Dependence of tourism destinations non-market value on the visit rate: the contingent valuation case study of Jägala Waterfall

Mart Reimann, Üllas Ehrlich

Abstract - The article discusses the resource utilisation conflict at the example of Jägala Waterfall, which is the highest and greatest natural waterfall in Estonia. There are plans to build a hydro-power plant there, which would conduct most of the water past the waterfall to the power plant's turbines, reducing significantly natural and recreational values of the waterfall. The authors carried out a contingent valuation (CV) study to identify the monetary equivalent of non-market values related with Jägala waterfall. This paper examines the dependence of the respondents' willingness to pay (WTP) on whether or not they have visited the waterfall, indicating thus the significance of nature tourism for the formation of non-market value of natural features. The paper analyses also the dependence of the visit rate on the respondents' sociometric characteristics. Using the Logit-model, it was identified that the statistically significant factors that influence the probability of visiting Jägala Waterfall are education, income and age. Gender and nationality are not statistictically significant factors for the probablity of visiting the Waterfall. It was also identified that visiting rate has positive impact to WTP.

Index Terms - Nature tourism, nature resource utilization, contingent valuation.

1 Introduction

Financial aspects and market values are often dominating in political decision making. Recreational values are hard to compare with direct market values. During the last decades there has been more discussion to make non-market recreational values comparable with market values with contingent valuation [1], [2], [4], [5].

Jägala waterfall is the highest and greatest natural waterfall in Estonia, its height is 8 meters and width is more than 50 meters [3]. The waterfall has become one of the main natural tourism attractions which illustrates numerous materials introducing Estonia as a tourism destination. Also due to the proximity to Estonian capital Tallinn the waterfall is intensively visited by Estonians and foreigners, visitor numbers being between 50 to 100 thousand people per year.

A private capital based enterprise is planning to restore a hydro-power plant, which would conduct most water past the waterfall to the power plant's turbines. As a result, the waterfall will have a minimal flow most of the % year. The expected capacity of the power plant would be 1-2MW, which is less than 0.1% of the total electricity production in Estonia [..]. But the aesthetical and recreational value of the waterfall will be significantly reduced.

To identify the monetary equivalent of the

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non-market value of Jägala Waterfall in natural state, the authors conducted in Estonia a representative contingent valuation study (950 questionnaires) of the waterfall. To simulate market scenario two photos of Jägala waterfall were presented. On the first photo the waterfall has a medium natural quantity of water. The second photo depicts the waterfall as it will be when the power plant is working. On the photo the quantity of water running down the waterfall corresponds to the minimal quantity of water the power plant is obliged to grant to the waterfall.

This paper deals with the dependence of the respondents' visiting rate on sociometric characteristics. It is also analysed how the willingness to pay is related to the fact, whether or not respondents have visited the waterfall, indicating thus the significance of nature tourism for the formation of non-market value of natural features.

2 METHODOLOGY

To find out relationships between respondents visiting rate and sociometric features, the logit-model was used.

The logit-model describes the relationship between binary dependent variable and constant or discrete explaining variables. The logit model is based on a logistic distribution function, which guarantees that the probabilities remain (e.g. 0;1). The probability that the event has occurred (person has visited the Jägala Waterfall) is expressed as:

$$P_i = \Pr(y_i = 1 \mid X_i) = \frac{1}{1 + e^{-\beta' X_i}}$$

where y_i is binary dependent variable: (y_i =1 – has visited, and y_i =0 – has not), X_i is the vector of independent variables and β is the vector of parameters.

The logit model is expressed as:

$$\ln\left(\frac{P_i}{1-P_i}\right) = \beta' X_i + u_i = \beta_0 + \beta_1 x_1 + \ldots + \beta_n x_n + u_i$$

where $\frac{P_i}{1-P_i}$ is the odds ratio, $\ln\left(\frac{P_i}{1-P_i}\right)$ is the log odds ratio or "logit".

It is somewhat difficult to interpret the Logit model parameters, as the estimated probability is not a linear function of the parameters. We can estimate the direction of the correlation. (In case $\beta>0$ and the value of x is increasing, the probability increases, and vice versa. In the case of binary descriptive variables 1vs0). Therefore is is better to use either the odds ratio or marginal effects.

3 RESULTS

3.1 Dependence of visiting rate on sociometrical characteristics

The variables used are: Gender: SEX (male=1, female=0); education: EDUC (1- primary, 2 – secondary, 3 – secondary specialised, 4 – higher, 5 – academic degree), income: INC(1 – less than 4000, 2 - 4-6 thous., 3 - 6-8 thous., 4 - 8-11 thous.,5 - 11-15 thous., 6 - 15 thous. +), AGE (1 – younger than 23, 2 24-29, 3 30=39, 4 40-49, 5 50-59, 6 60+).

To identify the factors that influence the probability of visiting the Jägala Waterfall we prepared 2 logit models. First we evaluated the model without restrictions where we included all factors –

$$\ln\left(\frac{P_i}{1-P_i}\right) = \beta_0 + \beta_1 SEX + \beta_2 NAC + \beta_3 EDUC + \beta_4 AGE + \beta_5 INC + u_i \quad (1)$$

The logit estimates are presented in Table1. The statistically significant factors that influence the probability of visiting Jägala Waterfall are education, income and age ($p<0.1$). With these indicators growing the probablity of having paid a visit to Jägala Waterfall (positive values of beta) is also growing. The odds ratio shows that the growth of education by 1 level increased the likelihood of the visit by approximately 1.5 times (if the other indicators remained the same). Hence,

for example, people with an academic degree are approximately 1.5^4≈5 times more likely to have visited the Waterfall. Gender and nationality are not statistictically significant factors for the probablity of visiting the Waterfall.

Insignficiant factors like gender and nationality have been excluded from Model 2

$$\ln\left(\frac{P_i}{1-P_i}\right) = \beta_0 + \beta_3 \text{EDUC} + \beta_4 \text{AGE} + \beta_5 \text{INC} + u_i \quad (2)$$

The values remained the same, the model is statistically significant.

TABLE 1
LOGIT VALUES

	Coef.	Std. Err.	Z	P>|z|	[95% Conf.Interval]	
Model 1:						
gender (male=1)	0.099	0.158	0.630	0.532	-0.211	0.409
nationality (Estonian=1)	0.227	0.194	1.170	0.241	-0.153	0.608
education	0.388	0.092	4.230	0.000	0.208	0.568
Age	0.081	0.046	1.780	0.075	-0.008	0.171
Income	0.110	0.058	1.900	0.057	-0.003	0.224
constant	-1.026	0.355	-2.890	0.004	-1.723	-0.330
Model 2						
education	0.379	0.089	4.240	0.000	0.204	0.554
Age	0.080	0.046	1.750	0.080	-0.009	0.169
Income	0.119	0.056	2.120	0.034	0.009	0.229
constant	-0.796	0.308	-2.580	0.010	-1.400	-0.192

TABLE 2
ODDS RATIO VALUES

	Coef.	Std. Err.	z	P>|z|	[95% Conf.Interval]	
Model 1:						
gender (male=1)	1.104	0.175	0.630	0.532	0.810	1.506
nationality (Estonian=1)	1.255	0.244	1.170	0.241	0.858	1.837
education	1.474	0.135	4.230	0.000	1.231	1.765
age	1.085	0.050	1.780	0.075	0.992	1.187
income	1.117	0.065	1.900	0.057	0.997	1.251
Model 2						
education	1.461	0.131	4.240	0.000	1.226	1.740
age	1.083	0.049	1.750	0.080	0.991	1.184
income	1.126	0.063	2.120	0.034	1.009	1.257

The probablity of visit calculated on the basis of equation

$$\ln\left(\frac{P_i}{1-P_i}\right) = -0.796 + 0.379\text{EDUC} + 0.080\text{AGE} + 0.119\text{INC} \quad (3)$$

A 18-23 years old person with primary education who earns less than 4000 EEK/ month: P=0.45.

An older than 60 years person with an academic degree who earns more than 15,000 EEK/month: P=0.91.

3.2 Relations on visiting rate and willingness to pay

The dependence of the willingness to pay (WTP) on the visiting rate is presented on Table 3. The average visiting rate of the respondents is 72%. In general, the WTP to visiting rate ratio can be regarded as positive; higher visiting rate also means higher willingness to pay. (Exceptions in groups with very high (4000-20000 EEK) WTP are statistically unreliable due to the very small size of the groups.) Clearly smaller willingness to pay is in the groups of visitors with the visiting rate lower than 60%. Somewhat surprising is the visiting rate in the groups with 0 WTP - 69%, hence only slightly smaller than average. 0 WTP is obviously caused by other factors than visit to the tourist attraction.

TABLE 3
VISITING RATE AND WTP

WTP,kroons	*Respondents*		*Visiting rate, %*
	number	*%*	
10001-20000	2	0.2	100.0
4001-10000	2	0.2	50.0
2001-4000	10	1.1	80.0
501-2000	73	7.7	74.0
301-500	51	5.4	82.4
101-300	64	6.7	85.9
31-100	256	26.9	77.3
11-30	61	6.4	57.4
1-10	54	5.7	55.6
0	377	39.7	69.2
	950	100.0	72.2

4 CONCLUSIONS

The statistically significant factors that influence the probability of visiting Jägala Waterfall are education, income and age. Gender and nationality are not statistictically signifi-

cant factors for the probablity of visiting the Waterfall.

The average visiting rate of the respondents is 72%. Clearly smaller willingness to pay is in the groups of visitors with the visiting rate lower than average. The exception is 0 WTP group, where visiting rate is close to the average- 69%, which indicates that 0 WTP is obviously caused by other factors than visit to the tourist attraction and need further studies.

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References

[1] J. Luttik, "The Value of Trees, Water and Open Space as Reflected by House Prices in the Netherlands". *Landscape and Urban Planning* vol.48 pp. 161-167, 2000

[2] R. Scarpa, W.G. Hutchinson, S.M. Chilton, J. Buongiorno, Importance of Forest Attributes in the Willigness to Pay for Recreation: a Contingent Valuation Study of Irish Forests" *Forst Policy and Econimics* vol. 1, pp. 315-329, 2000

[3] K. Suuroja, "Estonian Waterfalls" Tallinn, 2003

[4] L. Tyrväinen, "Economic Valuation of Urban Forest Benefits in Finland" *Journal of Environmental Management,* vol. 1, pp 75-92, 2001

[5] C. Zoppi, "A Multicriteria-Contingent Valuation Analysis Concerning a Coastal Area of Sardinia, Italy". *Land Use Policy,* vol 24. pp.322-337. 2007

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