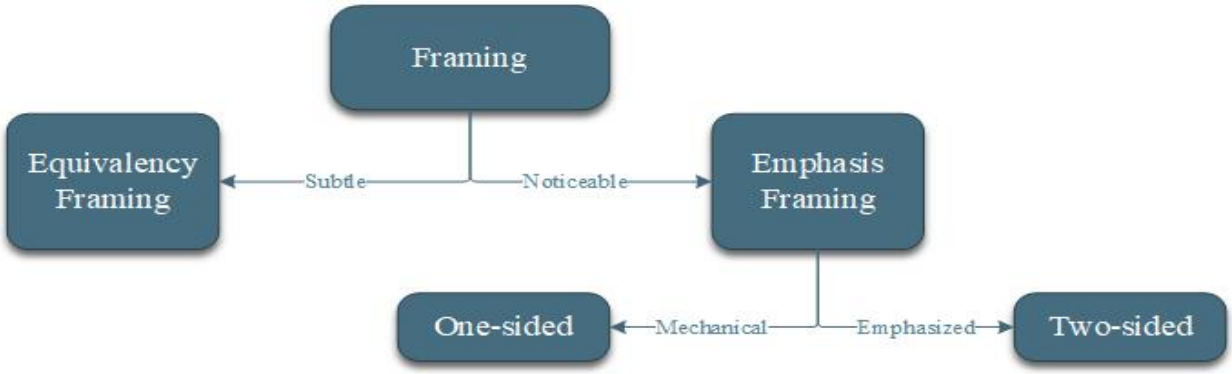

Figure 7.1: Framing

Within the PVE the most extreme and mechanical version is chosen for this experiment. The mechanical ability to manipulate project descriptions by leaving out positive or negative aspects, like in one-sided framing, suits the intended experiment well. This structural approach in manipulation is successfully shown in research. Both (Nelson et al., 1997) in his KKK research, and (De Vries et al., 2016) in her research towards CO2 storage.

7.2 Framing the Experiment

A distinction is made between safety and public nuisance projects as mentioned in chapter 6 of the report. Three groups, or versions, will be constructed; a neutral group where no framing is applied. A second group framed towards traffic safety, where the three projects concerning safety are framed positively and the three projects concerning public nuisance are framed negatively. The third group receives the reverse manipulation with public nuisance projects being positively framed and the safety projects are framed negative.

To allow for this manipulation, the descriptions of the projects all receive the same basic structure. For all projects a small neutral description is made, followed by how much the project costs and how this money is spent. Finally, both a positive and a negative aspect of the project is described. The structure is graphically shown in figure 7.2. The development of the frames is an iterative process in an effort to weigh the positive, negative, and neutral descriptions similarly.

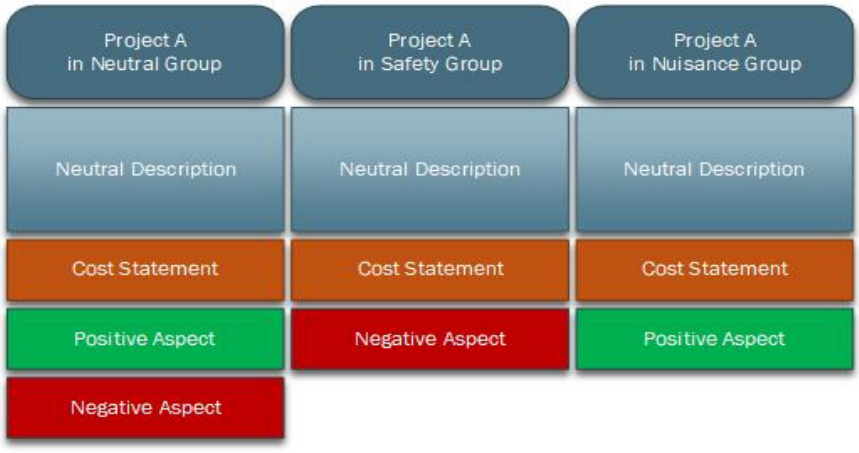

Figure 7.2: Framing Structure

The first project is the Helmet requirement project within the category of traffic safety.

The Dutch neutral description is:

Het invoeren van een fietshelm draagverplichting, voor specifieke groepen. Deze groepen zijn;

kinderen onder 12 jaar, wielrenners, elektrische fietsers en snorfietsers.

The overall cost and its allocative justification of the project is described as:

Het invoeren van deze beleidsoptie kost 2 miljoen euro. Deze kosten bestaan uit het aanpassen en vervolgens handhaven van de wetgeving.

The positive aspect of the helmet requirement project:

Een voordeel van het dragen van een helm is dat het levensreddend kan zijn én dat het de kans op hoofdletsel verkleint tot wel 65 percent, volgens wetenschappelijk onderzoek.

The negative aspect of the helmet requirement project:

Een nadeel van het invoeren van de helmplicht is dat in landen waar de helmplicht geldt, het fietsgebruik aantoonbaar daalt. Het invoeren van de helmplicht is dus het actief ontmoedigen van de fiets als vervoersmiddel.

The second project is the bicycle boulevard project within the category of traffic safety.

The neutral description is:

Het toepassen van fietsstraten in stadscentra doormiddel van wegmarkering. Het fietspad wordt verbreed en vervolgens zijn fietsers in deze straten de hoofdgebruikers en automobilisten 'te gast'.

The overall cost and its allocative justification of the project is described as:

Het invoeren van deze beleidsoptie kost 2,5 miljoen euro. Deze kosten bestaan uit het aanpassen van geselecteerde straten en het handhaven van de snelheid.

The positive aspect of the bicycle boulevard project:

Een voordeel van fietsstraten is dat de verkeersveiligheid wordt vergroot. Onderzoek toont aan dat de verkeersveiligheid van fietsers wordt vergroot, doordat fietsers meer ruimte hebben op de weg.

The negative aspect of the bicycle boulevard project:

Een nadeel van fietsstraten is dat onderzoek heeft aangetoond dat er gevaarlijke situaties ontstaan wanneer automobilisten fietsers inhalen op een fietsstraat.

The third project is the intersection adaptation project within the category of traffic safety.

The neutral description is:

Kruispunten worden omgebouwd tot voorrangspleinen voor fietsers, waar geen stoplichten noodzakelijk zijn en fietsers voorrang krijgen ten opzicht van auto's en voetgangers.

The overall cost and its allocative justification of the project is described as:

Het invoeren van deze beleidsoptie kost 1,6 miljoen euro. Deze kosten zijn toe te schrijven aan het aanpassen van bestaande kruispunten.

The positive aspect of the intersection adaptation project:

Een voordeel van voorrangspleinen is een verbetering van de doorstroming en een verkeersveiligere situatie voor de fietser.

The negative aspect of the intersection adaptation project:

Een nadeel van voorrangspleinen is dat de doorstroming vooral is gebaseerd op fietsverkeer. Automobilisten en voetgangers hebben meer baat bij ander soort kruispunten zoals rotondes.

The fourth project is the green wave project within the category of public nuisance.

The neutral description is:

De groene golf voor fietsers, genaamd Light Companion, bestaat uit een led-strip ingebouwd in het fietspad. Deze led-strip geeft met een groen lampje, dat op een bepaalde snelheid naar het stoplicht toe beweegt, de snelheid aan die de fietser moet aanhouden om gebruik te maken van een groene golf.

The overall cost and its allocative justification of the project is described as:

Het invoeren van deze beleidsoptie kost 2,0 miljoen euro. Deze kosten zijn toe te schrijven aan het aanpassen van bestaande fietspaden en het koppelen van kruispunt-regelsystemen.

The positive aspect of the green wave project:

Het voordeel van de Light Companion is dat voor gebruikers van het fietspad, de groene golf, de doorstroming van verkeersaders verbetert. Deze innovatieve beleidsoptie kan de reistijd van veel fietsers verlagen.

The negative aspect of the green wave project:

Een nadeel van de Light Companion is dat deze optie alleen de doorstroming voor fietsers verbetert, zonder invloed te hebben op verkeersveiligheid. Dit maakt de Light Companion, relatief gezien, duur door de noodzakelijke aanpassingen aan het regelsysteem.

The fifth project is the temporary bicyle parking project within the category of public nuisance.

The neutral description is:

Doormiddel van grondmarkeringen worden er korte-tijd parkeervakken voor fietsen gegenereerd in stadscentra. Binnen deze parkeervakken is de fiets een maximaal aantal uren te plaatsen. Dit kan op verschillende manieren worden gecontroleerd door handhavingspersoneel. Naast het toepassen van deze methode wordt extra opgetreden tegen verkeerd geplaatste fietsen.

The overall cost and its allocative justification of the project is described as:

Het invoeren van deze beleidsoptie kost 1,6 miljoen euro. Deze kosten zijn toe te schrijven aan de constructie van de parkeervakken en de extra handhaving en controle.

The positive aspect of the temporary bicycle parking project:

Een voordeel van de korte-tijd fietsparkeervakken is dat deze zorgen voor extra parkeerplekken in stadcentra. Daarnaast zorgt deze methode voor het terugdringen van verkeerd geplaatste fietsen.

The negative aspect of the temporary bicycle parking project:

Een nadeel van de korte-tijd fietsparkeervakken is dat deze zorgen voor extra fiets parkeerplekken voor mensen die hun fiets maar tijdelijk willen stallen, terwijl er sprake is van een consequent tekort aan parkeerplekken. Daarnaast is deze methode afhankelijk van de juiste controle en handhaving.

The sixth and final project is the underground bicycle garage project within the category of public nuisance.

The neutral description is:

De ondergrondse automatische fietsgarage is een parkeergarage voor fietsen die wordt ingegraven in de grond. De fiets wordt door zijn/haar gebruiker aangeboden op straatniveau, waarna de fiets automatisch een vrije plaats krijgt onder de grond doormiddel van een robotlift en -arm.

The overall cost and its allocative justification of the project is described as:

Het invoeren van deze beleidsoptie kost 2.5 miljoen euro. Deze kosten bestaan uit de aankoop van het product en het ingraven ervan.

The positive aspect of the underground bicycle garage project:

Een voordeel van deze versie van de automatische fietsgarage is dat er extra parkeerplekken voor fietsen worden toegevoegd op een relatief klein oppervlak.

The negative aspect of the underground bicycle garage project:

Een nadeel van de automatische fietsgarage is dat deze erg kostbaar is, waardoor er alleen een kleine versie kan worden geplaatst als experiment.

8

Results

Three versions of the PVE were made and can be found online through the links below. The potential participant list of 390 people who volunteered to participate was split in three ways and each group of 130 potential participants received a different link to participate in the experiment. In addition to this, students of the TU Delft were invited to participate through flyers distributed on the campus. Three versions of the flyer were made to account for all versions of the PVE. In appendix B, examples of both the email and the used flyer can be found.

The neutral version: www.tinyurl.com/fietsbeleid

The traffic safety version: www.tinyurl.com/onderzoekfietsbeleid

The public nuisance version: www.tinyurl.com/fietsbeleidonderzoek

8.1 Data

The experiment ran for seven weeks, it went live on February first 2019 until the twentieth of March 2019. During this period 181 responses were recorded over the three versions of the experiment. The neutral version received 63 responses, the traffic safety version and the public nuisance version both received 59 responses each.

The dataset is stored in comma-separated values and contains both the quantitative session data as well as the quantitative/qualitative questionnaire data. The quantitative data was manually entered in statistical analysis program SPSS to be able to analyse the data accordingly.The qualitative data is discussed in terms of motivations and the expert interviews.

8.2 Quantitative Results

8.2.1 Sample

The sample group of 181 participants is identified in terms of age, gender, and education. From this group , 159 participants shared this information.

Gender

Within category gender there were 159 results, 22 individuals refrained from answering. 105 males and 54 females participated in the experiment, this translate to 66 percent males and 34 percent females.

Age

The category age has 159 results, this means 22 participants did not fill out their age. The average age of the participants is 49 with a standard deviation of 15 years. The minimum age of the sample is 21 while the maximum age is 80. The average age of Dutch citizens in 2016 was 41,5 years (CBS, 2018). The participants in the experiment are older than the national average.

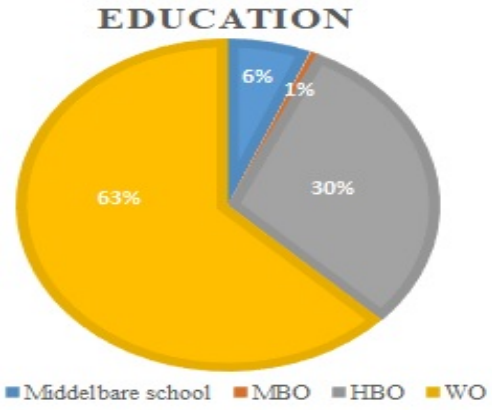

Figure 8.1: Education

Education

The education level of the respondent is shown both in frequency numbers and in figure 8.1. Respondents could choose between primary school, high school, MBO, HBO, and WO. This is respectively coded as 1, 2, 3, 4, and 5. With a mean of 4,50 this indicates that most participants are university schooled. This is reflected in the percentages, as 63 percent of the participants is university schooled. In the national average level of education, 29,5 percent of the population is higher educated, HBO or WO (CBS, 2019a). This shows a large difference between the national average and the participants of this experiment.

Bicycle Use

The use of bicycles by the respondents is important to research as a convenience sample is used and a large part of the participants volunteered to participate in research towards bicycle policy. This was previously discussed in the context part, 6.2.1, of this report. Bicycle usage was tested through two post-test questions, Q4 and Q5 of part 6.2.5. Participants could indicate how often they used a bicycle in their daily commute to work and how often they used a bike as a means of transportation. A five point answer scale was used where never, yearly, monthly, weekly and daily were the possible choices. The results show that there is a strong representation of both daily and weekly bike users. 56.2 percent of the participants use the bicycle in their daily commute. 20,3 percent of the participants do this weekly. A chart is shown below in figure 8.2.

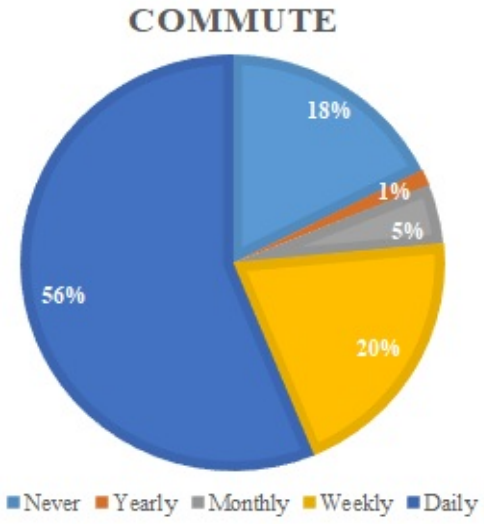

Figure 8.2: Commute

When looking at how often a bicycle was used as a means of transportation an overlapping effect can be witnessed. 76.5 percent of the participants are daily bicycle users and 16,8 percent are weekly bicycle users. This means a cumulative percentage of 93,3 percent of the participants use the bicycle weekly or daily. This is shown below in figure 8.3.

These numbers show that the used convenience sample is over-represented with bicycle users. This can have an effect on the experiment as the sample is knowledgeable about bicycle use and might know some of the presented project in the experiment. Framing can therefore be more difficult to establish as it tries to influence participants that might have already formed an opinion on different projects. However, through the use of the control group the difference that is shown can be allocated towards the framing effect.

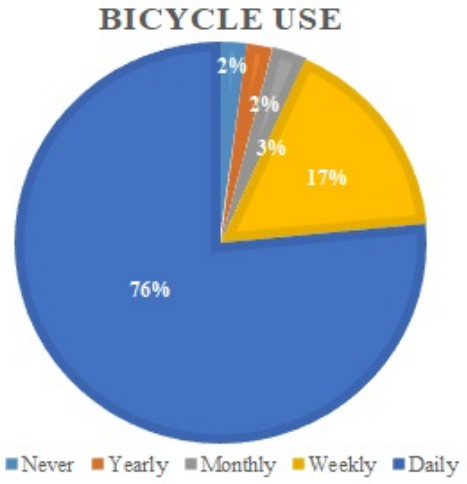

Figure 8.3: Transportation

8.2.2 Decision-making in Participatory Value Evaluation

Three versions of the PVE were constructed; the first group with neutral descriptions, the second group with three projects that contained positive descriptions towards traffic safety and three negative descriptions towards public nuisance. This second group is identified as the traffic safety group. The third group reversed the second group, all projects that received a positive description now receive a negative description and the projects that received a negative frame now received a positive frame. The results of the groups are discussed next.

Group 1 Results

The first group, where all projects are described neutrally, can be treated as a benchmark to compare the manipulated groups with.
The neutral group contained 63 participants. The participants could choose a maximum of three projects each in terms of budget, which means 63 x 3 = 189 projects could be chosen in total by this group. 176 times a project was chosen according to the data, this means some participants chose not to spend the full budget.
The first project, Helmet requirement, was chosen 17 times. The second project, Bicycle boulevards, was chosen 50 times. The third project, Intersection adaptations, was chosen 46 times. The fourth project, Green wave,was chosen 30 times. The fifth project, Temporary bicycle parking, was chosen 25 times. Finally the sixth project, Underground bicycle garage, was chosen 8 times. An overview is given below in table 8.1.

Table 8.1: Group 1: Neutral group results

N = 63	**Neutral Group**	Ranking	Frequency	Percentage	Type
Project 2	Bicycle Boulevards	# 1	50	28,4%	Safety
Project 3	Intersection Adaptations	# 2	46	26,1%	Safety
Project 4	Green Wave	# 3	30	17,0%	Public Nuisance
Project 5	Temporary Parking Spots	# 4	25	14,2%	Public Nuisance
Project 1	Bicycle Helmet	# 5	17	9,7%	Safety
Project 6	Automated Underground Garage	# 6	8	4,5%	Public Nuisance
Total			176	100,0%	

When analysing the group as a whole a trade-off between safety and public nuisance projects can be shown. The three projects that focus on improving safety make up $28,4\% + 26,1\% + 9,7\% = 64,2\%$ of the total choices. The three projects that focus on mitigating public nuisance represent $17\% + 14,2\% + 4,5\% = 35,8\%$ of the total chosen projects. In general the safety projects are more popular compared to the public nuisance projects, an overview of the trade-off is shown below in figure 8.4.

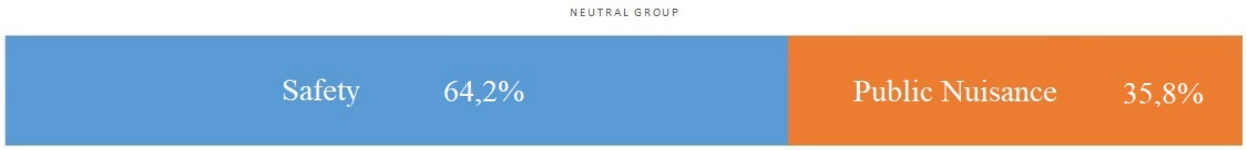

Figure 8.4: Group 1: Safety versus Public Nuisance

Group 2 Results

The second group, where projects 1, 2, and 3 were framed positive and projects 4, 5, and 6 were framed negative, contained 59 participants. In terms of budget, 59 x 3 = 177 projects could be chosen in total by this group. 159 times a project was chosen according to the data, this means some participants chose not to spend the full budget.
The first project, Helmet requirement, was chosen 18 times. The second project, Bicycle boulevards, was chosen 56 times. The third project, Intersection adaptations, was chosen 50 times. The fourth project, Green wave,was chosen 19 times. The fifth project, Temporary bicycle parking, was chosen 9 times. Finally the sixth project, Underground bicycle garage, was chosen 7 times. An overview is given below in table 8.2.

Table 8.2: Group 2: Safety group results

N = 59	**Safety Group**	Ranking	Frequency	Percentage	Type
Project 2	Bicycle Boulevards	# 1	56	35,2%	Safety
Project 3	Intersection Adaptations	# 2	50	31,4%	Safety
Project 4	Green Wave	# 3	19	11,9%	Public Nuisance
Project 1	Bicycle Helmet	# 4	18	11,3%	Safety
Project 5	Temporary Parking Spots	# 5	9	5,7%	Public Nuisance
Project 6	Automated Underground Garage	# 6	7	4,4%	Public Nuisance
Total			159	100,0%	

When analysing the group as a whole a trade-off between safety and public nuisance projects can be shown. The three projects that focus on improving safety make up $35,2\% + 31,4\% + 11,3\% = 78\%$ of the total choices. The three projects that focus on mitigating public nuisance represent $11,9\% + 11,3\% + 4,4\% = 22\%$ of the total chosen projects. In general the safety projects are more popular compared to the public nuisance projects, an overview of the trade-off is shown below in figure 8.5.

Figure 8.5: Group 2: Safety versus Public Nuisance

Group 3 Results

The third group, where projects 4, 5, and 6 were framed positive and projects 1, 2, and 3 were framed negative, contained 50 participants. In terms of budget, 59 x 3 = 177 projects could be chosen in total by this group. 169 times a project was chosen according to the data, this means some participants chose not to spend the full budget.
The first project, Helmet requirement, was chosen 5 times. The second project, Bicycle boulevards, was chosen 55 times. The third project, Intersection adaptations, was chosen 31 times. The fourth project, Green wave, was chosen 40 times. The fifth project, Temporary bicycle parking, was chosen 19 times. Finally the sixth project, Underground bicycle garage, was chosen 19 times. An overview is given below in table 8.3

Table 8.3: Group 3: Public Nuisance group results

N = 59	**Public Nuisance Group**	Ranking	Frequency	Percentage	Type
Project 2	Bicycle Boulevards	# 1	55	32,5%	Safety
Project 4	Green Wave	# 2	40	23,7%	Public Nuisance
Project 3	Intersection Adaptations	# 3	31	18,3%	Safety
Project 6	Automated Underground Garage	# 4	19	11,2%	Public Nuisance
Project 5	Temporary Parking Spots	# 5	19	11,2%	Public Nuisance
Project 1	Bicycle Helmet	# 6	5	3,0%	Safety
Total			169	33,8%	

When analysing the group as a whole a trade-off between safety and public nuisance projects can be shown. The three projects that focus on improving safety make up $32,5\% + 18,3\% + 3,0\% = 53,8\%$ of the total choices. The three projects that focus on mitigating public nuisance represent $23,7\% + 11,2\% + 11,2\% = 46,2\%$ of the total chosen projects. In general the safety projects are more popular compared to the public nuisance projects, an overview of the trade-off is shown below in figure 8.6.

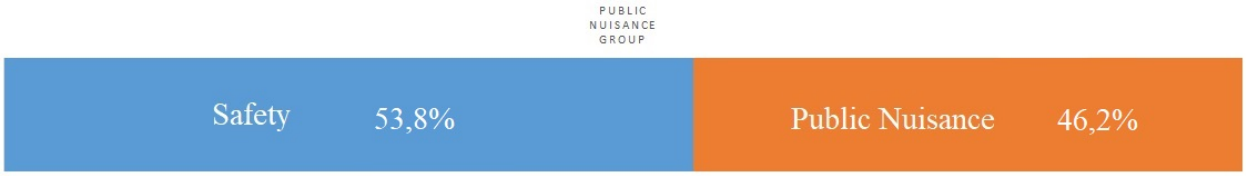

Figure 8.6: Group 3: Safety versus Public Nuisance

Comparing The Groups

A comparison between the groups can be made on a group level and on a project level. On a group level the different combinations of chosen projects, or portfolios, can be compared. In addition to this the overall trade-off between safety and public nuisance can show a different preference between the groups.
On a project level, the specific projects can be compared to itself throughout the different manipulations of the groups to indicate a difference that can be attributed to the framing effect.

Group Level

The overall trade-off between traffic safety and public nuisance is compared by selecting all cumulative project percentages that are attached to traffic safety and public nuisance within the corresponding groups.
For the neutral group this means that from all chosen projects 63 percent focused on safety and 37 percent focused on public nuisance. Overall, within the neutral group, the safety projects were more popular compared to the public nuisance projects. This sets the benchmark to which the manipulated groups can be compared against.

The second group, or safety group, was manipulated with a positive frame towards safety and a negative frame towards public nuisance. An expected result, when framing has an effect, would be to have a trade-off that is shifted more towards safety compared to the neutral group. This effect is indeed visible in the results as 78 percent of the chosen projects focus on safety and 22 percent on public nuisance. This is an increase of 15 percent of safety projects compared to the neutral benchmark group.

The third group, or public nuisance group, was manipulated with a negative frame towards safety and a positive frame towards public nuisance. The expected result was to see a shift in the trade-off towards public nuisance projects. This shift is indeed visible in the results as 56 percent of the chosen projects focus on safety and 44 percent of the projects revolve around public nuisance. This is an increase of 7 percent of public nuisance projects compared to the neutral benchmark group.
It is interesting to identify that even with the positive frame towards public nuisance, the safety projects within the third group are more popular with 56 percent of the chosen projects. Below in figure 8.7 the difference between the groups is visually shown in an overview.

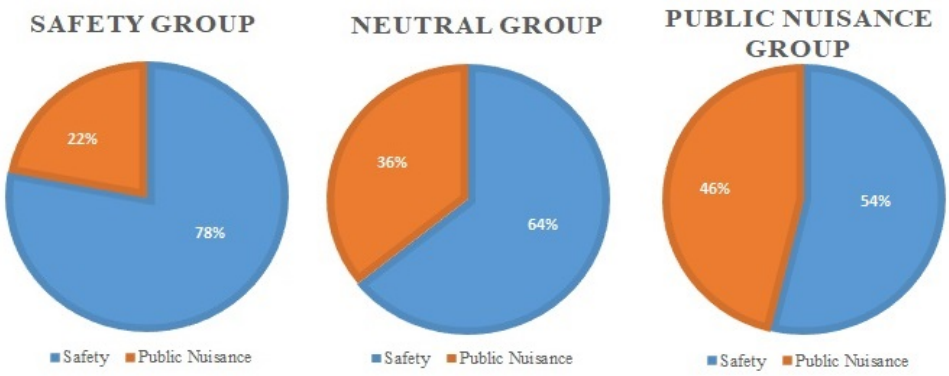

Figure 8.7: Overall results

Portfolios

When analysing the results on the group level, the difference in chosen portfolios of the groups can give further insight in the decision-making process. The portfolios are the combination of projects the participants could make within the PVE. With the total of six projects and the budget constraint, discussed in part 6.2.2 of the report, a maximum three different projects could be chosen to form a portfolio.

Since six possible projects can be chosen, every project can be chosen once, and the order/ranking of the projects does not matter, the statistical combination formula can be used to calculate the number of possible portfolios. In this formula, N is the total amount of projects, six. K represents the amount of chosen projects in a single portfolio, in this case three.

$$nCr\binom{6}{3} = \frac{3!}{6!(3-6)!} = 20$$

Twenty possible unique combinations of three projects can be made from a total of six projects. A list was made with those twenty possible portfolios and their corresponding frequencies. Statistical analysis is used to find the frequencies of the different portfolios. This list can be found in appendix C. The top three portfolios of the tested groups are shown below in figure 8.8

All three groups share the same most popular portfolio, this is a combination of Bicycle Boulevards, Intersection adaptations and Green wave for bicyclists. This portfolio consists of three easily recognisable projects. Both Bicycle Boulevards and the Intersection Adaptation projects are currently implemented in different municipalities in the Netherlands. The Green Wave project is a proven concept for cars and therefore easy to understand for participants. In addition to this, the overall trade-off between safety and public nuisance in the neutral group, is at roughly 66 % safety and 33 % public nuisance projects. The most popular portfolio is composed of two thirds safety projects and one third public nuisance, and coincides with the overall trade-off of the participants.

Neutral Top 3			
1	Bicycle Boulevard	Intersection	Green Wave
2	Bicycle Boulevard	Intersection	Parking Spots
3	Bicycle Boulevard	Intersection	Bicycle Helmet

Safety Top 3			
1	Bicycle Boulevard	Intersection	Green Wave
2	Bicycle Boulevard	Intersection	Bicycle Helmet
3	Bicycle Boulevard	Intersection	Parking Spots

Public Nuisance Top 3			
1	Bicycle Boulevard	Intersection	Green Wave
2	Bicycle Boulevard	Green Wave	Bicycle Garage
3	Bicycle Boulevard	Green Wave	Parking Spots

Public Nuisance Safety

Figure 8.8: Portfolio Top 3

The three top portfolios in the safety group are the same as the neutral group. However, the portfolio with exclusively safety projects is second most popular compared to a third place in the neutral group.

Within the public nuisance top three portfolios, a clear increase of sets with two public nuisance based projects is visible. Both the second and third most popular portfolios contain two projects related to public nuisance.

Project Level

When looking at the portfolios and compare the groups as a whole, a shift towards the positive frames can be identified. To prove this in a more exact manner the groups can be compared on a project level with their corresponding frequency results. Below in table 8.4 an overview of all three groups is shown, with blue representing safety and orange representing public nuisance. The significance of this observation is analysed in part 8.2.3.

Table 8.4: Frequency Overview

		Neutral	Safety	Nuisance
Project 1	Bicycle Helmet	17	18	5
Project 2	Bicycle Boulevards	50	56	55
Project 3	Intersection Adaptations	46	50	31
Project 4	Green Wave	30	19	40
Project 5	Temporary Parking Spots	25	9	19
Project 6	Automated Underground Garage	8	7	19
Total		176	159	169

The expected result from the one-sided emphasis frame is that a positive frame attracts participants and a negative frame repels participants from choosing that particular project. The first three projects; Bicycle Helmet, Bicycle Boulevards, and Intersection adaptations, are framed positive in the Safety group and negative in the Public Nuisance group. Compared to the neutral group, an increase in frequency is expected in the Safety group and a decrease is expected in the Public nuisance group. This effect is shown below in figure 8.9 for all projects that focus on traffic safety.

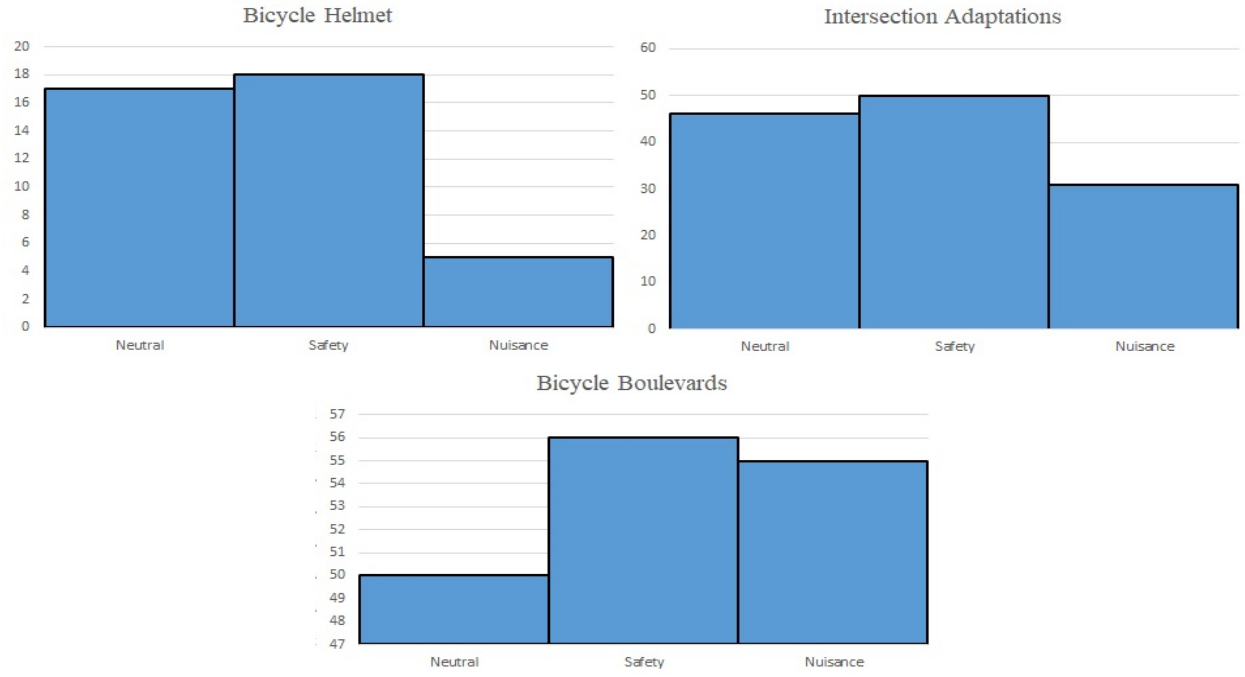

Figure 8.9: Traffic Safety Frequency Charts

For all three projects the frequencies follow the frames. When a frame is positive, the project is chosen more than its negative counterpart. However, with the neutral group acting as a benchmark, an expected result is that the neutral outcome will be between the maximum and minimum outcome. When framed positive, the frequency is higher compared to neutral, and when framed negative the frequency is lower compared to neutral. This is the case for the Bicycle Helmet and Intersection Adaptation projects but this is not applicable for the overall most popular project, bicycle boulevards. When a frame is applied, no matter what kind, the frequency of the project goes up.

The used structure of one-sided framing allows for a mechanical application of the framing effect, it is however possible that the strength of this specific frame or the specific issue importance of the project can influence the outcome (Lecheler et al., 2009).

A similar effect is visible when looking at the results from the public nuisance projects; the Green Wave, Temporary Parking Spots, and the Automated Underground Garage. The expected result is that these projects are more frequently chosen in the Public Nuisance group where the projects are framed positive. In the Safety group the projects are framed negative and are expected to be repelled compared to the neutral group. The results are visually shown in figure 8.10 below.

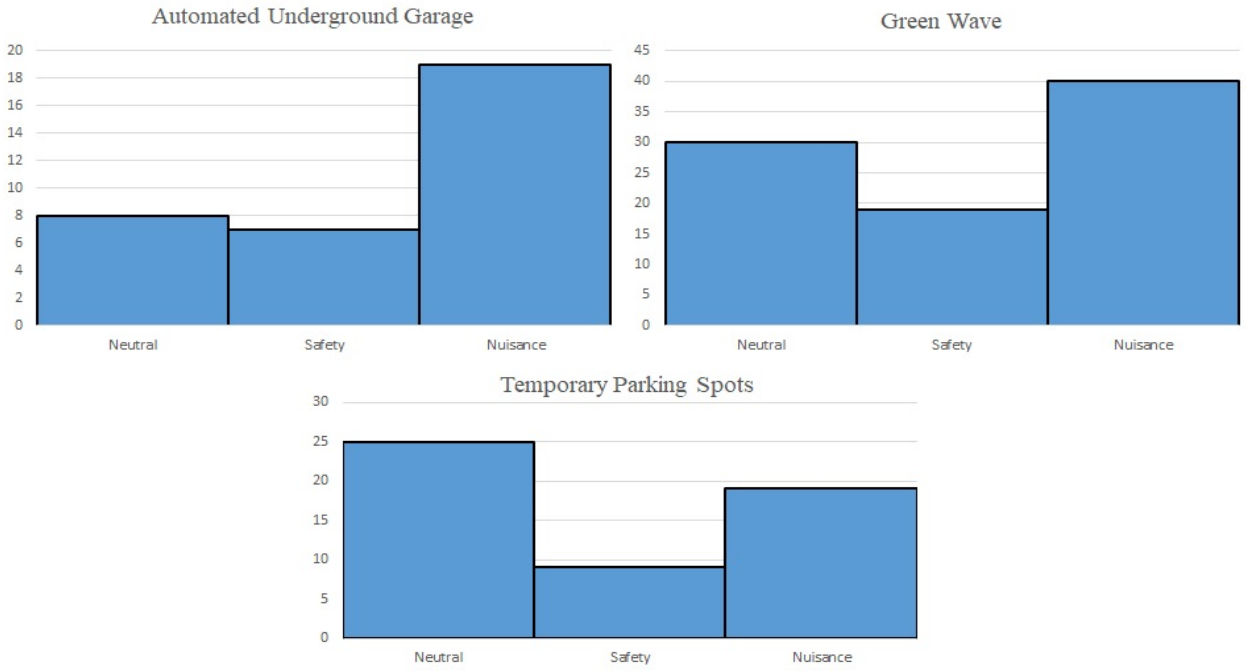

Figure 8.10: Public Nuisance Frequency Charts

For all three projects the frequencies follow the frames. When a frame is positive, the project is chosen more than its negative counterpart. The neutral group falls between the maximum and minimum frequencies except for the Temporary Parking Spots project. The frequencies go down from the neutral group to the other groups. When comparing the safety group to the public nuisance group the effect still holds however. This might, again, be allocated towards the strength of the frame or the specific issue importance of this project. It is interesting to see that when a frame is applied, no matter what kind, the frequency of this project goes down.

8.2.3 Analysis

The three groups are compared and analysed for difference, as only the frames differ between the groups any significant difference can be accounted to the framing effect.
The null hypothesis in this case is that there is no significant statistical difference between the groups. Any significance, equal or lower than p = 0.05 will prove that there is a 95 percent chance the groups differ from each other and thus that an effect of framing within the method of PVE is observed.

The analysis is executed through the Pearson's Chi-Square Test. This tests the categorical data, if a project is chosen, yes / no.
An analysis of variance test, ANOVA, cannot be performed on this data since its nominal nature. The test takes the outcome of the neutral group frequency, based on this information it attaches an expected value to the second group and checks whether the second groups values are different compared to the first group in a significant way.

The test is executed on a project level. For every project the difference is measured between Group 1 (Neutral) and Group 2 (Traffic Safety), between Group 1 and Group 3 (Public Nuisance), between Group 2 and Group 3, and finally between all groups.

Project 1: Bicycle Helmet

The bicycle helmet project is a controversial project within the Dutch society. Strong resistance towards implementation of this project exists even when applied on specific groups. This showed in the results as this projects was not popular. The difference between the first and second group, the Neutral group and the Traffic safety group shows a small increase in terms of frequency in the results. The Chi Square test compares this to the expected change in frequency according to the difference in group size. The result shows a non-significant difference between the groups: Neutral group - Traffic Safety group: $X^2(1) = 0.185, p < 0.667$. The difference between the two groups is too small to show a significant difference.
When comparing the neutral group and the public nuisance group a larger difference is observed. A table is made where the frequencies are calculated into relative percentages to be able to compare the results throughout the groups. This table can be found in appendix D. For this particular project, 9,7 percent of the participants in the neutral group chose bicycle helmet within their portfolio where only 3.0 percent of the public nuisance group did this. This difference is significant

$X^2(1) = 7.062, p < 0.008$
The biggest difference is shown between the traffic safety group and the public nuisance group as 11.3 percent of the safety group chose this project and 3.0 percent of the public nuisance group. This shows a significant difference between the groups with $X^2(1) = 9.127, p < 0.003$. When comparing all three groups an overall significant difference, $X^2(2) = 9.659, p < 0.008$, is shown.

Post-hoc tests are executed to determine the effect size and to show where the statistical difference is found. The size of the effect, or how strong the difference between the groups is can be shown through Cramer's V. This shows the size of the effect in small, medium, or large for nominal values like the values tested in this experiment. The interpretation of Cramer's V is done through a score between 0 and 1. Depending of the degrees of freedom (df) in the experiment, a different effect sizes is allocated. For this experiment where three groups are compared the effect sizes for $df = N - 1$, df = 2 are used. A small effect, $0.07 \leq$ Cramer's V ≤ 0.2, indicates that the shown difference between the groups is small and that the framing effect has a relatively weak effect on decision-making even though the difference is statistical significant. A medium effect size, $0.21 \leq$ Cramer's V < 0.35, shows a medium effect, this effect is strong but still can be influenced by issue importance and can depend case-to-case. Finally a large effect is possible, $0.35 \leq$ Cramer's V ≤ 1.00, in this case the effect size is large, the frame in this case has had a strong incorporated direction. (Cohen, 1988). In the case of the bicycle helmet, the effect of Cramer's V was: $(2) = 0.231, p < 0.008$ Which shows a medium overall effect size.

The adjusted standardised residuals show post-hoc statistical difference compared to the null hypothesis. This means the frequency values of the different groups get compared to another. For every group expected frequency values, adjusted for group composition, is made. The Chi Square test shows if the difference is large enough to be outside of the chance factor. Adjusted standardised residuals show where the statistical differences are located, between which groups and what direction, plus or minus. When the outcome of the adjusted standardised residual test is larger than ± 1.96 the null hypothesis can be rejected and a statistical difference is shown. In this case the adjusted standardised residual is 1.2 for the first group, 1.9 for the second group and -3.1 for the third group. This shows the largest difference is found in the third group. In this group the project is framed negatively. This result coincides with the general opinion of the society and therefore the reduction in frequency can be explained.

Project 2: Bicycle Boulevards

The bicycle boulevards project is the most popular project of the experiment. In all framed/non-framed forms this project was chosen. The frequencies, however, do follow the general direction of the frames. The difference between the first and second group, the Neutral group and the Traffic safety group shows an substantial increase in terms of frequency in the results. The Chi Square test compares this to the expected change in frequency according to the difference in group size. Where in the neutral group this project was chosen 28.4 percent of the time, within the safety group this increased to 35.2 percent of the time. This leads to a Chi square result of $X^2(1) = 6.465, p < 0.011$. With p being below 0.05 this means the difference between the groups is significant.

Between the neutral group and the public nuisance group there is an increase identified. 32.5 percent of the public nuisance group chose this project even though it was framed negatively. The difference between the groups is tested to be $X^2(1) = 4.877, p < 0.027$. This means there is a significant difference between the groups.

The difference between the manipulated groups is not significant with $X^2(1) = 0.152, p < 0.697$. The overall difference between the three groups however is significant with $X^2(2) = 9.119, p < 0.010$

Post-hoc tests are executed to determine the effect size and to show where the statistical difference is found. The framing effect size is shown through Cramer's V: $(2) = 0.224, p < 0.010$ Which shows a medium effect size as the score is between 0.21 and 0.35.

The adjusted standardised residuals show post-hoc statistical difference compared to the null hypothesis. When this is larger than ± 1.96 the null hypothesis can be rejected and a statistical difference is shown. In this case the adjusted standardised residual is -3 for the first group, 1.8 for the second group and 1.3 for the third group.

An overall significant difference between the groups of the bicycle boulevard project is found. Compared to the neutral group there is a significant difference, but between group 2 and 3 this is not the case. This popular project shows an increase regardless of the direction of the frame. The result can be connected to the temporary parking spot project where the neutral group shows a general decrease regardless of the frame. This might be an interesting effect when framing multiple projects in a PVE group.

Project 3: Intersection Adaptations

The intersection adaptations project is the second most popular safety project. In the neutral group, 26.1 percent of the participants chose this projects. In the safety group, where the project was framed positive, 35.2 percent of participants chose the project. The difference between those groups is not significant according to the chi square test, $X^2(1) = 2.500, p < 0.114$. When looking at the combination of the neutral group and the public nuisance group, $X^2(1) = 5.486, p < 0.019$, and the combination of the safety and public nuisance group, $X^2(1) = 14.214, p < 0.000$ the difference is significant. Overall significance between the three groups is shown as well, $X^2(2) = 14.990, p < 0.001$.

The effect size is shown through Cramer's V: $(2) = 0.288, p < 0.001$. This shows a medium effect size. For this project the adjusted standardised residual is 0.6 for the neutral group, 3.0 for the safety group and -3.6 for the public nuisance group , this shows a statistical difference in the safety and public nuisance groups.

An overall significant difference between the groups of the intersection adaptations project is found. The significant difference is however not shown when comparing the neutral description with the positive description of the safety group. This might be explained by the popularity of the project. Since it was already popular in the neutral group the positive manipulation has not increased the amount of times the project was picked by a significant amount.

Project 4: Green Wave for Bicycles

The green wave project is the first public nuisance based project. This means that in the safety group, this projects receives a negative frame. The green wave project is the most popular public nuisance project. 17 percent of the neutral group participants chose this project compared to 11.9 percent of the safety group and 23.7 percent of the public nuisance participants. When comparing the neutral and safety groups the difference is not significantly different even though it is close to the statistical chance factor of 0.05, $X^2(1) = 3.013, p < 0.083$. When the p of the project is larger than 0.05 the difference between the groups can be explained by chance.
Significant difference between the neutral group and the public nuisance group, $X^2(1) = 5.072, p < 0.024$, and between the safety group and the public nuisance group, $X^2(1) = 14.949, p < 0.000$, is shown through the chi square test. The difference between all groups is significant as the result of the test is, $X^2(2) = 15.046, p < 0.001$. The frequencies follow the direction of the frames and the difference is large enough to be outside of the accepted chance statistics.

The effect size is shown through Cramer's V: $(2) = 0.288, p < 0.001$. This is exactly the same as the previous project and shows a medium effect size. For this project the adjusted standardised residual is -0.3 for the neutral group, -3.2 for the safety group and 3.5 for the public nuisance group , this shows a statistical difference in the safety and public nuisance groups.

A overall significant difference between the groups of the green wave for bicycles project is found. The significant difference is however not shown when comparing the neutral description with the negative description of the safety group. The significance of p = 0.083 is however close to the chosen significance statistic of 0.05.

Project 5: Temporary Parking Spots

This project followed the direction of the frames, however when a frame was used a reduction in terms of frequency was observed regardless of the direction of the frame. 14.2 percent of the neutral group participants chose this project compared to 5.7 percent of the safety group and 11.2 percent of the public nuisance participants. When comparing the neutral group to the safety group, $X^2(1) = 9.044, p < 0.003$, the difference is significant according to the chi square test, as is the difference between the safety group and the public nuisance group, $X^2(1) = 4.683, p < 0.030$. However, the difference between the neutral group and the public nuisance group, $X^2(1) = 0.739, p < 0.390$, is not significant. Overall when looking at all groups and comparing their frequencies, the difference is significant, $X^2(2) = 9.141, p < 0.010$

The effect size is shown through Cramer's V: $(2) = 0.225, p < 0.010$. This shows a medium effect size. For this project the adjusted standardised residual is 2.2 for the neutral group, -2.9 for the safety group and 0.6 for the public nuisance group , this shows a statistical difference in the safety and neutral groups.

An overall significant difference between the groups of the temporary parking spots project is found. The significant difference is however not shown when comparing the neutral description with the positive description of the public nuisance group.

Project 6: Automated Underground Garage

The automated underground garage project was the overall least popular project. The overall value to price ratio was relatively low compared to other projects and effects. As only the description of the project was framed and not the price or attributes, this was the same for all three groups. The frequencies of both the neutral and the safety group are very close, with 4.5 percent of the neutral group participants that chose this project compared to 4.4 percent of safety group participants. This does not lead to a significant difference as the Chi Square test results showed, $X^2(1) = 0.020, p < 0.889$. When this project was framed positively, this can be seen in the results as 11.2 percent of the public nuisance group participants chose the project. This does lead to significant differences as the result between the neutral group and the public nuisance group showed, $X^2(1) = 6.726, p < 0.010$. The effect is the same when the safety and the public nuisance groups are compared, $X^2(1) = 7.104, p < 0.008$. Overall the difference between all three groups is found to be $X^2(2) = 10.345, p < 0.006$. This shows a significant difference between the groups.

The size of the effect is once again calculated through Cramer's V: $(2) = 0.239, p < 0.006$. This shows a medium overall effect size. When looking for where the effect shows the most expected from the chi square results is that this would be in the public nuisance group. The adjusted standardised residual is -1.5 for the neutral group, -1.7 for the safety group and 3.2 for the public nuisance group , this shows a statistical difference in the public nuisance group that is in line with the expected value.

A overall significant difference between the groups of the automated underground garage project is found. The significant difference is attributed to the positive framing in the public nuisance group. When framed negatively the result did not differ significantly compared to the neutral group.

8.3 Qualitative Results

8.3.1 Open Questions

The open questions mentioned were dummy coded in an effort to analyse the answers. Not all responses were usable as some participants opt for an answer between yes or no.

Q: Did you get the feeling you were steered towards a decision in any way, shape, or form within the project descriptions, if yes/no, why?

Expected in the results is that a percentage of participants feels like they were manipulated when they were actually not. A variety of reasons is possible for this effect. The fact that the participants were asked the question implies that they might have been manipulated and therefore this effect might show in the control group.
In both the traffic safety group and the public nuisance group this percentage is expected to be higher since these groups are manipulated and steer towards a decision in terms of framing.

The results are discussed and shown below in figure 8.11.In the control group 46 responses were recorded. Eight of them replied to have had the feeling they were steered towards a decision. This comes down to 17 percent of the total respondents in group 1.

In the manipulated groups, 2 and 3, 104 responses were recorded. 30 of them replied to have had the feeling they were steered towards a decision. This comes down to 35,4 percent of the total respondents in the safety group and 40,8 percent of respondents in group three. It is not possible to subtract the neutral 17 percent from these findings in an effort to eliminate the false positive answers, other factors can have contributed in the manipulated groups. However, the higher percentages in both groups suggest that, besides the false positive factor, framing has increased the percentage of the participants that noticed a sense of direction in the descriptions.

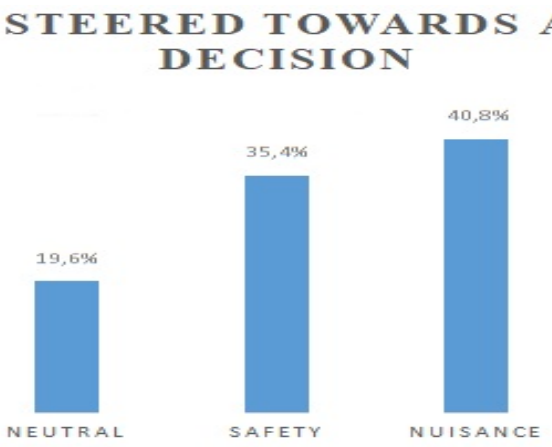

Figure 8.11: Steered Towards A Decision

Q: Did you feel sufficient information was given to make a well-considered choice between the different options?

The expected result is that a number of participants feels like sufficient information was not provided. For every group this might mean the participants feel this way because of the concise structure of this experiment, limited information is provided to control the amount of distracting influences. In the control group, where both a positive and negative side is discussed of every project, a number of participants might say yes to this question because the question itself implies that there might have been something wrong with the provided information.
The remaining two groups are manipulated by restricting the amount of information that is provided. A reduction is expected in the amount of participants that feel like sufficient information was given.

The results are discussed and shown below in figure 8.12. In the control group 47 responses were recorded. 40 of them replied that they thought to have enough information to make a well-considered decision. This comes down to 85.1 percent of the total respondents in the neutral group.

In the manipulated groups, 2 and 3, 104 responses were recorded. 74 of them replied that they thought to have enough information to make a well-considered decision. This comes down to 80 percent of the total respondents in the safety group and 75 percent in the public nuisance group.
This results indicates that a larger percentage of the participants that actually were manipulated, in terms of provided information, felt like information was missing from the descriptions. This result was expected, as in the literature study it was found that an overall feeling of manipulation, can

lead to the experiment being perceived as illegitimate (De Vries et al., 2016).

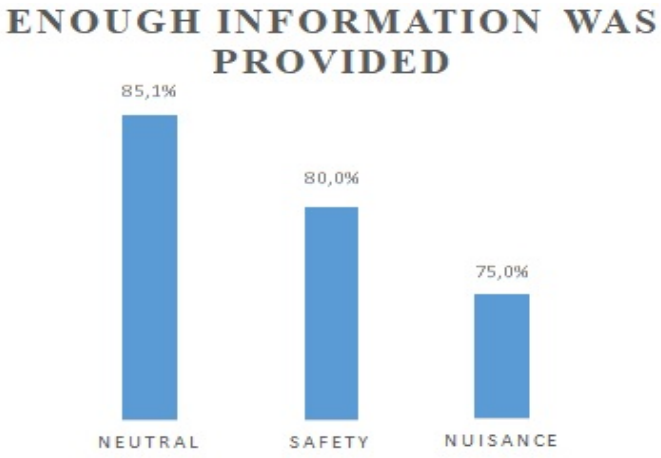

Figure 8.12: Sufficient Information Provided

Q: Do you have any further questions and/or comments regarding this research?
The further comments and questions were predominantly based on budget and project options. Participants show interest in where the total budget is based on and if they can affect this. besides this, there is the general tendency to be able to allocate the leftover budget.
Furthermore, participants showed interest in more project options and shared their opinion in what these projects might be. Car-free city centres, bicycle highways and weather adjusted traffic lights for bicyclists were mentioned. This adds to the fact that the sample group was knowledgeable in the topic.

8.3.2 Expert Interviews

Three expert interviews were conducted in an effort to gain extra insight in the thought process of policy-makers when dealing with participatory budgeting and PVE. The interviews, in general, do not help answer the research question as a whole, but contribute to the overall PVE research as this was previously focused on the experience of the participant. The interviews can share information on how policy makers would use a PVE and share their opinion on framing in PVE. The interviews were conducted on the 20th (Delft), 21st (Rotterdam) of February, and the 6th of March (Delft) of 2019. The conversations, of about an hour, covered different topics concerning PVE. The PVE method was explained and compared to existing versions of citizen involvement. How to find the right sample and how to deal with the results was asked. Finally, how the municipality would implement such a method, and how to would deal with framing within PVE was discussed. A guideline form, in Dutch, was made with potential question that can be found in appendix E.

Interview with Martina Huijsmans, Executive Officer of the Municipality of Delft in charge of Spacial Planning, Mobility and Public Service.

A short summary of the interview with mrs. Huijsmans:
20 - 02 - 2019, 10:00 - 11:00, City hall of Delft.
The results of this interview are used in this report with the explicit permission of the interviewee.

The PVE method was explained and all main aspects discussed. The municipality of Delft tries to involve their citizens through "Delft Doet." A project where citizens can initiate a plan or a solution to a problem, together with the municipality, and create support within the community for this plan.
Delft is a city where bicyclists and public transport is used on a large scale, but as soon as traffic needs to go outside of the municipal borders, for example during commute, these modes of transportation are less used and the car is most popular. In a new mobility plan the objective is to change this behaviour.
The involvement of citizens is sought through social media, active engagement on the street of Delft and during presentation/meetings. This involvement can be difficult because in the opinion of the executive officer it is important to incorporate citizens that never use a bicycle in bicycle policy. In this way plans can be critiqued on a level of citizens that are not enthusiastic. In general, she mentions, the involvement of people is related to a certain distance from themselves. Involvement in terms of kilometres of where they live but also in terms of point of view, social status and political colour. This affects the right sample for a method like PVE. A chosen sample with people who can log-in with their Digi-D might be an option. But it is easier to ask people if they want to share their opinion about the area they live in.

Mrs. Huijsmans thinks the PVE method can be a useful tool when used from a governmental perspective. This means the municipality has the control over the different projects and overall budget. The outcome of the PVE will, in her opinion, never be treated as a requirement to act, but as an advice to the policy-makers of the municipality. She thinks the chosen projects can show the underlying preferences of the participants.

When asked for how to deal with a result from the PVE that is not in line with the preferences of the municipality, she replies that multiple options are possible. In general, the opinion of the participants should be in line with how the municipality acts, this is sometimes in conflict because of

the different political parties in the municipal council. The one-on-one implementation of projects is therefore difficult as they can be outvoted in council. Sometimes unpopular decisions have to be made in an effort to achieve a higher goal, this can be a reason to not go with the direction the PVE shows.

Framing can be a villain or a hero within PVE. Basic framing to try and influence participants is not desirable, but it can be used to emphasise the importance of some projects. A fine line between those both sides exist.

Interview with Bart Christiaens, Bicycle Coordinator for the Municipality of Rotterdam.

A short summary of the interview with mr. Christiaens:

21 - 02 - 2019, 16:00 - 17:00, Municipal office Timmerhuis, Rotterdam.

The results of this interview are used in this report with the explicit permission of the interviewee.

The PVE method was explained and all main aspects discussed. The municipality of Rotterdam tries to involve participants in terms of bicycle policy by polls on social media (fietsfan010.nl) and citizen-panels. The budget for bicycle policy in Rotterdam is allocated for the city as a whole. The method of PVE is perceived to be a great way of involving citizens in bicycle policy. The critique Christiaens mentions is that he would like to be able to allocate the left-over budget.

Mr. Christiaens thinks it is best if as many people as possible can be involved in terms of sample. The social media method of involving citizens does however only involve interested participants that can result in a convenience sample. The citizen-panels of the municipality would be a better alternative as this is a more accurate representation of the citizens of Rotterdam, these panels can be used a maximum amount of times (twelve) in a year and therefore not all policy can be presented to these panels.

He sees the use for the PVE method only in a advising role. The pure one-on-one implementation of projects is not how he would generally like to use the method. Within an advising role, the method shows the municipality where the focus of future policy must go.

He then was asked what he would do when the results of the PVE were not in line with the municipal policy. In general, the results must reflect what the municipality does as the government is chosen by the citizens to act in their voice. However, sometimes it can be necessary to implement a certain project for the greater good. A specific PVE can potentially be made just for the unpopular measure to see how to the citizens would want to deal with this. When composing the PVE only the municipality must be able to determine the possible projects and budget constraints in an effort to maintain control over the direction.

Framing in PVE can be both useful and not useful. In essence framing is unwanted because it can potentially influence the decision and affect the truthful opinion of participants. Framing can however be useful to emphasise the importance of certain factors within the PVE as long as it represents the truth. This is therefore a reason why it is important to have control over the PVE as a municipality.

The interview was finalised with the interest of the city of Rotterdam to test the method within their bicycle policy. The PVE method is perceived to be a great method for involving citizens in policy decision-making and the municipality is willing to test this in co-operation with the TU Delft.

Interview with Lars Matthijssen, Policy-advisor Traffic and Transport, department of City Planning and Economics for the Municipality of Delft.

A short summary of the interview with mr. Matthijssen:

06 - 03 - 2019, 14:00 - 15:00, City hall of Delft.

The results of this interview are used in this report with the explicit permission of the interviewee. The PVE method was explained and all main aspects discussed. Mr. Matthijssen thinks the method is very interesting. This method of using citizens can show the municipality what kinds of projects are popular. Citizens tend to have different considerations when it comes to policy making. Their decision is based on their own opinion and behaviour while the choice of the municipality is subject to all kinds of different constraints. This method can assist the policy makers in identifying problems in current policy.

The method shows the different options and the budget constraint in a simplistic manner. This helps the participants in understanding the options, however the reality is more complex as policy making is subject to multiple constraints on different levels within the municipality. In addition to this, some effects will be more clear after a certain implementation time and are difficult to add to the attribute part of the PVE. Mr. Matthijssen thinks the budget constraint is something participants will debate, the total budget will be discussed by participants and in reality it is difficult to obtain a clear budget to spend on a variety of options in bicycle policy as a whole.

An executed policy is the result of politics, mr Matthijssen thinks, it would be difficult to implement any given option in a PVE in a one-to-one manner. For example, a plan for a certain bicycle boulevard in the city centre of Delft is made, but within the process of policy making it becomes clear that the specific area in the city centre is part of a larger maintenance plan in five years. The implementation of the bicycle boulevard is therefore more financially viable when it is executed in five years time. These types of considerations are not something that can be discussed through a PVE, nor is it expected of citizens to have an opinion on these types of considerations as it is the job of the policy maker to do so.

The method can be very useful to obtain underlying preferences of citizens. As policy makers are not necessary the same people who use the bicycle lanes or the parking spots the input from citizens is of great importance. Delft uses multiple sources to gain information of citizens to help in their policy-making process. DIP panels, or Delft Internet Panels, are used. Approximately 2500 citizens participate in these online questionnaire style panels. The city of Delft works on a mobility plan that has effect until 2040. For this mobility plan citizens are approached in different ways, information events, street surveys and social media is used to gain insight in citizen preferences.

When the result of the PVE is contrary to the city's policy it is important to find out why the citizens want this. When bicycle boulevards are chosen, this might also mean that participants think there are too many cars in the city centre. This issue can be addressed in multiple ways but not always the bicycle boulevard implementation is the best option to address this. It is important to find out why someone chooses a certain project.

Mr. Matthijssen feels strongly about framing in PVE. He thinks that framing in this application is morally wrong. When frames are used to influence participants, the PVE as a method of gathering information cannot be trusted. When asked if framing can also be benifical, Mr. Matthijsen replies that framing to create support for a certain project is unwanted, but a frame can also highlight the importance of cycling in general. Therefore, on a project level framing should be avoided as it is ethically wrong to use framing in PVE according to mr. Matthijssen.

9

Conclusions

This research tested the concept of framing in the participatory value evaluation method. Within this method the opinion of citizens is asked in terms of governmental budgeting. Different potential projects are compared in an online system within the constraint of a set budget. The projects are described, the effects are shown and the cost of the project is given.
The decision of the participants, within the PVE, is based on a combination of those aspects. The description of the project was framed in an effort to influence the decision-making process in the PVE. This influence, however, was never researched and a knowledge gap exists on how strong the influence of framing on the decision-making process in PVE is. This led to the following research question: Is there a measurable difference in outcome of the decision-making process between emphasis-framed alternatives within the participatory value evaluation method?

To answer this question a laboratory experiment in combination with between-subject design was used. Three groups were designed, where one group acted as the neutral control group, the other groups were manipulated through one-sided emphasis framing.
A structure from literature was used to frame six different projects, in the context of ”the use of bicycles in an urban environment.” Three of those projects focused on improving traffic safety, the three other projects focused on mitigating public nuisance.
Every project was described through the same structure, a short neutral description, a cost justification, a positive aspect and a negative aspect. A positive frame was made by removing the negative aspect from the basic structure. The negative frame was consequently made by removing the positive aspect.
These versions of the experiment were set-up and a convenience sample of 181 people was used. The sample was comprised of people who volunteered themselves to participate in a study towards

bicycle policy. In addition to this, students from the TU Delft were asked to participate, this was done by handing out flyers. 181 usable responses were used to analyse results. 63 respondents in the control group, 59 respondents in the second group that was positively framed towards traffic safety, the final group received 59 respondents as well, this group was positively framed towards mitigating public nuisance. The sample comprised of 66 percent males and 34 percent females. The average age was 49 years old and education level was 63 percent university level and 30 percent HBO level. This means the sample contains more males, is older and higher educated than average Dutch citizens.

The analysis of the data shows that overall there is a significant difference between the three versions of the PVE. The versions of the PVE were compared on a project level. As data was collected over a course of seven weeks and when the final data was collected all six projects showed a difference between the groups that was calculated to be significant. The results show that issue importance affects the strength of the frames as was expected through literature. Certain frames are not strong enough to influence the outcome, this showed mainly when the frame was in line with the neutral standpoint of the control group. Because the projects in the PVE are shown as a package from which a certain amount of projects can be chosen, the projects get compared and therefore are interconnected. As a set of six projects are given and a maximum of three projects could be chosen the decision is based on how the project compares relative to the complete set of projects that is available. How the individual projects are perceived therefore influences the outcome as was shown in the results. In general the outcome showed the direction of the positive frames in terms of frequency and a reduction when a negative frame was attached.

Based on these results the research question can be answered:
Through this research it is shown that there is a measurable difference in outcome of the decision-making process between emphasis-framed alternatives within the participatory value evaluation method.

Qualitative data was used to add to existing knowledge surrounding the design of a PVE and how it is used.
In the open questions, participants were asked if they felt like they were steered in certain direction through the project descriptions. In the control group roughly a fifth of the participants thought they were influenced while in fact they were not. In the manipulated groups, roughly a third in the safety group and 40 percent in the public nuisance group felt steered towards a decision. This

means that even with the most explicit form of framing, one-sided emphasis, the majority of participants does not feel manipulated.

The second qualitative question that was asked was if the participant felt like they were supplied with enough information to make a well-considered choice between the projects. In the control group 85 percent of the participants felt like they had enough information, in the manipulated groups this was 71 percent. Since everything else between the different versions of the PVE was kept exactly the same, this decrease in perceived information can be explained by the one-sided descriptions.

Expert interviews were conducted to gain insight in how the PVE method is perceived by policy-makers. An executive officer of the municipality of Delft and two bicycle policy coordinators from the municipalities of Rotterdam and Delft were interviewed. All interviewees think the method is useful in giving advise to the municipality. In general the cities would treat the results as important but not decisive. Multiple issues are at play within a municipality and sometimes it is important to choose an option that is unpopular to the public, for a higher cause. Framing can be both useful and unwanted. In general the information provided has to be neutral for participants to make a well-considered decision. However, framing can be useful to emphasise important factors within the bigger picture.

Overall the framing effect within the decision-making process of participatory value evaluation was proven through this research. This conclusion is important to take into account when designing a PVE. The results suggests that appropriate steps should be taken to adopt the results into the design method of a PVE. When the information within a PVE is biased the intended measurement of citizen value can not be trusted to be the true value of citizens. When this is not addressed the method can become obsolete as participants do not feel like PVE represented their opinion. However the premise of the participatory value evaluation method is auspicious, as participants and policy-makers positive reactions show. The outcome of this research should therefore be used to improve the method and not discard it as a whole.

10

Discussion

This research showed the effect of framing within the participatory value evaluation method. In all projects the decision-making followed the direction of the frame throughout the groups. This resulted in a difference in frequency between the groups that was shown to be significant.
This result can lead to a discussion that addresses the usability of the participatory value evaluation method as a whole. When frames affect the result of the PVE method, is it still a viable method of measuring value of participants?

To answer this question, one needs to look at the size, or strength, of the effect on decision-making in PVE. The framing effect has an influencing effect on decision-making within PVE, however the effect is not equally strong for every project. This shows that issue importance is a limitation of framing, as was previously discussed in the literary part of this report. When participants feel strongly about a certain subject or project, the frame will have a smaller effect on decision-making (Lecheler et al., 2009). This attitude is the reason why a frame might not work. The attitude towards a project is a combination of four factors; experience, literature, beliefs, and values(Boninger et al., 1995)(Lecheler et al., 2009). This contains factors that strengthen the attitude, for instance, when a project is not in line with certain beliefs or values of an individual, he/she is likely to look for more literature and experiences that strengthen this attitude. In essence this makes sense, suppose that a PVE was implemented to test whether or not tax should be increased by 20 percent. When the participant is not willing or able to pay this, the participant is bound to research this and advise against this whether a frame is in place or not.

The used sample group that participated in this research expressed an interest in a study about bicycle policy. This might mean that the convenience sample used, was opinionated before starting

the experiment. I argue that when participants do not have any prior knowledge about a subject and a project is framed in a negative way this will impact the results. For instance, when a layman is shown two potential designs of a new bridge. For one of the designs only a negative aspect is given and for the other only a positive aspect is presented. The participant will choose the design with the positive aspect, as no other information is available. This only works as long as the source is perceived to be trusted (Druckman, 2001b).

It is therefore important to gather information about the participants to be able to estimate the issue importance in advance. For the sake of testing the framing effect in PVE it was desirable that the participants had no previous knowledge. Since this previous knowledge could have an effect on the bias of participants through issue importance. This research showed that even with a convenience sample containing interested, higher educated, and informed people, the framing effect showed its influence in all six projects. It is therefore probable that the results of this research are conservative. With a neutral sample regarding unknown projects, the effects of framing will be even larger.

The results of this research have to be taken into account when designing a PVE. As the influence of the framing effect is shown, the responsibility of a truthful design depends on the ones creating the PVE. The use of a PVE therefore can be, albeit under certain circumstances, an ethical consideration.

10.1 To Frame or not to Frame?

The three conducted interviews provide interesting information in terms of ethics in PVE. All three interviewees mention two sides of framing in PVE. Their first response was that deliberate framing in PVE is unwanted, as it can influence the true opinion of participants. The method becomes superfluous when it does not measure what it intends to measure.
However, all policy makers mentioned that framing can be beneficial to highlight a certain importance. For instance, using a bicycle to commute to work is promoted more compared to the use of a car, because of the health- and environmental benefits. The use of a frame within a PVE can thus be an ethical consideration.

Furthermore, the use of framing can backfire when participants feel like they are being manipulated. An example of this is the recent use of a controversial ”Framing Manual” that was leaked in Germany. In this €120.000 manual, the framing technique explained to be used to influence

citizens on their perception of the television station ARD (Eijsvoogel, 2019). With ARD being a publicly funded channel, citizens felt like they paid for their own manipulation, which in turn became a political scandal.

The question remains if it is ethically wrong to use framing in an effort to intentionally manipulate a certain audience. For the PVE there can be argued it is unethical to intentionally frame on a project level in an effort to generate public support for a decision that is effectively all ready made by the involved governmental entity. This represents an intentional form of framing. When framing on a project level takes place unintentionally, it still affects the decision-making process and consequently the outcome of the PVE. Therefore, it is argued that framing on the project level is unwanted and should be avoided by incorporating necessary steps in the design process of the PVE to ensure truthful representation of the involved projects.

10.2 Recommendations for Further Research

Further research is necessary to identify the extent of framing in PVE.
Do less obvious ways of framing have the same effect or is this effect smaller as it is less explicitly mentioned?
Furthermore, the argument can be made that difference in presentation can influence the decision-making process as well. This research was limited to textual frames that were comparable in structure. Research can be done to further assess differences in how a well a project is explained, extensively versus negligibly. Visual stimuli, like added pictures, might have a framing effect as they influence the overall presentation of a project, which can be important to research.
Perhaps most importantly, further research must focus on a method to mitigate the influence of the framing effect within PVE. This mitigating action could be, for example, incorporated within the existing general method of designing a PVE that was used within this research (Pak, 2018).

To find a suitable adaptation of the current PVE method, a link can be made to the incorporation of public values through responsible innovation that was suggested by Taebi, Correlje, Cuppen, Dignum, and Pesch in their (2014) article ”Responsible innovation as an endorsement of public values: The need for interdisciplinary research”.

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Appendices

A

PVE Overview

A.1 Introduction Page

Figure A.1: Introduction page

A.2 Why This Research Page

Figure A.2: Why this research page

A.3 Instruction Page

Figure A.3: Instruction page

A.4 Main Overview Page

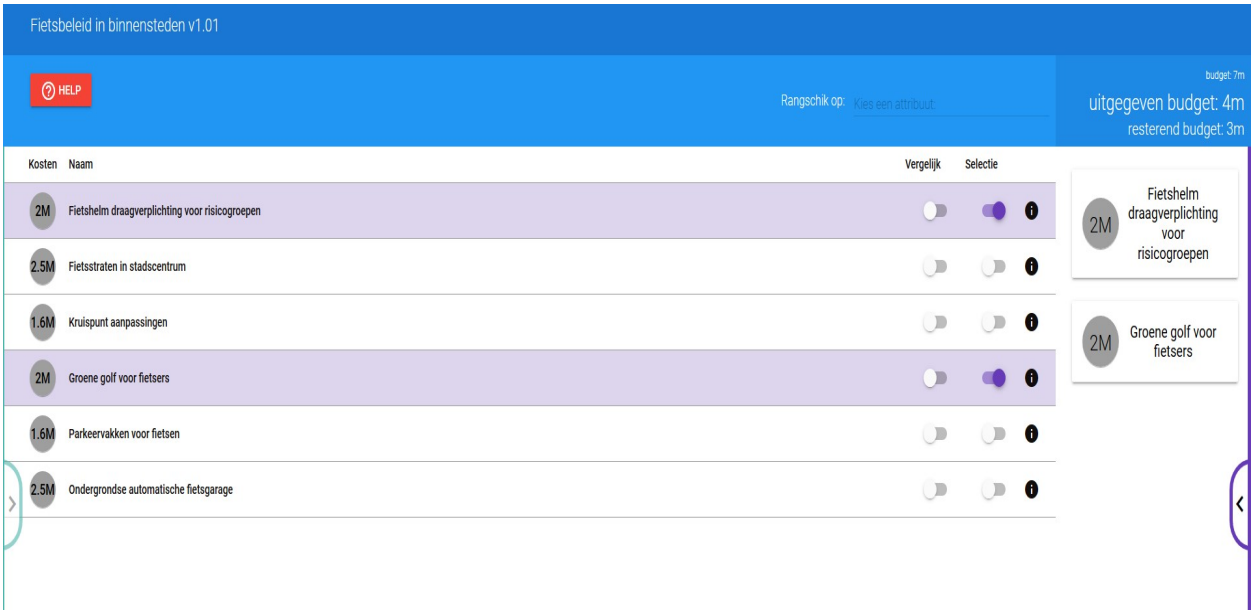


Figure A.4: Main overview page

A.5 Compare Attributes Page

Figure A.5: Compare attributes page

A.6 Final Choice Overview Page

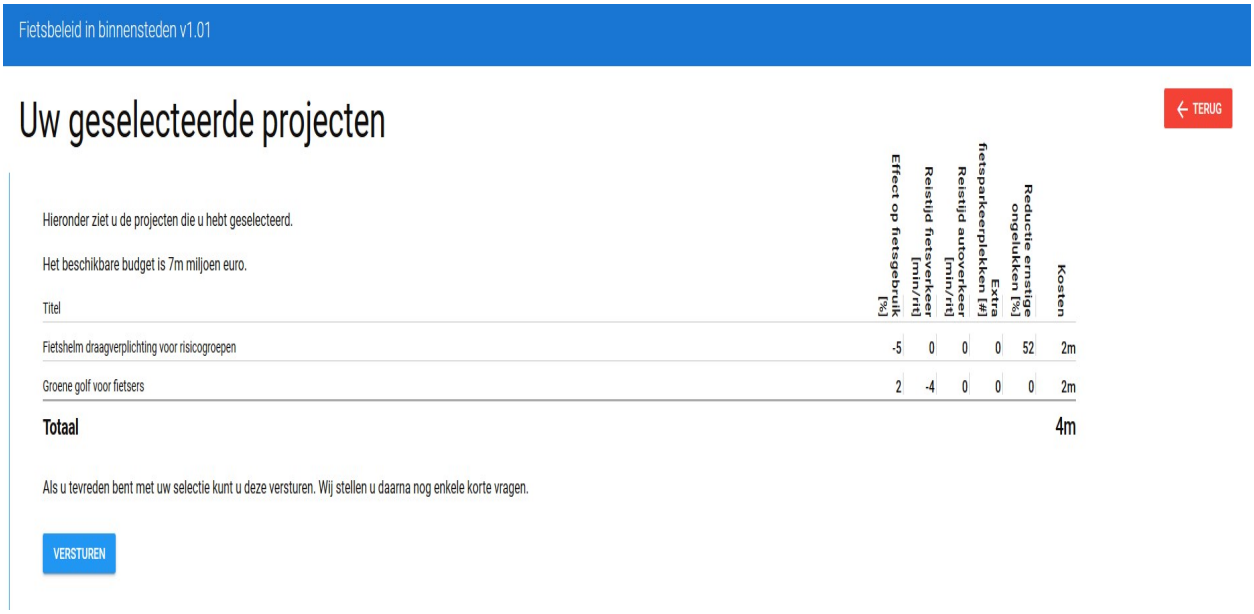


Figure A.6: Choice overview page

A.7 Questionnaire Page

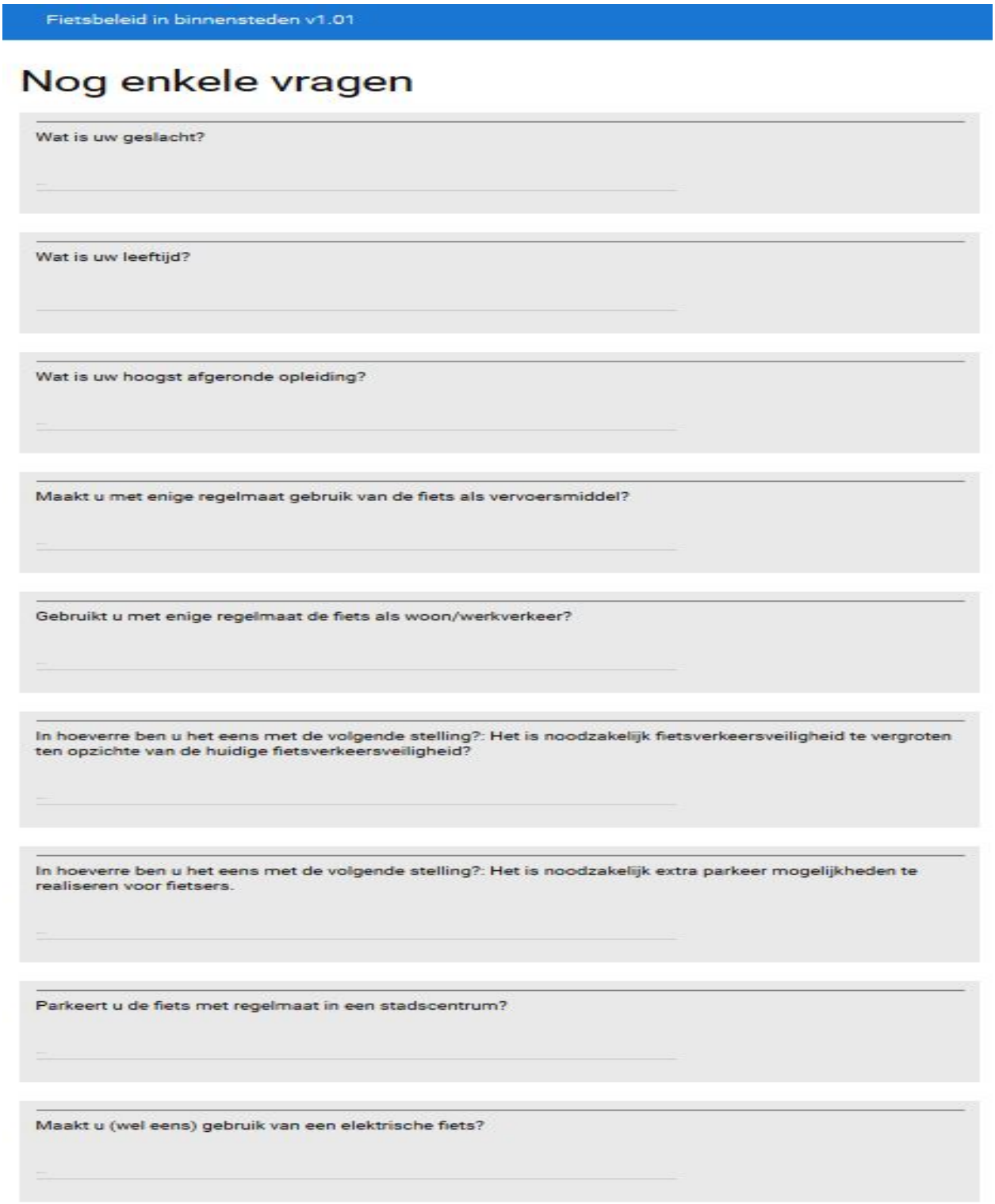


Figure A.7: Questionnaire page

A.8 Final Page

Figure A.8: Final page

B

Participant Invitations

B.1 E-mail

Geachte heer, geachte mevrouw,

Naar aanleiding van het artikel, “Denk en bepaal mee hoe(veel) overheidsgeld aan fietsen wordt uitgegeven” van de Correspondent, mail ik u.

In het artikel van september 2017 wordt een onderzoek van de TU Delft naar zogenoemde participatiebegroting (wetenschappelijke term: Participatieve Waarde Evaluatie) omschreven. In deze participatiebegroting kan de deelnemer zijn/haar voorkeur voor een bepaald beleid aangeven binnen de mogelijkheden van een vastgesteld budget van de overheid.

U heeft destijds aangeven geïnteresseerd te zijn in deelname aan een participatiebegroting voor de fiets. Die mogelijkheid is er nu. De TU Delft onderzoekt naast de werking van de methode de voorkeur van deelnemers omtrent zes fietsbeleid opties in binnensteden.

Gemeenten zijn bereid te investeren in fietsgebruik, mits de gekozen projecten draagvlak hebben onder de bevolking. Dit onderzoek beoogt vooral inzichtelijk te maken welke maatregelen de voorkeur hebben van bewoners en welke kenmerken belangrijk zijn in de afweging tussen de maatregelen.

Deelnemen aan het onderzoek kan via de volgende link:

https://tinyurl.com/fietsbeleidonderzoek

Bij voorbaat dank voor uw deelname

Met vriendelijke groet,

T.F. (Tom) de Geus
Msc student Management Of Technology, TU Delft
Afdeling Technology, Policy and Management

B.2 Flyer

TU Delft

Altijd al het beleid willen bepalen?
Dat kan nu!

Doe mee aan het onderzoek:

"Fietsbeleid in binnensteden"

In welk fietsbeleid moet de gemeente volgens jou in investeren?

Doe mee met een onderzoek naar participatiebegroting.
Geef aan waar jij het budget van de overheid aan uit wil geven!

10 min.

https://tinyurl.com/fietsbeleid

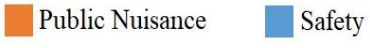
Figure B.1: Flyer

C

Portfolio Frequencies

Table C.1: Portfolio Frequencies

				Neutral	Safety	Public Nuisance	Overall
1	Bicycle Helmet	Bicycle Boulevard	Intersection	6	12	2	20
2	Bicycle Helmet	Bicycle Boulevard	Green Wave	1	1	3	5
3	Bicycle Helmet	Bicycle Boulevard	Parking Spots	4	2	0	6
4	Bicycle Helmet	Bicycle Boulevard	Bicycle Garage	0	0	0	0
5	Bicycle Helmet	Intersection	Green Wave	1	2	0	3
6	Bicycle Helmet	Intersection	Parking Spots	1	0	0	1
7	Bicycle Helmet	Intersection	Bicycle Garage	1	0	0	1
8	Bicycle Helmet	Green Wave	Parking Spots	0	0	0	0
9	Bicycle Helmet	Green Wave	Bicycle Garage	0	0	0	0
10	Bicycle Helmet	Parking Spots	Bicycle Garage	1	0	0	1
11	Bicycle Boulevard	Intersection	Green Wave	19	14	13	46
12	Bicycle Boulevard	Intersection	Parking Spots	10	5	7	22
13	Bicycle Boulevard	Intersection	Bicycle Garage	1	4	6	11
14	Bicycle Boulevard	Green Wave	Parking Spots	2	1	9	12
15	Bicycle Boulevard	Green Wave	Bicycle Garage	2	1	10	13
16	Bicycle Boulevard	Parking Spots	Bicycle Garage	0	1	0	1
17	Intersection	Green Wave	Parking Spots	1	0	0	1
18	Intersection	Green Wave	Bicycle Garage	1	0	1	2
19	Intersection	Parking Spots	Bicycle Garage	1	0	1	2
20	Green Wave	Parking Spots	Bicycle Garage	1	0	2	3



D

Percentage Table

Table D.1: Project Percentages

		Neutral	Safety	Nuisance
Project 1	Bicycle Helmet	9,7%	11,3%	3,0%
Project 2	Bicycle Boulevards	28,4%	35,2%	32,5%
Project 3	Intersection Adaptations	26,1%	31,4%	18,3%
Project 4	Green Wave	17,0%	11,9%	23,7%
Project 5	Temporary Parking Spots	14,2%	5,7%	11,2%
Project 6	Automated Underground Garage	4,5%	4,4%	11,2%
Total		100,00%	100,00%	100,00%

E

Interview Guideline Questions

Expert interview PVE fietsbeleid in binnensteden

Uitleg interview, kan (gedeeltelijk) anoniem indien gewenst, samenvatting van interview kan doorgestuurd worden. Het wordt opgenomen voor uitwerking, niet voor publicatie.

Uitleg : Focus tot nu toe lag op de ervaring van deelnemers/burgers. Wat vinden zij dat beter kan? Nu willen we vooral kijken wat beleidsambtenaren en politici van PVE vinden. Wat zijn de sterke en zwakke punten en wat kan er beter?

Algemene uitleg methode aan de hand van de neutrale versie van PVE fietsbeleid in binnensteden.

Vragen

- Wat vindt u van burgerparticipatie op deze manier?
- Wat zijn sterke punten van de methode?
- Wat zijn zwakke punten van de methode?

Wat vindt u van PVE ten opzichte van andere vormen van burgerparticipatie? (Presentatie, beleidsnota op radio en televisie, inspraakavonden etc..)

Moet iedereen mee kunnen doen? Of een steekproef van bijvoorbeeld 3000 willekeurige gekozen deelnemers? Of een combinatie van beide vormen?

Hoe zou u omgaan met de resultaten van de methode?
Bijvoorbeeld: verplicht doen wat er wordt gekozen, of raadgevend?

Wat is volgens u de juiste positie van de resultaten van de PVE in de besluitvorming?

Wat als de uitkomst tegenstrijdig is aan de mening van de gemeente?

Wat zou het beste argument zijn om een ander besluit te nemen dan de uitkomst van de burgerparticipatie methode?

Voordelen op volgorde zetten (1-5) (1=Grootste voordeel):

- Bereik vergroten door de online methode
- Kosten
- Burgers betrekken bij besluitvorming
- Bewustwording vergroten
- Besluitvorming met burger input

Nadelen op volgorde zetten (1-4) (1=Grootste nadeel):

- Framing
- Moeilijk om in besluitvorming om te gaan met de resultaten
- Technische problemen
- Steekproef

Hoe kijkt u naar de opbouw van de methode. Wie mogen, als het aan u ligt, de verschillende beleidsopties aanleveren en hoe gaat dat? Alleen gemeente of ook bewoners en bedrijven?

Als framing een sterke/zwakke invloed heeft op de uitkomst van het onderzoek hoe zou u daar mee omgaan?

Wat is uw opvatting als u kijkt naar de ethische kant van het framen in zo'n soort onderzoek? Voordelen voor wel / niet gebruiken van framen?