Designing Contingent Valuation (CV) Surveys for Estimating Use Values: Some Experience from a Case Study of a Water Supply Project

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Abstract

Contingent Valuation Method (CVM) is a frequently used non-market valuation method of eliciting use values of infrastructural projects in developing countries. The main criticism against it is that it has biases and the results are unreliable. Yet, it is used indiscriminately, especially in the developing countries. Consequently, the policy decisions lead to inefficient outcomes. CV studies should focus more on addressing the theoretical, methodological and other empirical issues rather than merely eliciting ‘numbers.’ This paper, drawing mainly from a case study, discusses how an ‘ideal’ CV survey can be conducted for estimating ‘use values’ in developing countries.

General Issues in CV Surveys

Contingent Valuation Method (CVM) is a stated preference method used primarily to estimate either the Hicksian ‘compensating variation’ or ‘the equivalent variation’ arising out of a change in the non-market environmental services and damages¹ (Mitchell and Carson 1989). Although it is a most frequently used method of estimating non-use values (e.g., Brookshire et al 1983; Walsh et al 1984), non-market use values (e.g., Choe et al 1996; Loehman et al 1994; Loomis and duVair 1993; Altaf et al 1992) or both (Niklitschek and Leon 1996) all over the world, the CVM has been heavily criticised in the non-market valuation literature (see Carson et al 2001; Venkatachalam 2004). The CV literature can be classified into two broad categories, namely, (i) CV studies estimating the value of changes in the provision of non-market goods and services without making any attempt to evaluate the properties of the method (e.g., Garrod and Willis 1995; Briscoe et al 1990) and (ii) CV studies that do evaluate the properties of the method while estimating the value of the changes in environmental resources (e.g. Boxall et al 1996; Carson et al 1996; Loomis and White 1996). The basic difference between studies under category (i) and those under category (ii) is that the former do not test for the ‘capability’ of the CV method to estimate the ‘true economic values’ of environmental resources, whereas the latter do it more rigorously. The CV studies in category (ii) can be

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further classified into two sub-categories: (a) those studies which conclude that though subject to biases and errors, the CV method is capable of estimating the ‘theoretically sound’ economic value of the non-market goods after scrutinising the results for different sources of error that are supposed to affect the CV results. In this category, a considerable literature has been devoted to how the CV methodology can be improved upon so as to obtain error-free results (Hanemann 1994; Portney 1994; NOAA 1993); and (b) those studies which suggest that the CV method is not capable of estimating the economic values properly and therefore should not be used for estimating the non-use values of the environmental resources (e.g., Kahneman and Knestch 1992; Diamond and Hausman 1994).

A summary of the various categories of CV studies mentioned above may reveal that the major criticism of the CV method revolves around two aspects, namely, (a) validity and (b) reliability (Smith 1993). One of the important conclusions derived from CV results is that the issue of validity and reliability arises from the fact that the CV method attracts several biases and ‘noise’ (Freeman 1993). Many studies have identified different sources of biases and noise, and have suggested various measures to improve upon the CV methodology (Mitchell and Carson 1989 and NOAA 1993). A major source of error has been identified as lack of realism in the ‘scenario’ conveyed to the respondents (Mitchell and Carson 1989; Hanemann 1994; Portney 1994). This is because the values obtained through the CV method are ‘contingent’ on the nature of the hypothetical market conveyed to the respondents in the form of ‘scenario.’ Hence, to obtain error-free results it is suggested that the ‘scenario’ be improved upon such that it could be ‘as realistic as possible’ (Portney 1994; NOAA 1993).

Despite many guidelines for conducting reliable CV surveys (e.g., Bateman and Turner 1993; NOAA 1993), CV studies in developing countries are being used indiscriminately (Merrett 2002). It should be noted that in developing countries, a larger percentage of CV studies is devoted to estimating the ‘use values’ derived from basic infrastructural projects, especially water supply and sanitation projects. Only a few CV studies of this kind attempt to ‘validate’ the results. The majority of them do not do so because of their basic assumption that the reliability and validity issues pertain mainly to the estimation of ‘non-use values’ and CV methods used in estimating ‘use values’ do generally perform well (Mitchell and Carson 1989). But, this does not mean that the CV results for use values are free from biases and errors. In the case of developing countries, apart from anomalies in ‘survey design,’ factors such as existence of illiteracy, deep-rooted cultural and historical values, traditional sociological and institutional set-up and inefficient government policies may affect the results of the household surveys, in general and CV surveys, in particular (Saunders and Warford 1976). Moreover, these factors are found to differ among regions — even among villages within a region — in a developing country context.
An efficient CV study takes into account all these factors right from the initial stages of designing, implementing and administering the survey to interpretation of results. Many CV studies conducted in developing countries give more priority to policy-oriented issues such as socio-economic factors to be included in the econometric analysis, interpretation of performance of variables and policy implications of the results, and neglect the importance of issues related to theoretical and methodological aspects. It should be noted that ‘results’ can be derived even from a poorly conducted CV study but they may not be useful for effective policy-making purposes. In a developing country where poorly conducted CV study may lead to provision of misleading policy prescriptions, it is strongly felt that every CV study should give more priority to theoretical and methodological issues as well. This paper attempts to illustrate how an ‘ideal CV survey’ can be conducted for estimating the use values of infrastructural projects like water supply in a developing country context,\(^4\) drawn mainly from an empirical CV study conducted in the semi-urban areas of Coimbatore district, Tamil Nadu, India.\(^5\)

**Theoretical Context of the CV Study**

In any CV study, the theoretical context or framework is a prerequisite for eliciting the appropriate economic value. The precondition for conducting a CV study is that there exists an *ex-ante* situation where the ‘expected Hicksian consumer surplus measures’\(^6\) can be estimated from the responses provided by the users of the commodity. Specifically, a CV practitioner tries to estimate the ‘expected change’ in the utility function of the households, prior to the provision of the commodity under uncertainty conditions (McFadden 2001). When the researcher does not have a readily available ‘utility function of the households,’ the CV survey helps him/her to measure the ‘change in the consumer surplus’ by eliciting the household ‘willingness to pay’ value for the commodity. It should be noted that the entire exercise is well grounded in the ‘expected utility theoretic framework’ (Fishburn 1982). However, in many developing country CV studies, the appropriate theoretical framework is missing and, therefore, often the researchers themselves will not have any idea of ‘what is being measured at all through the CV survey’. In other words, ‘willingness to pay’ from a layman’s perspective is entirely different from ‘willingness to pay’ from an environmental economist’s perspective. Ignorance of this important distinction on the part of a CV practitioner leads to negligence of rigorous ‘theoretical validity’ tests of the CV results. Most of the time, CV researchers in developing countries are interested only in ‘numbers’ elicited through CV surveys, giving less or no importance to the validity of the numbers. Therefore, it is always important that the entire CV survey be guided by an appropriate theoretical framework so that ‘the theoretical validity’ of the results can be assessed properly.\(^7\)

Another theoretical issue to be addressed is the type of ‘consumer surplus’ measure (or the elicitation format) that the researcher intends to measure in an *ex-
ante situation through a CV survey. It should be noted that there are four types of Hicksian consumer surplus measures: compensating variation; equivalent variation; compensating surplus; and equivalent surplus. Depending on the reference point in the provision of public good and the variation in the quantity of the good, the kind of surplus measure [i.e., either ‘willingness to pay’ (WTP) or ‘willingness to accept compensation’ (WTA)] to be used would vary. There are certain concrete reasons why one has to use WTP format rather than WTA format in a CV survey (see NOAA 1993). For instance, a CV practitioner may be interested in estimating the loss in the ‘utility’ of the households owing to a fall in the quality of water from a particular source. In this case, a WTA compensation for the utility loss experienced by the households is considered to be an appropriate measure. However, the households may not have any well-defined property rights over the source of water and, as many empirical studies have suggested, the households may ‘overstate’ their WTA compensation. For these reasons, the CV practitioner has to design an alternative elicitation format using the WTP measure. This is where the ‘ex-ante situation’ plays a crucial role. More precisely, the respondents should be asked to state their WTP value for an alternative source of water, creating an ex-ante situation. If the researcher does not modify the CV survey appropriately, she/he will end up using an ‘inappropriate’ format and hence get irrelevant results. Against this background, let us discuss how we dealt with different kinds of theoretical and methodological issues in our case study.

Our CV survey for eliciting the use value of the proposed water supply scheme was conducted in a semi-urban area of Coimbatore City, Tamil Nadu, India. The proposed scheme (namely, Pillur scheme) was sponsored by the World Bank and implemented by the Tamil Nadu Water and Drainage Board (TWAD Board). The Pillur scheme was to benefit households in terms of meeting all the water requirements at the household level and the drinking water requirement as the major one), industrial and commercial establishments located in part of Coimbatore City, 21 suburban towns and 523 wayside villages. Since the objective of our CV study was to estimate the expected ‘Hicksian compensating variation’ (Bateman et al 2000) from the beneficiaries of the Pillur scheme, we had to select an area to be benefited by this scheme. When preliminary investigation was made to select one of the areas for survey, it was found that a major part of Coimbatore City, 18 suburban towns and a larger percentage of the wayside villages, had already been covered by water supply from this scheme. In other words, an ex-post situation had arisen in these areas where there was no possibility of implementing the CV survey to elicit the ‘expected utility’ of the households. This being the case, we were left with only three suburban towns where the Pillur scheme was expected to be implemented in another six months’ time. Since these three suburban towns provided us the ex-ante situation, we had to select one of these towns, namely,
Othakkalmandapam (hereafter, Mandapam) for the proposed CV survey. Two phenomena in the town provided us with appropriate input for developing an *ex-ante* situation. The first is the existing scenario on water supply in the town. Even though both ground and surface water resources are available, the existing supply was dependent mainly on groundwater sources. Public sources consisted of open wells, bore wells and hand-pumps installed by the water supply authorities of the town. Out of 18 open wells located all over the town, only one was used for pumping out water while the rest were completely dry. Even among the 27 hand pumps, only two hand pumps were frequently used by the households since these were the only hand pumps providing ‘relatively good quality drinking water’. On an average, many of the existing sources of drinking water supply in this town had either dried up or become brackish when we undertook the survey.

The second factor that influenced the selection of the present study area relates to some aspects of the Pillur scheme. In the study area we had another feature that the water supply authorities had already decided about the policy on various components of the expected Pillur scheme, such as number of individual connections to be provided, amount of advance payment (or connection charge), monthly water tariff, etc, and conveyed it to the households as well. With these two aspects, we created a hypothetical ‘*ex-ante*’ situation using the information about the proposed Pillur scheme which provided us with the appropriate theoretical context.

**Developing a Hypothetical Scenario**

Once an appropriate theoretical framework has been established, the next most important and challenging task in a CV survey is to provide relevant and adequate information in the CV scenario so that a ‘realistic’ hypothetical market about the commodity can be conveyed to the respondents. According to Mitchell and Carson (1989), the realism of the scenario improves if: (i) the respondents are made familiar with the elements included in the scenario such as the good under investigation, the method of provision, the levels of provision, the elicitation framework, etc; (ii) the key elements are presented to the respondents in such a way that it can be grasped by the respondents; and (iii) the degree to which the scenario appears plausible to the respondents.

However, it has been pointed out that not only does lack of realism in the scenario attract a bias but any attempt to increase it will also affect the results (Mitchell and Carson 1989). The scenario in a CV study contains two major elements, namely, (a) the value enhancing element (for instance, different levels of quantity of water supplied); and (b) the value neutral elements (such as photographs shown to describe the visibility). Mitchell and Carson (1989) argue that it is the value neutral elements that may lead to the problem while improving the scenario with these elements. Hence, any imbalance between different elements included in the scenario
would affect the results of the CV study. Therefore, there is a need for an optimum level of information with which a realistic scenario can be conveyed to the respondents. The concept of optimum level of information may even be irrelevant in a CV study because the context in which the CV studies are carried out differs among various studies. As there is no readily available standard scenario for application, a CV practitioner has to depend on many sources for constructing a meaningful scenario so as to obtain valid and reliable results.

One of the important aspects to be noted is that many of the CV studies, especially those trying to estimate the non-use values, depend heavily on the ‘supply side information’ for constructing the scenario, i.e., a larger percentage of the scenario conveyed contains information ‘intended’ only by the researcher. The basic assumption in these studies is that the information on non-use values may not be available from the respondents since they are generally not familiar with these kinds of values, which is also true concerning many of the use values. In the case of goods with which the respondents are already familiar, a meaningful scenario and the resulting true economic value depend mainly on the information provided by the respondents themselves. So, one way of improving the scenario, especially for the quasi-public goods like water supply, is to include information derived from the respondents themselves through a pilot study, pretesting, etc. Among these means, pretesting is considered to be one of the effective ways of not only constructing the realistic scenario but also designing, implementing and administering the CV studies. Pretesting the Interview Schedule (IS) before the main survey is considered a prerequisite for minimising biases that occur due to the very design of the IS (NOAA 1993; Smith 1992). It should be noted that pretesting helped us enormously to design not only an appropriate scenario but also the entire CV study during the main survey. We now discuss how we developed an appropriate scenario through pre-testing.

**Pretesting the Interview Schedule**

Before the main survey was undertaken, we proposed to pretest the IS in the study area. The draft IS prepared prior to pretesting consisted of three major parts, namely, (i) the general socio-economic characteristics of the households, (ii) the present water use behaviour of the households and, (iii) the contingent valuation part. The original version of the IS had been circulated among some of the experts working on contingent valuation methodology, research students working on psychology, and project staff who had done household surveys for other CV studies. After incorporating the modifications in the original version of the IS, pretesting was carried out in the study area among the ‘focus group’ of thirty households. These households were selected from various geographical locations...
of the study area so as to accommodate factors influencing the behaviour of the households, such as social, economic, institutional, and environmental.

**Rapport with the Households**

During pretesting, the researcher (i.e., the present author) experienced problems in establishing a rapport with the households in the town especially those located in the rural part of the town. This was because these households considered the researcher as an outsider and a stranger. This made the households reluctant to talk to the researcher. Thus, the researcher was advised to accompany the ‘bill collector’, an official from the town who was responsible for collecting property tax from the households. However, accompanying such an official would give the impression to the households that the researcher was actually associated with the town panchayat. This would deter them from disclosing certain information and cause them to behave strategically.\(^\text{13}\)

In the case of those households with which the researcher had no difficulty in establishing a rapport, a different problem was encountered. That is, some of the households were reluctant to answer some of the questions included in the IS for many reasons: (a) a general tendency of the households not only in the town but also in many parts of Tamil Nadu was that they should not reveal any information about their demographic and economic status to any outsider, which they thought would affect their ration provided through the government-run fair price shops. More precisely, the poorer section of the households who were entitled to purchase goods from fair price shops at lower rates had a tendency to exaggerate the household size and understate the household income;\(^\text{14}\) (b) it was found that some of the households were cheated by outsiders who promised them that they would convert all the household items made up of bronze and copper metals into gold, and escaped with all these items. Owing to this incident, the questions related to metal goods of the households such as storage facilities available in the household, etc. were not found to work well during pretesting; (c) frequent visits of newspaper reporters in the town in view of the assembly elections to the State government made the households reluctant to talk about general problems such as water supply and sanitation in the town. The households had the tendency to avoid talking about these things in detail to any outsider for fear that if the water supply authorities came to know of it, they would cut the existing supply itself; and (d) it was found that these households were not familiar with these kinds of household survey in the past. It should be noted that the reasons mentioned above were responsible for ‘non-response’ and other kinds of biases that frequently occurred in the CV study.

One important aspect noted during the pretesting was that there was a lot of potential for the occurrence of ‘interviewer bias’ in the survey. To avoid this problem, the researcher took with him three college students experienced in conducting household surveys, throughout the main survey. This strategy worked well.
**Initiating the Discussion**

One of the important aspects noticed during the pretesting was that the way in which we initiated the discussion itself led to problems like non-response. The households even started spreading information to neighbours about the survey and persuading others to understate the WTP amounts. Beginning the interview with an introduction about the researcher and describing the objective of the study immediately thereafter were found to create these kinds of problems. In many of the CV surveys, the first part of the questionnaire deals with the specific objective of the study followed by other aspects such as socio-demographic-economic aspects of the households/individuals. However, we found almost every part of the IS attracted problem if started with. This problem was found to attract strategic bias too, apart from 'non-response.' During the main survey, the IS as well as the interview was structured such that the households would not be given any hint that the study was about eliciting the households’ WTP for water. Alternatively, the interview began with general issues in the town, historical aspects, etc, moved on to specific issues like sanitation, solid waste, water, etc, and then to specific questions related to Pillur water scheme. Moreover, the presence of college students along with the researcher conveyed to the households that the study team was an independent body not associated with any government agency.

**Pretesting the CV Part**

In any CV study, the contingent valuation part requires more attention than any other part of the IS/Questionnaire in the sense that this is the only part which differs from other parts of the conventional IS/Questionnaire used in the household survey. Moreover, this is the only part that is supposed to attract a number of errors. Pretesting the contingent valuation part rigorously helped the researcher to completely refine the scenarios described in the original version of the IS. Even though water is a commodity that every household is much more familiar with, what these households were not familiar with were some of the aspects related to the expected water supply scheme such as the date of commencement of the Pillur scheme in the study area, duration of water supply, timings of water supply, quantity to be supplied, method of supply, method of payment, duration of payment, etc. The households were very curious about these kinds of things which other developing country studies tended to simply ignore. Before clarifying the doubts, the focus group itself was asked to state their own preferences on all these aspects, in an open-ended way. Each household was explained with an ‘improved scenario’ with information provided by the previous household without changing the meaning of the scenarios. This not only facilitated the efforts of the researcher to make the scenarios more clear but also eliminated unnecessary information included in them. Moreover, this strategy helped the researcher to gain additional information that enriched the quality of the scenario. The next section
briefly discusses how various elements included in the scenario were tested during the pretesting, given the existence of different kinds of policies and the institutional set-up in the study area.

**Households’ Perception about the Pillur Scheme**

Even if the *ex-ante* situation exists in the study area, there has to be a long interval between the time of survey and the time of water supply so as to minimise any possible ‘strategic bias’ occurring due to people’s expectation of the supply of water. The strategic bias occurs if: (i) the households understate their true willingness to pay for water on the expectation that water is definitely supplied irrespective of their WTP amount (accompanied also with the expectation that their stated WTP would influence the future tariff policy); or (ii) households overstate their true WTP on the expectation that supply is effected soon if they overstate the WTP amount (accompanied also with the expectation that their stated WTP does not form the basis for the future tariff policy) (Mitchell and Carson 1989). A proper way of dealing with this issue is to convey to the respondents the exact month of commencement of water supply and include it as a variable to see its impact on the WTP values in a post-survey analysis. When the preliminary work for undertaking the survey began, detailed discussions with the officials in-charge of the water supply scheme revealed that the groundwork for supplying water had already started and regular supply would be effected after 4–5 months. The scenario conveyed during the main survey was modified in such a way that the households would expect the Pillur water supply in four months from the time of interview.

If the households were still uncertain over the commencement of the programme then one expected a situation in which considerable ‘non-response’ would occur. Some of the households in the focus group expressed their uncertainty over the implementation of the scheme. These households stated that the water supply authorities of the suburban town were constantly making announcements about the implementation of the Pillur scheme for the past six years but ‘nothing had materialised.’ Although these respondents were aware that overhead tanks had already been constructed and main pipelines laid under the Pillur scheme, still some uncertainty prevailed in their minds with regard to the implementation of the Pillur scheme. Moreover, these households suspected that the long delay in implementing the scheme was due to the rent-seeking behaviour of the officials who in the past collected some money towards the ‘application fee’ (or ‘processing fee’) from some of the households who applied for individual connections during previous announcements. It was found that a few households even installed their own bore-wells owing to the delay in the implementation of the programme.

It should be noted that our aim was not to eliminate the uncertainty from the minds of the users but to give unbiased information to the sample households during the main survey. All that we could do was to include a statement in the
scenario that Pillur water would be supplied in four months and how much they were willing to pay for different components of the Pillur scheme. If they were still uncertain and based their WTP on this particular aspect, then it would be taken care of during the analysis.

Another aspect the households were very curious about was the duration of the Pillur scheme. The water supply authorities mentioned that this scheme would run for another fifteen years, which was conveyed to the households during pretesting.

Individual connection: When it was informed that individual house connections would be provided to those households willing to have them, the respondents started asking the following questions related to technical aspects of the individual connection: (i) whether meters would be installed? (ii) whether the pipe would be fixed with a valve which might be used to either stop or release the water? (iii) whether the delivery point would be located inside the house or outside? Instead of answering the questions, the researcher asked the respondents themselves to give their opinion on all these aspects. The following points emerged regarding the technical aspects of the individual connection: (i) most of the households felt that the individual connection should be attached with metering system. However, some of the households objected to the installation of meters for two reasons: (a) these households suspected that introduction of a metering system would lead to malpractice by some households in the town,\(^{16}\) and (b) these households pointed out that the metering system would not be reliable since reading would take place even if air flows in the pipe. But most of the households suggested that the present system of ‘minimum charge’ is acceptable but that the meter should be installed to monitor over-consumption; (ii) since the existing individual connections at present do not have a valve, most of the respondents preferred a valve to be fixed at the delivery point so that they could stop the water once they collected the required amount of water. Under the existing system, the individual connections were not fitted with any valve, and the excess water was let free; and (iii) regarding the location of the delivery point, most of the respondents in the focus group were willing to have it just outside the house as most of the water-related activities, such as washing, bathing, cleaning utensils, watering cattle, etc., were carried out only outside the houses in the study area. Moreover, storage tanks were also located outside the house. The only activities that required water inside the house were cooling and drinking. If the delivery point was located inside, then a large quantity of water had to be carried outside the house, which was both labour and time-consuming. Hence, most of the respondents felt that the delivery point could be located outside the house. This aspect had been included in the scenario.

Apart from these aspects, the households were found to be more concerned about the length of the tariff policy that would be followed under the Pillur scheme.
They reported that the tariff policy in the past had been subject to frequent changes in the sense that once an individual got connected to individual connection for a particular tariff level, then the water supply authorities kept revising it upwards. This being the case, we asked the households to assume that the tariff policy once framed would continue at least for the subsequent five years.

**Quantity:** Studies on water supply in developing countries neglect the aspect of quantity (Merrett 2002). Rather, they concentrate either on ‘pressure’ (i.e., they convey to the households that the ‘pressure’ will be sufficient to collect adequate water’) or convey to the respondents that they can collect ‘as much amount of water as possible.’ In the case of our study area, the households were found to be more particular about the quantity that they would obtain through the new scheme. Hence, we had to specify the quantity in the scenario to be conveyed during the main survey. But the next question to be addressed was, how to express the quantity — in terms of litres, barrels, etc? Every household in the study area used a plastic vessel, which was locally called *kodam,* for fetching and storing water. But the capacity of the *kodams* used differed even within the household according to the distance between the house and the sources of water supply. For instance, if a household had two sources of water supply, one close by and the other at a distance from the house, it would use two types of *kodams,* a big and a small one. The capacity of the *kodams* was found to range between 10 litres and 18 litres. But in most of the households the standard *kodam* used was of 12-litre capacity. During the main survey, the scenario included the *kodam* with 12-litre capacity as measurement.

The next aspect to be investigated was ‘how many’ *kodams* the household would actually require per day under the Pillur scheme so as to convey in the scenario different levels of quantity to different households and elicit the corresponding WTP of the households.¹⁷ The central objective of this methodology was to ascertain whether the so-called ‘embedding effect’ occurred. Since testing for embedding effect required at least two quantity levels, during pretesting we assigned 25 *kodams* and 40 *kodams* to various households. An interesting result that emerged was that most of the households assigned 40 *kodams* stated that they did not require that much water, contrary to the conventional expectation that households would use as much water as possible if it was made available to them.¹⁸ The reason was, according to these households, adequate water was already available but they required only as much as was necessary for drinking and cooking purposes. Moreover, the households recalled a severe water scarcity problem that they had experienced and said they were aware of the difficulties in getting good quality water. Hence, they pointed out that Pillur water would be of relatively better quality in terms of taste, suitability for cooking, etc, and therefore should not be wasted.¹⁹ Accordingly, the two quantity levels assigned to the sample households
during the main survey were 10 *kodams* and 25 *kodams*.

*Frequency and duration of supply:* Some of the households raised doubts about the frequency and duration of the supply of water under the Pillur scheme. Under the existing scheme, the frequency of the public supply was found to differ among the various wards, ranging from one to three days. When there was no supply through individual connection or public taps, the households had to fetch water from other sources such as hand pumps, agricultural bore-wells, etc, which required more labour and time. Hence, a majority of the households, especially those without adequate storage facilities, preferred water supply every day under the Pillur scheme, whereas a few households with individual connections at present preferred supply on alternate days so that they could use the existing water one day and Pillur water the next day. It was observed that even those households with adequate storage facilities supported the idea of daily water supply under the Pillur scheme. These households said that if the supply of water was effected on alternate days, the households tended to store more water and empty a considerable amount when the supply was resumed. This led to huge wastage of water if all the households in the town were taken into account. Since we found that the quantity mattered to the households, the two levels of quantity decided were 10 *kodams* (the minimum) and 25 *kodams* (the maximum).

In the case of duration of water supply, especially in the case of public taps, the households were more concerned about the number of households collecting water from the public tap, the pressure, the amount of water available in a given period, etc. On pretesting, it was found that on an average, a public tap was being used by 12 households and the duration of supply ranged from 1½ – 2 hours. But many households believed that once the scheme began, many households collecting water from the public tap would switch over to individual connections, which would facilitate collection of more water from the public tap by other households. Most of the households seemed to support the idea of one-hour supply a day, which had been included in the scenario.

*Time of supply:* Having decided on the duration of supply, the next aspect was to decide on the time of supply. During pretesting, it was noticed that water supply was effected at any hour of the day depending on the availability of electricity. Many households reported that they were uncertain about the time of supply at present as this was entirely dependent on the availability of electricity. Many households said that they would face the same kind of problem under the Pillur scheme also. But, an earlier discussion with the water supply authorities in the town revealed that Pillur water would be pumped from the pumping stations located far away, stored in the overhead tanks, and released to the households. This had nothing to do with the electricity problem, which was local in nature. When asked
for their preferences regarding the time of supply, every household indicated morning hours especially between 6.00 a.m. and 8.00 a.m. as members of most of the households went to work after 8.00 a.m. and returned only after 6 p.m. This aspect had been included in the scenario conveyed during the main survey.

**Payment Vehicle:** The payment vehicle used in the CV study was found to attract a bias, which affected the results of the survey (NOAA 1993). During pretesting, the payment vehicle, namely, ‘the monthly water tariff’ used under the existing scheme itself had been used in the scenario. However, in some of the wards of the study area, around 40 per cent of the households were rented households, which would be sharing individual connection if the owner of the household had connected to individual connection. These rented households were not paying ‘water tariff’ directly to the town panchayat but were paying only the rent to the house owner, part of which included water tariff. For the renters, the payment vehicle used was ‘increased house rent.’ However, it was expected that having two different payment vehicles in the context of a small sample size would have led to problems later, especially when the statistical analysis was made. This being the case, the rented households were asked to state their maximum amount of ‘monthly water tariff in the form of increased house rent’ so that they could distinguish between house rent and water tariff, even though it was routed through the house owner.

As to payment for the public tap, most of the households pointed out that paying for the public tap was entirely new to them. But many of the households felt that the ‘property tax’ collected by the town panchayat included tariff on water supplied through the public tap. However, the households were asked to state whether they would agree if, as in the case of individual connection, a monthly tariff were introduced on public taps. Almost all the households in the focus group agreed to this suggestion.

**Conclusion**

So far we have discussed important theoretical and methodological aspects of conducting a CV survey for eliciting the true Hicksian surplus derived from the water supply project in the context of developing countries. A few important points emerging from our discussion are worth mentioning here. First, the way in which the CV methods are being practised in developed countries may not be extended in the same form to some of the environmental issues in developing countries. This is because the factors influencing household behaviour in the context of environmental issues are entirely different from those in developed countries. It is seen that the behaviour of individuals/households in the developing countries is embedded in a complex system characterised by different kinds of social, economic, political, institutional and cultural system. These points have been highlighted in many
studies on CV method on water supply (for example, Briscoe et al 1990). However, the present paper has highlighted the fact that the factors influencing household behaviour are not universal in nature but differ among countries, regions, etc. This implies that there is no universal CV methodology that can be applied to a single environmental issue in developing countries. It is the regional and local factors that play a crucial role that should be given priority in any CV study.

The second notable aspect about the CV method is that many of the biases that occur owing to the very design of the IS/questionnaire can be minimised even at the pretesting level itself, rather than accommodating them in the main survey and testing for their impact on the final results. In a developing country where policy-oriented research plays a vital role, the CV should be so designed as to achieve the most productive result rather than merely as an academic exercise. In this direction, rigorous pretesting of the IS, identifying sources of error and eliminating them would be the proper way of conducting CV in a developing country.

Notes

1 CV methodology has been used also to estimate the economic values of private goods sold in the conventional markets (for example, Randall and Hoehn 1996).
2 For a detailed discussion of validity and reliability issues, see, Mitchell and Carson 1989.
3 We have had cases where the researchers could not even enter the field for conducting CV surveys (Paulomi, personal communication), let alone talk about conducting a good CV survey. However, this is a different kind of issue to be addressed elsewhere.
4 For similar kinds of views regarding CV studies in other developing countries, see, Whittington 1996.
5 The CV results, methodology used, biases addressed, validity tests conducted, etc., are discussed in detail in Venkatachalam (2000). The main purpose of this paper is to highlight how we elicited the ‘valid’ CV results through proper designing of CV survey in the field.
7 See, Haab and McConnell (2002) for appropriate theoretical and statistical frameworks.
8 See, Bateman and Turner (1993) and Bateman et al (2000), for a detailed discussion on all the four types of Hicksian consumer surplus measures.
9 Though what kind of environmental improvements (such as health benefits) would be achieved through the Pillur scheme in the project areas has not been studied, the scheme was expected to improve the availability of ‘good quality water’ at the household level, thereby increasing both direct and indirect benefits.
10 This is considered to be a standard format in most of the CV studies on water supply and sanitation, especially in developing countries (for example, Altaf et al 1992;
11 The author’s involvement in two earlier CV studies (one on water supply and another on solid waste disposal) conducted by the Madras Institute of Development Studies, Chennai, has been of immense use in not only formatting the interview schedule (IS) but also in conducting the main survey in the field.

12 Mitchell and Carson (1989) suggest that for a larger sample size of around 1,000 the focus group should consist of at least thirty households. However, our sample size for the main survey was smaller (i.e., 210 households), and eighteen IS used in the pretesting have been found to be complete and included in the analysis part later on.

13 For instance, the households might not reveal their true WTP if they felt that the author was associated with the officials who formulated the water tariff policy (Mitchell and Carson 1989).

14 It should be noted that the commodities sold through fair price shops targeting the poorer sections of households in Tamil Nadu are distributed on the basis of family size and household income, i.e., households of larger size and with lesser income would get more goods, and vice versa.

15 Briscoe et al (1990) also report the same kind of problem in their study area.

16 Even though these households were not clear about what kind of malpractice would occur, they stated that some of the households would extract as much water as possible and bribe the water supply authorities rather than paying the tariff on the basis of actual meter reading.

17 It should be noted that in our study we have used ‘open-ended’ elicitation format rather than ‘closed-ended’ format, which is mostly recommended in the literature. The reason why we have used the open-ended format is that the CV literature also suggests that it worked well in case of goods that were familiar to respondents, and therefore there was nothing wrong in using it for familiar goods like water supply.

18 Whittington et al (1992) reported that some of the households in Kenya that were experiencing severe water scarcity started hosing their water buffaloes once the water supply scheme started functioning in their area.

19 Another way of interpreting the households’ attitude towards quantity of water was that these households might have kept in mind that ‘the price tag’ attached to the quantity of water used would be higher if they used more water.

References


