

# Measuring the Value of Japanese Public Broadcasting: An Application of Contingent Valuation Method

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**Keywords:** CVM, WTP, logit model, NHK, public values

## EXTENDED ABSTRACT

In accordance with the convergence of broadcasting and telecommunications, media are becoming increasingly diversified and public broadcasting all over the world face new challenges. In cope with this, BBC in UK and RTE in Ireland, for instance, analyse their values as a public broadcasting and whether current fees are appropriate from the viewers' perspective in order to determine future strategies as a public broadcasting. This paper analyses the value of Japanese public broadcasting NHK (*Nippon Hoso Kyokai*) by conducting questionnaire surveys in April 2006, which interviewed among 3,600 men and women aged 16 and over throughout Japan, selected by stratified two-stage random sampling, and 2,018 valid replies were obtained. Questionnaires were based on the three-stage double bound model. According to our estimation, respondents were willing to pay 1,780 yen (approximately US\$ 15.50) monthly per viewer for terrestrial services (NHK General, Educational, Radio 1, Radio 2, FM) and 1,245 yen (about US\$ 10.83) monthly per viewer for satellite services (BS-1, BS-2, Hi-vision). These amounts are higher than current viewing fees (1,395 yen monthly for a colour TV contract, plus an additional 945 yen monthly for colour satellite broadcasts). Based on WTP of each respondent, we attempt to extract factors which affect their values by fully using econometric method. Since there are so many factors which affect WTP, in order to simplify the analysis, we divide them into three categories: (i) respondent characteristics; (ii) viewers' satisfaction with NHK's "Promises" to restore viewers' trust; and (iii) public value of NHK. At first, the relationship between respondents' characteristics and their WTP is examined. As characteristics, (i) age, (ii) occupation, (iii) number of family; (iv) income, and (v) regions and cities where they reside. For the actual estimation, two models are estimated: (i) full model and (ii) selected model. The results of estimation show that two models have the almost same significant variables. Variables which affect strongly WTP are

such as "age," "satisfaction with NHK's program," and residents of "cities with 100-300 thousand population" (1% level). "Manager, professional occupations," "income," and "cities with less than 100 thousand population" are significant at the 5% level. "Cities with more than 300 thousand population" is at the 10% level. "Viewing hours," on the other hand, does not affect their WTP, but "satisfaction with NHK's program" does WTP.

In accordance with consecutive improprieties, NHK announced "Promise" in order to restore its confidence. We asked how much viewers are satisfied with NHK's efforts to fulfil the duties. "Promises" consist of six main promises and nine subsidiary items, and we take viewers' satisfaction with these promises as variables. In these estimations, few variables are extracted as significant, namely "creates better programs consistent with receiving fees paid" (1% level) in the full model, in addition to this, "establishes strong relationship with viewers and reflects their opinions in our operation" (5% level) and "broadcasts program contributing the benefit of local society" (10% level) are found to be significant in the selected model. One way to restore viewers' confidence is to broadcast high quality programs.

The last analysis is aimed to clarify NHK's positioning as a medium and serve as an important element when considering NHK as a public broadcaster. NHK's public nature was broken down into nineteen categories and viewers' expectations of and satisfactions with NHK were questioned. The estimation in the selected model extracts the following three factors have positive relationship with WTP, namely, "Takes up broad issues from the through Japanese society and provides information that people can share and discuss," "Passes on Japanese traditions and culture to the younger generations in audio and video format," and "Products programs that are not influenced by advertisers or sponsors".

## 1. INTRODUCTION

In accordance with the convergence of broadcasting and telecommunications, media are becoming increasingly diversified and public broadcasting all over the world face new challenges. Challenges come from severer competition in the broadcasting industry. The share of public broadcasting has been steadily decreasing by the entrance in new entrants such as private broadcasting, cables and satellite. In cope with these, public broadcasting have to determine long-term strategy for strengthen its finance and managerial foundations. Coming digital broadcast (or digital television) is expected to increase these transformations further. Other challenges are deregulation or privatization since 1980s. Although public broadcasters were not privatized, they had to introduce reforms by aiming efficient management by focusing on problems such finance, reduction of costs and the accountability and governance of management.

Facing these transformations, public broadcastings reform themselves in such a way to strength their financial and managerial basis such as starting new services to distribute their contents via the Internet and increasing transparency of the decision processes in management. In this context, they analyse their values as a public broadcasting and whether current fees are appropriate from the viewers' perspective. In so doing, Contingent Valuation Method (CVM) has been extensively utilized. This method is effective not only to calculate willingness to pay (WTP) for the Cost/Benefit Analysis but also to determine future strategies as a public broadcasting. As for the latter, by making use of suitable estimation methods, factors to promote WTP are identified, in other words, value drivers of strengthen nature and characteristics of public broadcasting can be derived. In addition, CVM can be applied for improving accountability of management and decision-making processes.

This paper aims to access public values of NHK (*Nippon Houso Kyokai*: Japanese Association of Broadcasting) by applying CVM. Our work to accessing NHK's WTP is not first in this filed. From 1975 to 76, Onoe and Sakamoto (1979) initiated earlier attempt to access NHK by CVM even in a primitive way. It should be noted that it is also quite early in the world (see Ichikawa (2007) in more detail). This paper is followed by experiences of CVM conducted by various public broadcasters such as BBC of UK, RTE of Ireland, and CBC of Canada, and so on, and the exact amounts of public values are estimated. In addition to accessing values, this paper analyses how

NHK's "Promises" announced in 2005 affect the values, in other words, how viewers respond to them and how WTP is affected. This is important issues when considering managerial strategy for a public broadcaster in the future.

The paper consists of four chapters, Chapter 1 shows the framework of CVM in details such as methods, questionnaires, and detailed question survey of this paper is presented in Chapter 2. Chapter 3 provides estimated WTP and presents some applications by using WTP. Factors affecting WTP are extensively analysed in the next chapter, two analyses are examined, namely, relationships between WTP and respondents' characteristics, and WTP and NHK's promises. Conclusions based on these analyses are briefly stated in the last chapter.

## 2. FRAMEWORK OF NHK SURVEY

The NHK promise survey adopted personal interviews on a nationwide basis, surveying as many respondents as possible and reflecting the views of audience as accurately as possible in terms region, age, gender, and other respondent characteristics.

In CVM, many different formats—open-end, closed-end, double bound, etc.—have been developed for the WTP question format, and the characteristics of WTP obtained from these are also analysed. The method used depends on the aim of the analysis and the research accumulated by the researchers until then. To simply estimate the amount of WTP, the double bound model is used, but in terms of evaluating NHK's "Promises," which is summarized by Tsuji (2007), in addition to WTP itself, we want to clarify factors determining its WTP and show how promises contribute to increase viewers' WTP as management strategies. Up to now, we have identified factors influencing WTP when analysing economic ratings of health care and public transportations, using the three-stage double bound model, and the Logit, Probit and Tobit methods (See, for example, Miyahara et al. (2006), (2007), Tsuji et al. [2004], and (2006).) Our most important reason for choosing these methods were that we could apply this kind of accumulated past researches.

In April 2006, a questionnaire survey regarding CVM was conducted in the form of personal interviews among 3,600 men and women aged 16 and over throughout Japan, selected by stratified two-stage random sampling. Respondents were divided into two groups, those asked about WTP and those asked about WTA (willingness to

accept). They were asked about WTP and WTA for terrestrial television services (NHK General, NHK Educational, NHK Radio 1, NHK Radio 2, NHK FM) and satellite services (NHK BS-1, NHK BS-2, NHK Hi-vision), with scores tabulated to calculate the monetary value of NHK broadcasting services. The valid response rate to this survey was 56.1 percent. The 2,018 respondents were 1,009 WTP respondents and 1,009 WTA respondents, who were asked the questions below. In the text of the questions, respondents are asked about a base amount of 1,500 yen, but after this question, they are asked a second time concerning a lower or higher amount, based on their answer to the question the first time, and the amount was again adjusted up or down, based on their answer. In order to reveal the true value, we follow the standard method of questionnaire survey developed in the field of environment economics, for instance. In the questionnaire survey, the following texts were mentioned to respondents.

**Text of the WTP question**

*Assume that NHK's existing receiving fee has been eliminated.*

*Based on that assumption, are you willing to play 1,500 yen per month to watch/listen to NHK's existing NHK General and NHK Education television and radio programs? This money will be used appropriately as a 'receiving fee' for creating programs provided by NHK and to support development of broadcasting technology and other operations necessary for maintaining public broadcasting. Since this amount is a monthly payment, please consider the effect that this amount will have on your household budget when answering.*

*Please note that answering this question will not affect the receiving fee you pay to NHK.*

After mentioning the above statements, three stage dichotomous method is used for asking WTP, which is one of the standard methods to obtain true values of respondents. The questionnaire survey related to WTP is as follows: To begin with we decide the initial value, which is the first amount to be asked to respondents. 1,500 yen (approximately US\$12.50) is selected as the initial value, since we expect the variation of replies are not widely distributed from the current viewing fees.<sup>8)</sup> We begin by asking whether they would be willing to pay monthly viewing fees of 1,500 yen. If their answer is "yes," we then ask whether they would be willing to pay 2,500 yen (US\$20.83). If they reply "yes" again to 2,500 yen, then they are asked to answer the amount in mind. The amount they reveal is their WTP. When they are asked whether they would be willing to pay 2,500 yen, if they reply "no," then we lower the amount to

2,000 yen (US\$54.17). If they reply "yes" to 2,000 yen, then that is their WTP. If again their answer is "no," then we can determine their WTP is 1,500 yen. If they reply "no" to 1,500 yen (US\$12.5), we repeat this process by lowering the amount in the same manner until their WTP is determined.

When calculating the WTP used in CVM, we designated the number of respondents, including those answering "0 yen" the universe and calculated WTP within the range of a maximum of 10,000 yen in the case of terrestrial services and 5,000 yen in the case of satellite services. Table 1 indicates respondent distributions of WTP.

**2.2 Estimation of WTP**

Based on the above replied WTP of each user, we estimate the demand function of for services; more precisely, we estimate the probability of acceptance to amounts questioned and the number of users who will agree to pay. The functional form of demand to be estimated is assumed to be logistic, namely,

**Probability of acceptance**

$$= 1 - 1 / (1 + \exp (-\alpha - \beta \log WTP)).$$

**Table 1 Respondent distributions of WTP**

Terrestrial		Satellite	
Value (yen)	No. of response	Value (yen)	No. of response
No answer	2	No answer	2
0	1	0	6
250	30	250	40
500	156	500	89
1,000	96	750	24
1,500	212	1,000	150
2,000	83	1,250	39
2,500	57	1,500	65
3,000	31	2,000	21
3,500	2	2,500	7
4,000	1	3,000	14
5,000	7	4,000	2
10,000	1	5,000	2

The probability of acceptance is the ratio of the number of users who reply that they are willing to use the device at the amount of charges provided in the questions. By plotting the probability of acceptance for the respective WTP along the logistic curve shown above, and parameters  $\alpha$  and  $\beta$  are estimated. The estimated coefficients  $\alpha$  and  $\beta$  are summarized in Table 2 and 3.

The WTP is obtained by calculating the area below the logistic curve. According to our estimates, respondents were willing to pay 1,780 yen (US\$14.83) monthly per viewer for terrestrial services (NHK General, NHK Educational, NHK Radio 1, NHK Radio 2, NHK FM) and 1,245

(US\$10.38) yen monthly per viewer for satellite services (NHK BS-1, NHK BS-2, NHK Hi-vision). These amounts are higher than current viewing fees (1,395 yen monthly for a colour TV contract, plus an additional 945 yen monthly for colour satellite broadcasts, when collected by a fee collector) calculated based on accumulated expenses.

**Table 2** Estimation results (Terrestrial services)

	Estimated	Standard error	<i>t</i> -value	<i>p</i> -value
$\alpha$	19.713677	0.62496436	31.544	0
$\beta$	2.7166362	0.08950838	30.351	0

Log likelihood function: -1429.557

**Table 2** Estimation results (Satellite services)

	Estimated	Standard error	<i>t</i> -value	<i>p</i> -value
$\alpha$	19.713677	0.62496436	31.544	0
$\beta$	2.7166362	0.08950838	30.351	0

Log likelihood function: -1035.871

### 3. FACTORS AFFECTING WTP

Based on WTP of each respondent, we attempt to extract factors which affect their values by fully using econometric method. Since there are so many factors which affect WTP, in order to simplify the analysis, we divide them into three categories: (i) respondent characteristics; (ii) viewers' satisfaction with NHK's "Promises" to restore viewers' trust; and (iii) public value of NHK.

#### 3.1. Viewers' Characteristics and WTP

At first, the relationship between respondents' characteristics and their WTP is examined. As characteristics, (i) age, (ii) occupation, (iii) number of family; (iv) income; and (v) regions and cities where they reside. The summary statistics is provided in Table 3. The result of estimation for terrestrial broadcast is summarized in Table 6. For the actual estimation, two models are estimated: (i) full model and (ii) selected model. The former takes all variables into account, while (ii) selects variables by making use of the Akaike Information Criterion [AIC].

The results of estimation show that two models have the almost same significant variables. Variables which affect strongly WTP are such as "age," "satisfaction with NHK's program," and residents of "cities with 100-300 thousand population". These are significant at the 1% level.

"Manager, professional occupations," "income," and "cities with less than 100 thousand population" are significant at the 5% level. "Cities with more than 300 thousand population" and "Chubu region" are those of 10% level, but the latter has negatively related to WTP. Among these factors, "age" is consistent with other data such that senior people tends have higher satisfaction with NHK. In addition, NHK is viewed rather in the rural area than in the metropolitan areas, which coincide with this result. "Viewing hours," on the other hand, does not affect their WTP, but "satisfaction with NHK's program" does WTP. It should be noted that this result is exactly same as Onoe and Sakamoto (1979).

#### 3.2 NHK "Promise" and WTP

Regarding (ii), a detailed explanation is required. In accordance with consecutive improprieties, NHK announced "Promise" in order to restore its confidence, which is indicated in Table 4. In the questionnaire survey, we asked how much viewers are satisfied with NHK's efforts to fulfill the duties (Question 9). "Promises" consist of six main promises and nine subsidiary items, and we take reviewers' satisfaction with these promises as variables. In the actual estimations, we omitted some of them because of duplication, and utilize only twelve main promises and subsidiary items as variables. Results of estimation are shown in Table 5. In this estimation, we attempt to analyse which one(s) of twelve promises raise the value of WTP. In these estimations, few variables are extracted as significant, namely "creates better programs consistent with receiving fees paid" (1% level) in the full model, in addition to this, "establishes strong relationship with viewers and reflects their opinions in our operation" (5% level) and "broadcasts program contributing the benefit of local society" (10% level) are found to be significant in the selected model. One way to restore viewers' confidence is to broadcast high quality programs.

#### 3.3 Value Analysis of Public Broadcasting

Viewers and listeners perceive many different values from public broadcasting, and it is a role of public broadcasting to make those values a reality. This insight clarifies what are public values that NHK should seek and fulfil. This analysis is aimed to clarify NHK's positioning as a medium and serve as an important element

**Table 3** WTP and Respondents' Characteristics

	Full model			Selected model		
	coefficient	t -value		coefficient	t -value	
constant	24.83	17.3	***	24.56	18.96	***
ln(WTP)	3.74	19.52	***	3.7	20.56	***
Q2	-0.01	-0.2				
Q6 (1)	0.86	4.37	***	0.86	4.49	***
Q6 (2)	-0.29	-1.51	+	-0.32	-1.72	*
age	0.03	3.7	***	0.03	4.69	***
Agriculture and fishery	0.52	0.81				
self-employed	-0.05	-0.17				
Manager and professional	1.37	2.49	**	1.57	3.02	***
Sales/service	-0.52	-0.95				
Factory worker	-0.12	-0.33				
Office worker, engineer	-0.24	-0.73				
Housewife	-0.39	-1.52	+	-0.34	-1.55	+
Student	-0.7	-0.73				
Number of family	-0.01	-0.14				
Income	0.13	2.07	**	0.13	2.49	**
Hokkaido/Tohoku region	0.34	0.92				
Kanto/kousinetsu region	-0.24	-0.73				
Chubu region	-0.62	-1.83	*	-0.53	-2.29	**
Kinki region	-0.04	-0.11				
Chugoku/Shikoku region	-0.24	-0.62				
Ordinance-designated city	0.42	1.23				
City with more than 300 thous. population	0.53	1.71	*			
City with 100-300 thous. population	0.88	2.81	***	0.49	2.25	**
City with less than 100 thous. population	0.78	2.41	**	0.48	2.06	**
No. of observation	408			408		
Log likelihood	691.35			695.97		

\*\*\*, \*\*, and \* indicate the 1%, 5%, and 10% significant level, respectively

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**Table 4** Summary of NHK “Promises”

Q9SQ(1)	Creates better programs consistent with receiving fees paid
Q9SQ(2)	Covers appropriately the issues Japan faces and broadcasts programs providing information helpful for thinking and deciding about those issues
Q9SQ(3)	Improves emergency broadcasting to respond promptly to threat to human life and property
Q9SQ(4)	Broadcasts programs contributing to the benefit of local society
Q9SQ(5)	Tailors broadcasts to better meet of seniors and persons with disabilities
Q9SQ(6)	Broadcasting programs contributing the healthy development of children, the future of Japan, and the stimulation of receptive intellectual curiosity
Q9SQ(7)	Works to promote understanding of the receiving fees and ensures that the burden is borne equitably
Q9SQ(8)	Establishes strong relationship with viewers and reflects their opinions in our operation
Q9SQ(9)	Stamps out improprieties and operates in a transparent manner and with full accountability, to restore the public’s trust in NHK
Q9SQ(10)	Reduces costs and carry out operations effectively and efficiently
Q9SQ(11)	Makes greater efforts to develop and spread digital broadcasting so as to improve viewers access to it
Q9SQ(12)	Develops digital technology and new services using this technology to improve the public’s convenience

**Table 5** WTP and NHK “Promises”

	Full model		Selected model	
	coefficient	t -value	coefficient	t -value
constant	23.6	25.98 ***	23.56	26.1 ***
ln(WTP)	3.35	25.93 ***	3.34	26 ***
Q9 SQ (1)	0.9	4.94 ***	0.92	5.08 ***
Q9 SQ (2)	0.28	1.37 +	0.3	1.58 +
Q9 SQ (3)	0.2	1.1		
Q9 SQ (4)	0.3	1.5 +	0.33	1.8 *
Q9 SQ (5)	-0.2	-1.02		
Q9 SQ (6)	-0.3	-1.5 +	-0.26	-1.48 +
Q9 SQ (7)	0.13	0.49		
Q9 SQ (8)	0.29	1.15	0.43	2.2 **
Q9 SQ (9)	0.06	0.19		
Q9 SQ (10)	0.15	0.5		
Q9 SQ (11)	0.31	1.04		
Q9 SQ (12)	-0.17	-0.6		
No. of observation	658		658	
Log likelihood	1169.45		1172.25	

\*\*\*, \*\*, and \* indicate the 1%, 5%, and 10% significant level, respectively

when considering NHK as a public broadcaster even in the future. In this context, NHK’s public nature was broken down into nineteen categories and viewers’ expectations of and satisfactions with NHK were questioned. NHK today is perceived by viewers and listeners as fulfilling many of the values of public broadcasting, but both expectations and satisfaction were very strong regarding broadcasting during emergencies or disasters,

speedy and accurate reporting, and world-class sports. On the other hand, there were relatively large gaps between expectations and satisfaction relating to “passing on Japanese traditions and culture to the younger generation through audio and video,” “trying to close the information gap that exists among the public,” “creating new program formats that go beyond the existing program framework,” “presenting programs that are well received

internationally” and “actively communicating events in Japan, Japanese history and culture, and information about Asia to the world”.

Regarding variables of category (iii), we analyse the statistical relationship between these public roles and WTP. This analysis helps NHK to consider its position as a public broadcast. The estimation in the selected model extracts the following three factors have positive relationship with WTP, namely, “Q10(4): Takes up broad issues from the through Japanese society and provides information that people can share and discuss,” “Q10(19): Passes on Japanese traditions and culture to the younger generations in audio and video format,” and “Q10(1):Products programs that are not influenced by advertisers or sponsors”. This implies that respondents who replied “yes” to those questions tend to reply higher WTP. It also, however, identifies following two with negative relationship, that is, “Q10(3): Provides information on disasters quickly and accurately,” and “Q10(11): Provides people of all age with opportunity to learn”. This is a contradiction to their replies to these questions. 96.3% (85.5%) of respondents replied “yes” to Q10(3) (Q10(11)). This is due to a limitation of econometric analysis, that is, the model cannot identify factors which almost all reply “yes”.

#### 4. CONCLUSION

This paper has two objectives: (i) derive the exact WTP of NHK as a public broadcasting; and (ii) factors affecting WTP. By the well-prepared question surveys, this paper can obtain the value of WTP, which is not so different from other researches. WTA is, however, failed to estimate due to problems related to questioning to reviewers, so that we have to revise questions on WTA. In addition, we have to examine how robust the results we gained here are, and in so doing, we need to ask in other formats of survey. In this survey, we do not fully analyse important issues related to CVM such as (i) zero bids, (ii) outlier bids, (iii) household and individual WTP, and no more than the current license fee” bids mentioned by Delaney and O’Toole (2004). In evaluation of environment, use and non-use values are assessed by CVM. In further survey, these issues will be challenged.

Regarding to the second object, the results we obtained by Logit models are not so different from other researches. The factors such as “age,” “viewing hours,” “income,” and regions are almost consistent with other models, especially those of Delaney and O’Toole (2004). This paper can identify factors affecting to WTP in the framework to examine effectiveness and importance of NHK “Promises”. These analyses can be utilized for setting up managerial strategy as a public broadcasting. In other words, this approach is referred to as “strategic” applications of CVM for identifying so-called “value-chain of public broadcasting” or long-term visions.

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