

The role of participation in CVM survey design: evidence from a tap water improvement program in Northern Thailand

Michael Ahlheim¹⁾, Oliver Frör¹⁾ and Nopasom Sinphurmsukskul²⁾

¹⁾ University of Hohenheim, 70593 Stuttgart, Germany
Department of Economics 520F

froer@uni-hohenheim.de

²⁾ Chiang Mai University, Faculty of Agriculture
Chiang Mai, Thailand
nopasom@hotmail.com

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Abstract:

In the environmental economics literature results from contingent valuation mail surveys (MS) are usually considered less reliable than results from face-to-face surveys (FtF). This is mostly due to low response rates and self-selection effects of the respondents. However, MS are much less costly than FtF surveys so that there exists a strong need to make MS more reliable in order to save costs for environmental policy makers. This paper proposes a participatory procedure of survey design in order to improve MS questionnaires. In an empirical study of water quality improvement it is demonstrated that this procedure yields results identical to those of a FtF survey. In contrast to focus groups commonly applied in contingent valuation, we are able to show with our empirical study that much better results can be obtained by conducting group meetings with respondents from a preceding mail survey. Their pre-information of the project and experience with the questionnaire as well as their high motivation to get involved proved to be advantageous for efficient and productive group discussions. Our participatory questionnaire design resulted in a doubling of the response rate and a significant reduction of respondent self-selection. Further, alternative willingness-to-pay elicitation question formats were tested in the context of Thailand. For the dichotomous choice format strong anchoring and "yea"-saying effects were detected so that the use of this format cannot be recommended here. In contrast, the payment card format was found to perform well in this study.

JEL-codes: D6, H4, L3, Q25, Q51

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1. Introduction

In the literature on environmental valuation the Contingent Valuation Method (CVM) is still considered one of the best methods at hand for the economic assessment of environmental values in spite of the fact that CVM studies are quite expensive in practice and that their results are prone to several kinds of systematic biases. In this paper we propose a method how to make CVM surveys less costly and we also deal with one of the most severe threats to the reliability of CVM results, namely the question format bias. Our analysis is based on a CVM study assessing the social value of an improved tap water quality in a suburban region in Northern Thailand.

CVM surveys are based on interviews where households are, among other things, asked their willingness to pay (WTP) for some public project, i. e. the maximum amount of money they would be willing to pay rather than go without that project. The individual WTPs of a representative sample of all households affected by the project in question are then aggregated to obtain its social value. There has been a long-going debate w.r.t. the appropriate interview form in CVM surveys. Apart from face-to-face interviews, mail, telephone and mall-stop interviews have been proposed of which only face-to-face and mail interviews are currently judged to lead to fairly reliable results. Nevertheless, CVM studies using mail surveys (MS) are often considered less reliable than studies using face-to-face interviews (FtF) due to self-selection of respondents returning the questionnaires (WHITEHEAD ET AL. 1993), low return rates, limited possibilities to convey a complex valuation scenario to the respondent and less possibilities to force respondents to strictly follow the standardized order of questions in the questionnaire (cf. CAMERON ET AL. 1999, ETHIER ET AL. 2000).

On the other hand, however, MS have a number of advantages that make their employment attractive: they are considerably less expensive than FtF surveys, respondents are much more

likely to respond truthfully to personal questions so that the problem of social desirability and interviewer biases, a well known problem of FtF surveys, can be avoided (cf. KRYSAN 1994). Also, respondents can take as much time as they need to think about the proposed scenario and their answer to the WTP elicitation question (cf. DILLMAN 1978). As a result of the described procedural shortcomings of both interview forms widely divergent estimates of project benefits for FtF surveys as compared to MS are reported in the literature where FtF surveys are usually regarded as the interview form leading to more reliable results (NOAA 1993).

The aim of the empirical study underlying this paper is to develop a standardized procedure to work out a MS design that mitigates or even eliminates the typical procedural problems of mail surveys so that the comparatively inexpensive MS technique can be applied for a wide range of CVM studies without reservation. The new MS technique should lead to the following improvements in particular: (1) increasing the comprehensibility of the CVM scenario and of the payment scheme; (2) preventing possible biases of the CVM results by identifying and eliminating potential resentments that respondents might have w.r.t. the proposed scenario and which might influence their answers; (3) increasing the credibility of the project and the perception of the probability of its implementation so that respondents take the survey more serious and their answers are more reliable. These improvements are hoped to lead to a higher response rate so that the typical self-selection bias is decreased. This bias arises from the fact that the group of respondents returning their mail questionnaires is not representative for the population affected by the project in question although the group receiving this questionnaire is representative. The reason is that each respondent can decide by himself if he wants to return the questionnaire or not. For FtF surveys this effect is minimized since most people agree to answer the questionnaire once they have been "caught"

by the interviewers. In order to minimize the non-response rate one has to find out possible reasons why respondents might refuse to fill in and return the questionnaire.

In view of these necessary improvements we consider a procedure which is based on direct participation, i.e. on the involvement of respondents from the survey population in the process of survey design as promising for achieving this aim. Particularly, in contrast to the already widely employed technique of focus groups we propose to conduct a series of participatory group meetings with respondents of a preceding CVM mail survey in order to design an improved MS questionnaire to be employed subsequently for the main valuation study. In the meetings proposed here participants receive further information on the proposed project, have the possibility to ask questions and can discuss the specifics of the project within the group. Further, they are confronted with a representative of the public authority in charge of implementing the project in question and, finally, suggest themselves improvements of the questionnaire. This approach where group participants have already completed and returned a mail questionnaire prior to the group meeting has a number of advantages over the focus group approach: participants are already acquainted with the proposed project, they have experience with the questionnaire to be improved and, therefore, they can report the effect the questionnaire had on them when they first received it. In our empirical study the members of the participatory groups told us which questions were difficult to answer, which misunderstandings arose and by which questions or remarks in the questionnaire negative emotions were provoked which influenced their answers. Especially, they could explain how they perceived the scenario described in the questionnaire which helped us to reformulate it so that the correct information on the project to be valued was conveyed. It turned out to be most advantageous that participants were not a random selection from the population affected by the project but, instead, people who were particularly critical of the proposed project and eager to discuss its practical consequences and possibilities of its implementation. It was

envisaged that these special circumstances would result in groups particularly suitable and productive for the improvement of the MS questionnaire. Ultimately, it was expected that a mail questionnaire designed by such a technique would yield results converging with those of an identical FtF survey.

A further controversy still unsettled is the debate on the appropriate WTP elicitation question format. At the beginning of the 1990s due to their seeming incentive compatibility the closed-ended question formats based on dichotomous choice (DC), where respondents are asked if they accept or reject a project for which they have to pay a given amount of money, were considered superior to open-ended formats like the payment card (PC) where they have to come up with their willingness to pay (WTP) by themselves (cf. NOAA 1993). This view, however, was challenged during the course of the last decade by a number of comparative studies between open-ended and closed-ended formats (cf. READY ET AL. 1996, HERRIGES AND SHOGREN 1996, BOYLE ET AL. 1996, FREW ET AL. 2003, RYAN ET AL. 2004). Most studies found that WTP elicited by the DC format is significantly higher than if the PC or other open-ended formats are used. Two explanations for this consistent finding were suggested: first, respondents might "anchor" their response on the proposed payment by interpreting this amount as a hint for a "reasonable" price of the good in question (cf. FRYKBLOM 2000), and second, respondents just say "yes" to any proposed amount, i.e. the typical "yea"-saying behavior of respondents who just cannot say "no" (cf. HOLMES AND KRAMER 1995, BLAMEY ET AL. 1999). The attempts to mitigate these effects of the DC format on the WTP stated by the respondents have been unsatisfactory so far. This paper contributes further to the analysis of this open issue and arrives at a definite conclusion for the socio-cultural context of Thailand where the empirical CVM study underlying this paper was conducted.

The remainder of the paper is structured as follows: section 2 describes the design of the empirical study conducted in Northern Thailand, section 3 presents the results of the initial

survey, the recommendations for questionnaire design derived from the participation groups and the results of the main survey. The results will be discussed in section 4, section 5 concludes and identifies directions for further research.

2. Method: The design of the study

Scenario

The study site was a watershed in Northern Thailand near Chiang Mai. The main river of this watershed is the Mae Sa river which connects the agricultural region upstream with the suburb Mae Rim which lies downstream. Obviously, the quality of household tap water obtained from the Mae Sa river in the downstream area depends critically on the agriculture practiced upstream.

The empirical objective of the research project was the assessment of the social benefits accruing to the population of Mae Rim from improved tap water quality and service. As already explained the downstream water quality depends heavily on the pest management and soil conservation practiced in the uplands of the watershed. The population of downstream Mae Rim, more specifically the customers of the Mae Rim Water Works (MRWW) with whom the survey was conducted, would benefit directly from the upstream improvements through better, i.e. drinkable, tap water quality. In addition to these direct private benefits, the MRWW customers could also be expected to derive indirect benefits from this program since it would lead to a general reduction of pesticide levels in fruits, vegetables and the whole environment and to less soil erosion in the uplands. Since these benefits are non-rival and nobody can be excluded from experiencing them they can be viewed as typical public benefits accruing at the same time to customers and non-customers of MRWW as well as to future generations.

The scenario which respondents in this study were asked to value suggested that upstream farmers might turn to an agricultural practice implying less pesticide use and less soil erosion upstream which will lead to a better tap water quality and to a reduced risk of flooding for the downstream population as well as to a reduced pesticide content in fruits, vegetables and the whole ecosystem. The scenario suggested that this program would be financed by increased water bills for the MRWW customers and people were asked which increase in their water bill they would be willing to agree to at maximum in order to make the realization of this program possible. According to the scenario the total benefits they may expect in return would consist of direct private benefits (improved tap water quality, less pesticide pollution of fruits and vegetable they eat etc.) and public benefits (less pesticide contamination of the whole environment, reduced danger of flooding etc.) from which also non-customers of MRWW and even future generations might benefit.

Study design

The structure of the study in this project aimed at an optimization procedure for the questionnaire design including the scenario such that the difference between the results obtained from a face-to-face sub-survey and the results obtained from a mail sub-survey vanished. If this goal were attained it would be possible to use only mail surveys instead of face-to-face surveys in the future in order to make CVM surveys less costly.

As already mentioned the pursuit of this goal requires among other things increasing the comprehensibility of the CVM scenario and of the payment scheme, identifying and eliminating potential resentments that respondents might have w.r.t. the proposed scenario as well as increasing the credibility of the project and the perception of the probability of its implementation.

The project study included three main phases: after conducting expert interviews and two rounds of pretests an initial CVM survey was conducted with a random sample of the MRWW customers. A split sample design was used in which 500 personal interviews were conducted and 1200 mail questionnaires were sent. For both interview forms the samples were divided into respondents receiving the DC elicitation format and others receiving the PC format. In the DC format they were asked if they agreed to this program if they had to pay a surcharge of a specified amount. The DC question was asked in its double-bounded form, i.e. a follow-up payment question was asked with a higher/lower amount depending on the answer to the first payment question. In the PC format, respondents were asked to specify the payment interval from a given list that contains the maximum amount of money they would be willing to pay as such a surcharge to make the program possible.

After the evaluation of the results of this initial survey, two rounds of participatory group meetings with those respondents of the mail survey agreeing to take part were conducted on two consecutive weekends. The objective pursued with these group meetings was an improvement of the questionnaire design in order to increase its comprehensibility and to reduce possible biases of respondents' answers.

In the first round of group meetings participants were asked to comment on the proposed project and discuss its elements in the group with the help of a moderator. At the beginning of the group meetings participants' perceptions of the project description in the mail questionnaire were tested. Subsequently, participants' information on the program was updated and its details as well as chances for practical implementation were discussed in the group. Following this exchange of arguments and points of view w.r.t. the proposed program participants were given a copy of the mail questionnaire and asked to comment on its design and suggest improvements. It was intended to detect resentments, taboos and other misformulations in the questionnaire that would lead respondents to either not return the

questionnaires or report untruthful results. Finally, they were asked to discuss the issues raised in the group meeting with their friends and family until the next group meeting and to write down the ensuing results.

The objective of the second round of group meetings held on the following weekend was to confront the participants with the director of MRWW in order to increase their understanding of the water supply system and the measures to be carried out, and to detect areas of conflict between the water users and MRWW. It is hypothesized that those hidden conflicts have a considerable influence on the response behavior of the water users, both in face-to-face and in mail surveys. Thus, detecting and anticipating these conflicts could improve the scenario description and formulations in the questionnaire to a large extent so that protest responses would be mitigated. After the detailed presentation of the director of MRWW, participants were given the possibility to ask questions and discuss issues of water supply, quality monitoring and water policy in every detail. Finally, the participants were asked the thoughts and considerations with respect to the project that had come to their minds during the past week.

Subsequently, the questionnaires for the FtF survey and the MS were revised according to the results and implications from the participatory group meetings. The same split sample design as in the initial survey round was employed where now 850 personal interviews were conducted and 1500 mail questionnaires were sent to MRWW customers.

3. Results

The results of the initial survey are shown in table 1. As expected, the return rate of 28.8 % of the MS was quite low. The answers to the DC questions were evaluated using three different evaluation methods simulating three different hypothetical question formats: (1) single-bounded; for the single-bounded method only the answers to the first payment question were

used, (2) double-bounded: for the double-bounded method both answers (first payment question and follow-up question) were taken into account, and (3) DeShazo: for the DeShazo method the answer to the follow-up question was ignored whenever the first payment amount was accepted. As argued by DeShazo (2002) this procedure should eliminate any anchoring effects that result from respondents' reluctance to enter into some kind of bargaining process once having already accepted the first proposed payment. The PC responses were evaluated with two different methods: (1) estimating a probit model of response probability, and (2) calculating the mean over the midpoints of the PC intervals chosen by the respondents.

Table 1: Summary of the WTP results of the initial survey (figures in Baht/month):

Format	Evaluation method	FtF	MS
		mean WTP (95%-confid. interval)	mean WTP (95%-confid. interval)
DC	Single-bounded	233 (199-272)	163 (105-222)
	Double-bounded	176 (154-198)	148 (101-198)
	DeShazo	227 (203-257)	168 (136-200)
PC	Probit	62 (48-75)	100 (63-137)
	Interval midpoints	63 (54-72)	102 (79-126)

The FtF DC results reflect perfectly our expectations formed by the literature: WTP estimated by the double-bounded method is significantly lower than WTP estimated by the single-bounded and the DeShazo methods. This same pattern is observed for the MS DC results, thus, it can be concluded that anchoring effects associated with the higher follow-up bid as explained above are strong so that the double-bounded DC format should not be used. A comparison of the DC with the PC WTP results reveals a dramatic discrepancy. However, while higher WTP estimates for the DC format were expected according to the literature such

a large difference is astonishing and needs to be explored further. As expected, significant differences of the WTP estimates were found for both elicitation question formats between the FtF survey and the MS. It showed that for the PC format the MS results are significantly higher than those of the FtF survey. This effect might be explained by the fact that only those MS respondents sent back the questionnaire (in the version used for this first round of MS) who were especially interested in the tap water improvement while the others did not care to answer. It will show that especially this kind of self-selection effect could be eliminated by using the participatory techniques to improve the questionnaire.

The participatory group meetings revealed some considerable lack of understanding of the proposed valuation scenario, resentments against MRWW, i.e. the public authority in charge of implementing the proposed program, doubts w.r.t. the possibilities of implementation of this program and substantial misconceptions concerning the purpose of the study. Respondents had quite a good understanding of the private benefits of the program, whereas an understanding of the associated public benefits required discussion in the group. Moreover, respondents seemed to have bad experience with the service and the reliability of MRWW which was revealed already in the first round of meetings. These issues were even more intensively discussed in the second round in direct confrontation with the MRWW director. Further, participants placed a high importance on control and monitoring measures in order to be assured that the proposed program would actually be implemented as promised and maintained in the long run. Finally, the inclusion of a set of personal questions in the mail questionnaire referring to people's attitudes w.r.t. to the environment, government and spending behavior had created the appearance that the tap water improvement program was just a pretext for sounding out the population w.r.t. personal and private issues.

These insights gained from the participatory group meetings formed the basis for a revision and refinement of the questionnaires to be used in the subsequent FtF survey and MS study.

First of all, the scenario was reformulated to include a clearer description of the public benefits and to stress the control and monitoring measures proposed by the groups. Second, the number of personal questions was reduced and their purpose for the study was explained more thoroughly. Further, the DC question format was changed to the DeShazo format, i.e. the higher follow-up question was eliminated, in order to account for the anchoring effects found in the initial survey. Finally, the design of the elicitation question was adapted so that a test of starting point bias for the DC format and range bias for the PC format could be conducted. Table 2 shows the results of the main survey.

Table 2: Summary of the WTP results of the main survey (figures in Baht/month):

Format	Evaluation method	FtF	MS
		mean WTP (95%-confid. interval)	mean WTP (95%-confid. interval)
DC	Single-bounded	196 (164-232)	45 (17 – 79)
	DeShazo	198 (178-217)	89 (68-108)
PC	Probit	69 (53-83)	68 (49-83)
	Interval midpoints	69 (60-78)	68 (57-79)

The most striking result from table 2 is that the WTP assessed by FtF interviews is the same as by MS for the PC format. In combination with the fact that the return rate of the MS has now increased to 50.5 % (after 28.8 % in the first survey) this result shows that our MS design was improved from the first to the second survey dramatically.

4. Discussion

As can be seen from the results in table 2 the improvement of the questionnaire design on the basis of the participatory group meetings eliminated the self-selection effect that was

responsible for the MS results of the PC format being significantly higher than the FtF results. The improvement of the MS design now induced much more people to return their questionnaires than in the first survey so that now not only the stated WTP of those who are most interested in the program (and consequently have the highest WTPs) are taken into account in the study. Further, no significant range bias, i.e. no systematic effect of the range of the specified payment intervals of the payment card presented to the respondents on their stated WTPs, was detected from the PC data. For the DC format a large discrepancy between FtF and MS results remains, a plausible explanation for this phenomenon is still missing and requires further research. Furthermore, a significant starting point bias, i.e. an effect of "anchoring" the response to the WTP question on the proposed payment amount, could be detected from the DC data. These results underscore our recommendation that in the socio-cultural context of Thailand the PC format is clearly superior to the DC format.

The results emphasize the high importance of participation groups for the improvement of the quality of CVM surveys, especially for the design of an inexpensive mail survey that can be used as a substitute for the traditional face-to-face surveys. During the group meetings the discussions between the participants and with the MRWW director revealed a number of issues that turned out to be very valuable for the revision of the questionnaires. Our study also illustrates two important points: (1) the pre-information of the participants of the group meetings stemming from the preceding mail survey was particularly helpful for an efficient and competent discussion in the groups, and (2) the fact that mostly critical and skeptical respondents from the mail survey agreed to join the meetings was advantageous because it allowed to address especially the concerns of those people who were typical candidates for non-response due to their critical overall attitude towards the program and the chances to implement it. In order to attract especially this respondent group to the participatory meetings it turned out to be a good idea to announce the participation of an official from the water

authority to whom they could complain about the shortcomings of Mae Rim water supply and with whom they could discuss the possibilities of implementing the water improvement program in practice.

This procedure distinguishes our participatory approach from the focus group approach for which group participants not yet informed about the public project to be valued are randomly selected from a survey population. In contrast, in our approach the knowledge about the project and the experience gained from filling in the mail questionnaire prior to the group meetings enables the participants to address the issues most critical for their understanding of the project and to voice their specific problems with filling in the questionnaire. By involving these "experienced" respondents actively in the questionnaire design it is possible to directly access the "inner perspective" of the target population of the survey.

5. Conclusion

The results of this study demonstrate that the combination of a preliminary initial mail survey based on thorough pretesting of the questionnaire on the one hand and a series of participatory group meetings on the other allowed the design of a second mail survey whose results were statistically identical to the results of a reference FtF survey (which is typically considered a benchmark for a valid and reliable valuation technique). Since the costs of a mail survey are substantially lower than the costs of FtF surveys this is an important finding and an essential improvement of the CVM technique. The crucial characteristic of the participatory technique proposed in this paper is to conduct the group meetings with respondents from a preceding mail survey who voluntarily join the participation groups. Their pre-information of the project and experience with the questionnaire as well as their high motivation to get involved proved to be advantageous for efficient and productive group discussions in order to improve the survey design and the questionnaire used. From the group discussions it showed that the

announcement of the inclusion of an official of the water authority in the group meetings was a main attractor for those participants who were most skeptical w.r.t. the whole project and whose comments on the survey design turned out to be the most useful.

Regarding the appropriate WTP elicitation question format the dichotomous choice format turned out to be unsuitable for CVM mail surveys in contrast to the PC format because of the adverse strategic and psychological incentives involved. It showed that a mail survey based on the payment card elicitation question format leads to the same results as a face-to-face survey with this format. Since the costs of mail surveys are much lower than the costs of face-to-face surveys this seems to be a rather strong and attractive result.

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