An Economic Analysis on Willingness to Pay for Jhansi Fort: An Evidence from Uttar Pradesh

David Chella Baskar (✉ davidbaskar@gmail.com)

Rani Lakshmi Bai Central Agricultural University

Kavitha

Karunya Institute of Technology and Sciences

Senthil kumarvel

Pandit Jawaharlal Nehru College of Agriculture and Research Institute

Sundar Pal

Rani Lakshmi Bai Central Agricultural University

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Abstract

The study has examined the willingness to pay for Jhansi fort in Uttar Pradesh. The study has utilized primary data collected from different commuters' using random survey method. In order to analyze the willingness to pay for the park, binary logistic regression was used. The results of the study has indicated that the willingness to pay for the park was influenced positively and also significantly by monthly income and negatively by cost spent inside the park and occupation status of the visitors. Garrett ranking on suggestions for the betterment of park indicates that the visitors have given rank one for maintenance of the park, rank two for enhancing the facilities and rank three for safe drinking water

Introduction

Increased stress and not taking enough self-care due to high work pressure for adults as well as heavy workloads and responsibilities to meet out parents expectations for students increased the cortisol levels-the stress hormone in our body and results in various health related issues. A recent survey (7th fold, India Today, 2020) revealed that in India, 50% employees are worried about an uncertain future due to the Covid-19 pandemic followed by personal finances (40%) and career growth (40%). Thus stress acts as a major factor behind many of the health and mind related disorders. Participation in leisure and recreational activities can manage stress and reduce depression. Parks acts as one of the stress burster as they not only connects us with nature but also provide fun, spiritual and mental well-being. Following a rise in the population, income and mobility, the demand for outdoor recreation has been increasing in many developing countries (Clawson et. al. 1966). In order to find out how far visitors realized the importance of parks, a study was carried out with the objective of finding out the willingness to pay (WTP) for the National park in Madhya Pradesh, India and analyzing the various factors that contribute to the willingness to pay. Study also ranked the various factors suggested by visitors for the better functioning of the park.

Methodology

Jhansi Fort is situated on a large hilltop called Bangira, in [Uttar Pradesh](#) with 25.4582° N, 78.5765° E, Northern India from 11th through the 17th century. The fort of Maharani Jhansi has strategic importance since the earliest of times. It was built by Raja Bir Singh Ju Deo (1606-27) of Orchha on a rocky hill called Bangra in the town of Balwantnagar (presently known as Jhansi). The fort has ten gates (Darwaza). Some of these are Khandero Gate, Datia Darwaza, Unnao gate, Jharna Gate, Laxmi Gate, Sagar Gate, Orcha Gate, Sainyar Gate, Chand Gate.

Among places of interest within the main fort area are the Karak Bijli Toup (Tank), Rani Jhansi Garden, Shiv temple and a "Mazar" of Ghulam Gaus Khan, Moti Bai and Khuda Baksh.

The Jhansi fort, a living testimony of ancient glamor and valour, also has a fine collection of sculptures which provide an excellent inside into the eventful history of Bundelkhand.

A systematic random sample was drawn for this study during 2020. Here visitors are interviewed by random selection approach and subsequently interviewed. For analyzing the willingness to pay, binary logistic regression was used.

Binary logistic regression: It is an extension of simple linear regression, where the dependent variable is dichotomous or binary in nature. It is the statistical technique used to predict the relationship between predictors or the independent variables and a predicted variable or the dependent variable.

$$\ln[p/(1-p)] = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7$$

Where p is the willingness to pay for the park

and 1-p is the non- willingness to pay

X1- Monthly Income of the sample visitor's household

X2- Occupation of sample visitors (1- Non Earner, 0- Earner), which is the categorical variable

X3- Cost spent inside the park

X4- Travel time to reach the park (1= less than 1 hour, 2= one to 2 hour, 3= 2 to 3 hours, 4= 3-4 hours, 5= more than 5 hours)

X5- Number of adults in the family

X6- Number of children in the family

X7- Frequency of visits to the park (1= 1 time per season, 4 = 4 times per month, 5= 2 times per month, 8= 8 times per month, 12= 12 times per month)

X8-Travel cost per person

Variables- X4 and X7 are ordinal variables,

Variable X2 is the nominal variable

Other variables are scale variables

Henry Garrett Ranking Technique

In-order to discover the most important suggestion influencing the respondent, Garrett's ranking technique was applied. This method was utilized to rank the various suggestions listed out by visitors like maintenance of the park, facilities that are expected by the visitors in the park and providing safe drinking water. According to this method, visitors were asked to specify the rank for all suggestions and the results of such ranking have been converted into score value with the help of the following formula:

According to Henry Garret (1969) ranking method, the percentage score is computed as

$$\text{Percentage Score} = 100 \frac{(R_{ij} - 0.5)}{N_j}$$

N_j

Where, R_{ij} = Rank given for i th item by j^{th} individual

N_j = Number of items ranked by j^{th} individual

Then for each factor, the scores of each individual are added and then total value of the scores and mean values of scores are calculated. The factors having highest mean value is considered to be the most important factor.

Descriptive Analysis

Determinants of willingness and non-willingness to pay:

Educational Status: When we see the educational status (Table 1), nearly 56 per cent of the visitors in willingness to pay category completed their degree and 21 per cent completed PG and PhD degree. Whereas under the non -willingness category (NWTP), 53 per cent completed school level and 47 per cent completed PG and PhD degree. Thus the study showed that most of the visitors in willingness to pay category completed degree and above. This high level of education has an influence over their

responsiveness in willingness to pay. This result is similar to the results of Enyew (2003). Creating an equation that predicts the willingness to pay for the environmental good with reasonable explanatory variables, having coefficients with the expected signs provides the reason to suggest that the study has measured the desired construct (Carson, Flores, and Meade, 2001). The positive relationship between the level of education and the willingness of the visitors to pay for conservation in this study is in line with many studies where education plays a significant role in determining the willingness to pay (Baral et al. 2008; Wang and Jia 2012; Hejazi, Shamsudin, and Rahim 2014)

Table 1: Educational status of visitors

Particulars	WTP	NWTP
School level	12(23)	10(53)
Degree	29(56)	8(42)
PG and PhD degree	11(21)	1(5)
Total	52(100)	19(100)

Relative frequency of visits to the park

Table 2: Visitor's frequency of visit in a month (times in numbers)

Particulars	WTP	NWTP
12	7 (13)	2(11)
8	4 (8)	1(5)
4	17(33)	5(26)
2	14(27)	3(16)
1	10(19)	8(42)
Total	52(100)	19(100)

A comparison on relative frequency of visits made by visitors (Table 2) indicated that frequency of visits per month is comparatively more in visitors of willingness to pay category. Since the visitors were willing to frequently visit the park they were interested in willingness to pay more for the park. Hence higher the frequency, higher the willingness to pay. This outcome is similar ambience with the finding of Reynisdottir

et al. (2008). As the degree of satisfaction increases the willingness to pay towards consuming those amenities will increase and thereby the income of the recreational site can be developed gradually.

Occupational Status of the visitors

India, for example, had almost 90% of its workforce (423 million workers out of 470 million workers) engaged in unorganized labor. Typical unorganized labour in rural areas is largely composed of mobile casual workers, while in urban areas, it consists of contract and subcontract migrant workers, maids and small-scale mechanics. There is a six-fold difference in productivity among workers in private organized and unorganized sectors in the country. Two thirds of people employed in the Indian organized sector are public employees and one third are private employees. Visitors were enquired about their employment status. All the visitors under the willingness to pay category were employed whereas under the non-willingness category nearly 68 per cent were non employed (Table 3). Thus the study shows that only employed category were willing to pay.

Table 3: Occupation status of the visitors

Particulars	WTP	NWTP
Employed	52(100)	6 (32)
non employed	0 (nil)	13 (68)
Total	52	19

Time taken by the visitors to reach the park

Table 4: Time travelled to reach the park

Particulars	WTP	NWTP
Less than 1 hour	38 (73)	18(95)
less than 2 hours	6(12)	Nil
less than 3 hours	2(4)	1(5)
less than 5 hours	6(12)	Nil
Total	52	19

Researchers have suggested three reasons why park use varies with distance: (1) the characteristics of a park, such as its naturalness or different services it offers can stimulate travel; (2) travelling to a distant park may provide a unique experience not offered by nearby parks; and (3) park visitors' motivations and

preferences for specific activities may impel shorter or longer travel (Golicnik & Ward Thompson, 2010; Hanink & White, 1999; Haugen & Vilhelmson, 2013; Hooper, 2014) Researchers have however, also found that socio-demographic factors can affect the distance that people are willing to travel to a particular park or recreational setting, including age, sex and income (Pescharadt, Schipperijn, & Stigsdotter, 2012; Schipperijn et al., 2010; Spinney & Millward, 2013) The 168 distance that people travel to a park has also been found to be related to other factors, such as 169 frequency of visit, mode of transportation, time spent in the park, day of the visit and type of 170 activity undertaken in the park (Byrne, Wolch, & Zhang, 2009). It is clearly evident from the above Table that majority of the visitors took less than one hour time to reach the park.

Amount spent by the visitors for travel

Table 5: Travel cost incurred by the visitors (Rs)

Particulars	WTP	NWTP
less than Rs.50	30(58)	10(53)
More than Rs. 50	22(42)	9(47)
	52(100)	19(100)

There are some amenities that do not have a direct cost. For instance, recreational sites are free to enter. Value is often applied to free amenities by referring to an appropriately priced good or service that complements their consumption. By determining the travel costs to a recreation site or amenity, it is possible to collect statistics about these costs. An estimation of a price for the non-price amenity can be obtained by aggregating the observed travel costs of different individuals who use the service. The travel cost incurred by the visitors for visiting the park (Table 5) indicated that under the willingness to pay category nearly 58 per cent of the visitors and under the non-willingness category 53 per cent of the visitors incurred less than Rs 50 respectively. Higher the travel cost lesser was the visitors per cent in willingness to pay.

Binary Logistic Regression

Table 6: Omnibus Tests of Model Coefficients				
		Chi-square	df	Sig.
Step 1	Step	36.917	1	.000
	Block	36.917	1	.000
	Model	36.917	1	.000
Step 2	Step	16.139	1	.000
	Block	53.056	2	.000
	Model	53.056	2	.000
Step 3	Step	6.030	1	.014
	Block	59.086	3	.000
	Model	59.086	3	.000

An application of logit regression is used to explain the relationship between one dependent binary variable and one or more independent variables at the level of nominal, ordinal, interval, or ratio data. To create this analysis, we performed a preliminary analysis to identify any outliers and to reduce or eliminate the effects of any manipulations. We also examined the distribution of the individual variables. Based on preliminary analysis, not all independent variables utilized are statistically significant nor highly correlated with others. The relation between the independent variable and the dependent variable is explained through the calculation of these estimates. The dependent variable is on the logit scale. These estimates indicate the amount of increase (or decrease, if the coefficient has a negative sign) in the predicted log odds of honcomp = 1 that would be predicted by a 1 unit change in the predictor, all other predictors held constant. The omnibus tests of model coefficients (Table 6) indicates that in the step 3 the significance of chi square value is less than 0.05 which shows the model accuracy.

Table 7: R square Value			
Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	45.565 ^a	.405	.590
2	29.426 ^b	.526	.766
3	23.397 ^c	.565	.822

The linear multiple regression R^2 provides that information about the fraction of variance explained by the model. But there is no single R^2 value that represents a "good fit"; that depends on the underlying subject matter. What's considered a "good fit" R^2 in a biomedical study might be considered woefully

inadequate for a "good fit" in a physical-science study, even if a large number of observations provided a "statistically significant" p-value of $p < 0.05$ in the latter study.

It's similar in logistic regression: the p-value tells you how likely you are to have found an apparent relationship even if there isn't really one. The value of a Cox-Snell pseudo- R^2 that represents a "good fit" will depend on what is being studied. Cox and Snell R Square value and Nagelkerke R square value (Table 7) indicates that 56 to 82 per cent of the variation in dependent variable is explained by independent variables.

Table 8: Hosmer and Lemeshow Test			
Step	Chi-square	df	Sig.
1	.000	0	.
2	.189	4	.996
3	3.060	7	.879

The **Hosmer-Lemeshow test** is used to determine the goodness of fit of the logistic regression model. Essentially it is a chi-square goodness of fit test (as described in [Goodness of Fit](#)) for grouped data, usually where the data is divided into 10 equal subgroups. The initial version of the test we present here uses the groupings that we have used elsewhere and not subgroups of size ten.

Since this is a chi-square goodness of fit test, we need to calculate the HL statistic

$$\sum_{i=1}^g \sum_{j=1}^2 \frac{(obs_{ij} - exp_{ij})^2}{exp_{ij}}$$

where g = the number of groups. The test used is chi-square with $g - 2$ degrees of freedom. A significant test indicates that the model is not a good fit and a non-significant test indicates a good fit. A goodness of fit test tells you how well your data fits the model. Specifically, the HL test calculates if the observed event rates match the expected event rates in population subgroups. The Hosmer–Lemeshow test can determine if the differences between observed and expected proportions are significant, indicating model lack of fit. The Hosmer and Lemeshow test value (Table 8) indicates that in the step 3 the chi square significant value is more than 0.05 which shows the goodness of fit.

Table 9: Variables in the Equation						
	B	S.E.	Wald	df	Sig.	Exp (B)
Constant	-3.834	2.060	3.462	1	.063	.022
MI	.000	.000	7.838	1	.005	1.000
Occupation of sample visitors	-8.434	2.467	11.688	1	.001	.000
Costs spent inside the park	-.017	.007	5.407	1	.020	.983

From the table 9 it is understood that the odds ratio of all the variables with the exception of monthly income was found to be less than one which showed that the variables have negative relation with the dependent variable. The variable monthly income was found to be five per cent significant and had a positive influence over willingness to pay. Occupation of sample visitors was found to have a negative relation with willingness to pay. Employed visitors are willing to pay more than that of visitors who are under the non-employed category like students, house wife or retired visitors. The variable, cost spent inside the park also influence the dependent variable negatively. One rupee increase in cost spent inside the park reduces the willingness to pay by 1.7 per cent. More the cost need to be spent on inside the park, lesser was the willingness to pay.

Table 10: Summary of Results

S.No	Test	Results of the Test
1	Omnibus test	All P values of Step, Block and Model chi square are less than 0.01 which indicates the accuracy of the model
2	Cox and Snell R ² and Neglekarke R ²	0.565 and 0.822 (Variation in the dependent variable explained by the independent variables ranged from 56.5 per cent to 82 per cent)
3	Hosmer and Lemeshow	0.879 (greater than 0.05, thus indicates goodness of fit)
4	Correct classification rate	93 per cent (indicates that out of 71 respondents, 66 respondents were correctly predicted)

Table 11: Garrett Ranking of suggestions made by visitors for the betterment of park

Factors	Total score	Average Score	Rank
Maintenance	2492	57.95	1
Introducing new facilities	1998	46.47	2
Safe Drinking water	1979	46.02	3

Many of the respondents (60 per cent) had given some suggestions for the better functioning of the park. Thus from the table 11 it is understood that visitors has ranked maintenance needed for the park as the foremost suggestion followed by introducing new facilities like extension of parking area, increasing stone benches, introducing more play things for children, lighting arrangements, lazer show, construction of archeological buildings and art gallery and employing adequate staffs as the second important suggestion. Provision of adequate and safe drinking water was the third major suggestion pointed out by visitors. About 40 per cent of the visitors felt that there were no problems with the current functioning of the park and the existing things could be continued.

Conclusion

The results of the study concluded that willingness to pay for the park was influenced positively by income of the household. Higher the income, higher will be the willingness to pay. Cost spent inside the park and occupation of the household was found to be negatively associated with willingness to pay. Employed category visitors are willing to pay more for the park than the non-employed category. Similarly higher the cost spent inside the park, lesser was the willingness to pay for the park. With respect to suggestions made by the visitors, more maintenance needed topped the list, followed by introducing new facilities for the park. More people are expected to come if there is lesser entry charge and facilities like mall and fun zone for kids present inside the premises. If these suggestions pointed out by the visitors were provided then the visitors will be willing to pay more for the park.

Declarations

Competing interests: The authors declare no competing interests.

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