

# **Identifying the Value of Public Services by the Contingent Valuation Method (CVM)**

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Under the financial straits that continue to plague the Japanese economy, it has become important to scientifically identify the value of public services in order to examine the validity of public investment. The Contingent Valuation Method (CVM) is a technique that quantifies the value of services that are unlikely to assume a market format—such as the natural environment and scenery—by using the amount that individual consumers are willing to pay.

Jointly with Professor Noboru Hidano, Department of Social Engineering, Tokyo Institute of Technology and with the full cooperation of the city of Kawasaki, NRI (Nomura Research Institute, Ltd.) conducted surveys to identify the value of public services by means of CVM in an attempt to quantify the value of software-like public services whose quantification has so far been considered difficult, such as emergency services and consumer consulting. Through the dissemination of this technique and the improvement of its accuracy in the future, the value of public services as quantified by CVM is expected to be utilized in various venues as an internal management index within administrative organizations and as a tool to explain public services to the public.

# I Importance of Quantifying the Value of Public Services

## 1 Changes in the Environment Surrounding Public Management

As we enter the 21st century, we are seeing the central and local governments in Japan being confronted with an increasingly severe economic environment. Under these circumstances, the following three points in particular can be pointed out as changes in the socioeconomic environment that are exerting a major influence on public management.

### (1) Stringent financial circumstances

Because of reduced tax revenues due to the continuing economic slowdown and borrowings by the national government and municipalities (now exceeding ¥660 trillion on the basis of the fiscal 2001 budget), the financial situation is extremely severe. As a result, front-line administrative operations are strengthening their efforts towards carefully selecting service-operating techniques that are more highly effective, as well as towards abolishing and/or integrating certain projects themselves.

### (2) Less pronounced policy determinations

With such examples as “increasing food production” after the war to “doubling income” and “remodeling of the Japanese archipelago,” the goals of government in the past were very clear and quickly generated consensus among many people. In contrast, policy determinations are rapidly becoming more muted under the present circumstances, which are characterized by a generally high national minimum (the minimum living standard that the government must guarantee the people) and the increasingly diversified values of the public. Such trends require that the government clarify the value of policy options and examine the validity of determinations when developing specific measures and/or evaluating policies.

### (3) Focus on accountability

Together with the tendency towards less pronounced policy determinations, the myth of government as a wise and mistake-free entity is also collapsing. Even before the enactment of information disclosure acts and/or the appointment of ombudsmen, the government of the future will be required to develop more detailed and scientific information than before on policy options and the selection process and willingly share such information with the public.

## 2 Increasing Importance of Quantifying the Value of Public Services

In response to such environmental changes, both the national and local governments have already started re-

forms. In particular, as part of the activities under what are known as public service evaluations, efforts are being made to introduce scientific and quantitative evaluations for public services and goal management techniques. In actuality, however, these approaches are not necessarily achieving the desired results.

Indeed, one of the reasons behind the difficulties of public service evaluations is the fact that the internal management methods so far implemented have not stressed the importance of identifying the value of public services themselves. Rather the activities have focused on managing how budgets will be allocated and the work volume covered by each budget. If this were likened to a private company, it would be the same as simply managing disbursements and output only.

While private companies naturally analyze and identify the value of their product output (the value for customers, competitiveness in the market, etc.) by various methods, administrative entities that have long focused simply on the management of costs and work volume have little know-how in measuring the results (value) of public services in an objective manner. The actual situation is that measuring the results of public investment has been limited to some hardware projects that require huge expenditures.

In today's severe financial environment, however, greater importance is being given to prioritizing investment for public services and selecting optimal operational techniques through scientific analyses of the effects of various approaches. This calls for a stronger need for identifying administrative costs (as a denominator) and also for identifying the value of public service (as a numerator). This is why a technique to quantify the value of public services is again coming in for attention.

## 3 Techniques to Measure the Benefits of Public Services

Measuring the value of public services requires identifying the effects to be brought about by each service in a quantitative manner. It is also possible to use the satisfaction of residents and specific indexes that are supported by a general consensus (e.g., the number of traffic accidents resulting in fatalities). In order to make comparisons with the different types of services and conduct analyses of investment efficiency, however, it is necessary to use the concept of “benefits” in which the effects of public services are converted to monetary values.

Various techniques have been developed to measure the benefits of non-marketable goods (goods for which there is no market to trade their values) such as environmental and public services. Some techniques focus on the expenses (input) required for their maintenance and/or change, such as a disbursement control method (in which expenses to keep an environment, etc., at a certain status are considered to yield benefits). Other

examples include a replication expense method (which measures the expenses needed to restore a deteriorated service or asset to its original status of providing a benefit).

At the same time, new techniques have been created to convert the value of the effects themselves (i.e., the outcome) of an environment, etc., into monetary amounts, such as the Hedonic Price Method (HPM) and the Travel Cost Method (TCM). The Contingent Valuation Method (CVM) to be discussed in this paper is one of these techniques. These latter methods are considered to offer greater accuracy in that they measure the outcome more directly than the former techniques, which paid more attention to input.

The Hedonic Price Method (HPM) is predicated on the hypothesis that “all benefits arising from the development of public undertakings will show up in land prices.” Accordingly, the HPM approach collectively measures all benefits of the relevant project by calculating or predicting how land prices will be increased after the implementation of a public project.

The Travel Cost Method (TCM) is predicated on the hypothesis that “travel expenses (transportation + time) spent by people to visit a specific facility reflect the public’s evaluation of such a facility.” Accordingly, the TCM technique imputes a value by using travel costs to a specific locale as a substitute for the benefits received by consumers through the use of such facilities.

One problem with HPM is that the public services that can be measured by this technique are limited to large-scale projects that can impact land prices such as roads, railways, waterworks and sewerage facilities and redevelopment projects. And a weak point in the TCM method is that the targeted public services are limited to those that can induce people to get up and go, such as recreational areas and facilities.

## 4 What is CVM?

CVM was first broached as a methodology in 1947 by Dr. S.V. Ciriacy-Wantrup of the University of California, Berkeley (Department of Agricultural and Resource Economics) in analyzing the benefits of measures to prevent soil erosion. The practical use of CVM dates back to 1958, when the technique was used by the US National Park Service to calculate the recreational value of the Delaware River basin.

CVM is an approach that quantifies the value of an environment or scenery itself by calculating an amount that measures the willingness-to-pay of local residents, or the amount of compensation required to agree to changing or eliminating the environment or scenery, and by replacing these amounts with pseudo market prices.

Specifically, upon explaining the effects and/or features of a certain environment or scenery, residents are surveyed by interview or questionnaire and asked: “How much do you think you (your household) can pay

for the realization of this environment (scenery) at the maximum (i.e., willingness-to-pay amount)?” or “How much compensation would you (your household) expect if this environment (scenery) ceased to exist?” The value of the relevant environment (scenery) is then estimated by multiplying the average values reported by the respondents by the total population (the number of households).

Compared to the HPM method that calculates the value by using land prices as a substitute and TCM that focuses on travel costs, a feature of CVM is to confirm the intentions of residents more directly (see Table 1).

A case in which CVM attracted considerable public attention was the Exxon-Valdez oil spill disaster off the coast of Alaska. Exxon spent \$3 billion to clean up the spilled oil, and was further held responsible to pay compensation for damages to the marine ecosystem. The fact that an Ohio court accepted CVM in 1989 as a method to calculate compensation for the oceanic ecosystem was considered an epoch-making event. In this widely heralded decision, the court set the estimated damages to the ecosystem at \$2.8 billion, although this was subsequently reduced to \$900 million through negotiations between the parties. (Due to subsequent controversies over CVM, however, it has not since been used in calculating compensation for environmental damages in the US.)

Japan is now at the stage where CVM is being used on a trial basis as one of the techniques in studying the public-benefit functions of agricultural villages and the water source cultivation functions of forests. With administrative service evaluations becoming more common, a tendency is seen towards expanding the range of CVM applications. This includes the official use of CVM as an evaluation technique for social capital development by the Ministry of Land, Infrastructure and Transport, and as a target of discussions on policy evaluation techniques at the Study Group on Policy Evaluation Techniques, Etc., of the Ministry of Public Management, Home Affairs, Posts and Telecommunications.

## II Actual CVM Applications in the City of Kawasaki

### 1 Flow of CVM Surveys

As discussed in the previous chapter, CVM applications in Japan have so far mainly involved cases relating to natural environments and scenery. However, front-line public service operations have been showing increased interest in identifying the value of software-like services such as welfare and emergency services, improvements in living environments and scenery, and various consultation services. As a result, CVM is coming in for increased attention as a specific means of meeting such needs.

**Table 1. Comparison of Features Among Public Service Evaluation Techniques**

	<b>Hedonic Price Method (HPM)</b>	<b>Travel Cost Method (TCM)</b>	<b>Contingent Valuation Method (CVM)</b>
<b>Application Range</b>	<ul style="list-style-type: none"> <li>Limited to regional amenities, water pollution, noise, etc. (railways, roads, parks, sewerage facilities, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>Limited to recreation, scenery, etc. (parks, libraries, museums, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>Extensive areas, such as recreation, scenery, wildlife, biodiversity, ecosystem, etc.</li> </ul>
<b>Contents</b>	<ul style="list-style-type: none"> <li>Quantifying the value based on the influence that the existence of environmental resources has on land prices</li> </ul>	<ul style="list-style-type: none"> <li>Quantifying the value based on travel costs to the target locale</li> </ul>	<ul style="list-style-type: none"> <li>Quantifying the value by surveying willingness-to-pay or compensation to accept changes in or elimination of environmental resources</li> </ul>
<b>Hypotheses</b>	<ul style="list-style-type: none"> <li>Changes in quality of environment are reflected in land prices</li> <li>Land prices create the market equilibrium price under full competition</li> <li>Consumer preferences are homogeneous</li> </ul>	<ul style="list-style-type: none"> <li>Travel costs spent by people to visit a specific facility reflect public evaluations of such facility</li> </ul>	<ul style="list-style-type: none"> <li>The total sum of willingness-to-pay represents the benefits of the project</li> </ul>
<b>Measurement Target</b>	<ul style="list-style-type: none"> <li>Land price function (a formula that explains land prices by such parameters as distance from a station)</li> </ul>	<ul style="list-style-type: none"> <li>Demand curve</li> </ul>	<ul style="list-style-type: none"> <li>Willingness-to-pay or compensation for acceptance</li> </ul>
<b>Advantages</b>	<ul style="list-style-type: none"> <li>Low costs to obtain information</li> <li>Information can be obtained from market data such as land prices and wages</li> </ul>	<ul style="list-style-type: none"> <li>Only little information is required (travel costs and visit frequency, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>Wide application range</li> <li>Can establish evaluations not related to usage, such as the existence and legacy values</li> </ul>
<b>Problems</b>	<ul style="list-style-type: none"> <li>Overestimating benefits</li> <li>While this method is useful for projects that have accumulated past data, it cannot be used for advance evaluations of individual projects</li> <li>Limited to cases with regional application range</li> <li>Tendency towards highly evaluating environmental goods in urban areas</li> </ul>	<ul style="list-style-type: none"> <li>Cannot be used for advance evaluations at stage where no facilities yet exist</li> <li>Sets identical time value for all respondents</li> <li>Results in overestimation by neglecting habit of people to "kill two birds with one stone" when in the area for another purpose (or visa versa)</li> </ul>	<ul style="list-style-type: none"> <li>Large costs to obtain information as questionnaire surveys are conducted</li> <li>Various biases exist <ul style="list-style-type: none"> <li>Surveyor bias (respondents give answers that they think surveyor wants)</li> <li>Information bias (results change depending on information given)</li> <li>Payment method bias (bias is generated by payment method)</li> <li>Initial value bias (if a willingness-to-pay amount is presented, the initial value influences respondents)</li> <li>Other</li> </ul> </li> </ul>

Source: Compiled by NRI from Noboru Hidano, editor, *Economic Evaluation of Environment and Administration*, Keiso Shobo, 1999; and Koichi Kuriyama, *Public Undertakings and Environmental Value*, Tsukiji Shokan, 1997.

Jointly with Professor Noboru Hidano, Department of Social Engineering, Tokyo Institute of Technology and with the full cooperation of the city of Kawasaki, NRI conducted surveys on a trial basis to identify the value of public services by using CVM. The overall flow of these surveys is presented in Figure 1.

## 2 Technical Matters to Consider in CVM Surveys

The following briefly explains the technical matters to consider and the characteristics of CVM surveys that differ from general awareness survey questionnaires.

### (1) Creating questions (scenario presented)

CVM is a method that asks respondents the amounts they would be willing to pay for non-marketable administrative services. This requires detailed explanations concerning the contents and the range of the target services. For example, as this survey was targeted at emergency services, detailed information was provided in conducting the surveys, such as the number and locations of fire stations and substations, the equipment used, the number of paramedics, the weekly number of dispatch runs, etc.

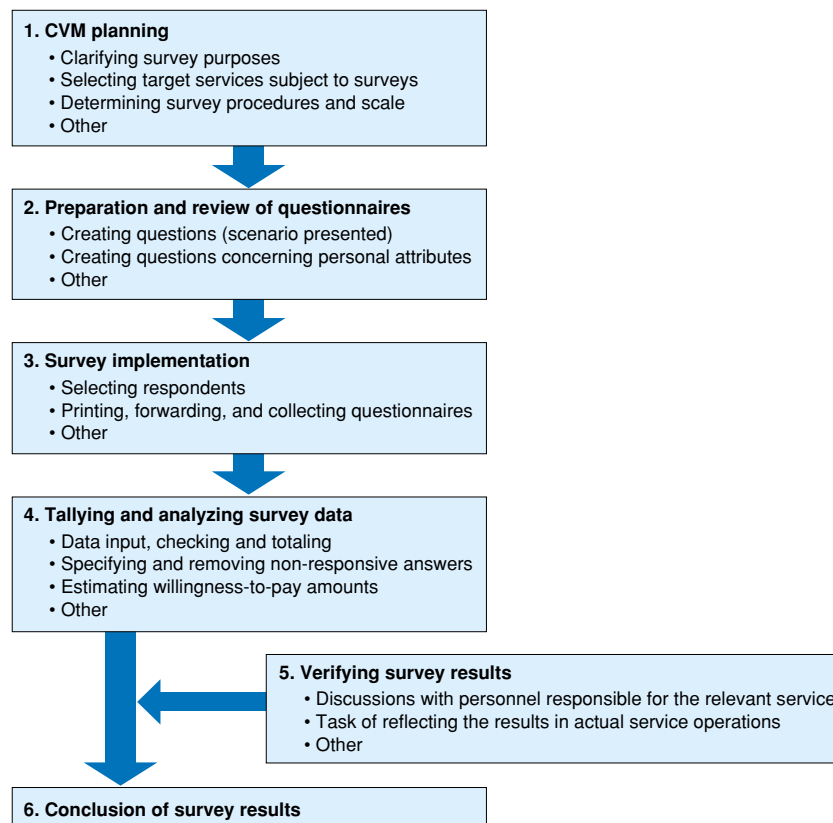
### (2) Specifying and removing non-responsive answers

When the data are totaled, the CVM technique removes non-responsive answers (e.g., those in which respondents indicated a zero willingness-to-pay due to opposition to the scenario presented such as the payment method or policy details). Table 2 enumerates the reasons for zero answers that could be determined as non-responsive in this survey. It should be noted, however, that a careful examination is required to correctly identify non-responsive answers, lest the benefits of the relevant service be consequently overestimated if ¥0 answers based on true judgments of "no value" are discarded as non-responsive. Accordingly, a question should be included in the questionnaire that asks respondents entering zero to specify a reason for such entry in order to separate non-responsive answers from ¥0 answers.

### (3) Estimating the Value of Public Services

The value of public services can be estimated on the basis of the sampling provided by valid responses after removing non-responsive answers. The average willingness-to-pay is calculated and then multiplied by the population being surveyed as the expansion coefficient. Depending on the questions, of course, the amounts

**Figure 1. Flow of Surveys by Contingent Valuation Method (CVM)**



Source: Nomura Research Institute.

**Table 2. Examples of Non-Responsive Answers**

<ul style="list-style-type: none"> <li>• Inadequate explanations</li> <li>• Should be borne by users</li> <li>• Cost reductions should be considered; should be covered by administrative reform</li> <li>• Should be covered by taxes; adjustments should be made within the national budget</li> <li>• Should be provided by volunteers</li> <li>• Users are limited</li> <li>• Other</li> </ul>
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Source: Nomura Research Institute.

**Table 3. Outline of Surveys Under Model Case**

<ul style="list-style-type: none"> <li>• <b>Services subject to surveys (public services)</b> <ul style="list-style-type: none"> <li>• Emergency services</li> <li>• Consumer consulting</li> <li>• Membership-based cultural activities</li> <li>• Creation of a citizens' health forest</li> </ul> </li> <li>• <b>Survey design</b> <ul style="list-style-type: none"> <li>• Survey area: All of the Kawasaki area</li> <li>• Survey target: Kawasaki citizens aged 18 or older</li> <li>• Sample: Random selection of 667 persons</li> <li>• Survey method: Mail</li> <li>• Survey period: August 9–31, 2000</li> </ul> </li> <li>• <b>Response results</b> <ul style="list-style-type: none"> <li>• Number of responses: 217</li> <li>• Response ratio: 32.5%</li> </ul> </li> </ul>
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Source: Nomura Research Institute.

that respondents are willing to pay on a per household basis will be asked in many cases related to administrative services. In such cases, the number of households is used as the coefficient of expansion. Naturally, the questionnaire uses the expression “Up to what amount would your household be willing to pay...” when the expansion coefficient is based on estimated households.

### 3 Estimating Public Service Values Under a Model Case

#### (1) Survey outline

In this trial, surveys were conducted covering four types of service operations—emergency services, consumer consulting, membership-based cultural activities, and the

creation of a “citizens’ health forest” (i.e., preserving and restoring greenbelts). The outline of the surveys is explained in Table 3.

#### (2) Specifying/removing non-responsive answers and calculating willingness-to-pay

Approximately 20 percent to 45 percent of the answers for each service were considered to be non-responsive (Table 4). In particular, the ratio of non-responsive replies was high for consumer consulting services, suggesting that a consensus still remains to be developed concerning the service provision framework itself.

Calculations of the average willingness-to-pay after removing non-responsive answers yielded the highest value of approximately ¥4,100 for emergency services, followed by approximately ¥2,900 for membership-based cultural activities, some ¥1,700 for the creation of a citizens' health forest, and about ¥1,100 for consumer consulting. (While the average willingness-to-pay amounts fluctuated somewhat depending on whether non-responsive replies were strictly or leniently defined, such fluctuations are not detailed here, as they were limited to a range of only 2 percent to 5 percent.)

Because there were few zero responses for emergency services and many respondents indicated a high willingness-to-pay (i.e., over ¥10,000) for membership-based cultural activities, the average willingness-to-pay values for such services were relatively high.

### (3) Estimating the public service value

The public service value was then calculated by multiplying the average willingness-to-pay values by the number of households in Kawasaki. As a result, about ¥2.21 billion was estimated for emergency services, some ¥61 million for consumer consulting, approximately ¥1.56 billion for membership-based cultural activities, and almost ¥90 million for the creation of a citizens' health forest (Table 5).

As a considerable number of non-responsive answers were generated for all items, the number of valid responses for sampling was smaller than the number of questionnaire responses received. This resulted in a large

range of statistical errors for each of the services surveyed.

## 4 Comparison with Actual Public Service Costs

We have conducted interviews with Kawasaki city officials based on the above results and examined the costs actually disbursed in providing the specified services (Table 6). Based on a comparison of the results, the following discussions would appear possible concerning the respective services in the future.

### (1) Emergency services

The estimated value of about ¥2.21 billion for emergency services is found to be almost within a scale that is equivalent to the total amount of initial investment (for fire stations and ambulances) and annual operating costs. It should be noted with emergency services, however, that the overall evaluation tends towards the low side, because of the limited number of those with actual experience in using such services. In accordance with the accepted methodologies of such analyses, the use of 1 as a cost/benefit multiplier is generally considered inadequate in determining the need for any service. In any case, the gap between the overall perceived value and actual costs must be accepted as fact.

With respect to emergency response services, however, any pursuit of cost reductions only could be dangerous. Therefore, while the necessary cost reductions should

**Table 4. Ratio of Non-Responsive Answers and Average Willingness-to-Pay Values**

Public Service Name	Number of Samples	Number of Non-Responsive Answers (Ratio)	Number of Valid Responses	Average Willingness-to-Pay (¥/Household)
Emergency Services	191	48 (25.1%)	143	4,050
Consumer Consulting	197	88 (44.7%)	109	1,128
Membership-Based Cultural Activities	197	42 (21.3%)	155	2,868
Creation of Citizens' Health Forest	191	63 (33.0%)	128	1,652

Source: Nomura Research Institute.

**Table 5. Estimation of Public Service Value**

		Emergency Services	Consumer Consulting	Membership-Based Cultural Activities	Creation of Citizens' Health Forest
Number of Valid Samples		143	109	155	128
Average Willingness-to-Pay (¥)		4,050	1,128	2,868	1,652
Public Service Value (¥ Billion)		2.21	0.61	1.56	0.90
Confidence Interval (¥ Billion)	95%	±0.56	±0.17	±0.65	±0.21
	90%	±0.47	±0.14	±0.54	±0.18

Source: Nomura Research Institute.

be promoted in the future by clarifying procurement costs for facilities and equipment, targeted improvements should also include efforts to create a perceived value that corresponds to costs (administrative disbursement) through shortening the response time, adopting better PR methods to keep citizens informed, etc.

It is only a matter of course that certain basic civil services (i.e., the minimum living environment that municipalities should guarantee residents) are a part of daily living needs that are supported by taxes. Accordingly, greater precision should be used in creating survey questions to distinguish between asking citizens to evaluate current services (as compared to cases in which no such service is available) or determining the value of service expansion (e.g., helicopter responses in trauma cases, improvements in staff skills, etc.).

## (2) Consumer consulting

The evaluation of about ¥610 million for consumer consulting substantially exceeds the total of facility and operating costs under the current scale and framework. This would suggest that some cost increases are acceptable to improve user services. Conceivable examples include the dispatch of contract experts and the joint usage of methods to provide service by telephone or email.

As noted previously, the considerable number of non-responsive answers submitted with respect to consumer consulting suggests the need to again validate the service provision framework itself-including a mechanism that would require beneficiaries to pay rather than providing extensive services free of charge.

## (3) Membership-based cultural activities

The evaluation of about ¥1.56 billion for membership-based cultural activities is an amount that is almost equivalent to the depreciation on large-scale facilities. However, this is not a figure that can cover the annual operating costs, etc.

The assumed question in this case is whether the service should “prepare a hall and provide free performances by a world-class symphony orchestra twice a year.” If one-third of this hall were used for the contracted orchestral activities, the costs related to facilities would total some ¥500 million. Because citizens have evaluated the service at ¥1.56 billion, the possible expenditure for software could run about ¥1.06 billion a year at the maximum (although the cost/benefit multiplier would be 1 in this case).

This rough calculation would limit the software portion of membership-based cultural activities to about ¥1.06 billion annually. If a world-class level of software services cannot be achieved for this amount, it would be necessary to re-evaluate the entire project.

As such, a project design with this rough amount in mind (overlooking some minor methodological problems for the moment) would make it possible to develop a project design with a high cost performance or a rational

investment decision-similar to that faced by private companies in product development.

## (4) Creation of a citizens' health forest

The estimated value for the creation of a citizens' health forest is substantially higher than the annual operating expenses. If the land costs are taken into account, however, the public service value would plummet. Accordingly, the acquisition of land for this project could be viewed as an over-investment that exceeds the value perceived by citizens.

However, in the event there are no immediate usage plans for any unused land owned by the city, it is also possible to consider that implementing such a project would have value if the development and annual management costs are within several hundred million yen per year. As the usage of the land in this case is predicated on temporary use, the project design must focus on recovering costs in a short period. This means that the total facility and equipment investment should be depreciated over the shortest possible period.

While the above analysis is based on the authors' opinions, we would like to add that more detailed studies concerning the actual working situation, etc., would be required before approaching any policy decisions.

# III CVM Utilization Methods and Future Tasks

## 1 Expected CVM Utilization

The usage of the CVM technique to directly determine the views of residents on non-marketable goods has so far been confined mainly to quantifying the value of natural environments, scenery, etc. In the future, it is expected to be fully applicable in evaluating public services as well. As approaches to measuring the effect of public services take further root-such as through the June 2001 Law Concerning Policy Evaluations Conducted by Administrative Organizations-CVM is expected to be utilized in the following areas as a technique to quantify public service values.

### (1) Providing materials for the determination or prioritization of public investment

Under the severe financial straits that continue to confront government administration, both central and local authorities must further promote their efforts to narrow the focus of public investment and to set appropriate priorities. If techniques such as CVM (along with HPM and TCM) become more common in determining or prioritizing public investment, quantification will become possible for a larger number of public services than before, and a great deal of effective information will become available in determining policies and providing explanations to the public.

## (2) Providing basic data in reviewing project frameworks

In an environment in which calls for greater efficiency in public service management are increasingly heard, opinion is growing towards requiring beneficiaries of such services to bear more of the costs. One example is seen in discussions concerning the review of service frameworks that would require users to pay the costs for libraries, funeral halls, sports facilities, etc. In examining existing services as well, techniques to quantify the public service value by CVM can be applied in providing needed data for internal decision-making as well as for eliciting the views of the affected residents.

## (3) Serving as goal management indexes for projects or organizations

Moves to introduce goal management for projects or organizations are seen as part of the ongoing administrative reforms. So far, the concern of those responsible for frontline operations was the limited availability of numeral data that could support the determination of goals. By using CVM to quantify public service values, however, certain projects and organizations will be able to determine new results (administrative value) and/or cost goal indexes.

## 2 Future Tasks

As the attempts to apply CVM to the quantification of public service values have just begun, a number of tasks still remain for the future. In particular, improved accuracy is required in terms of survey targets, composing questionnaires (i.e., how and to what extent information is provided), survey methodologies, and the sampling procedures.

### (1) Survey targets

Because CVM is a technique that more directly measures the public's evaluation of a service, it should be noted that the respondents' perception, understanding,

experience, etc., will largely influence their value judgments concerning the relevant service. Accordingly, careful attention is required in selecting both the services and subjects of the survey as a means of identifying the content and range of public services that can be surveyed.

### (2) Composing questionnaires

Public services are deeply intertwined with the life of a community, and this very familiarity often means that residents have little understanding of the contents and costs of many services. For example, it is difficult for people to clearly visualize what is involved in terms of facilities and personnel in providing waterworks, sewerage or emergency services. In such cases, responses can easily be influenced if the explanations and questions used in the questionnaire are massaged or leading—even by inadvertence. This means that further improvements and safeguards are needed with respect to providing information in the course of examining survey methodology, and that appropriate standards in these areas must be developed.

### (3) Survey methodology

While interviews are generally considered preferable to mailings in CVM surveys, multiple-choice answers are better than open answers in identifying willingness-to-pay—especially when alternating choices are offered in multi-stage formats. In real applications, however, survey costs (expenses, time, personnel) must be kept to the minimum. We would therefore look forward to developing greater accuracy in formats that rely on mailings, which offer a simple and easy survey method.

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