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## **Abstract:**

In this paper we show how citizen expert groups can be used to improve the design of contingent valuation surveys. The concept of citizen expert groups combines the various advantages of focus groups and of participatory approaches like citizen juries and the market stall method. Using an empirical study in Thailand it is demonstrated that after developing the project scenario and the questionnaire in cooperation with a citizen expert group the result of the study became independent of the interview form used in the survey which was taken as an indicator for the reliability and validity of the study.

Testing different elicitation question formats in our survey it showed that with the payment card format face-to-face interviews and mail interviews yielded the same social willingness to pay. A practical consequence of our findings could be that in the future costly face-to-face interviews can be substituted by much cheaper mail interviews in CVM surveys if the payment card format is used for the elicitation question and the whole survey design is optimized following the advice resulting from appropriately organized citizen expert groups.

**JEL-classification:** D6, H4, L3, Q25, Q51

## **1. Introduction**

In spite of its numerous well-known deficiencies the Contingent Valuation Method (CVM) is still one of the most popular methods at hand for the economic assessment of environmental values. Among other shortcomings CVM studies are quite expensive in practice and their results are prone to several kinds of systematic biases. In this paper we propose a method to make CVM surveys less costly without loss of validity and reliability. The empirical part of our analysis refers to a CVM study assessing the social value of improved tap water quality in a suburban region in Northern Thailand.

CVM surveys are based on household interviews where respondents are asked their willingness to pay (WTP) for some public project, namely the maximum amount of money they would be willing to pay for the realization of that project rather than go without it. The estimated mean WTPs of a representative sample of all households affected by that project are then aggregated to derive its social value.

In CVM studies a person's WTP is interpreted as the monetary equivalent of the utility accruing to him from the project in question. In this interpretation the practical concept of WTP is equivalent to the theoretical concept of Hicksian Compensating Variation (CV). Therefore, in the context of project evaluation the Contingent Valuation Method aims at the empirical assessment of a monetary expression for the utility change a household will experience if the project in question will be realized (e.g. Ahlheim and Frör, 2003). From this background it becomes apparent that no practical assessment technique can accomplish this ambitious theoretical goal perfectly. All that can be hoped for is to approximate these potential individual utility gains as closely as possible. In this paper we propose to involve so-called citizen expert groups in the whole process of CVM survey design in order to minimize the typical sources of biases and to improve the CVM survey design such that mail surveys can be used instead of face-to-face interviews in the future in order to save cost without loss of reliability of the results. Based on the above mentioned empirical CVM survey in Northern Thailand we analyze the performance and effectiveness of the proposed method.

The rest of the paper is organized as follows: In the next section we analyze the main sources of errors and biases in practical CVM studies in order to identify the crucial points where improvements might set in. Section 3 offers an overview over the existing participatory valuation techniques, while in section 4 we introduce the concept of citizen expert groups (CEG) as a possibility to improve participatory valuation of environmental changes. In Section 5 we analyze a CVM study we carried out in Northern Thailand where the CEG technique was tested in practice. Section 6 contains concluding remarks.

## **2. Sources of CVM failure**

There are three fundamental sources of error in a typical CVM procedure. One stems from the fact that it will be very hard for people to form a concrete enough idea of the future benefits they may expect from an environmental project that does not exist yet and, therefore, cannot be inspected before they have to state their WTP for its realization. The WTP for such a

project will typically depend on its specific features, on the utility a person might obtain from its direct use (use values) and from the benefits accruing from the mere existence of that project (nonuse values). Different people will appreciate different features of such a project which poses a rather complex information problem regarding the design of the questionnaire. The questionnaire must provide a description of the planned project which allows all kinds of respondents to form an exact as possible idea of the project features which are relevant for their personal appreciation of the project. The quality of CVM responses depends critically on the conveyance of all information necessary for a respondent's decision making with respect to his WTP and his ability to process this information within the short time span he is given to answer the WTP question. While for most of us it is quite obvious what benefits we have to expect from e.g. a toothpaste or a cup of coffee it is far more difficult to imagine the future benefits from e.g. a new agro-forestry technique clearly enough to state a WTP which represents exactly the benefits we expect from that technique. Therefore, the danger exists that respondents in a CVM interview are unsure themselves what benefits to expect and how to express these benefits in monetary terms.

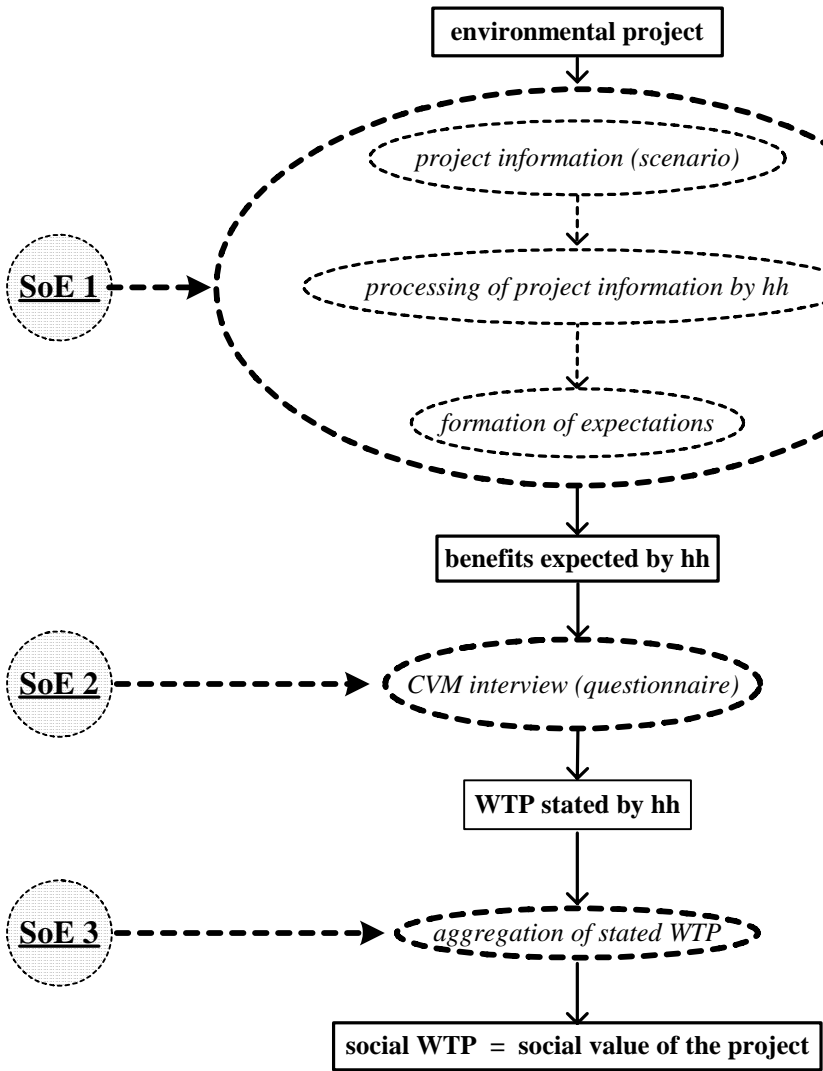
A second main source of a whole class of errors arises from the fact that even if people know exactly what benefits they expect from some environmental project and how to express them in WTP terms they might not be willing to state this WTP correctly in a CVM survey. There are many reasons discussed in the literature for such deliberate misstatements of WTP, some of them strategically motivated (e.g. Brookshire et al., 1980; Mitchell and Carson, 1989; Champ and Bishop, 2006), others arising more or less by chance if respondents do not like the person of the interviewer in face-to-face interviews or if their religious, ethical or political convictions and feelings are hurt by formulations or statements in the questionnaire (e.g. Ethier et al. 2000; Legett et al., 2003). Therefore, when designing a CVM study everything has to be done to preclude the occurrence of undue negative or positive feelings that have nothing to do with the properties of the project itself.

The third general weakness of CVM studies lies in the aggregation of individual WTPs and their extrapolation to a social WTP which is interpreted as the social value of the project under consideration. Typically, a representative random sample of all households affected by a project is chosen for the CVM interviews and the mean or, in some cases, the median of the WTPs stated by the interviewed households is multiplied by the number of all affected households to obtain the social value of the project. Clearly, this aggregation procedure is justified only if the group of households actually interviewed is representative of the whole population affected by the project, i.e. it is not enough to approach a representative household group about being interviewed, the decisive point is that the group that is finally interviewed is representative. Especially in the case of mail surveys where response rates are typically rather low and the problem of self-selection of respondents arises this difference might be important for the validity of the whole study.

This situation is illustrated in figure 1 where the three main sources of error (SoE) of a CVM survey are shown. The first source of error (SoE 1 in fig. 1) arises from the fact that if the information on the future project or its perception and processing by the CVM respondent is flawed the respondent will form a wrong idea of the project and of the benefits it will yield to him. Therefore, the project scenario which describes the project and its probable

consequences must be designed such that the information it contains can be understood also with low intellectual effort so that respondents of all kinds of social background may obtain a realistic impression of the project they have to value.

The second general source of error (SoE 2) lies in the circumstances of the CVM interview itself. Here the formulation of the questionnaire is of great importance, especially, the formulation and format of the elicitation question, i.e. the question that aims at eliciting respondent's willingness to pay. If some of the formulations used in the questionnaire appear inappropriate to respondents from a religious, ethical or cultural point of view they might state a WTP that is not consistent with their true feelings, i.e. with the benefits they really expect from the project to be valued. Of course, the interview form (face-to-face, mail interview, telephone interview etc.) might also influence stated WTPs, no matter what the true preferences for the project are.



- fig. 1: Sources of error in CVM -

The quality of the interview will also influence the number of people addressed who refuse to answer the questionnaire. If as a consequence of such "drop-out losses" the sample of those respondents whose stated WTP is aggregated in a CVM study is not representative for the whole population affected by the respective project the social value yielded by the study is not the "true" social value of the project – no matter if the originally chosen sample of people who were asked to fill in the questionnaire was representative or not. Therefore, the (self-)selection of those respondents with whom the interview could actually be completed represents a third source of potential error (SoE 3). This source is especially important for interview forms with high denial rates like mail or telephone interviews.

In our empirical analysis we scrutinize possibilities to avoid these different kinds of pitfalls described here by employing so-called citizen expert groups, i.e. groups of people who are ready to get involved in a CVM survey and to cooperate with the CVM researchers. It is hoped that the special features of this kind of citizen participation will help to reduce the error-proneness of CVM studies.

Since it is not a priori clear when the result of a CVM study is "correct" and since the quality criteria that can be found in the literature (e.g. Kanninen and Khawaja, 1995; Herriges, 1999) refer only to the formal statistical quality of CVM results a criterion is needed which refers to the factual correctness of CVM results. As such a factual quality criterion we postulate that the results of a CVM survey are "correct" if they are independent of the interview form, namely, if face-to-face interviews and mail interviews with the same questionnaire design lead to the same social WTP for the project to be valued. The use of this criterion has an interesting implication regarding future applications of CVM. Since face-to-face interviews increase the cost of a CVM survey considerably in comparison with a mail survey it would be quite attractive to find a technique which improves the design of CVM survey such that both interview forms lead to the same results so that nothing can be gained by using costly face-to-face surveys instead of mail surveys. If citizen expert groups lead to an improvement of CVM quality in the sense of our criterion it also opens up the possibility to substitute mail surveys for costly face-to-face surveys in the future.

There has been a long-going debate about 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 (e.g. 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 and attitudinal questions since the problem of social desirability and interviewer biases, a well known problem of FtF surveys, can be avoided (e.g. Krysan, 1994). Also, respondents can take as much time as they need to think about the proposed scenario and about their answer to the WTP elicitation question (e.g. 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). In the course of our empirical study we try to develop a standardized procedure to work out a CVM survey design that leads to the same (or nearly the same) results for both interview forms, i.e. for face-to-face and mail surveys. This procedure should yield the following improvements in particular: (1) increase the comprehensibility of the CVM scenario so that respondents can form a correct idea of the project and the benefits they might receive from it without too much intellectual effort (addressing SoE 1); (2) identify hidden resentments and cultural taboos of the population to be interviewed in order to avoid questions and formulations in the questionnaire that might lead to deliberate misstatements of respondents' true WTP (SoE 2); (3) increase the credibility of the project and the perception of the probability of its realization so that respondents take the survey seriously; this should help to keep response rates high to preserve the representativeness of the sample of actual respondents (SoE 3). As an instrument to reach these goals we use a special form of citizen participation, citizen expert groups, for our empirical CVM study. In the next section we give a short overview of the role participatory processes can play in CVM studies. Afterward, we introduce citizen expert groups as a special case of stakeholder participation in environmental valuation.

### **3. Participatory group processes in CVM**

The idea of making use of group processes in the context of environmental valuation is not new. A variety of techniques where groups of respondents from a sample population instead of just single individuals are interviewed has been developed and analyzed in the literature. This idea is based on the assumption that social interaction in the form of discussions and an exchange of personal views and opinions among the group members generate insights that would have remained hidden in purely individual interviews. In addition, such group processes are thought to facilitate the group members' reasoning about the proposed CVM project scenario. By allowing them to build their thinking on other group members' ideas participants shall be enabled to better reflect on their impressions of the project which shall, finally, lead to better value judgments.

The most popular techniques are the so called focus groups which originated from sociological research (e.g. Krueger, 1998; Morgan, 1996) and are now widely used in marketing research. As purely qualitative techniques they can either be employed in the pre-survey phase for aiding and improving the process of CVM questionnaire design or as post-survey focus groups to gain insights into respondents' reasoning during the survey for an assessment of the validity of the survey results. A different type of participation groups which aims at an elicitation of WTP in valuation workshops has been known as the "market stall" technique and is becoming increasingly popular among CVM researchers (Macmillan et al., 2002).

Among these different types of groups the pre-survey focus groups are the most widely employed. Today they represent a standard procedure for CVM questionnaire design and



subsequent pretesting (e.g. Painter et al. 2002; Hanley et al., 1998; Hutchinson et al., 1995; see Christie et al., 2006 for focus groups in the context of choice experiments). Typically, focus groups consist of 8 to 12 participants recruited from the survey population to be sampled and as such they have no or very little prior information regarding the project to be conducted. During these group interviews which typically last about two hours a trained moderator presents selected information in a prespecified way and encourages and guides discussions among the group members. Chilton and Hutchinson (1999a) describe content analysis as a suitable technique for the classification of qualitative focus group data.

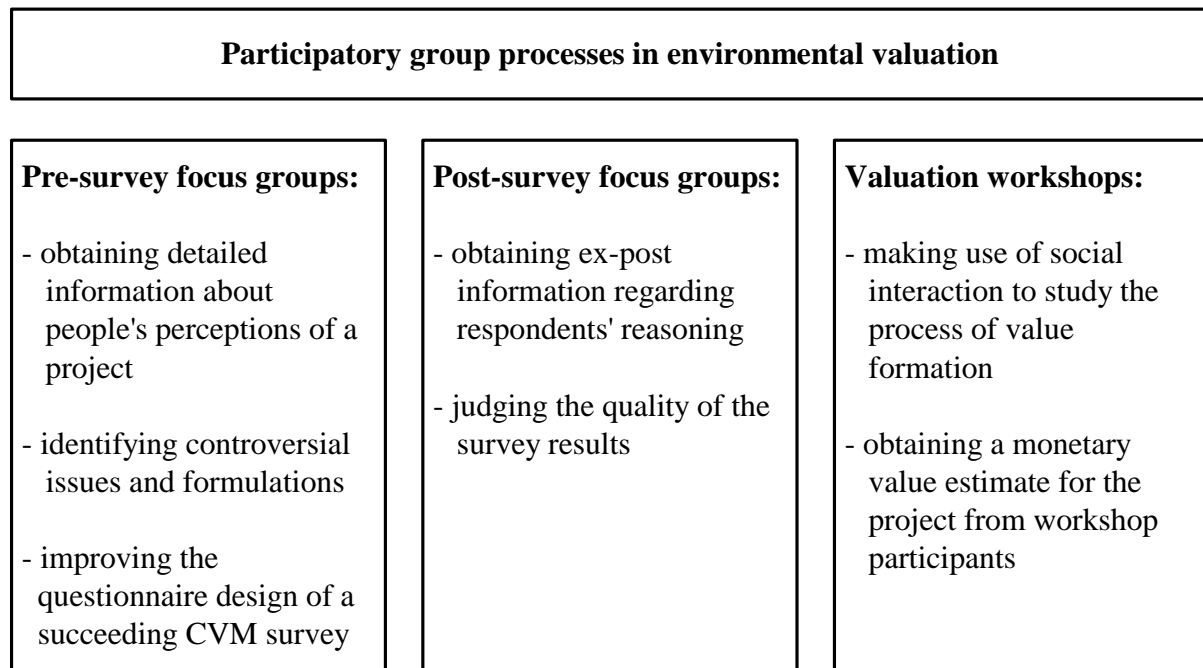
Although focus groups have become a standard tool in CVM most studies provide only few details about their specific groups and the insights that were gained and used for the formulation of the CVM questionnaire. Chilton and Hutchinson (1999a, 1999b) were the first to conduct a systematic study of the kind of information that could be acquired in a series of pre-survey focus groups. In a study about wetland ecosystem services in Mexico Kaplowitz (2000) and Kaplowitz and Hoehn (2001) analyze whether focus groups generate more or other kinds of information as compared to the in-depth individual interviews commonly conducted in the pre-survey phase of a CVM study.

A number of studies employing focus groups in a post-survey phase have been carried out with the objective to receive feedback from respondents to be used as a diagnostic tool for judging the reliability of the responses (Powe et al., 2005). Post-survey focus groups can be conducted in two ways: either respondents recruited for the meetings first complete a valuation questionnaire and discuss their perceptions of the project and their opinions with the questionnaire immediately thereafter (e.g. Powe et al., 2005; Blamey, 1998), or they constitute a sub-sample of a larger CVM survey conducted at some earlier time (e.g. Brouwer et al., 1999; Clark et al., 2000).

Another type of group processes in CVM, the valuation workshop, is becoming more and more popular but remains controversially discussed (Niemeyer and Spash, 2001; Söderholm, 2001). In contrast to focus groups which assess qualitative information regarding people's perceptions of environmental issues and of the specific project under consideration, valuation workshops aim at a quantitative, i.e. monetary value assessment like in a regular CVM survey. These workshops that represent a quantitative extension of the method of citizen juries in public decision making (e.g. Kenyon et al., 2001, Kenyon and Nevin, 2001) have become known as "market stall" method (Macmillan et al., 2002). This method is motivated by the assumption that ordinary people do not hold well-defined preferences for environmental goods since often issues of environmental change are unfamiliar to them and rather complex to understand. Moreover, people are not used to consider environmental issues in monetary terms so that it is doubtful that respondents in an ordinary CVM survey are able to provide a meaningful WTP statement with the given limited information and time (Sagoff, 1998). In a market stall workshop these conceptual problems of the traditional CVM are hoped to be overcome by making use of group deliberation and discussion. At the end of such workshops participants typically receive a short questionnaire and are asked their WTP for the proposed environmental project (Macmillan et al., 2006; Philip and Macmillan, 2005; see Álvarez-Farizo and Hanley, 2006 for an application of valuation workshops in the context of choice modeling). In a recent study Macmillan et al. (2006) analyze the effects of familiarity

of the environmental good to be valued on the performance of the market stall technique. McDaniels et al. (2003) employ valuation workshops in an attempt to overcome the embedding effect widely observed in CVM surveys.

While such valuation workshops seem to be able to overcome a number of serious concerns often voiced against the traditional CVM technique its conceptual basis remains problematic from an economic point of view. These workshops constrain the number of respondents to much smaller sample sizes than are common in traditional CVM surveys, even if various workshops are conducted in parallel. Further, after all that intensive information, group discussion and social interaction participants of market stall workshops must be expected to have different preferences than the non-informed ordinary people whose preferences are relevant for the social valuation of an environmental project. Consequently, aggregation of the WTPs stated in market stall workshops will lead to wrong results as far as the social value of an environmental project is concerned (cf. SoE 3 above).



**- fig. 2: Participatory group processes -**

Summing up, pre-survey focus groups can provide a useful tool for reducing the main sources of error shown in fig. 1 if they are developed further in order to increase the quality of their impact on CVM survey design. Our approach of forming citizen expert groups for CVM surveys, therefore, follows this line. Post-survey focus groups may be helpful to detect flaws of a CVM survey already completed, but then, of course, it is too late to obtain a reliable valuation of the actual project. Valuation workshops are interesting for studying the influence of social interaction on preference formation in general but they cannot reasonably be used for the valuation of environmental goods since the participants of these workshops cannot be

taken as representative for the ordinary people whose valuation is decisive for the social value of a public project. Fig. 2 shows the main characteristics of these three participatory approaches to environmental valuation.

#### **4. Citizen expert groups**

The concept of citizen expert groups (CEG) combines the advantages of the three participatory approaches described in the previous section. The idea is to form a group of citizens affected by the environmental project to be valued who have already shown a personal interest in this project and acquired a certain standard of knowledge about it. In a sequence of meetings the group discusses the whole range of different aspects concerning the environmental, social, economic and political background of the project. Also, personal experiences with the environmental issue under consideration are exchanged among group members. If possible, government officials, scientists and members of the public administration are invited to feed in outside information and expert knowledge. After this information phase group members obtain detailed information on the principles of CVM and on the planned valuation survey. Then they are asked to discuss the various aspects of this valuation project and, especially, to comment on a draft of the questionnaire. This discussion aims at a minimization of the three main sources of CVM errors discussed in section 2 (cf. fig. 1) and is, therefore, directed towards the survey characteristics behind these sources by the moderators. In particular, the following points are addressed:

- SoE 1: The central issue in the context of this source of error is the formulation of the project scenario since it forms a link between the objective characteristics of the environmental project and the expectations respondents of the future CVM survey will form w. r. t. the benefits they may receive from that project. These expectations are the basis for their valuation of the project and for their stated WTP since it is the main, if not the only, source of information they have regarding that specific project.

The typical dilemma regarding the formulation of a project scenario is that on the one hand it should be as exact as possible and convey as much information about the project as possible and on the other hand it must not demand too much of the intellectual capacity of respondents which means that information should be kept short and simple. It is extremely difficult to compromise between these two contradictory goals, especially, since it is not enough to aim at the intellectual capacity of some "average" citizen because that would mean to exclude half of the population from the survey. If the information contained in the project scenario is too superficial (and therefore easy to grasp) people's valuation of the project will be superficial, too. In this case one cannot really attribute their stated WTP to the specific features of the project to be valued since they do not know these features in detail. If on the other hand information is really adequate the danger arises that it is too complicated to understand for less gifted respondents and that the text is too long so that, especially in a mail survey, people will stop reading it and the non-response rate will increase.

Apart from these points, it is obvious that the formulation of the scenario must not be suggestive in a sense that it guides respondents' judgment on the project emotionally in one direction or the other.

- SoE 2: The main problem here is to make sure that respondents are willing to state their valuation of the project in monetary terms honestly (e.g. Ahlheim, 1998). This implies, of course, that the whole questionnaire should not contain any facts or formulations offending people's feelings from a religious, ethical, cultural or political point of view because this will lead to antipathy towards the project and to a downward bias of stated WTP no matter what respondents' true valuation of the project is. Therefore, detailed knowledge of the cultural background of the society where the CVM survey takes place is necessary.

Even if respondents have no emotional reason to state a wrong WTP deliberately they might be misled in their judgment unintentionally by some formulation in the questionnaire which they interpret to suggest that a certain amount of WTP is considered "adequate" by the interviewers or by anchoring effects due to the chosen elicitation question format. Since, again, the possibility of such misinterpretations and pitfalls depends on the specific cultural characteristics of the interviewed population it is extremely important to highlight this background. This is especially true if the survey is carried out in a cultural environment that is foreign to the CVM researchers (e.g. Ahlheim et al., 2006).

The fact that environmental goods are typically available for free makes it difficult to convey the idea to respondents that they should express their appreciation of an environmental project in terms of willingness to pay. A convincing payment scenario and an adequate choice of the payment vehicle are essential in this context.

- SoE 3: Especially with respect to mail surveys where the social pressure to comply with the request to fill in the questionnaire is rather low, the design of the project scenario and of the questionnaire is essential for the attainment of a satisfactory response rate. A sufficiently high response rate and a representative sample of respondents who actually complete the questionnaire are necessary for the aggregation of individual WTPs to be meaningful. Therefore, all facts which may motivate respondents to comply or which may keep them from complying have to be considered for the whole survey design.

It is obvious that a group of highly motivated and committed citizens like a CEG is an ideal forum for the discussion of these issues and for the development of strategies to cope with the problems arising from the three main sources of CVM errors. In the first phase of such a cooperation between CVM researchers and citizens when the group discusses personal experience and attitudes towards the project the group is more or less an object of observation for the researchers. In the second phase when the specific details of the survey design and the formulation of the scenario and the questionnaire are discussed they "change sides" and become part of the research team whose advice influences the whole study directly. This part seems to make the participation in a citizen expert group attractive, as we found.

A decisive problem of the formation of successful CEGs is to find suitable candidates. In our empirical CVM study in Northern Thailand we organized two succeeding waves of interviews with a FtF and a MS sub-sample each. After the first wave we approached the respondents of the mail survey sub-sample and asked them to take part in a citizen participation group. The objectives of the group meetings were explained to them and as an additional incentive they were offered a free meal at the Chiang Mai University campus (where the CEG meetings took

place) after each meeting. It was interesting that especially those former MS respondents who were rather critical of our tap water improvement project were willing to participate in the CEGs. This turned out to be a great advantage for the group discussions since their critical attitude made them very active discussants and conscientious advisers to our survey.

Since we felt that we should also consult those citizens who refused to return our mail questionnaire we traced them back and visited them in their homes to ask them the reasons for their non-compliance. Combining the opinions of compliant and non-compliant citizens gave us an excellent picture of what went wrong in the first wave of our survey and helped us to improve the whole survey design so that the second round turned out to be quite successful in terms of our reliability criterion which requires that roughly the same social WTP should be obtained from both surveys, mail and face-to-face.

## **5. A CVM study in Northern Thailand**

### *Objectives*

As explained above the general objective of this study is to scrutinize the possibilities of using citizen expert groups to optimize the design of CVM surveys. Particularly, the employment of CEGs should improve the quality of CVM results in the sense that the social WTP assessed in a CVM study should be independent of the interview form chosen in the survey. Of course, for such a comparison only face-to-face and mail interviews are eligible since the flaws of telephone or mall stop interviews are too obvious.

If with the help of CEGs it becomes possible to find a standard procedure to design CVM surveys so that face-to-face and mail interviews lead to the same social WTP this procedure would (1) improve the reliability of CVM studies in general and (2) open up new possibilities to decrease the cost of CVM surveys dramatically without loss of reliability and validity of the results because in the future mails surveys could be used instead of costly face-to-face surveys.

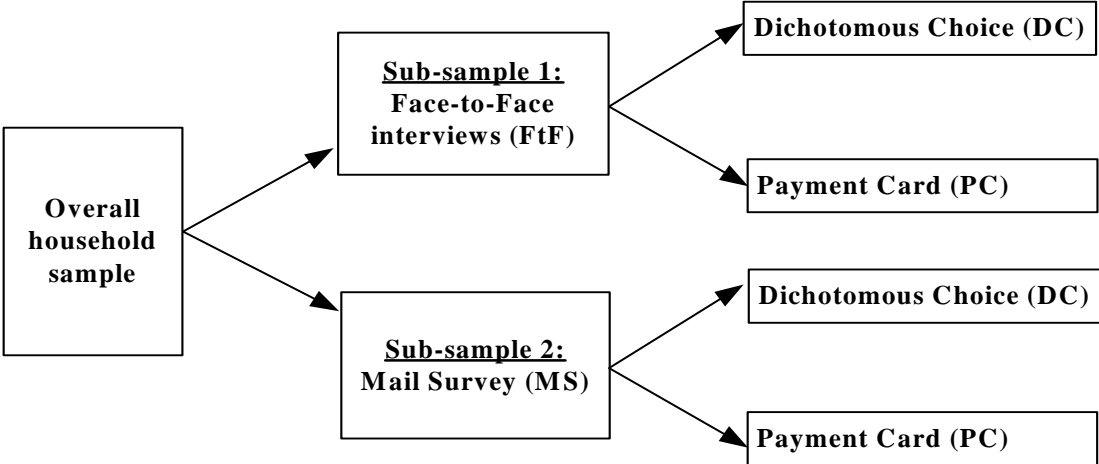
### *Structure*

The intended comparison of the two different interview forms makes it necessary to divide the overall household sample chosen for the CVM interviews into two sub-samples where one sample of households is interviewed face-to-face and the other by mail survey. This separation makes it possible to compare the respective results of the two interview forms.

A further subdivision of the sample is necessary in order to test different elicitation question formats in combination with the different interview forms. Among many other things the choice of the elicitation question format is well-known to have at least a potential influence on the WTP answers. Until today the controversy on the appropriate WTP elicitation question format which leads to "correct" WTP answers is still unsettled. 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 (e.g. 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 (e.g. 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 (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" (e.g. 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.

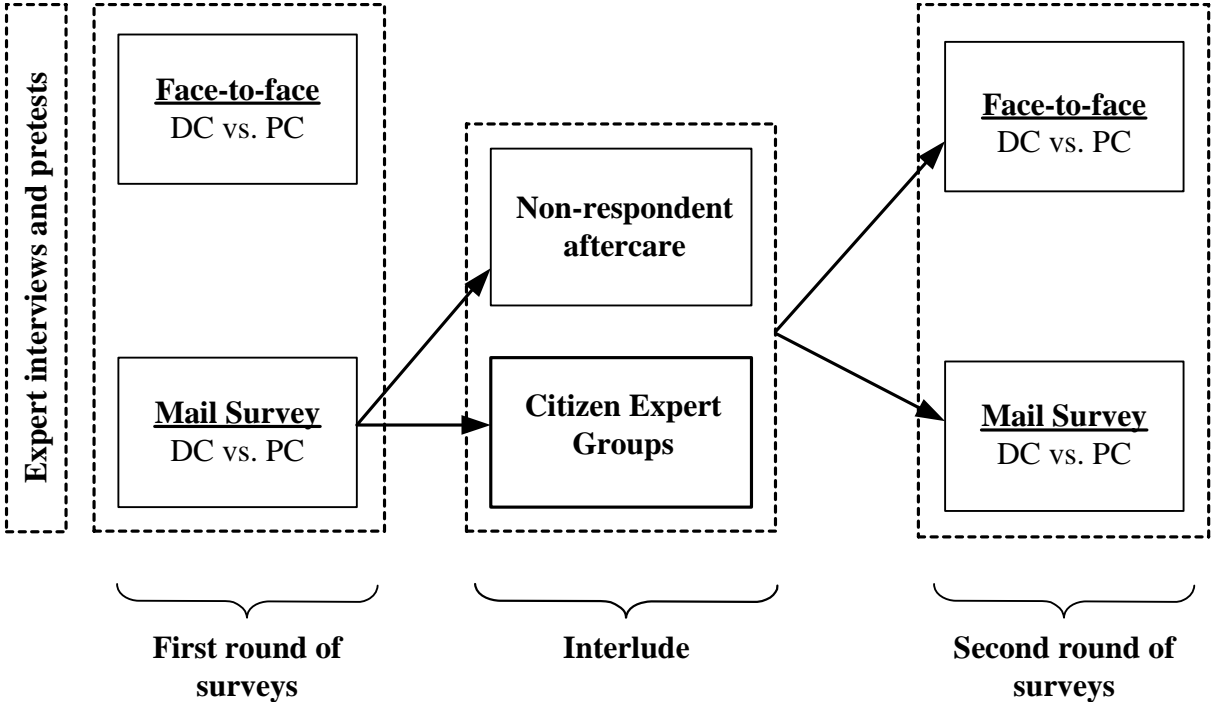
Since it is not clear a priori which elicitation question format is more appropriate to elicit people's "true" WTP we formed two representative sub-samples of the FtF-sample and of the MS-sample, respectively. Respondents of one sub-sample in the FtF sample and in the MS sample were confronted with the DC question format while the members of the other sub-samples had to choose their WTP from a payment card. This somewhat complicated structure is shown in fig. 3. For the decision which elicitation question format is the correct one the same criterion was employed as for the comparison between the two interview forms: we postulate that the "correct" question format should lead to the same social WTP for both interview forms. A question format that leads to different results for different interview forms does not seem to be acceptable.



- fig. 3: Split sample design of the study -

The whole CVM 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 our

survey population, the customers of a local water supplier near the city of Chiang Mai in Northern Thailand. A split sample design was used in which 562 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 the proposed program (improvement of tap water quality in a suburb of Chiang Mai) if they had to pay a surcharge on their water bill 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 proposed program possible.



- fig. 4: Structure of the study -

After the evaluation of the results of this initial survey, two rounds of CEG 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 regarding 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 misleading formulations in the questionnaire that might induce respondents to either not return the questionnaires or report untruthful results (SoE 2). Finally, they were asked to discuss the issues raised in the group meeting with their friends and family at home until the next group meeting and to write down the ensuing results. All meetings were videotaped and fully transcribed in Thai and English to allow systematic analysis of the observations and of the qualitative data.

The objective of the second round of group meetings held on the following weekend was to confront the participants with an external expert, in our case the director of the local water supplier, in order to increase their understanding of the water supply system and the measures to be carried out. Further, it was intended to detect areas of conflict between the water users and the water supplier. 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 by the expert, participants were given the possibility to ask questions and discuss issues of water supply, quality monitoring and water policy in every detail. By the end of the session participants were asked to lay down their own thoughts and the considerations of their friends and family regarding the project which they had written down at home after the last meeting.

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 (see fig. 3) was employed where now 823 personal interviews were conducted and 1150 mail questionnaires were sent to the customers of the local water supplier. The structure of the whole study is shown in fig. 4.

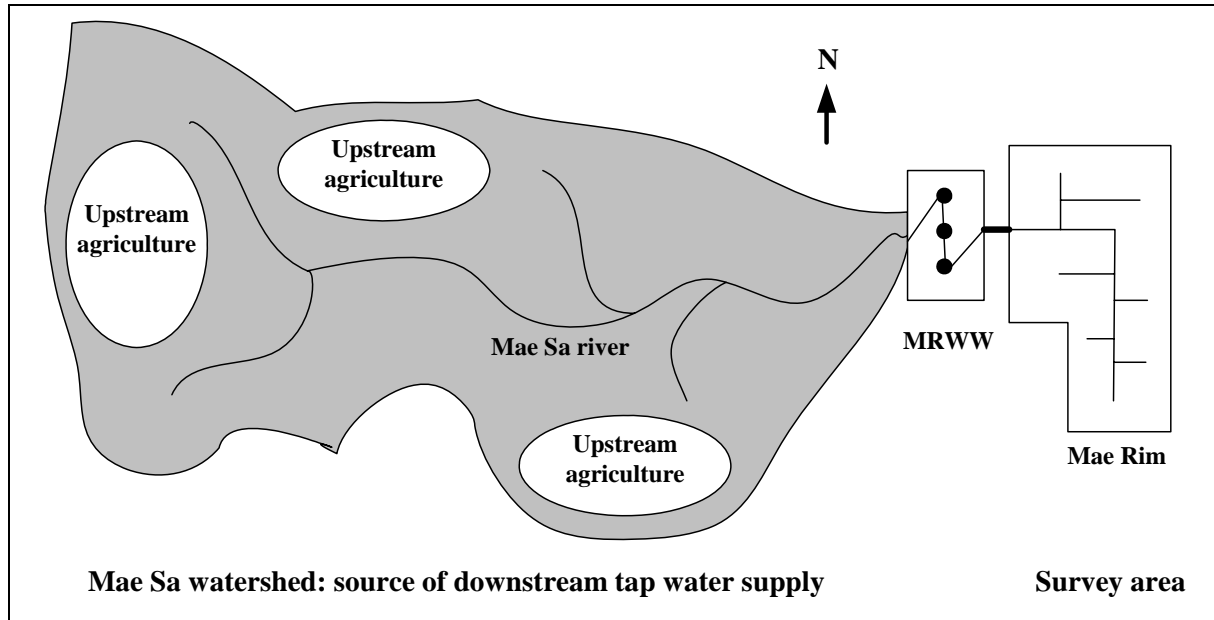
### *The project scenario*

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. A schematic map of the Mae Sa watershed and the downstream survey area is depicted in fig. 5.

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. 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, 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.



**- fig. 5: Schematic map of the Mae Sa watershed and the survey area -**

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 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 have to be financed by increased water bills for the MRWW customers and people were asked which maximum increase in their water bill they would be willing to tolerate 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 soil erosion in the uplands etc.) from which also non-customers of MRWW and even future generations might benefit.

### *Results*

The results of the first survey are shown in table 1. As expected, the return rate of 28.8 % of the MS was quite low, although this figure is well within the range of typical response rates in mail surveys. For the analysis of possible anchoring effects 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. Confidence intervals were computed by the bootstrap method following Park et al. (1991).

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

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

The FtF-DC results reflect perfectly our expectations: 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.

A comparison of the main socio-economic and demographic characteristics between the FtF and the MS samples revealed the self-selection effect of MS-respondents. Most importantly, the sample differed in the variables 'sex' and 'age', where significantly more men responded to the mail questionnaires than were interviewed face-to-face. Also, in comparison between the two survey types respondents of the mail survey were significantly older. Table 2 exhibits the results of probit regression models using the socio-economic and demographic characteristics of respondents as explanatory variables for WTP.

**Table 2:** Socioeconomic characteristics as explanatory variables of the WTP models (first survey)

Variable	FtF-DC	FtF-PC	MS-DC	MS-PC
	Coefficient (p-value)	Coefficient (p-value)	Coefficient (p-value)	Coefficient (p-value)
Bid	-565.58 <sup>**</sup> (.0000)	-15.24 <sup>**</sup> (.0000)	-8.79 <sup>**</sup> (.0000)	-11.33 <sup>**</sup> (.0000)
Income	.11 <sup>**</sup> (.0395)	-.13 (.8683)	.67 (.7478)	-5.53 (.4483)
Household size	85.17 (.1880)	-28.30 (.6516)	69.77 (.6282)	361.37 <sup>**</sup> (.0000)
Education	-508.44 (.8964)	73.57 <sup>*</sup> (.0747)	112.49 (.3109)	51.65 (.4306)
Sex (1 = male)	-126.17 (.2351)	30.11 (.8324)	532.40 (.1990)	98.54 (.6635)
Age	-104.22 (.1756)	-.93 (.9147)	27.29 (.3222)	2.09 (.8490)
Married	14.62 (.9431)	34.25 (.8534)	-562.47 (.1551)	272.50 (.4422)
Children	-252.59 (.2798)	-255.71 <sup>**</sup> (.0261)	-344.60 (.5050)	-185.20 (.5599)
N	337	225	84	113
Log-Likelihood	-292.44	-765.89	-64.51	-388.10
$\chi^2$ - test	585 (df=9, p<.001)	1531 (df=9, p<.001)	129 (df=9, p<.001)	776 (df=9, p<.001)

<sup>\*\*</sup>) significant at the 5 % level

<sup>\*</sup>) significant at the 10 % level

From table 2 it can be observed that the socio-economic and demographic variables have only little influence on stated WTP in this survey. In the FtF-DC model income was found to have a significantly positive effect on WTP, while in the other models this was not the case. In the FtF-PC model respondents' levels of education had a significantly positive effect which also seems to be plausible. In the MS-PC model household size showed a significantly positive effect on WTP while children showed a negative effect in the FtF-PC model. This combination of results is puzzling since one would expect just the opposite signs: for big households the budget constraint should be expected to be tighter than for smaller households so that their stated willingness to pay might be limited by their ability to pay. Overall, no clear

patterns can be detected when comparing the models pertaining to the FtF survey on the one hand and the MS on the other. As will be shown below, these results shall improve considerably after employing the citizen expert groups.

The CEG meetings held after the first survey round revealed a 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 regarding the possibilities of implementation of this program and substantial misconceptions concerning the purpose of the study. This was rather astonishing because several rounds of expert interviews and of thorough pretesting of the questionnaire had taken place before the first main survey. Participants of the CEGs 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 regarding 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 on personal and private issues.

These insights gained from the citizen expert 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. The scenario was structured in a 'question and answer' manner, like e.g. *"What is the idea of the program?" – "The idea is that all MRWW customers should enjoy an uninterrupted supply of tap water which is also drinkable"*, since it was suggested in the groups that this structure would better reflect the respondents' main concerns regarding the project. Second, the number of personal questions was reduced and their purpose for the study was explained more thoroughly to reduce respondents' reluctance to provide such personal information and, thus, to increase the likelihood of response. 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 first survey.

As can be seen from the regression results in table 3 the socio-economic and demographic variables have much more explanatory power in the second survey as compared to the first survey. For the PC version household income is significantly positively related to WTP both in the face-to-face and in the mail survey. The same is true for the level of education in the case of the DC format. However, the fact of having children or grandchildren is significantly positively related to WTP in the face-to-face versions of both question formats but not in the models of the mail survey. At least, the coefficients of this variable have the same sign for all four regression models. In the second survey the self-selection of the MS respondents was considerably reduced which can be observed from a dramatic increase in the response rate

(50.5% versus 28.8% in the first survey) and in the lack of significant differences in the variables 'sex' and 'income'. This is of particular importance since these two variables proved to be significantly related to WTP in the regression models of the FtF sample. Overall, the variables in the regression models of the second survey allow much more interpretation of the survey results since a few plausible and consistent relationships between socio-economic and demographic variables and WTP were found.

**Table 3:** Socioeconomic characteristics as explanatory variables of the WTP models (second survey)

<b>Variable</b>	<b>FtF-DC</b> Coefficient (p-value)	<b>FtF-PC</b> Coefficient (p-value)	<b>MS-DC</b> Coefficient (p-value)	<b>MS-PC</b> Coefficient (p-value)
Bid	-5.87 <sup>**</sup> ) (.0000)	-11.80 <sup>**</sup> ) (.0000)	-7.75 <sup>**</sup> ) (.0000)	-12.86 <sup>**</sup> ) (.0000)
Income	.64 (.1821)	2.88 <sup>**</sup> ) (.0000)	1.35 <sup>**</sup> ) (.0104)	1.50 <sup>**</sup> ) (.0082)
Household size	8.79 (.7390)	31.19 (.3400)	-31.06 (.5926)	44.27 (.4230)
Education	109.60 <sup>**</sup> ) (.0007)	-4.90 (.8724)	81.48 <sup>**</sup> ) (.0442)	-34.05 (.4216)
Sex (1 = male)	-226.96 <sup>**</sup> ) (.0466)	179.20 <sup>*</sup> ) (.0898)	-29.14 (.8272)	73.58 (.6348)
Age	-4.48 (.3940)	-16.54 <sup>**</sup> ) (.0006)	8.87 (.2417)	-6.60 (.5344)
Married	-104.38 (.5046)	-377.99 <sup>**</sup> ) (.0284)	-8.06 (.9615)	-.41 (.9984)
Children	579.71 <sup>**</sup> ) (.0016)	305.19 <sup>*</sup> ) (.0866)	74.90 (.6978)	149.86 (.5513)
N	337	345	363	222
Log-Likelihood	-433.58	-1311.30	-502.43	-813.70
$\chi^2$ - test	585 (df=9, p<.001)	2622 (df=9, p<.001)	1004 (df=9, p<.001)	1627 (df=9, p<.001)

<sup>\*\*</sup>) significant at the 5 % level

<sup>\*</sup>) significant at the 10 % level

The most striking improvement of the survey results brought about by the CEGs in the second survey can be observed by comparing the WTP estimates of the various survey versions in table 4. While still considerable differences of WTP between the face-to-face and the mail survey exist for the DC format, equality of WTP estimates could be achieved 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 dramatically from the first to the second survey.

**Table 4:** Summary of the WTP results of the second survey (figures in Thai Baht/month):

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

### *Discussion*

As can be seen from the results in table 4 the improvement of the questionnaire design based on 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 considered in the study. Further, no significant range bias, i.e. no systematic effect of the range of the specified payment intervals in the payment card on stated WTP, could be 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 underline the high importance and significance of CEGs for the improvement of the quality of CVM surveys. Obviously, they are also useful for the design of reliable mail surveys that can substitute the traditional face-to-face surveys in the future. During the group meetings the discussions among 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. In order to attract this respondent group to the participatory meetings it turned out to be a good idea to announce the participation of an official from the local water authority to whom they could convey their misgivings and complaints regarding the Mae Rim water supply and with whom they could discuss the possibilities of implementing the water improvement program in practice.

This procedure distinguishes the CEG approach from the focus group approach for which participants with no pre-information regarding the public project to be valued are randomly selected from a survey population. 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 filling in the questionnaire. By involving these "experienced" respondents actively in the questionnaire design it turned out to be possible to access the "inner perspective" of the target population of the survey directly.

## **6. Conclusions**

Our empirical study showed how citizen expert groups can be used to improve the design of CVM surveys significantly. It turned out that after a thorough revision of the project scenario and of the questionnaire in accordance with the outcome of the CEG discussions the result of our CVM study became independent of the interview form used in the survey. This independence of the estimated social WTP of the chosen interview form was taken as an indicator for the reliability and validity of our study.

Testing different elicitation question formats after having discussed them with the CEG members showed that the payment card format is significantly superior to the dichotomous choice format which still enjoys great popularity among CVM researchers. It seems that the anchoring effects arising from DC questions are quite strong so that CVM results are severely biased if this question format is used. With the payment card format face-to-face interviews and mail interviews yielded the same social willingness to pay for the tap water improvement project in our CVM study.

A practical consequence of our findings could be that in the future costly face-to-face interviews can be substituted by much cheaper mail interviews in CVM surveys if (1) the payment card format is used for the elicitation question and (2) the whole survey design is optimized following the advice resulting from appropriately organized citizen expert groups.

At the moment we can only note that this route to more reliable and less costly CVM surveys looks quite promising. It will take many further studies to find out the exact reasons for the beneficial influence of CEGs on CVM results and a standardized procedure for the organization of successful CEGs has to be developed, before we can give up using face-to-face interviews completely. But at least the times where large face-to-face interview samples

of thousand and more completed interviews (according to the NOAA panel) were required seem to run out.

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