

Effects of Improving Public Services for Tourism Developments in Islands: The Case of Remote Islands in Nagasaki, Japan

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Abstract

Growths of numbers of tourists who stay long-term in tourism sites are an important policy for local governments in islands due to their locations that are far from urban areas. However, many tourists hesitate to stay long-term in islands owing to not only the expensive travel costs but also the lack of public services in islands. The purpose of this study is to examine effects of improving public services in islands for tourists' willingness to pay (WTPs) and non-tourists' attitudes for long-term stays. Data on tourism activity for islands, Nagasaki, Japan were used. Respondents were asked about their WTPs for long-term stays and their needs for public services of islands; reductions of costs for rent or purchasing houses for long-term stays and travel costs, easy to take a vacation, to enhance medical services, educational services and job search services. The logit model was used for estimations. Median and mean values of WTPs (per year) were calculated JPY 151,629 (USD 1184) and JPY 242,110 (USD 3008). Positive effects on five public services (without travel costs) were confirmed. For example, the median values of WTPs were increased to JPY 478,369 (USD 5943) when the medical services were improved, and JPY 1,484,704 (USD 18,446) when all public services were improved. The results showed that improvement of public services have the effect 1) to improve tourists' benefits and 2) to change many non-tourists' attitudes from the rejection of staying long term in islands to the acceptance. Thus, results indicate that it would be better for central and/or local governments in islands to enhance islands' public services.

Keywords

Island, Public Service, Tourism Activity, Willingness to Pay, Long Term Stay

1. Introduction

The concern of this paper is to examine whether improvements of public services in islands lead to increase a

number of tourists who would like to stay in long term.

The islands have historically played important roles to sustain international interactions (trades, exchanges and cooperation), thus having much number of historical heritages and natural environments [1]-[4]. However, developing the world economy (transportation systems, etc.) has depressed the roles, causing significant social problems in islands of the world; reductions of employments and populations, incomplete public services (medical and educational services, etc.) which lead to inconvenient and unsustainable life for residents in islands [3]-[5]. The local governments in islands encourage performing policies to solve the problems to maintain their cultures, societies and economic growth [6]. However, severe financial limitations of the local governments in islands prevent implementing expensive public projects for solving the problems.

To improve the social situations, the local governments in islands focus on the tourism policy because tourism activities have positive economic impacts on primary, secondary and tertiary industries [5]. Many governments in islands have effort to achieve increments of numbers of tourists by appealing and using their historical heritages and the natural environments [6] [7]. Islands with abundant tourism resources (e.g. Hawaiian islands, Caribbean islands) would have achieved the purpose, while other (small) islands have not achieved it due to the islands' geographical locations that far from urban areas [8]. Especially, the fact that the long distance (*i.e.* the long travel time by ships and/or air planes) makes it difficult to increase the number of tourists who prefer a short-term tourism indicates an importance for implementing policies on long term tourism in islands.

Some local governments in islands perform the long-term tourism policies by targeting tourists who are much interested in the islands' historical heritages and natural environments [6] [7]. Here, a dilemma is raised; tourists hesitate (or reject) to stay long term in islands due to the anxieties for incomplete public services (including the subsidies for second houses) even if they were much interested in island tourism resources [7]. In short, the improvements of (incomplete) public services are required for local governments in islands to increase the number of tourists who accept to stay long term in islands in spite of their severe financial conditions.

The benefit analysis is one of methods to enable policy makers to see the improvement effects in monetary term. The purposes of this study are to examine the effects of improving public services by estimating 1) tourists' willingness to pay (hereafter WTPs) for the long term stay in islands and 2) tourists' attitude changes (from the rejection to the acceptance) for staying long term in islands.

Previous studies on the island tourism analyze the tourism effect to island economy and society [1] [3] [8]; tourists' needs for the islands' natural resources [1], some common problems among small islands [6], effects of the second home development policies related to tourism [9], tourists' well-being and the sustainable tourism in local areas [10]. As for public services, individual preferences for public services, house types, natural environments and cultures in purchasing second homes are analyzed by using a choice experiment analysis [11]. Researches on the public activities for the retirement migrations and the second home tourism are performed in the case of Canary Islands [12].

Previous descriptive and quantitative studies indicate that the improvements of public services certainly contribute to sustain and/or develop the economy and society in islands. However, few studies have quantitatively analyzed what kinds of public services were needed and how the improvements of public services influence tourists' or non-tourists' attributes for staying long term in islands. This paper analyzed those points. As mentioned above, all islands in the world have a common problem [1] [6], leading that the results of this paper contribute to improve the public services in other islands.

This paper is organized as follows. Section 2 presents the estimation models and survey designs. Section 3 describes the estimation results, followed in Section 4 by a discussion of the results. Finally, Section 5 provides concluding remarks.

2. Method

2.1. Estimation Model

The logit model was used for estimations [13]-[16]. Let i be an index of respondents ($i=1,2,\dots,N$) and j be an index of WTP_j ($j=1,2,\dots,T$) presented in the questionnaire. Here, $WTP_j > WTP_{j-1}$. Let V_i^{wo} and V_i^w be utilities with and without implementing a project, then $\Delta V_i \equiv V_i^w - V_i^{wo}$ be a difference between utilities. Let \mathbf{x}_i be a matrix of explanatory variables excluding WTP_j , ε_i be a randomly distributed preference, γ and $\boldsymbol{\beta}$ be parameters of WTP_j and \mathbf{x}_i , respectively. Then, the ΔV_i are defined as $\Delta V_i = \gamma WTP_{ij} + \mathbf{x}_i \boldsymbol{\beta}' + \varepsilon_i$.

Let $\Pr(\cdot)$ be a probability function which the respondent i willing to pay for a WTP_j . Here, it was con-

sidered that a respondent i answered “yes” for WTP_{j-1} when the respondent i answered “yes” for WTP_j . Let y_{ij} be a response function that $y_{ij} = 1$ when the respondent i answered “yes” and otherwise $y_{ij} = 0$. The probability function was assumed the logistic distribution. Then, the log likelihood function was defined as Equation (1)

$$\ln L = \sum_{j=1}^T \sum_{i=1}^N y_{ij} \ln \Pr(\varepsilon_i) + (1 - y_{ij}) \ln(1 - \Pr(\varepsilon_i)) \quad (1)$$

Finally, mean WTPs calculated by integrating $\Pr(\cdot)$ from 0 to 3000 (the maximum value of WTPs) with both estimated parameters and mean values of the data. Median WTPs are calculated as a WTP under $\Delta V = 0$, namely, $-x\beta'/\gamma$.

2.2. Survey and Basic Statistics

2.2.1. Research Object Areas

Research object areas of this study were Tsushima islands, Iki islands, Goto islands, Hirado islands and Saikai islands in Nagasaki prefecture, Japan. **Figure 1** shows locations of Tokyo (capital city), Fukuoka (the largest city in west-Japan) and the islands. Geographic and characteristics information referred from the Nagasaki prefectural government [17] were showed in **Table 1**. Those islands have larger populations and areas among 971 islands of Nagasaki prefecture. The economic activities rely on the tourism industry for using heritages and natural environments due to the lack of the manufacturing industry and agriculture in the islands.

2.2.2. Survey

An internet research was performed in February, 2012. The research was performed to respondents who registered for an internet research-company and live in Fukuoka, Saga, Nagasaki, Oita or Kumamoto prefectures followed by previous study [9]; The target tourists (consumers) of the long term stay or the second house researches would live within 300 km from the research object areas.

On the investigation, firstly, E-mail was sent to 5111 respondents. Then, 770 respondents answered questionnaires (the percentage of the appearance is 14.6%). Since it is difficult for people who do not know islands' environments to answer WTPs for long-term stay, then the target of this research was respondents who know islands' environments (at least, respondents who have experiences to visit islands). Here, 24 respondents were excluded from estimations because they answered that they have never been to these islands. As a result, 746 respondents' data were used for estimations. 746 respondents were asked questionnaires on WTPs, public services of islands, tourism activities in islands and individual characteristics. Here, the calculations on this paper used the exchange rate of 80.49 Japanese yen (hereafter, JPY) to the US dollar (hereafter, USD) in February, 2012 referred from the Bank of Japan [18].

2.3. Questionnaire on Willingness to Pay

WTP data was collected though four questionnaires. The first question was designed to confirm whether

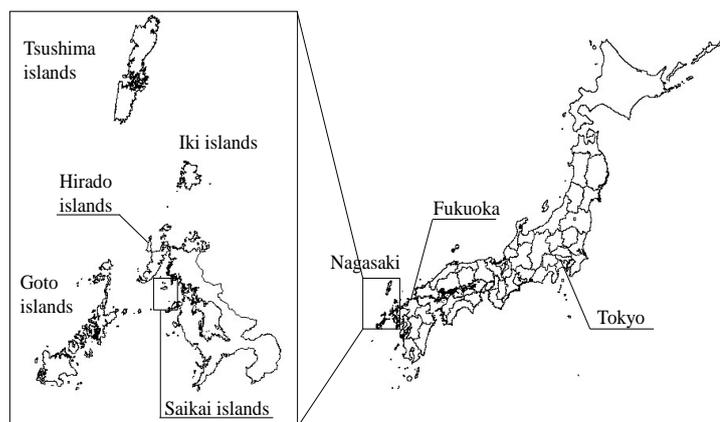


Figure 1. Locations of islands; Tsushima, Iki, Hidado, Goto, Saikai.

Table 1. Geographic and characteristics information of islands.

<p>[Tsushima islands] Population: 32,954 people, Area:708.66 km², Longitude and latitude: E129°17' N34°12', The distance between Tsushima and Tokyo: 1,231.0km</p> <p>Characteristic: Tsushima islands locate on near the republic of Korea (south Korea). Thus people lived in Tsushima has traded Japanese goods to East Asian countries from long time ago. There are many cultural heritages (national treasures) such as the Kaneda castle, the Kaneishi castle and the Banshojin temple. As for environment characteristics, numbers of species live in forest; the Tsushima cat (endangered species), the Tsushima's endemic flora and fauna (protected by the Japanese government), etc.</p>
<p>[Iki islands] Population: 27,456 people, Area: 138.58 km², Longitude and latitude: E129°42' N33°45', The distance between Iki and Tokyo: 1164.8 km</p> <p>Characteristic: Iki islands locate on between Tsushima islands and Nagasaki prefecture. Iki islands has also traded as same as Tsushima islands. There are lots of old mounds and the excavated articles (national treasures) such as the Sasazuka, the Souroku and the Haranotsuzi. The food culture such as the Iki shochu (Japanese sprits) and the Iki beef have been popular to tourists.</p>
<p>[Goto islands] Population: 37,867 people, Area:420.91 km², Longitude and latitude: E128°51' N32°42', The distance between Goto and Tokyo:1238.3 km</p> <p>Characteristic: Goto islands have Catholic Churches registered as national treasure such as the Kasiraga island Catholic Churches, the Aosagaura Catholic Churches, and the Egamietc Catholic Churches. Now that there are civic actions that aim to register the Catholic Churches in the World Heritage List. The beautiful environment also attracts tourists; The Takahama beach is famous for having the one of most beautiful sandy.</p>
<p>[Hirado islands] Population:32,252 Area:235.66 km², Longitude and latitude: E129°43' N33°20', The distance between Hirado and Tokyo: 1234.1 km</p> <p>Characteristic: Hirado islands locate nearest in Nagasaki prefecture, having remains intrading with the Netherlands long time ago. Thus, Hirado-shokan is registered as a national treasure for the Netherlands trade. The Tabira church and Houki church (built with bricks) are also important cultural heritages.</p>
<p>[Saikai islands] Population:33,680 Area: 241.94 km² Longitude and latitude: E129°38' N 32°55', he distance between Saikai and Tokyo:1225.1 km</p> <p>Characteristic: Saikai islands are constructed by lots of islands called as the Kuzuyukushima islands. The region has a zoo and an aquarium for tourists. The beautiful ocean and islands views are famous tourism sites. The Hashima (alias, Gunkann-zima; it looks like a war ship) is now under the registration in the World heritage list.</p>

respondents accepted to stay long-term in islands or not. The context is “Assume that you have no issues (such as housing or travel costs, jobs, educations and life cycles etc.) to stay long term in the islands where you visited. Would you like to stay long term? If you would, please check the boxes below.” 307 respondents answered “yes” (namely, accepted to stay), while 439 respondents answered “no” (namely, rejected to stay). The values of 439 respondents' WTPs were designed as zero.

307 respondents were asked the second questionnaire that was designed for collecting the WTP data. The context is “Please answer next questionnaire in consideration of your present status (income, jobs, and life cycles etc). How much do you willing to pay for staying one of islands where you visited? Please check the alternatives below.” Alternatives and statistical information (numbers of “yes” responses) were shown in **Table 2**. The column of DWTP shows data used for estimations. The unit of WTPs was the Japanese yen (JPY). 227 respondents answered positive WTPs, while 30 respondents chose “0 yen”, setting the 30 respondents' WTPs as zero. Data of the 30 respondents in second questionnaire were included in “Other” of third questionnaire described below. Hereafter, the data set constructed from 746 respondents was called as “Full data”, and the one from 227 respondents was called as “Positive WTP data”.

Mean values and standard deviations of WTPs were shown in **Table 3**. Mean values were calculated JPY 137,131 per year from Full data and JPY 369,314 per year from Positive WTP data.

2.4. Questionnaires on Rejection Reasons to Stay Long Term

439 respondents, who reject to stay, were asked the third questionnaire which was designed to confirm the rejection reasons to stay long term in islands. Here, items in questionnaires on the rejection reasons and the needs for public services (described below) were decided by discussions with officers of the Shin-kamigoto-cho public office in Goto area.

The context of the third is “Please answer your rejection reasons to stay long term in islands. Please check the alternatives below.” Alternatives and statistical information were shown in **Table 4**. For simplicity, the data obtained from the third questionnaire (from NS_DIST to NS_LIFE in **Table 4**) were called as “NS (Not-stay) variables”, hereafter.

Table 2. Numbers of respondents in WTPs.

Alternatives	DWTP (thousand yen)	Numbers
0 yen	0	30
1 yen to less than 100 thousand yen	50	121
100 thousand yen to less than 500 thousand yen	250	96
500 thousand yen to less than 1 million yen	750	33
1 million yen to less than 2 million yen	1,500	21
2 million yen to less than 3 million yen	2,500	4
Over 3 million yen	3,000	2

Table 3. Mean values of WTPs.

Data	Full data	Positive WTP data
Mean values (thousand yen)	137.1314 (368.3565)	369.3141 (529.3357)
N	746	277

Values in parentheses were standard deviations.

Table 4. Rejection reasons to stay islands in long term.

Alternatives	Notations	Response rates (yes)
Long-distance from my home	NS_DIST	0.4499 (0.4980)
Costs	NS_COST	0.3497 (0.4774)
Do not know (image) islands	NS_IMAGE	0.0512 (0.2206)
Feel anxiety for medical institutions	NS_MED	0.1642 (0.3708)
Feel anxiety for employment opportunities	NS_JOB	0.2388 (0.4268)
Feel anxiety for other public services	NS_PUB	0.0469 (0.2117)
Do not like to change my life style	NS_LIFE	0.3284 (0.4701)
Other	-	0.0235 (0.1515)
N		469

Values in parentheses were standard deviations.

In **Table 4**, high response rates of NS_DIST, NS_COST and NS_LIFE indicated that tourists thought the financial and the life-style problems as main rejection reasons. NS_MED and NS_JOB would be secondary ones.

2.5. Needs for Public Services in Islands

The fourth questionnaire was asked to 746 respondents after the second and the third questionnaires. All respondents were asked “Assume that the Japanese and the local governments in islands plan to improve some of public services in the islands where you visited. Please answer public services (within three) that you would (accept to) stay long term in islands if the improvement plans were implemented. Alternatives and statistical information were shown in **Table 5**. For simplicity, the data obtained from the fourth questionnaire (from PS_HOUSE to PS_JOB in **Table 5**) were called as “PS (Public services) variables”. PS variables were used for estimations to confirm whether the improvements of public services resolve (or disappear) the rejection reasons shown by NS variables or not.

Totally, response rates of the Positive WTP data were higher than the one of the Full data. The results of

Table 5. Needs for public services.

Alternatives	Notations	FULL	Positive WTP
Reducing housing costs	PS_HOUSE	0.4450 (0.4973)	0.6606 (0.4743)
Reducing travel costs	PS_TRAVEL	0.3445 (0.4755)	0.4549 (0.4989)
Taking long vacations more easily	PS_VAC	0.2480 (0.4321)	0.3755 (0.4851)
Medical services	PS_MED	0.2359 (0.4249)	0.3177 (0.4664)
Educational services	PS_EDUC	0.0630 (0.2431)	0.0939 (0.2922)
Job search services	PS_JOB	0.1381 (0.3452)	0.1913 (0.3941)
Other services	-	0.0121 (0.1092)	0.0108 (0.1037)
No necessary for improvements	-	0.0201 (0.1405)	0.0542 (0.2267)
Never stay if anything	-	0.3150 (0.4648)	0.0000 (0.0000)
N		746	277

Values in parentheses were standard deviations.

PS_HOUSE and PS_TRAVEL indicate the high needs for reducing costs. The “Never stay if anything” was an exclusive alternative (a respondent cannot select other alternatives when the respondent selects this). The result of “Never stay if anything” indicates that about 31% respondents would certainly reject to stay long term in islands even if all public services were improved.

The PS variables that reveal respondents’ needs for public services were inadequate to show the effects of improving public services in benefit calculations. They would not express the degree of lack of public services, resulting that hypothetical improvement levels of public services in benefit calculations could not be designed. Thus, a construction of data on the lack of public services (called as PSR variables) was considered by using PS variables and WTP responses. Firstly, the levels of lack of public services were designed as {-1, -2, -3} and those values were assigned following by results of respondents’ answers. This paper considered that the zero WTP or the needless for improving public services answers would show the higher level of lack of public services. Thus, the -1 was assigned to respondents that answer positive WTPs in WTP questionnaire and yes for at least a public service in the fourth questionnaire. The -2 was assigned to respondents that answer zero WTPs and yes for at least a public service. The -3 was assigned to respondents that answer zero WTPs and no for all public services. The results of PSR variables were presented in [Table 6](#).

2.6. Basic Information

Basic information used for independent variables in estimations was presented in [Table 7](#). As for individual characteristics, respondents’ income, gender, age educational levels and job status were employed. As for tourism activities, activity time in islands and purposes of visit were employed for estimate influences of tourism activity experiences for WTPs.

2.7. Models

This paper conducted estimations on 1) the WTP function for benefit calculations and 2) the effects of improving public services to tourists’ attitudes to stay long-term in islands (the probability of changing the rejection to the acceptance). Firstly, the estimation model on the WTP function was defined as the equation (2).

$$\begin{aligned}
 \Delta V = & \alpha_0 + \gamma WTP + \beta_1 ICM + \beta_2 GND + \beta_3 AGE + \beta_4 UNIV + \beta_5 REG + \beta_6 HM \\
 & + \beta_7 AT_TSUSHIMA + \beta_8 A_TIKI + \beta_9 AT_HIRADO + \beta_{10} AT_GOTO + \beta_{11} AT_SAIKAI \\
 & + \beta_{12} PSR_HOUSE + \beta_{13} PSR_TRAVEL + \beta_{14} PSR_VAC + \beta_{15} PSR_MED + \beta_{16} PSR_EDUC \quad (2) \\
 & + \beta_{17} PSR_JOB + \beta_{18} VP_IVT + \beta_{19} VP_LES + \beta_{20} VP_AMUS + \beta_{21} VP_SPG \\
 & + \beta_{22} VP_PRC + \beta_{23} VP_WORK + \beta_{24} VP_FOOD + \beta_{25} VP_RTN
 \end{aligned}$$

Table 6. Scarcity on public services.

Alternatives	Notations	Full data	Positive WTP data
Reducing rents or costs for purchasing houses	PSR_HOUSE	-2.3097 (0.8398)	-1.6787 (0.9487)
Reducing travel costs	PSR_TRAVEL	-2.4866 (0.7671)	-2.0903 (0.9977)
Taking long vacations easily	PSR_VAC	-2.6126 (0.7189)	-2.2491 (0.9702)
Improving medical services	PSR_MED	-2.6461 (0.6821)	-2.3646 (0.9328)
Improving educational services	PSR_EDUC	-2.9021 (0.3977)	-2.8123 (0.5843)
Improving Job search services	PSR_JOB	-2.7909 (0.5549)	-2.6173 (0.7881)
N		746	277

Values in parentheses were standard deviations.

Table 7. Basic information.

Categories	Notations	Full	Positive WTP
Individual characteristics			
Respondents' household income (100 thousand yen)	ICM	57.1716 (43.5641)	60.8303 (47.3045)
Respondents' gender; 1 for male, 0 for female	GND	0.5831 (0.4934)	0.6390 (0.4812)
Respondents' actual years (years)	AGE	44.7413 (10.3611)	44.3285 (10.3046)
Respondents' educational levels; 1 for over under graduate, 0 for otherwise	UNIV	0.5214 (0.4999)	0.5451 (0.4989)
Respondents' job; 1 for regular employees, 0 for otherwise	REG	0.5161 (0.5001)	0.5271 (0.5002)
Respondents' job; 1 for homemakers, 0 for otherwise	HM	0.1568 (0.3639)	0.1300 (0.3369)
Respondents' job; 1 for students, 0 for otherwise	STU	0.0107 (0.1031)	0.0144 (0.1195)
Activity time in islands (hours)			
Tsushima islands	ATTSU	3.7326 (19.8319)	6.7419 (30.1787)
Iki islands	ATIKI	5.6930 (15.9795)	7.4296 (21.6751)
Hirado islands	ATHIRA	7.8177 (15.1840)	9.4043 (20.7195)
Goto islands	ATGOTO	4.2286 (19.1568)	6.2527 (21.8914)
Saikai islands	ATSAI	6.3277 (14.7140)	7.5144 (20.3978)
Main purpose in visiting islands			
Events ; 1 for events, 0 for otherwise	VP_IVT	0.0496 (0.2173)	0.0578 (0.2337)
Leisure; 1 for leisures, 0 for otherwise	VP_LES	0.4075 (0.4917)	0.4224 (0.4948)
Sight-seeing; 1 for sight-seeing, 0 for otherwise	VP_AMUS	0.0912 (0.2880)	0.1119 (0.3158)
Relaxations; 1 for relaxations, 0 for otherwise	VP_SPG	0.0992 (0.2991)	0.0903 (0.2871)
Purchasing; 1 for purchasing, 0 for otherwise	VP_PRC	0.0603 (0.2382)	0.0722 (0.2593)
Works; 1 for works, 0 for otherwise	VP_WORK	0.0724 (0.2593)	0.0722 (0.2593)
Foods; 1 for foods, 0 for otherwise	VP_FOOD	0.1126 (0.3163)	0.1444 (0.3521)
Return to home etc.; 1 for return, 0 for otherwise	VP_RTN	0.1595 (0.3664)	0.1552 (0.3628)
N		746	277

Values in parentheses were standard deviations.

Assumptions of the signs of parameters were as follows; the γ was negative and the β_1 was positive from previous studies; The signs from β_7 to β_{11} were positive because it was guessed that respondents who experienced longer time in islands prefer to stay islands; The signs from β_{12} to β_{17} assumed to be positive since increments of PSR variables (namely, when a respondent thought the level of lack of public services would be low) lead to increase respondents' willingness to stay long term in islands. The signs of other parameters were confirmed through estimations.

Secondly, the estimation model on tourists' attitudes was defined as the Equation (3). PS variables were used for dependent variables, while NS variables for independent variables. Parameters of independent variables were confirmed through estimations. Here, the fact that a respondent selected a PS variable indicated that the respondent would like to stay long term in islands when the public service was improved. Thus, $\alpha > 0$ means a rejection reason to stay long term in islands (a NS variable) would be solved by improving the public service. In short, the PS variable would be thought to have a possibility to resolve the (respondent's) rejection reason. Otherwise, $\alpha \leq 0$ means the rejection reason would not be resolved by the PS variable.

$$\Delta V = \alpha_0 + \alpha_1 \text{NS_DIST} + \alpha_2 \text{NS_COST} + \alpha_3 \text{NS_IMAGE} + \alpha_4 \text{NS_MED} + \alpha_5 \text{NS_JOB} + \alpha_6 \text{NS_PUB} + \alpha_7 \text{NS_LIFE} \quad (3)$$

3. Results

3.1. Estimations on Willingness-to-Pay Functions

Estimations were performed by using the glm function packaged in R ver. 3.01. Estimation results of both the Full data and the Positive WTP data were shown in **Table 8**. The columns of All shows the results by using all independent variables in equation (2). The columns of Stepwise show the results obtained by applying the stepwise AIC method to equation (2). The LL shows the maximum value of log likelihoods; the AIC shows the values of Akaike information criteria. The results of Stepwise indicated that some independent variables would not be necessary to explain influences for WTPs. Thus, results of Stepwise were discussed below.

From results of Stepwise in Full data, positive parameters that p-values were less than 5% were ICM, AT_TSUSHIMA, AT_IKI, AT_HIRADO, PSR_HOUSE, PSR_VAC, PSR_MED, PSR_EDUC, PSR_JOB and negative parameters that p-values were less than 5% were WTP and JOB_REG. In Positive WTP data, positive parameters that p-values were less than 5% were ICM, AT_TSUSHIMA, AT_IKI, AT_HIRADO, PSR_MED and negative parameters that p-values were less than 5% were WTP, JB_HM, PSR_TRAVEL and VP_PRC.

From **Table 8**, positive signs of WTPD (WTPs) and ICM (income) were consistent with previous studies. The fact that all parameters of AT variables (tourism activity time) were positive indicates that it is beneficial for tourists to stay long term in islands, suggesting that the long-term tourism policy were necessary for the local governments in islands to increase the number of tourists for islands. Parameters of the PS variables (public services) were examined in discussion section.

3.2. Benefit Calculations

Table 9 shows that benefits were calculated by using estimated parameters of Stepwise in the Full and the Positive WTP data. The row of Base shows that the median and the mean WTPs calculated by all parameters of Full data were JPY 151,629 (USD 1884) per year and JPY 242,110 (USD 3008) per year, respectively. The median and the mean WTPs by the Positive WTP data were JPY 585,735 (USD 7277.115) per year and JPY 609,524 (USD 7573) per year, respectively.

Values in the Hypothetical scenarios were benefits after hypothetically improving public services. The PSR variables were designed as negative values, setting an improvement of a public service as zero value of a PSR variable. For example, a hypothetical improvement of PSR_MED (medical services) was designed as PSR_MED = 0 in the calculation. Values in the final row of ALL were benefits calculated under the assumption that all PS variables were improved. Results of Hypothetical scenario were discussed in the next section.

3.3. Estimation on Needs for Public Services and Rejection Reasons

Results were shown in **Table 10**. The PS variables (independent variables) were listed in the row of the Independents. As mentioned above, a positive sign of a parameter means the PS variable has a possibility to resolve

Table 8. Estimation results on WTP.

	Full data		Positive WTP data	
	All	Stepwise	All	Stepwise
CONT	6.2200 ^{***} (0.5353)	6.3581 ^{***} (0.4975)	0.7167 (0.7593)	1.6842 ^{***} (0.3267)
WTP	-0.0045 ^{***} (0.0002)	-0.0045 ^{***} (0.0002)	-0.0040 ^{***} (0.0002)	-0.0040 ^{***} (0.0002)
ICM	0.0046 ^{***} (0.0012)	0.0047 ^{***} (0.0011)	0.0112 ^{***} (0.0022)	0.0111 ^{***} (0.0021)
GND	0.0415 (0.1176)		0.0484 (0.2174)	
AGE	0.0018 (0.0047)		0.0067 (0.0085)	
UNIV	-0.0300 (0.0957)		-0.0169 (0.1734)	
JOB_REG	-0.1899 [*] (0.1078)	-0.2064 ^{**} (0.1031)	-0.2972 (0.1899)	-0.2946 (0.1798)
JOB_HM	-0.2161 (0.1525)	-0.2530 [*] (0.1391)	-0.6291 ^{**} (0.2845)	-0.5730 ^{**} (0.2480)
AT_TSU	0.0137 ^{***} (0.0032)	0.0143 ^{***} (0.0032)	0.0083 ^{**} (0.0037)	0.0080 ^{**} (0.0036)
AT_IKI	0.0099 ^{***} (0.0036)	0.0097 ^{***} (0.0035)	0.0128 ^{**} (0.0060)	0.0143 ^{**} (0.0057)
AT_HIRA	0.0153 ^{***} (0.0038)	0.0155 ^{***} (0.0037)	0.0132 [*] (0.0068)	0.0168 ^{***} (0.0061)
AT_GOTO	0.0038 (0.0027)	0.0039 (0.0027)	0.0050 (0.0057)	
AT_SAI	0.0041 (0.0041)		0.0065 (0.0071)	
PSR_HOUSE	0.5411 ^{***} (0.0657)	0.5428 ^{***} (0.0644)	-0.0268 (0.0906)	
PSR_TRAVEL	0.0941 (0.0683)	0.1096 (0.0676)	-0.2216 ^{***} (0.0858)	-0.2018 ^{**} (0.0794)
PSR_VAC	0.5350 ^{***} (0.0678)	0.5280 ^{***} (0.0672)	0.0110 (0.0870)	
PSR_MED	0.5572 ^{***} (0.0723)	0.5573 ^{***} (0.0717)	0.1959 ^{**} (0.0908)	0.2092 ^{**} (0.0872)
PSR_EDUC	0.2837 ^{**} (0.1227)	0.2722 ^{**} (0.1213)	-0.1539 (0.1441)	
PSR_JOB	0.3109 ^{***} (0.0875)	0.3034 ^{***} (0.0867)	0.0048 (0.1060)	
VP_IVT	0.2262 (0.2084)		0.1102 (0.3384)	
VP_LES	0.0262 (0.0951)		0.2507 (0.1722)	
VP_AMUS	0.0398 (0.1611)		0.0483 (0.2565)	
VP_SPG	-0.2928 [*] (0.1554)	-0.2512 [*] (0.1526)	-0.0518 (0.2950)	
VP_PRC	-0.2119 (0.1959)		-0.7335 ^{**} (0.3076)	-0.8426 ^{***} (0.2866)
VP_WORK	0.1304 (0.1778)		0.0007 (0.3211)	
VP_FOOD	0.2060 (0.1451)		-0.2273 (0.2321)	
VP_RTN	0.0467 (0.1257)		0.2601 (0.2295)	
LL	-1506.2897	-1509.6687	-532.0044	-535.9553
AIC	3066.5794	3051.3374	1118.0088	1093.9106
R2	0.4808	0.4797	0.5957	0.5927
N	5222	5222	1939	1939

^{***}p-values were less than 1%, ^{**}less than 5%, ^{*}less than 10%, None: over 10%.

a rejection reason to stay long term in islands discussed in 2.7. Here, it was an issue how to judge the possibility. This paper judged that there is the possibility when a p-value of a parameter was less than 10%. In **Table 10**,

Table 9. Benefit Calculations (par year).

	Full data		Positive WTP data	
	Median	Mean	Median	Mean
Base	151,629 (1884)	242,110 (3008)	585,735 (7277)	609,524 (7573)
Hypothetical scenarios				
PSR_HOUSE	429,370 (5334)	459,172 (5705)	-	-
PSR_TRAVEL	-	-	-	-
PSR_VAC	457,227 (5681)	483,709 (6010)	-	-
PSR_MED	478,369 (5943)	502,568 (6244)	710,861 (8,832)	725,613 (9,015)
PSR_EDUC	326,631 (4058)	372,305 (4625)	-	-
PSR_JOB	339,237 (4215)	382,616 (4754)	-	-
ALL	1,484,704 (18,446)	1,484,739 (18,446)	same with PUB4	same with PUB4

*Values converting USD were in parenthesis. USD values were calculated by the average exchange rate on February, 2012 of USD1 = JPY80.49 referred from the Bank of Japan

Table 10. Estimations on public services and rejection reasons.

Independents	PS_HOUSE	PSR_TRAVEL	PSR_VAC
CONT	-1.1709*** (0.2277)	-1.2797*** (0.2357)	-2.2936*** (0.2979)
NS_DIST	0.6993*** (0.2135)	0.3110 (0.2210)	0.9092*** (0.2658)
NS_COST	0.2531 (0.2209)	0.5590** (0.2253)	0.6304** (0.2618)
NS_IMAGE	0.8521* (0.4388)	0.7870* (0.4451)	-0.2713 (0.6477)
NS_MED	-0.0009 (0.2922)	0.3031 (0.2925)	0.1707 (0.3536)
NS_JOB	0.3604 (0.2410)	0.2282 (0.2482)	0.2350 (0.2952)
NS_PUB	0.1431 (0.4904)	0.2185 (0.4904)	-1.4042 (1.0509)
NS_LIFE	-0.5660** (0.2399)	-0.6675*** (0.2539)	-0.0777 (0.2867)
LL	-279.2484	-265.7770	-205.0391
AIC	574.4968	547.5541	426.0782
R2	0.0475	0.0433	0.0499
N	469	469	469
Independents	PS_MED	PSR_EDUC	PSR_JOB
CONT	-1.8561*** (0.2912)	-2.7085*** (0.4694)	-2.6993*** (0.3669)
NS_DIST	-0.1602 (0.2768)	-1.1668** (0.5547)	0.3436 (0.3245)
NS_COST	0.1259 (0.2844)	-1.5141** (0.6679)	0.0895 (0.3418)
NS_IMAGE	0.4899 (0.5613)	0.5614 (0.8210)	1.0029* (0.5309)
NS_MED	2.2426*** (0.3074)	0.9931* (0.5341)	-0.1644 (0.4290)
NS_JOB	-0.3198 (0.3164)	1.0030** (0.4936)	1.1109*** (0.3226)
NS_PUB	-0.1711 (0.5445)	-1.4495 (1.1279)	1.0585* (0.5721)
NS_LIFE	-0.2563 (0.2999)	-0.5723 (0.5357)	-0.3835 (0.3794)
LL	-195.5649	-74.3809	-147.6933
AIC	407.1298	164.7617	311.3866
R2	0.1363	0.1326	0.0721
N	469	469	469

*** p-values were less than 1%, ** less than 5%, * less than 10%, None: over 10%.

parameters that p-values were less than 10% and the signs are positive were NS_NIMG in PS_HOUSE; NS_COST and NS_NIMG in PS_TRAVEL; NS_DIST and NS_COST in PS_COST; NS_AMED in PS_MED, NS_AMED and NS_AJOB in PS_EDC; NS_NIMG, NS_AJOB and NS_APUB in PS_JB.

4. Discussion

Firstly, the influences of the lack of public services for respondents' willingness to pay (for staying long term in islands) are discussed. In **Table 8**, parameters of PSR_HOUSE, PSR_VAC, PSR_MED, PSR_EDUC and PSR_JOB are positive in Full data and PSR_MED is positive in Positive WTP data. The results in Full data indicate that improvements of public services would lead to increase the number (probability) of respondents who willing to stay long term in islands. Especially, the PSR_MED has a positive effect to both respondents who accept to stay islands in long term and reject it.

The number of statistically significant PSR variables in Full data is larger than in Positive WTP data, indicating the fact that effects of improving public services for respondents' preferences to stay long term in islands would be larger for respondents who reject to stay long-term in islands than respondents who accept it.

Secondly, the influences of improving public services for benefits are discussed by using the values of median WTPs. **Table 9** shows the median WTP without improvements of public services in Full data is JPY 151,629 (USD 1,884) per year. The value increases to JPY 429,370 (USD 5334) per year if the PSR_HOUSE was improved (namely, equals to zero); JPY 457,227 (USD 5681) per year for the PSR_VAC, JPY 478,369 (USD 5943) per year for the PSR_MED, JPY 326,631 (USD 4058) per year for the PSR_EDUC, JPY 339,237 (USD 4215) per year for the PSR_JOB, respectively. When all PS variables are improved, the median WTP is calculated as JPY 1,484,704 (USD 18,446) per year. In positive WTP data, the median WTP without improvements of public services is JPY 585,735 (USD 7277) per year. The median WTP increases to JPY 710,861 (USD 8832) per year if PSR_MED was improved. The calculation results indicated that an anxiety for medical services in islands reduces tourists' willingness to stay long-term in islands. The fact was consistent with previous study [11].

Here, the validity of values of WTPs is confirmed. Ministry of Land, Infrastructure, Transport and Tourism [19] has researched household expenditures (*i.e.* willingness to pay in this paper) for living in a different area (house) from their houses living now. In the research, the mean value of the expenditures is reported about JPY 130,000 (USD 1615) per month; namely, about JPY 1,560,000 (USD 19,381) per year. The mean value of this study, JPY 1,484,704 (USD 18,446) per year in improving all PS variables, is below the reported value, resulting that the values of WTPs in this study would be valid.

Finally, the possibilities of solving causes (reasons) of the rejection to stay long term in islands are discussed. **Table 11** shows the summary of results in **Table 10**. The Circles mean that a PS variable has the possibility to solve a cause of the rejection.

Table 11 shows that the "Long-distance for my home" (NS_DIST) would be solved by improving the PS_HOUSE or the PS_VAC. The reason of solving the NS_DIST by the PSR_VAC (Taking long vacations more easily) is obvious. The reason of the PS_HOUSE (Reducing rents or costs for purchasing houses) was guessed that respondents would image the reduction of housing costs means the reduction of their labor times (wages) for housing. The "Costs" (NS_COST) would be solved by improving the PS_TRAVEL or the PS_VAC. It was

Table 11. Summary on needs for public services.

	PS_HOUSE	PS_TRAVEL	PS_VAC	PS_MED	PS_EDUC	PS_JOB
RN_DIST	○		○			
RN_COST		○	○			
RN_NIMG	○	○				○
RN_AMED				○	○	
RN_AJOB					○	○
RN_APUB						○
RN_LIFE						

obvious that the PS_TRAVEL (Reducing travel costs) leads to reduce the costs. The reason of the PS_VAC (Taking long vacations easily) was guessed that respondents would think that they could take enough labor time to obtain additional revenue for staying long-term in islands by adjusting their schedules on jobs and vacations. For example, they work over 15 hours per day during eight months and take a vacation of two months when they would like to stay.

The “Do not know (image) islands” (NS_IMAGE) would be solved by improving the PS_HOUSE or the PS_TRAVEL. The reason of revealing the two was guessed that lower costs for renting houses or traveling would make respondents want to stay long-term in islands even if they have no image on island lives.

The “Feel anxiety for medical institutions” (NS_MED) would be solved by improving the PS_MED or the PS_EDUC. The improvement of PS_MED (Improving medical services) was clearly the solution. The reason of the PS_EDUC (Improving educational services) was guessed that respondents might need educational services on medical techniques for life-saving activities in islands. The “Feel anxiety for job opportunities” (NS_JOB) would be solved by improving the PS_JOB. The reason was obvious. Also, the “Feel anxiety for other public services” (NS_PUB) would be solved by improving the PS_JOB, resulting that respondents’ highest interest were the job search services in islands.

Finally, the “Do not like to change my life style” (NS_LIFE) could not be solved by improving any public services presented in this paper. The fact indicated that the NS_LIFE would be the strongest cause for the rejection reason to stay long term in islands.

Table 11 shows that improvements of public services have possibility to change many respondents’ attitudes from the rejection to stay long term in islands to the acceptance. However, the “Do not like to change my life style” would not be solved by improving any services in this paper.

5. Conclusions

A concern of local governments in islands is to increase the number of tourists staying long-term in islands. Many tourists, however, hesitate to stay long-term due to the expensive costs and the anxiety for the lacks of public services in islands.

The purpose of this paper is to examine effects of improving public services for 1) tourists’ willingness to pays (WTPs) and 2) non-tourists’ attitudes on long-term stay in islands.

Data on tourism activities for islands, Nagasaki, Japan were used. Respondents were asked about their WTPs for long-term stay and needs for public services; Reducing rents or costs for purchasing houses and travel costs, taking vacations, medical services, educational services and job search services were employed. The logit model was used for estimations.

The findings of this study were as follows. Firstly, estimation results indicated that improvements of public services would lead to increase the number of respondents who accept to stay long term in islands. Secondly, the median and mean values of WTPs for staying long term in islands were calculated for with- and without-cases of the improvements of public services. The median and mean values without the improvements were calculated as JPY 151,629 (USD 1884) and JPY 242,110 (USD 3008), respectively. Those with the improvements were calculated as JPY 1,484,704 (USD 18,446) and JPY 1,484,739 (USD 18,446), respectively. The calculations indicated that the improvement of medical services would contribute to respondents’ benefits the most regardless whether the respondents accept to stay long-term in islands or not. Thirdly, estimations on causes of the rejection to long-term stay were performed. The results indicated that improvements of public services have possibility to change respondents’ attitudes from the rejection to stay long term in islands to the acceptance. However, it was pointed that none of public services would change the rejection reason “Do not like to change my life style”.

Estimation and calculation results indicated that the improvements of islands’ public services contribute not only to stabilize residents’ lives but also to develop tourism activities in islands.

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