

Meeting the demand for information provision by participants in Participatory Value Evaluation

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Abstract

Participatory Value Evaluation (PVE) is a webtool-based participation method that is used to increase participation by others than the usual suspects. In PVE, respondents are asked to allocate a budget or points to a portfolio of projects that reflect real policy options, therewith evaluating the projects by stating their preferences. However, the provision of information in PVE on complex subjects such as urban climate adaptation still is characterized by some problems such as susceptibility by framing, misinterpretation and self-selection. In other words, information provision often does not comply with wishes and needs of participants. In this research, two information provision approaches are tested in PVE in an information manipulation experiment. From the research both quantitative as qualitative results are obtained, analysed by using a mixed methods approach. It is observed that the tested information provision approaches do not affect the choices made in PVE or participants' feeling of empowerment. Moreover, it appears that the wishes and needs for information in PVE vary widely between participants. It is concluded that this heterogeneity should be the starting point in designing information provision. Deliberative participation and progressive disclosure of information are ways to accomplish this. It is recommended to apply these approaches in PVE in future research.

Keywords: Participatory Value Evaluation (PVE); public participation; information provision; mixed methods research

I. Introduction

Participatory Value Evaluation (PVE) is a webtool-based participation method that is used to increase participation by others than the usual suspects. In PVE, respondents are asked to evaluate policy options by allocating a budget or a restricted set of point to these options. The allocation represents the preferences of participants. Participants can make their choices on basis of information provided in the form of attributes of policy options (Mouter et al., 2019a). Besides being an evaluation method in which the choices of citizens are central instead of consumers choices, PVE is a participation method with distinguishing characteristics (Mouter et al., 2019b). First of all, the method reduces or removes several barriers associated to conventional participation methods, such as time place or skills needed (e.g. public speaking). Secondly, participants are informed about the different options available to decision-makers and gives insight in the trade-offs to be made by decision-makers. Thirdly, in case decision-makers commit to the outcomes of a PVE, citizens are given a voice in public evaluation and decision-making and therefore the decision-making process becomes more transparent. Finally, the method mobilizes local knowledge – by asking participants to motivate their selection – and gives respondents the possibility to take other effects than given in the PVE into consideration.

PVE is used in a range of different policy areas in which complex subjects are tackled. Complex subjects can be characterized as problems that are associated with great uncertainties and in which a large number of stakeholders – both public and private – with differing values is involved (Dewulf & Termeer, 2015). For example, PVE is used for the heat transition in Utrecht (Mouter et al., 2020b), as consultation on lifting corona measures (Mouter et al., 2020a), for urban climate adaptation (Dartée, 2018) and water management problems (Mouter et al., 2019a). PVE is suitable for consultations on complex subject as it presents the range of possible solutions and the trade-offs to be made by policy makers to participants.

However, in using the method there are still some complications and obstacles in the information provision related to transferring knowledge on complex subjects to participants. Firstly, in former PVE-experiments respondents state they do not have the knowledge to make a choice or they do not trust their neighbours in making the right choice (Mouter et al., 2018). And although respondents are satisfied with the outcome of their evaluation – probably because people take the experiment seriously as it can have serious consequences (Mouter et al., 2019a) – it turns out that respondents often make choices on basis of information that is not given in the PVE-experiment. With arbitrary choices as possible consequence (Mouter et al., 2019b). Besides, it turns out that task complexity – especially in subjects that are quite technical – often is perceived to high (Dartée, 2018). This raises the possibility of self-selection, for example, when participants with limited knowledge on the subject quit the experiment (Pak, 2018). Likewise, it turns out that respondents with limited knowledge on a subject are more receptive to framing (De Geus, 2018). In other words, policy makers can manipulate the outcomes of the PVE by providing their selection of information thereby steering the evaluation to a preferred outcome. These studies indicate that information provision in PVE is not always in line with the required information by participants and that the information provision can influence the outcomes of PVE.

Similar problems with the information provision are found in public participation on complex subjects. Public participation is defined as “securing the active involvement of a broad range of stakeholders in decision-making and action [...] such participation encompasses input into formal decision-making structures, as well as into the deliberative democratic fora” (Few et al., 2007, p. 47). A complex subject in which information provision often does not connect to the needs of participants is urban climate adaptation (UCA), which is about “adjustments in ecological-social-economic systems in response to actual or expected climatic stimuli, their effects or impacts (Smit et al., 1999, p. 200) in an urban context. It has a complex context because of the great uncertainties related to it (e.g. Marchau et al., 2019; Dunn et al., 2017), the horizontal – with other urban challenges – (e.g. Kirshen

et al., 2018; Nieuwenhuis et al., 2019 and vertical interrelatedness – the involvement of different government tiers – (e.g. Mancilla Garcia et al., 2019; Fidelman et al., 2013), and the large range of different stakeholders and networks involved (e.g. Dunn et al., 2017; Driessen et al., 2018). The complexity of UCA asks a lot from participation regarding knowledge, where the policy maker possesses this knowledge. Quite some knowledge on climate change and adaptation is required to assess the uncertainty and risks involved and how that effects local communities (Sarzynski, 2015). This complicates the inclusion of citizens that have no or limited prior knowledge on UCA. Likewise, the interrelatedness with other challenges and the multi-level governance needed makes UCA hard to grasp for people that are not working on UCA on a daily basis. This translates in participation processes that tend to have an overrepresentation of high educated people with knowledge of legal processes (Brink & Wamsler, 2018).

Thus, the complications associated to information provision is not only found in PVE. Still, it is urgently needed to enhance the information provision in the method to fulfil the promise of mass participation. Already two studies have been performed on information provision in PVE. De Geus (2019) studied the influence of framing on decision-making by respondents in PVE, where Peeters (2020) analysed the effect of a variation in the presentation of attributes – presenting quantitative values or short narrative sentences – on the decision-making process by respondents. Both studies do not focus on information provision on complex subjects and mainly look at the effects of specific information provision on the choices respondents make. No research has been done on what information selection and presentation participants want in a PVE. Therefore, the following main research question is formulated: *How to meet the needs and wishes on information provision of participants– with little prior knowledge on a complex subject such as UCA – in PVE?* The objective of this research is to find out what approaches of information provision can be used in PVE to enable or empower participants to state their preferences on policy options.

This article is structured as follows. In the next section, the theoretical framework on providing complex information in participation is described. Subsequently, the mixed methods research approach consisting of three steps is introduced in the third section. Thereafter, the three steps are elaborated in Sections IV, V and VI, included a discussion of the results. The article closes with conclusions and a discussion in the final section.

II. Information provision in public participation

Before an optimal information provision for complex subjects in PVE can be formulated, the concept of information provision in public participation needs to be elaborated. Information provision starts with an information asymmetry that exists between the policy maker (here the facilitator of participation) and the participants (Ianniello et al., 2019). Policy makers have all the information about the subject of the participation process and participants depend on the information provision by policy makers to be able to join in participation processes. Therefore, the facilitator transfers information to the participant. The flow of information consists of three steps, see Figure 1. Firstly, the facilitator selects the information. Subsequently, the selected information is presented in a specific form by the facilitator to the participant. In the last step the information is processed by the participant.

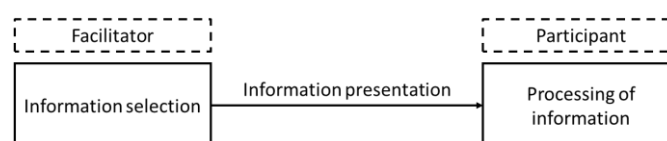


Figure 1 Flow of information

The exact information selection and presentation originates from the perception of useful participation by the facilitator. Useful participation can be defined as the extent to which the

facilitators' objectives for the participation process are achieved. In PVE, information is provided by policy makers that define the portfolio of projects and how these projects are presented in the tool. The content of the policy options is based on the objectives for participation of the facilitator. For example, when the objective is mobilizing local knowledge, the policy options will reflect the whole solution space to elicit all possible reaction among citizens. But when the objective is to purely perform a consultation on the options considered by decision-makers, the portfolio of policy options will only include these considered policy options.

However, only a transfer of information will not solve the inequality between policy maker and participant on basis of the perception of useful participation. The participant pursues meaningful participation. Participation is meaningful in the case that all possible or existing viewpoints of interest are included in the process (inclusion) and that the affected population is represented in the process (representation). Moreover, this inclusion and representation should lead to influence on the process and outcomes (Few et al., 2007; Arnstein, 1969). In this research, influence is defined as the extent to which the input of participants is noticeably – observed in the outcome or argumentation behind the outcome – and significantly – the weight of the citizens' input is reflected in the outcome or argumentation behind the outcome – part of the policy and decision making process.

To ensure that the participants' input will be of influence, the participant needs to be empowered (Arnstein, 1969). Here, empowerment is defined as being enabled by the information provision of the facilitator to give substantiated input. This substantiated input comprises input by participants based on complete, correct and relevant information that enables participants to form motivated, informed and deliberated opinions and preferences. For empowerment, a process of capacity building needs to start in which participants learn about the subject matter and the participation process in general (Blackstock et al., 2007). In this learning process, information provided by policy makers is processed by participants into knowledge.

To design an information provision that empowers participants, it is important to understand the public to which the information is directed to. Therefore, the processing of information by the public must be considered. The processing of information is influenced by the following characteristics of participants: capacities, skills, experiences, socio-economic characteristics and attitudes (Jiménez et al., 2019; Bohner & Dickel, 2011). And to design an information selection and presentation that is adjusted to this processing of information, four factors need to be considered: psychological distance – the distance that people feel from a subject consisting of four dimensions: geographic, temporal, and social distance and uncertainty – (Bar-Anan et al., 2006; Jones et al., 2017), the complexity of the subject (Sheppard et al., 2011; Rowe & Frewer, 2005), misinterpretation of information by participants (Rowe & Frewer, 2005) and the heterogeneity of the public (Hine et al., 2016; Pearce et al., 2015; Jiménez et al., 2019).

Concluding, the perception of useful participation by policy makers influences the design of the information provision greatly. This information provision partly determines the extent to which participation are enabled to join the participation process and therefore influences the extent to which participation is meaningful. Rowe & Frewer (2005) define participation in which both the concepts behind meaningful and useful participation are safeguarded as effective participation. Hence, information provision is key realizing effective participation.

III. Methodology

The aim of this research is to gain insight in what information approaches can be used to connect useful and meaningful participation within PVE. In other words, to find out how facilitators should design information provision within PVE in order to arrive at effective participation. A mixed methods approach is used to answer the research question. The combination of quantitative and qualitative methods will lead to "a better understanding of the research problem" (Creswell & Plano Clark, 2011,

p. 5). First, an exploratory research is executed to identify what information provision approaches for complex subjects are described in scientific literature and are used by facilitators of participation. Thereafter, an information manipulation experiment is performed in which these approaches are tested by translating them into treatments that are applied in a PVE-survey. Subsequently, the explanatory research starts. In this phase of the research the effects of the treatments on participants' evaluation of (the meaningfulness of) participation is analysed. Besides, an evaluation by policy makers is performed to provide insight in whether the approaches reflect their perception of useful participation. The research is executed among citizens of Reyeroord. Reyeroord is a neighbourhood in the city of Rotterdam in which a water storage is realized – to prevent water nuisance because of climate change – in a green area that will be redeveloped.

IV. Exploratory research phase

A. Research approach

In the exploratory phase, possible approaches of information provision which can be used to transfer complex information are described. Therefor, theory and practice are compared. A literature review is performed to determine the state-of-the-art knowledge on information provision in participation. The literature used discussed information provision or the knowledge transfer in public participation in UCA or related subjects. Besides, articles that discussed online participation or the method PVE were used. The use of information in practice was analysed by doing expert interviews. Two policy makers of the Municipality of Rotterdam and two employees of civic organisations facilitating participation processes in Rotterdam were interviewed to ensure different viewpoints are included in the analysis. The interviews were open-structured and based on a topic guide. The open structure enables most to elicit procedural and non-explicit knowledge (Meuser & Nagel, 2009). Besides, a document analysis based on thematic coding was performed on documents of the municipality related to public participation and/or UCA. The document analysis is applied to find gaps in the literature or interviews as it is a method “to verify findings or corroborate evidence from other sources” (Bowen, 2009, p. 30).

B. Three approaches for information provision

The combination of the literature review, expert interviews and document analysis resulted in three possible approaches of information provision on complex subjects:

- 1) *In order to reduce complexity and psychological distance, the message should stay away from the broader debate on climate change and the technical aspects of UCA.*

The analyses show that the complexity and psychological distance of a message can be decreased by making the message more relatable to citizens. Both the literature (e.g. Pearce et al., 2015) and the interviews indicate that the information provided should not focus on UCA alone but also on socio-economic aspects affected by it (Sheppard et al., 2011; Nerlich et al., 2010). The interviewees emphasize that this will lead to more enriched input from participants. However, they also think it is better to stay away from the broader debate on climate change since involving this often national or international debate on climate change will narrow the discussion to the distribution of costs in society. This distracts from positive contributions from citizens that are free or from interventions that benefit citizens on a local scale. Furthermore, interviewees state that the use of scenarios – as recommended in literature (e.g. Tompkins et al., 2008) – and technicalities on UCA would increase the complexity of the message as they are a bridge too far for most participants.

2) *The message should be specific and tangible – by visualization and localization of the message – to support the processing of information.*

From the literature and the interviews it follows that a message can best be related to the experiences of citizens. An approachable and attainable message will be processed best by participants. This can be achieved by making the message visualized (Sheppard et al., 2011) and localized (Jones et al., 2017; Sheppard et al., 2011).

3) *Finally, complexity and misinterpretation can be reduced by making the information provision flexible.*

The analyses show that the heterogeneity of the public in, for example, capacities, experiences, and knowledge are of great influence on the need for specific information. Differentiation of information answers to this heterogeneity in the demand for information and enables to provide participants with the information they need to make a decision (Hine et al., 2016; Pearce et al., 2015; Jiménez et al., 2019). A way to provide differentiation is the progressive disclosure of information (Guimaraes Pereira et al., 2003) or deliberation (Sheppard et al., 2011; Nerlich et al., 2010; Pearce et al., 2015).

V. Information manipulation experiment

A. Research design of the information manipulation experiment

For the information manipulation experiment, two of the three approaches were translated into treatments and applied to the introduction text and policy options texts in a PVE-survey on the design of the water storage in Reyeroord. The third approach was not included in the experiment because of time constraints. The first treatment included the broader debate on climate change and increased the number of technicalities and figures named in the text. In the second treatment the message was made more attainable for participants, mostly by adding visualisations (see Figure 2 for examples).



Figure 2 Examples of visualisation for the options conservative (left) and the options 'progressive' (right)

In research such as this information manipulation experiment, it is important to isolate the effect of the variation in information (De Vries et al., 2014). Therefore, only the introduction texts and texts accompanying the policy options were varied. All other elements in the PVE-survey – e.g. policy options, attributes, attribute levels – were kept constant. The manipulation of information was performed as follows. In both treatments a basic text is used for the introduction and the policy option texts. The manipulation of information is implemented by adding additional texts. The use of basic and additional texts based on guidelines also ensures the isolation of the information manipulation. Composing the basic and additional text is based on guidelines presented Table 1.

Table 1 Guidelines for information manipulation of introduction and policy option texts

Basic text	The information should be complete, correct, relevant and timely. The information is provided by the municipality and therefore assumed to fulfil these four criteria. The information provision was checked by the municipality in several iterations. In the case that there was an indication that information missed or was incorrect, the policy makers were asked for more information.
	The guideline above is partly interpreted by findings following from the expert interviews and document analysis. This means that complete, correct, relevant, and timely information involves being open and transparent and stating a clear objective for the policy options.
	Disclaimers are placed about the costs and figures and by the images in order to manage expectations.
Treatment 1	Place the policy options and their objective in the wider public debate on climate change and climate adaptation. This means that climate change problems and effects are discussed and that the motivation for UCA is explained.
	If possible, technicalities are added. This means that figures such as surface areas, volumes and the amount of levelling up are added. In addition, this treatment elaborates on technical details of, for example, the sewage system used for the water storage.
Treatment 2	Texts should be as specific, tangible and appealing as possible. This means that texts are shorter compared to the first treatment (especially in the introduction) and that abstract terms as biodiversity are elaborated in a tangible way.
	All policy options are presented with a picture that shows a map of the water storage, a section/profile of the water storage, and one or two images that give an impression on what the option will look like.
	The information should be provided in simple language (this therefore implicitly applies to the basic text).
	The information should be provided in a broad way (input of citizens not constraint to the water storage). This was interpreted as a focus on an improvement of the living environment instead a focus on the debate on climate change.

Within the PVE-survey, respondents could allocate in total 100 points to five policy options. Each option represented a value: conservative, liberal, family, nature and progressive. The design of the water storage and green area was based on these values. The option from a conservative value represents a simple redevelopment of the green area and had the lowest cost. The liberal option was focused on recreation by creating a footpath, playgrounds etc. The option related to the family value incorporates courtyards in the design and gives the opportunity for redevelopment close to the homes of all citizens in Reyerwaard. The rationale behind this option is a close relationship of citizens with the direct surrounding. The option reflecting the nature value focusses on biodiversity, which is enhanced in the whole neighbourhood. Finally, the option designed from a progressive value represented a redevelopment that considers more uncertainty and is more future proof.

B. Respondents

The targeted population of this experiment are the citizens of Reyerwaard older than 15 years, all citizens can participate in the PVE. They were attracted by letters spread in the neighbourhood and the online newsletter of the neighbourhood. Respondents were randomly distributed over the two treatments.

Eventually, 41 respondents filled in the PVE-survey. One of these respondents filled in a zip code that was different to that of Reyerwaard. This respondent was left out. Therefore, the answers of 40 respondents –20 in treatment 1 and 20 in treatment 2 – were used in the analyses. Gender and age were evenly spread over the samples (in both the total sample as the treatment samples). However, regarding education level, the total sample showed an overrepresentation of highly educated respondents (50%). This is also observed in testing the representativity of the sample for the population of Reyerwaard. The total sample is representative for gender and age, but not for education

level. For the treatment samples, the used chi-square test could only be performed on the gender variable because of the small sample size. The treatment samples are representative for gender.

VI. Explanatory research phase

A. Research approach

After the PVE-survey, respondents filled in a questionnaire that included an evaluation of the information provided, an evaluation of respondents' empowerment and an evaluation of the PVE method. The evaluations were based attitudes of respondents measured by statements scored with Likert scales (Table 2) and open questions, which enabled to perform both a quantitative and qualitative analysis. The quantitative part was based on independent samples t-tests and its non-parametric equivalent Mann-Whitney U tests. The answer to the open questions were analysed with a thematic coding analysis.

An evaluation by policy makers was also performed in the explanatory phase. Three policy makers working on the Reyeroord case, which were also involved in designing the PVE-survey, evaluated the information manipulation experiment and its outcomes. Like the expert interviews, the evaluation was an open structured interview based on a topic guide. The aim of the evaluation was to find out what the policy makers think is useful participation and whether the PVE-survey and the information provision were in line with that perception of useful participation.

Table 2 Statements used to measure participants' attitudes (scored on 5-point Likert scales: fully disagree-disagree-neutral-agree-fully agree)

Information selection	The information provided by the different options was complete
	The provided information was relevant
	The provided information was correct
	The provided information was accurate
	The provided information was timely
	The information was specific and tangible
	In the information the perspective of the citizens of Rotterdam is considered well enough
Information presentation	I understood the information completely
	The way in which the information was presented appeals to me
	I found the presented information too complicated
	I found the presented information too simple
Empowerment by information provision	The information was presented in an approachable ('laagdremkelig') way
	I am convinced about my choices in this experiment
	The provided information enabled me to make a substantiated choice
	I received enough information to make a choice
PVE method	This method of participation provides me with enough voice in the development of the water storage
	I find this a realistic experiment
	I think that the municipality should use this method to involve citizens in their policy making
	This experiment provides the municipality with relevant information for making choices about the water storage and the redevelopment of the green area

B. Results

Quantitative analysis

The scores on the attitudes were on average positive, which indicates that respondents have positive attitudes towards the information provision, their empowerment and the PVE method. The analysed statements representing attitudes comprise a long list that can be divided into four attitude categories: quality of information selection, quality of information presentation, feeling of empowerment and PVE as a method. A factor analysis was used to decrease the number of variables analysed. This is often

done with attitudinal variables (Hair et al., 2013). The objective of the factor analysis is to construct interpretable summated scales of the scores on the statements. The factor analysis was performed on basis of Principal Axis Factoring and used Oblimin rotation in all iterations. Loadings of attitudes on factors lower than 0.3 were not considered, only factors with at least two attitudes above 0.5 were valid. The analysis resulted in three factors:

1. Factor 1 comprises the statements that measured the attitudes of respondents towards the correctness, the attainability, the completeness, the relevance, the timeliness and the comprehensibility of the information. Besides, it includes the attitudes on the trustworthiness of the information and whether enough information was received by participants. All these attitudes relate to the selection of information. Therefore, this factor represents the attitude of respondents towards the quality of the information selection.
2. In factor 2 the attitudes towards the approachability and the attainability of the presentation of the information are included. Moreover, this factor comprises the evaluation on whether the information empowers participants to have a voice in the participation process and the evaluation on whether the necessity of the policy options was clear for the participants. This factor is related to whether the presentation of information connects to what respondents need, the extent to which respondents understand the necessity of the options and the extent to which the participation process provides them with a voice. This factor therefore represents the relation between information presentation and empowerment. The factor is called information presentation.
3. Factor 3 includes the three statements that were included in the questionnaire to evaluate the PVE method. Therefore, this factor is called Evaluation PVE.

Table 3 shows the results of the independent sample t-tests for the differences in the factor scores between the two treatments. The null hypothesis for the test is that the difference in average scores cannot be explained by the treatments. For none of the factors the null hypothesis is rejected. The differences in the average evaluation cannot be explained by the treatments.

Table 3 Results of the independent samples t-test on the three factors

		Number	Mean	Std. Dev.	Difference	T	P (2-tailed)
1. Information selection	Treatment 1	17	0.05	1.073	0.105	0.286	0.777
	Treatment 2	13	-0.06	0.893			
2. Information presentation	Treatment 1	17	-0.19	0.987	-0.444	-1.325	0.196
	Treatment 2	13	0.25	0.795			
3. Evaluation PVE	Treatment 1	17	0.04	1.012	0.102	0.295	0.770
	Treatment 2	13	-0.06	0.832			

To perform an independent samples t-test, the variable tested needs to be normally distributed in the sample. In samples bigger than 30, normal distribution is assumed but since the treatment samples include only 20 respondents the distribution of the factor scores needs to be tested. From the Shapiro-Wilkinson tests performed it follows that the factor scores of the third factor are not normally distributed over the treatments. Therefore, a non-parametric test equivalent to the independent samples t-test was performed: the Mann-Whitney U test (see Table 4). Again, the null hypothesis is that the difference in average scores cannot be explained by the treatments. This hypothesis is rejected.

Table 4 Results of the Mann-Whitney U test on the three factors (α = not corrected for ties)

		Number	Mean Rank	Sum of Ranks	Mann-Whitney U	Asymp. Sig. (2-tailed)	Exact Sig. [2*(1-tailed Sig.)]
1. Information selection	Treatment 1	17	16.18	275.00	99.000	0.630	0.650 ^a
	Treatment 2	13	14.62	190.00			
2. Information presentation	Treatment 1	17	13.59	231.00	78.000	0.174	0.183 ^a
	Treatment 2	13	18.00	234.00			
3. Evaluation PVE	Treatment 1	17	15.24	259.00	106.000	0.851	0.869 ^a
	Treatment 2	13	15.85	206.00			

Concluding, it is observed that respondents on average are positive about the quality of the information selection and presentation, the extent to which they feel empowered and the PVE method. Surprisingly, the differences between the two samples cannot be explained by the treatments. The information provision and PVE are equally evaluated by the samples and both groups feel equally empowered.

Qualitative analysis

In examining the qualitative results of the questionnaire, a partially contradictory conclusion compared to the quantitative analysis can be drawn. Especially, when asked for improvements of the information presentation 7 of the 11 respondents that filled in the open questions in treatment 1 – that did not receive visualisations – ask for visualisations. On the other hand, respondents that did receive visualisations ask for a higher quality and quantity of visualisations. Thus, visualisations play an important role in information presentation, especially in a subject related to spatial development. However, participants are likely to want more and better visualisations than they receive.

Similarly, respondents in both treatments have a clear idea on what information misses in the information selection. However, the specific information respondents wanted varied widely between participants. This confirms that the heterogeneity among participants is of great influence on their need for information.

The small differences in the evaluation of the empowerment of respondents by information and the PVE method could not be explained by the used information manipulations. This is also reflected in the answers to the open questions on evaluating the PVE-survey. The answers show no difference between the treatments, but in both treatments respondents give divergent answers. In both samples, there is a divide between participants that are enthusiastic about the method and respondents that find the method (especially the distribution of points) difficult or not intuitive.

Remarkably, there are eight respondents in the total sample that are concerned about the capacities of other respondents, which is also observed in other studies on PVE (e.g. Mouter et al., 2018). In treatment 1, participants are concerned that the language is too difficult or that the survey is too long for other respondents. Five respondents in treatment 2 comment about the difficulty of language and the length of the survey when talking about other respondents. One respondent explicitly states that he or she grasped the survey totally, thinks the threshold may be too high for others. Another respondent is concerned that the average citizen does not have a good overview of all affected interests.

Thus, it is observed that within treatments there is a lot of diversity in the perception of the information selection and the method. The information missed varies widely among respondents. The same goes for the evaluation of the method. On the one hand there are respondents that find the method satisfying, where other point out the difficulty and the lack of intuitiveness of the PVE method.

Evaluation by policy makers

The results of the PVE-surveys and questionnaires were evaluated by policy makers working on UCA in Reyerood. For these policy makers, participation is useful when citizens have a voice in the interventions in their living environment. However, they also implement participation to obtain information possessed by citizens and use participation to ensure the engagement of citizens in the future. The transitions in the neighbourhood will ask for interventions done by citizens themselves, regarding the policy makers citizens will be more willing to do so if you involve them in the preliminary policy and decision-making processes.

According to the facilitators, PVE does not fit their objectives for participation in the early stage of policymaking they are in. They like to start with an open dialogue between the municipality and citizens. In such a dialogue, citizens should not be restricted or framed by preliminary plans of the municipality. However, the concept of PVE forces the facilitator to design policy options. The disclaimers used in the PVE texts could not prevent this misinterpretation. Nonetheless, the policy makers acknowledge the dilemma in information provision which is also related to meaningfulness. Giving more information and context to participants will lead to more clearness for participants but may result in (a perception of) a restricted portfolio of options. Whereas, providing participants with less information will result in more unclearness and less direction for participants, but provides them with more freedom to state their wishes and needs.

According to the policy makers, PVE in its current form is more useful when used in a later stadium of policy-making processes. After a more open and exploratory phase of participation based on conversations, policy options can be defined. Thereafter, consultation on basis of PVE is more suitable.

VII. Conclusions and discussion

A. Conclusions

Involving the broader debate on climate change and technicalities on UCA or making the information provided in PVE more attainable by adding visualisations does not affect, statistically, the way in which they evaluate the quality of the information selection and presentation, their evaluation of their (feeling of) empowerment or their evaluation of the PVE method.

However, the qualitative results in this research show that within the information manipulation treatments there is variation between respondents. Participants show a great diversity in what information they missed in the selection and how they perceived the PVE method in terms of difficulty and intuitiveness. Besides, it is observed that visualisations are an important element in the presentation of information, but that a majority of respondents is not entirely satisfied with the provided visualisations and that there is variety in what kind of visualisations respondents want.

It can be concluded that the wishes and needs for information in participation processes, in PVE and UCA, differ widely among participants. In line with the exploratory research, heterogeneity of the public is key in designing information provision (e.g. Hine et al., 2016). The diverse backgrounds of participants – dependent on their attitudes, skills, experiences, etc. – seems to influence the need for information considerably. The information provision in PVE would facilitate meaningful participation more when the heterogeneity of participants is included in the provision of information. Hence, it can be concluded that the third approach of using flexible information provision to answer to the heterogeneity of the public, although not tested in this research, is more suitable for achieving meaningful participation compared to the two approaches tested in this research. Flexible information provision can be achieved by using progressive disclosure of information or by making the participation process more deliberative.

In earlier studies, PVE included the possibility for participants to receive more detailed information and thereby a form of progressive disclosure of information. However, according to the policy makers in this study, in its current form the flexibility of information provision in PVE is limited. The basis of the information selection are the policy options with their attributes. The policy makers feel restricted by the rigid structure of consultation in PVE that does not facilitate, to their opinion, an open dialogue between facilitator and participants. They state that PVE is not suitable for the exploratory phase of participation processes but becomes useful when the policy making process is in a stadium in which the policy options are specific enough.

Concluding, the information provision in PVE needs to incorporate the heterogeneous needs for information by participants. The responsibility to do this lies with the facilitator. However, the facilitator needs to combine often different objectives of participation of which some are contrary to ensuring information provision for meaningful participation. Therefore, one of the objectives or maybe the core objective of the facilitator (and therefore part of the perception of useful participation) should be to create an information provision that ensures meaningful participation.

B. Limitations

Small sample sizes

In several steps of the research sample sizes were small. Firstly, only four experts were interviewed in the exploratory phase. Besides, the dataset of the information manipulation experiment included a small number of respondents. The total sample is representative for gender, age, and living situation. However, since the treatment samples are only representative for gender, it is hard to generalize outcomes to the population of Reyerood. The sample also showed an overrepresentation of highly educated people, which could have influenced the results on the perception of quality of information.

Ambiguity in the information manipulation experiment

As observed in the study of De Vries et al. (2014), isolating the information manipulation is important in research on the influence of information provision. The isolation of the manipulation in this research was defined by the two treatments. However, the isolation was weakened by the fact that the manipulation was implemented in both textual and visual information, in different parts of the PVE (introduction text and policy options texts) and because both treatments included information on UCA which undermined the effect of treatment 1 that was on the broader debate on climate change.

There was also some ambiguity in the PVE-survey. As a budget was not available, a PVE based on points was used. However, it turns out that a part of the respondents thought the evaluation based on points was difficult. Besides, respondents interpreted the distribution of points differently. Therefore, the method needs to be explained better in future

C. Discussion

The PVE method is characterized by its flexibility, for example, the range of policy areas it is applied in. Within the method there is also flexibility in providing information, which can help tackling heterogeneity among participants. Firstly, progressive disclosure of information can easily be implemented in PVE. In the PVE on lifting the corona measure in the Netherlands, participants could click on hyperlinks if they wanted more detailed information on the problems with testing for immunity and more figures on the spreading of the virus (Mouter et al., 2020a). Although the feature is not systematically researched, it shows that there is the possibility for flexible information provision.

Secondly, early involvement of participants is also applied in earlier PVE's. In several cases, workshops were organized in which the policy options in the PVE-survey were designed by all affected stakeholders (e.g. Spruit et al., 2020). These workshops could also be used to determine the

information selection and presentation, which could ensure a central role for participants in the design of information provision. However, completely covering the heterogeneity among citizens in these workshops is not possible. Again, as such a workshop is a public meeting there is a risk of self-selection and the attraction of usual suspects, thereby missing the needs of a part of possible participants in PVE and undermining one of the advantages of PVE.

Therefore, deliberative processes such as these workshops need to be implemented in the webtool itself. At present, there is little deliberation facilitated in the method. The flows of information between the facilitator and participants are limited; there is only a flow of information to participants to inform them about the policy options and attributes and a flow back when participants state their preferences. As soon as the options are presented, communication with the facilitator is only possible via email, causing a delay in communication (Wyss & Beste, 2017) and exclusion of other participants from this flow of information. However, there are possibilities to adapt the webtool. For example, the flows of information can be made more iterative by implementing the possibility for participants to ask questions in the webtool that are answered by the facilitator and visible for all participants. Such a chat box also can facilitate a discussion on the policy options between participants. Another possibility is to give the facilitator the possibility to add more information about policy options in a later stage and that participants are notified about the change. However, these solutions also weaken the simplicity in PVE. As discussion platform, the attention for the policy options may weaken and the evaluation may become less straight-forward. Then there is also the problem that participants that already filled in the PVE before more or improved information is given, cannot change their evaluation anymore.

In performing research on whether the approaches mentioned above work in PVE, it is recommended to do comparative studies. In these comparative studies different information provision approaches (or improvements to the PVE method) are can be evaluated. Most important in these studies is to analyse the reaction and use of information and the participation method by participants. Observations or process tracing studies (e.g. Peeters, 2020) are appropriate methods to get more insight in the interaction between participant and the participation method or information provision.

Literature

Arnstein, S.R. (1969). A Ladder of Citizen Participation. *Journal of the American Institute of Planners*, 35(4), pp. 216-224.

Bar-Anan, Y., Liberman, N. & Trope, Y. (2006). The association between psychological distance and construal level: Evidence from an implicit association test. *Journal of Experimental Psychology: General*, 135(4), pp. 609-622.

Blackstock, K.L., Kelly, G.J. & Horsey, B.L. (2007). Developing and applying a framework to evaluate participatory research for sustainability. *Sociological Economics*, 60, pp. 726-742.

Bohner, G. & Dickel, N. (2011). Attitudes and attitude change. *Annual Review of Psychology*, 62, pp. 391-417.

Bowen, G.A. (2009). Document Analysis as a Qualitative Research Method. *Qualitative Research Journal*, 9(2), pp. 27-40.

Brink, E. & Wamsler, C. (2018). Collaborative Governance for Climate Change Adaptation: Mapping citizen-municipality interactions. *Environmental Policy and Governance*, 28, pp. 82-97.

Creswell, J.W. & Plano Clark, V.L. (2017). *Designing and Conducting Mixed Methods Research*. 3rd edition. London: SAGE Publication Ltd.

Dartée, K. (2018). *Practicing Participatory Value Evaluation. Assessing the applicability of the participatory value evaluation method for public decision-making on urban storm water management in a Th Hague case study*. Delft University of Technology.

De Geus, T.F. (2019). *Decision-Making in Participatory Value Evaluation*. Delft University of Technology.

De Vries, G., Terwel, B.W. & Ellemers, N. (2014). Spare the details, share the relevance: The dilution effect in communications about carbon dioxide capture and storage. *Journal of Environmental Psychology*, 38, pp. 116-123.

Dewulf, A. & Termeer, C. (2015). Governing the future? The potential of adaptive delta management to contribute to governance capabilities for dealing with the wicked problem of climate change adaptation. *Journal of Water and Climate Change*, 6(4), pp. 759-771.

Dunn, G., Brown, R.R., Bos, J.J. & Bakker, K. (2017). Standing on the shoulders of giants: Understanding changes in urban water practice through the lens of complexity science. *Urban Water Journal*, 14(7), pp. 758-767.

Driessen, P.P.J., Hegger, D.L.T., Kundzewicz, Z.W., Van Rijswick, H.F.M.W., Crabbé, A., Larrue, C., Matczak, P., Pettersson, M., Priest, S., Suykens, C., Raadgever, G.T. & Wiering, M. (2018). Governance Strategies for Improving Flood Resilience in the Face of Climate Change. *Water*, 10(11), 1595.

Few, R., Brown, K & Tompkins, E.L. (2007). Public participation and climate change adaptation: avoiding the illusion of inclusion. *Climate Policy*, 7(1), pp. 46-59.

Fidelman, P.I.J., Leitch, A.M. & Nelson, D.R. (2013). Unpacking multilevel adaptation to climate change in the Great Barrier Reef, Australia. *Global Environmental Change*, 23, pp. 800-812.

Guimaraes Pereira, A., Rinaudo, J., Jeffrey, P., Blasques, J., Corral Quintana, S., Courtois, N., Funtowicz, S. & Petit, V. (2003). ICT tools to support public participation in water resources governance & planning: experiences from the design and testing of a multi-media platform. *Journal of Environmental Assessment Policy and Management*, 5(3), pp. 395-420.

Hair, J.F., Black, W.C., Babin, B.J. & Anderson, R.E. (2013). *Multivariate data analysis: Pearson new international edition*. Pearson Higher Ed.

Hine, D.W., Phillips, W.J., Cooksey, R., Reser, J.P., Nunn, P., Marks, A.D.G., Loi, N.M. & Watt, S.E. (2016). Preaching to different choirs: How to motivate dismissive, uncommitted, and alarmed audiences to adapt to climate change? *Global Environmental Change*, 36, pp. 1-11.

Jiménez, A., LeDeunff, H., Giné, R., Sjödin, J., Cronk, R., Murad, S., Takane, M. & Bartram, J. (2019). The Enabling Environment for Participation in Water and Sanitation: A Conceptual Framework. *Water*, 11, 308.

Jones, C., Hine, D.W. & Marks, A.D.G. (2017). The Future is Now: Reducing Psychological Distance to Increase Public Engagement with Climate Change. *Risk Analysis*, 37(2), pp. 331-341.

Ianniello, M., Iacuzzi, S., Fedele, P. & Brusati, L. (2019). Obstacles and solutions on the ladder of citizen participation: a systemic review. *Public Management Review*, 21(1), pp. 21-46.

Rowe, G. & Frewer, L.J. (2005). A Typology of Public Engagement Mechanisms. *Science, Technology, & Human Values*, 30(2), pp. 251-290.

Kirshen, P., Aytur, S., Hecht, J., Walker, A., Burdick, S., Jones, S., Fennessey, N., Bourdeau, R. & Mather, L. (2018). Integrated urban water management applied to adaptation to climate change. *Urban Climate*, 24, pp. 247-263.

Mancilla Garcia, M., Hileman, J., Bodin, Ö., Nilsson, A. & Jacobi, P.R. (2019). The unique role of municipalities in integrated watershed governance arrangements: a new research frontier. *Ecology and Society*, 24(1), art. 28.

Marchau, V., Bloemen, P. & Walker, W. (2019). Water governance in times of uncertainty. Insights for the further development of adaptive delta management. *Water governance*, 3/2019, pp. 61-69.

- Meuser, M. & Nagel, U. (2009). The Expert Interview and Changes in Knowledge Production. In: A. Bogner, B. Littig & W. Menz (eds.), *Interviewing Experts* (pp. 17-42). Palgrave Macmillan.
- Mouter, N., Koster, P. & Dekker, T. (2019a). An Introduction to Participatory Value Evaluation. *Tinbergen Institute Discussion Paper*, 2019-024/V.
- Mouter, N., Koster, P. & Dekker, T. (2019b). Participatory Value Evaluation: A Novel Method to Evaluate Future Urban Mobility Investments. *Tinbergen Institute Discussion Paper*, 2019-046/VIII.
- Mouter, N., Koster, P., Dekker, T. & Borst P. (2018). *Een Participatieve Waarde Evaluatie voor de Lange Termijn Ambitie Rivieren*. In opdracht van het Ministerie van Infrastructuur en Waterstaat.
- Mouter, N., Spruit, S. Itten, A., Hernandez, J.I., Volberda, L. & Jenninga, S. (2020a). *Als eenheid uit de intelligente lock-down. Resultaten van een raadpleging onder 30.000 Nederlanders over de versoepeling van coronamaatregelen*.
- Mouter, N., Spruit, S., Itten, A., Shortall, R., Hernandez, J.I., Collewet, M., Koster, P. & Borst, P. (2020b). *Bewoners kiezen aardgasvrije wijken. Eindrapport en achtergronden*.
- Nerlich, B., Koteyko, N. & Brown, B. (2010). Theory and language of climate change communication. *WIREs Clim Change*, 1, pp. 97-110.
- Nieuwenhuis, E., Cuppen, E., Langeveld, J. & De Bruin, H. (2019). De toekomst van het stedelijk watersysteem. Opereren in een stad vol transitie. *Water governance*, 3/2019, pp. 48-55.
- Pak, S. (2018). *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*. Delft University of Technology.
- Peeters, T. (2020). *Studying participant decision-making processes in Participatory Value Evaluation*. Delft University of Technology.
- Pearce, W., Brown, B., Nerlich, B. & Koteyko, N. (2015). Communicating climate change: conduits, content and consensus. *WIREs Clim Change*, 6, pp. 613-626.
- Rowe, G. & Frewer, L.J. (2005). A Typology of Public Engagement Mechanisms. *Science, Technology, & Human Values*, 30(2), pp. 251-290.
- Sarzynski, A. (2015). Public participation, civic capacity, and climate change adaptation in cities. *Urban Climate*, 14(1), pp. 52-67.
- Smit, B., Burton, L., Klein, R.J.T. & Street, R. (1999). The Science of Adaptation: A Framework for Assessment. *Mitigation and Adaptation Strategies for Global Change*, 4, pp. 199-213.
- Sheppard, S.R.J., Shaw, A., Flanders, D., Burch, S., Wiek, A., Carmicheal, J., Robinson, J. & Cohen, S. (2011). Future visioning of local climate change: A framework for community engagement and planning with scenarios and visualization. *Futures*, 43, pp. 400-412.
- Tompkins, E.L., Few, R. & Brown, K. (2008). Scenario-based stakeholder engagement: Incorporating stakeholders' preferences into coastal planning for climate change. *Journal of Environmental Management*, 88, pp. 1580-1592.
- Wyss, D. & Beste, S. (2017). Artificial facilitation: Promoting collective reasoning within asynchronous discussions. *Journal of Information Technology & Politics*, 14(3), pp. 214-231.