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## Double-bounded Dichotomous Choice CVM for Public Library Services in Japan

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### Abstract

Under the recent severe financial situation, it is more important that central and local governments justify their public investments than ever. Cost-benefit analysis (CBA) is often used for this problem. However, CBA has not been done on public library services in Japan. The aim of this study is to conduct double-bounded dichotomous choice CVM (contingent valuation method) and to validate applicability and effectiveness of this method. The result shows that respondents are willing to pay about 350 JPY per library-use on average. Moreover, household income and frequency of public library use significantly affect their willingness to pay.

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### 1. Introduction

Cost-benefit analysis (CBA) is classical research interest in library and information science [1][2][3][4][5]. To conduct CBA, benefits should be measured in the same unit of costs. However, it is difficult to estimate the monetary value of non-market goods that do not have price like environmental resources or library services. Flowerdew & Whitehead (1974) pointed out “despite much interesting work, no really satisfactory cost/benefit study has yet been carried out” [6]. After 19 years since then, Lancaster (1993) also described similar opinion as below [7].

Cost-benefit analyses are very difficult to perform in the information service environment and perhaps no study of this kind has ever been fully credible. Nevertheless, one way or another, libraries and other

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information centers must justify their existence, so the benefits of their services, even if they seem rather nebulous, cannot be ignored in evaluative studies.

In addition, Lancaster mentioned that more attempts at cost-benefit analysis have been applied to industrial libraries than to libraries other kinds (e.g. public, school and academic) [7].

On the other hands, Aabø (2009) insists that new research field (library valuation research) has evolved from wider research area library management and economics, and the number of library valuation studies and return on investment (ROI) studies has considerably increased since the latter half of 1990 [8]. Some review articles have been already published on this field [9][10][11][12][13]. Moreover, Aabø reports that 32 of the 38 reviewed library valuation studies are of public libraries. Under the recent global economic recession and severe financial constraints, it is more important that national governments and municipalities justify their public investments than before.

Various techniques have been developed for valuing non-market goods especially in the field of environmental economics and agricultural economics. Those are categorized by two main approaches. One is ‘revealed preference method (RPM)’ and the other is ‘stated preference method (SPM)’. Travel cost method (TCM) and hedonic price method (HPM) are representative approaches in RPM. CVM and conjoint analysis are typical in SPM. Although CVM is often applied to estimate monetary values of public library services, there are a few examples in Japan [14][15]. Then, the aim of this study is to conduct double-bounded dichotomous choice CVM and to validate applicability and effectiveness of this method for public libraries in Japan.

## 2. Methods

On March 2012, Subjects were recruited through an internet research company. Gender-balance, age composition and frequency of public library use were taken into account on the screening stage. As a result, 1,108 respondents were selected by stratified multistage sampling method. Table 1 shows respondents’ demographic attributes and their library usage.

First of all, respondents who have used public library at least once in the past year were asked to answer their satisfaction level of public libraries that they usually use. According to table 2, ‘satisfied’ is most selected on every aspect of public libraries.

In contingent valuation surveys, subjects are directly asked their maximum willingness to pay (WTP) or maximum willingness to accept compensation (WTA) of non-market goods. WTP is generally more conservative than WTA. NOAA panel on contingent valuation (1993) recommends to using WTP, because a conservative design increases the reliability of the estimate by eliminating extreme responses [16].

Table 1. Overview of respondents' features

Gender		Age		Household income (YEN)		Frequency of public library use	
Female	554 (50.0%)	20s	244 (22.0%)	under 2 millions	47 (4.2%)	several times a month	249 (67.3%)
Male	554 (50.0%)	30s	222 (20.0%)	under 4 millions	232 (20.9%)	at least once a month	123 (32.7%)
Marital status		40s	210 (19.0%)	under 6 millions	262 (23.6%)	at least once half year	193 (17.4%)
Married	746 (67.3%)	50s	260 (23.8%)	under 8 millions	171 (15.3%)	at least once a year	179 (58.9%)
not married	362 (32.7%)	60s or over	168 (15.2%)	under 10 millions	116 (10.5%)	not use the past year	297 (41.1%)
Child				over 10 millions	89 (8.0%)	Never	67 (6.0%)
have a child	653 (58.9%)			N/A	181 (17.2)		
not have a child	455 (41.1%)						

Table 2. Results of public library user satisfaction

	Very Dissatisfied	Dissatisfied	Neutral	Satisfied	Very Satisfied
(1) Amount of materials	36 (4.8%)	204 (27.4)	171 (23.0%)	299 (40.2%)	34 (4.6%)
(2) Quality of materials	29 (3.9%)	163 (21.9%)	203 (27.3%)	316 (42.5%)	33 (4.4%)
(3) Staff service	14 (1.9%)	59 (7.9%)	196 (26.3%)	405 (54.4%)	70 (9.4%)
(4) Open hours	22 (3.0%)	151 (20.3%)	148 (19.9%)	382 (51.3%)	41 (5.5%)
(5) Open days	16 (2.2%)	93 (12.5%)	170 (22.8%)	413 (55.5%)	52 (7.0%)
(6) Overall satisfaction	8 (1.1%)	109 (14.7%)	171 (23.0%)	417 (56.0%)	39 (5.2%)

There are three types of payment vehicles in contingent valuation survey, which are (1) tax, (2) donation and (3) charge. In this study, we employ ‘charge’ for library admission fee because of attempting to estimate more conservative results. Each respondent is shown one of the two types of library service models (see table 3). For double-bounded dichotomous choice CVM, respondents are asked whether they are willing to pay or not at presented price. If a respondent accepts to pay the price, the higher price is displayed next. If a respondent rejects to pay the price, the lower price is displayed. We have determined these prices by reference to actual fee of other cultural facilities as well as average costs of public libraries.

Table 3. Two types of library service models

	Library type 1	Library type 2
Book stock	500,000 volumes	100,000 volumes
Magazine stock	500 titles	100 titles
Library hours	10:00 - 20:00 (10 hours)	10:00 - 18:00 (8 hours)
Material loan limit	20 volumes	10 volumes
Material loan period	3 weeks	2 weeks

Table 4. Response results of library type 1

1st bid	2nd bid (upper)	2nd bid (lower)	Y/Y	Y/N	N/Y	N/N	Total respondents
500 JPY	750 JPY	250 JPY	8 (4.3%)	41 (22.2%)	28 (15.1%)	108 (58.4%)	185 (100%)
1,000 JPY	1,250 JPY	750 JPY	3 (1.6%)	15 (8.2%)	1 (0.5%)	165 (89.7%)	184 (100%)
1,500 JPY	2,000 JPY	1,000 JPY	4 (2.2%)	8 (4.3%)	22 (11.9%)	151 (81.6%)	185 (100%)

Table 5. Response results of library type 2

1st bid	2nd bid (upper)	2nd bid (lower)	Y/Y	Y/N	N/Y	N/N	Total respondents
500 JPY	750 JPY	250 JPY	5 (2.7%)	38 (20.5%)	32 (17.31%)	110 (59.5%)	185 (100%)
1,000 JPY	1,250 JPY	750 JPY	5 (2.7%)	8 (4.3%)	5 (2.7%)	166 (90.2%)	184 (100%)
1,500 JPY	2,000 JPY	1,000 JPY	3 (1.6%)	8 (4.3%)	14 (7.6%)	160 (86.5%)	185 (100%)

### 3. Results

Table 4 and table 5 show overview of response results. Y denotes acceptance to pay at the presented price, and N denotes reject to pay. The WTP data resulting from the dichotomous choice questions can be analyzed by either a parametric or a nonparametric approach. In this study, we conducted a parametric approach and estimated WTP by survival analysis with Weibull function. As a result, mean WTP of library type 1 is 374.9 yen and median is 222.4 yen. On the other hand, mean WTP of library type 2 is 340.4 yen and median is 200.1 yen. There is no statistically significant difference between type1 and type 2. In terms of relationship between respondents' attributes and WTP, household income and frequency of public library use significantly affect their WTP.

### 4. Conclusion

In this study, we conducted double-bounded dichotomous choice CVM and attempted to validated applicability and effectiveness of this method. The result showed that respondents are willing to pay about 350 JPY per library-use on average. household income and frequency of public library use significantly affect their WTP.

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