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Economic Valuation of Menelik II Historical Site in Entoto Hill Using Travel Cost and Contingent Valuation Methods

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Abstract

Economic evaluations have shown to be crucial tools for enhancing the management and preservation of cultural resources. This study's primary objective was to evaluate and calculate the total economic worth of the historical site Menelik II using a methodical, analytical approach. The individual travel cost method and contingent valuation method were used to estimate the total economic value of the site. A questionnaire has been used to collect data for travel cost method 120 and contingent valuation method 119 from site sample visitors through face-to-face interviews for the analysis. The truncated poison model is employed for the use benefit estimation, and the bivariate probit model is used to estimate the non-use value of a historical site, Menelik II. The regression results obtained from the travel cost method showed that travel costs, visitor's income, and travel distance were important determinants of the recreation demand for the site. On the other hand, the results of the contingent valuation method showed that offer bid price, education, income, family size, and distance from the historical site of Menelik II were important determinants of willingness to pay. As estimated by the count data model, the study found the mean consumer surplus per individual to be 664 Ethiopian Birr per year, and the total use value of the site is approximately estimated to be 10,388,280 Ethiopian Birr. On the other hand, the estimated mean willingness to pay of the bivariate probit model is 25.59 Ethiopian Birr, and the total nonuse value of the site is approximately estimated to be 44,904,666.66 Ethiopian Birr. Therefore, the total economic value of this historical site, which is the sum of use and non-use value, is estimated to be 55,292,946.66 Ethiopian Birr. This suggests that there is a strong economic case for the conservation of the historical site and improving cultural heritage management.

Keywords: *historical site of Menelik II, contingent valuation method, travel cost method, Willingness to pay, Use value, non-use value*

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Introduction

In day-to-day market economics, markets determine prices and quantities of products. The theory of demand and supply says that an optimal mix of products and services is demanded and supplied, leading to the highest possible welfare (given the physical production and consumption limitations). However, for products and services that are non-market goods, no direct market price information is available, making it difficult to optimize the supply and demand of such services. Nowadays, non-market valuation techniques are increasingly gaining ground at the forefront of most research work in economics. This is so because some goods and services that readily have some kind of value either do not command a market price or the market price of such goods and services does not correctly match the value of the goods or services. Non-market valuation is therefore all about seeking ways to ascribe values to such goods and services that are either not traded in the market or whose prices are not fair reflections of their values (Boardman, 2006).

Economic valuation is concerned with assigning monetary values to natural resources and cultural assets. Historical sites are one part of cultural assets; unlike other privately marketable goods, the values of historical sites cannot easily be determined through the interaction of supply and demand. Thus, there is a need to have some ways to put an economic estimate on recreation sites whose values are not easily determined in conventional market situations.

Entoto Hill is a historical place where Emperor Menelik II resided and built his palace when he came from Ankober and founded Addis Ababa. Mount Entoto is also the location of a number of celebrated churches, including Saint Raguel and Saint Mary. However, as discussed with the site authorities, they do not make informed decisions to improve the quality of services supplied to their customers and conserve the historical sites due to the fact that they do not have a scientific estimate of the economic benefit of the site. Therefore, there is a need to estimate the economic value of the site which could help the site authorities be aware of how much revenue they can extract out of the benefit of consumers to improve the qualities of the site and expand the varieties of its potential services. And also preserve the site from harmful things. The basic aim of the study is to examine and estimate the total economic value of Menelik II's historical site. It has to use the Individual travel cost method and Contingent Valuation Method to estimate the total economic value of the site

Literature Review

Economic Valuation Method for Non-Market Goods

There are two main groups of economic valuation methods: revealed preference methods (RP) and stated preference methods (SP). Revealed preference methods are based on the actual market behavior of users of ecosystem goods and services. Stated preference valuation uses individual respondents' statements about their preferences to estimate the change in utility associated with a proposed increase in the quality or quantity of an ecosystem service or bundle of services.

Revealed Preferences

Market Price Method

The market price method estimates the economic value of ecosystem goods or services that are bought and sold in markets. This method can be used to value changes in either the quantity or quality of a good or service. It uses standard economic techniques for measuring the economic benefits from marketed goods and services based on the quantity people purchase at different prices and the quantity supplied at different prices. The market price represents the value of an additional unit of that good or service. (Pearce, 2001)

Cost Based Methods

The cost-based methods (damage cost avoided, replacement cost, and substitute cost methods) are related methods that estimate the values of ecosystem goods and services based on either the costs of avoiding damages due to lost services, the costs of replacing environmental assets, or the costs of providing substitute goods or services. These methods might be applied for valuing improved water quality, erosion protection services, water purification services, storm protection services, and habitat and nursery services (Mavsar R., Varela E., Gouriveau, F., Herreros, F. 2013).

Hedonic Pricing Method (HP)

The hedonic pricing method derives from the characteristics theory of value, and it has been mostly applied to analyze the underlying demands for and supplies of characteristics of housing such as age, size, and number of rooms, and neighborhood characteristics like air quality, crime rate, and availability of public goods, e.g., roads (Palmquist, 1984, cited by Negassa 2014).

The hedonic pricing method is one of the earliest applications of a technique to determine environmental value; these techniques were intended to capture the willingness-to-pay measures associated with variations in property values caused by the presence or absence of specific environmental attributes, such as air pollution, noise, or water views. By comparing the market values of two properties that differ only with respect to a specific environmental attribute (Khalid Abdul, 2008).

The Travel Cost Method (TCM)

The travel cost method is used to estimate the value of recreational benefits, which are generated by ecosystems and cultural heritage. It assumes that the value of the site or its recreational services is reflected in how much people are willing to pay to get there. The basic premise of the travel cost method is that the time and travel expenses that people incur to visit a site represent the value of access to the site. Thus, people's willingness to pay to visit the site can be estimated based on the number of trips that they make at different travel costs. This is analogous to estimating people's willingness to pay for marketed goods based on the quantity demanded at different prices (Mavsar R., Varela E., Gouriveau, F., and Herreros, F. 2013). The travel cost method is divided into two models: zonal travel cost method and individual travel cost method.

The zonal travel cost method is the simplest and least expensive approach. It will estimate a value for the recreational services of the site as a whole. The zonal travel cost method is applied by collecting information on the number of visits to the site from different distances. Because travel and time costs will increase with distance, this information allows the researcher to calculate the number of visits "purchased" at different "prices." This information is used to construct the demand function for the site and estimate the consumer surplus, or economic benefits, for the recreational services of the site (Dennis M. King 2000). The individual travel cost approach is similar to the zonal approach but uses survey data from individual visitors in the statistical analysis rather than data from each zone. This method thus requires more data collection and slightly more complicated analysis, but will give more precise results. The regression equation gives us the demand function for the "average" visitor to the site, and the area below this demand curve gives the average consumer surplus. This is multiplied by the total relevant population (the population in the region where visitors come from) to estimate the total consumer surplus for the site (Dennis M. King 2000).

A simple TCM model can be defined by a trip generation function (f) as follows (Eq. 1):

$V = f(C, X)$

Where:

V – Number of visits to a recreation site,

C – Cost per visit,

X – Other socio-economic variables which significantly explain V.

Issues and Limitations of the Travel Cost Method

The travel cost method assumes that people perceive and respond to changes in travel costs in the same way that they would respond to changes in admission prices. The simplest models assume that individuals take a trip for a single purpose—to visit a specific recreational site; thus, if a trip has more than one purpose, the value of the site may be overestimated. It can be difficult to apportion the travel costs among the various purposes. Defining and measuring the opportunity cost of time, or the value of time spent traveling, can be problematic. Because the time spent could have been used in other ways, it has an "opportunity cost." This should be added to the travel cost, or the value of the site will be underestimated. However, there is no strong consensus on the appropriate measure—the person's wage rate or some fraction of the wage rate—and the value chosen can have a large effect on benefit estimates. In addition, if people enjoy the travel itself, then travel time becomes a benefit, not a cost, and the value of the site will be overestimated.

The availability of substitute sites will affect values. For example, if two people travel the same distance, they are assumed to have the same value. However, if one person has several substitutes available but travels to this site because it is preferred, this person's value is actually higher. Some of the more complicated models account for the availability of substitutes. Those who value certain sites may choose to live nearby. If this is the case, they will have low travel costs but high values for the site that are not captured by the method. Interviewing visitors on site can introduce sampling biases to the analysis. Measuring recreational quality and relating recreational quality to environmental quality can be difficult. Standard travel cost approaches provide information about current conditions but not about gains or losses from anticipated changes in resource conditions.

In order to estimate the demand function, there needs to be enough difference between the distances traveled to affect travel costs and for differences in travel costs to affect the number of trips made. Thus, it is not well suited for sites near major population centers where many visitations may be from "origin zones" that are quite close to one another. The travel cost method is limited in its scope of application because it requires user participation. It cannot be used to assign values to on-site environmental features and functions that users of the site do not find valuable. It cannot be used to value off-site values supported by the site. Most importantly, it cannot be used to measure non-use values. Thus, sites that have unique qualities that are valued by non-users will be undervalued. As in all statistical methods, certain statistical problems can affect the results. These include the choice of the functional form used to estimate the demand curve, the choice of the estimating method, and the choice of variables included in the model (Dennis M. and Marisa J., 2000).

Sated Preference Method

The direct (stated preference) method refers to the direct expression of individuals' WTP or WTA in compensation for any change in environmental qualities, quantities, or both. That is, it involves the direct estimation of environmental and historical site value based on the responses of individuals to hypothetical valuation questions. This approach includes Contingent Valuation Method (CVM) Choice Experiment.

Contingent Valuation Method

The Contingent Valuation Method (CVM) is one of the techniques for the valuation of non-market resources and a commonly used technique for valuing the non-use values or passive values of the environment. This is a survey-based method where people are asked directly how much money they would be willing to pay (or accept) to maintain the existence of (or be compensated for the loss of) some environmental feature such as biodiversity. The contingent valuation method is also referred to as the stated preference 'method because it asks people to directly state their values rather than infer values from actual choices. (Andualem, 2011). Researchers use the Contingent Valuation (CV) method to elicit the amount respondents are willing to pay for an improvement in the quality of service or commodity they are receiving.

Another approach is to ask how much respondents are willing to accept in exchange for forgoing the current service they are using. The first approach is called the "willingness to pay approach, and the second is called the "willingness to accept" approach. Since CV creates a hypothetical market for unmarketed goods, CV surveys have become a popular way of placing a monetary value on various aspects of the environment (Spash, 2000, cited by Mekdes, 2014).

Issues and limitations of Contingent valuation method

CVM assumes that people understand the good in question and will reveal their preferences in the contingent market just as they would in a real market. However, most people are unfamiliar with placing dollar values on environmental goods and services. Therefore, they may not have an adequate basis for stating their true value. The expressed answers to a willingness to pay question in a contingent valuation format may be biased because the respondent is actually answering a different question than the surveyor had intended. Rather than expressing value for the good, the respondent might actually be expressing their feelings about the scenario or the valuation exercise itself. Respondents may state a positive willingness to pay in order to signal that they place importance on improved environmental quality in general. Alternatively, some respondents may value the good but state that they are not willing to pay for it because they are protesting some aspect of the scenario, such as increased taxes or the means of providing the good. Respondents may make associations among environmental goods that the researcher had not intended.

Some researchers argue that there is a fundamental difference between the way people make hypothetical decisions and the way they make actual decisions. The payment question can either be phrased as the conventional ‘What are you willing to pay to receive this environmental asset?" or in the less usual form, "What are you willing to accept in compensation for giving up this environmental asset?' In theory, the results should be very close. However, when the two formats have been compared, WTA significantly exceeds WTP. Critics have claimed that this result invalidates the CVM[2] approach, showing responses to be expressions of what individuals would like to have happen rather than true valuations.

[2] Contingent valuation method

Many early studies attempted to prompt respondents by suggesting a starting bid and then increasing or decreasing this bid based on whether the respondent agreed or refused to pay the proposed amount. However, it has been shown that the choice of starting bid affects respondents' final willingness to pay. Strategic bias arises when the respondent provides a biased answer in order to influence a particular outcome. Information bias may arise whenever respondents are forced to value attributes with which they have little or no experience. In such cases, the amount and type of information presented to respondents may affect their answers. Non-response bias is a concern when sampling respondents, since individuals who do not respond are likely to have, on average, different values than individuals who do respond.

Estimates of nonuse values are difficult to validate externally. When conducted to the exacting standards of the profession, contingent valuation methods can be very expensive and time-consuming because of the extensive pre-testing and survey work (Dennis M. and Marisa J., 2000).

Choice experiment method

The choice experiment method, which is based on a questionnaire, aims to identify individual preferences for changes that occur simultaneously to the attributes that make up an environmental good or service. The only approaches that can estimate use values produced by ecosystems as well as non-use values of historical sites and ecosystems are state preference methods. The fundamental idea of the choice experiment is that a forest good or service can be broken down into a collection of features. As a result, people are surveyed about how much they would be prepared to spend to make these modifications.

The choice experiment method is used to estimate the non-use values that ecosystems provide while simultaneously estimating use values, such as recreational values, associated with these ecosystems. The method can be used to estimate the economic benefits or costs resulting from an environmental change that has an impact on (i) non-use values, such as existence values people hold for biodiversity, and (ii) use-values, such as recreational values or landscape values people hold for a given natural site. (Mavsar R., Varela E., Gouriveau, F., Herreros, F. 2013)

Empirical

Chin-Huang Huang and Chiung-Hsia Wang (2014) Study the total economic value of Tianwei Township, which is Taiwan's largest floral farmland region. Direct use value measures the floral products' output value and recreational benefit. Recreational benefit from visitors' flower sightseeing was measured by the travel cost method. Option value and non-use value, including bequest value and existence value, measure the residents' willingness to pay through the double-bounded, dichotomous contingent valuation method. The results show that the total output of floral products was NT$1.441 billion in 2007 and that the recreational benefit is roughly NT$17.757 billion. The intangible values of option value and non-use value are approximately between NT$5 million and NT$15 million. Samuel Seongseop Kim, Kevin K.F. Wong, and Min Cho (2005) studied the economic value of a world heritage site and willingness-to-pay determinants. In the case of Changdeok Palace, the main objective of this study is to estimate the use value of a World Cultural Heritage site in Korea using the contingent valuation method. Aggregate use value from the log-linear model was estimated to be approximately 1.93 million dollars, while aggregate use value from the log-logit model was estimated at 2.01 million dollars. The results of this study revealed that the economic value of the World Heritage site to users or tourists exceeded its monetary benefits.

Sitotaw (2003) finds that the Individual Travel Cost Method was used in this study to calculate the recreational economic benefits of the WabiShebele Langano recreation site. In the selection of a model, the researcher has considered the fact that the number of visits, which is the dependent variable, is truncated. In this study, travel costs, visitors' income, age, level of education, family size, acquaintance with the site, experience on other similar sites, and being the head of the family were found to be major determinants of visits to the site. In this study, using a truncated Poisson model, the total annual recreational benefit of the site was estimated to be Birr 8,685,774 (USD 1,009,974).

Andualem (2011) applied both ITCM[3] and CVM[4] to estimate the total economic value of Addis Ababa Zoo Park. He used the ITCM on 158 on-site visitors to estimate the value of viewing

[3] Individual Travel Cost Method
[4] Contingent Valuation Method

wildlife at Addis Zoo Park and the DBDC[5] contingent valuation method on 90 respondents to investigate the mean WTP[6] for the non-use value of the park. He employed the seemingly unrelated bivariate probit model to derive the demand function for the recreational use value of wildlife and the truncated probit model to estimate the non-use value contribution of wildlife. His result showed that travel cost and monthly income are important determinants of the recreational demand for the site. Further, his CVM result showed that the first bid price, monthly income, and age are important determinants of willingness to pay for the non-use value of wildlife. According to this study, the estimated annual total economic value of the park (both use and non-use value of the park) is approximately 22.5 times higher than the current revenue.

Addisu Anteneh (2014) Non-Market Valuation of Cultural Heritages in Ethiopia Using Travel Cost and Contingent Valuation Methods: An Application to the Rock-Hewn Churches of Lalibela, the main purpose of this study is to estimate the total economic value of the RHCL[7] using non-market valuation methods. The total number of respondents used in the empirical analysis was 200. The study uses the Individual Travel Cost Method to estimate the use value of RHCL and the Dichotomous Contingent Valuation Method to investigate the mean WTP for the non-use value of RHCL. The truncated negative binomial method was used to calculate the demand function for RHCL use value. The logit model and bivariate probit model were used to estimate the nonuse value of RHCL. To know the basic determinants of maximum WTP, we also applied the standard Tobit model.

The regression result showed that travel cost, monthly income, age, education, and knowledge are important determinants of the recreational demand for the site. On the other hand, the first bid price, the second bid, monthly income, and gender are important determinants of WTP for the non-use value part of the site. The Tobit model depicts that income, gender, and age are important determinants of the maximum willingness to pay. The result of the study also showed that the potential annual use value of the RHCL was estimated to be 759,687,113 ETB per annum and the annual non-use value of the site was 42,525,661 ETB.

[5] Double Bounded Dichotomous Choice
[6] Willingness-to-Pay
[7] Rock-Hewn Churches of Lalibela

Research Methodology

The data source for this study is based on primary data, which was collected from randomly selected individuals among visitors to historical sites, and secondary data, which was also collected from the administration of the Entoto Museum office. A representative sample size is a crucial factor in obtaining a proper and reliable estimation of the total economic value of historical sites. The cost of sampling, the variability of the population, and the margin of error were some of the factors considered for the choice of the sample size. In drawing the sample for this study, reference was made to the resources of the National Business Research Institute, which is an American-based firm of professional researchers and business consultants.

One of the resources that NBRI[8] provides for its users is an online sample size calculator. Using this calculator and the assumptions below, we have derived the sample size for the study: 7% margin of error, which is a statistic expressing the degree to which a researcher believes the data may not represent the whole population. The generally accepted margin of error for representative samples is 10% or less (Hosking and Preez, 2003) and a 93% confidence level, which is a statistic expressing the researcher's confidence that the data truly represents the whole population, Given the above-mentioned assumptions, NBRI's online sample size calculator suggests a minimum of 119 samples for CVM and 120 samples for TCM.

The method of analysis used in this study is based on a joint analysis of the travel cost method and the contingent valuation method. The travel cost method is used to estimate the recreational use value of the site, whereas the contingent valuation method is used to investigate the non-use value of a historic site.

Model Specifications

The Travel Cost Method

The underlying assumption in TCM is that the value of a place is equal to the cost's respondents pay to use that place. In essence, the TCM evaluates the recreational use benefit for a specific recreation site by relating the demand for that site (measured as the quantity of site visits) to its

[8] National Business Research Institute

price (measured as the costs of a visit). A simple TCM model can be defined by a trip generation function (f) as follows:

V = f (C, X) …………………………………………………… ………………………… (1)

Where:

V – Number of visits to a recreation site,

C – Cost per visit,

X – Other socio-economic variables which significantly explain V.

Because the data for the dependent variable are integers, truncated below one visit per year, equation estimation by OLS[9] regression is inappropriate. Madalla (1983) showed that the regression slopes estimated by OLS will be biased toward zero when the dependent variable is truncated. The result is that the least squares method understates price elasticity and overstates consumers' surplus. Price elasticity is defined as (in this case) the percentage change in quantity demanded (trips) caused by a one percent change in the money trip price (travel cost).

Thus, maximum likelihood (ML) estimators are used to estimate the regression results acquired for this investigation. On any given occasion, the decision whether to take a journey or not can be described with a binomial distribution. This asymptotically converges to a Poisson distribution as the number of options rises. Given by is the density of this distribution for the count (y).

$$Pr\ (Y = y)\ \frac{e^{-\mu}\ \mu^{y}}{y!}\quad y\ 1\ 2\ \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots 2$$

Where, μ is the intensity or rate parameter. When the first two moments of this distribution equal each other (E[Y] = μ = V [Y]), a property known as equidispersion occur. This model can be extended to a regression framework by parameterizing the relation between the mean parameter μ and a set of regressors x.

$$\mu i = \exp\ (X'\beta)\ i = 1\ 2\ ...n \ \ldots\ldots\ldots\ldots 3$$

[9] Ordinary Least Square

Where x is the matrix of k regressors and β is a conformable matrix of coefficients to be estimated. Given the above two equations, the Poisson regression model can be estimated, under the assumption that (Yi/Xi) are independent, by maximum likelihood

The Truncated Poisson Model, one of several count data models used in this study, is used to calculate the demand function for visits and the visitor surplus. The use of count data to forecast recreational demand has a theoretical foundation, according to Hellerstein and Mendelsohn (1993). Since everyone has visited the site at least once, the models are cutoff at zero and the data begin at one; otherwise, our estimations will be inaccurate and inconsistent (Shaw, 1988). A truncation-adjusted Poisson model can be estimated using the common regression software programs.

$$Pr\ [Y = y|Y > 0]\ \frac{e\ -^{\mu}\ \mu^{\ y-1}}{(y-1)!}\quad y\ 1\ 2 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots .4$$

The dependent variable (y) in this case is the number of trips, which are truncated at zero, which means the number of trips is one or more since only actual visitors are included. The Poisson model is best suited for distributions that are free from over dispersion; over dispersion occurs when the variance is larger than the mean for the data because a few respondents make a large number of trips while most respondents make only a few. This makes the Poisson model overly restrictive.

Overdispersion has a qualitatively similar consequence to heteroskedasticity in the linear regression model. Therefore, as long as the conditional mean is correctly specified, the Poisson maximum likelihood estimator with overdispersion is still consistent, but it underestimates the standard errors and inflates the t-statistics in the usual maximum-likelihood output. For cases where the overdispersion problem is serious, a widely-accepted alternative is the negative binomial model. A likelihood-ratio test based on the parameter (degree of dispersion) was employed to test the hypothesis of collected since the over dispersion parameter is zero. In our study, a likelihood-ratio test based on the parameter α is employed to test the hypothesis of no over dispersion. The test showed the rejection of the null hypothesis α=1(over-dispersion)

Contingent Valuation Method

Basically, CVM aims at measuring the willingness of individuals to pay for environmental services such as nature protection, cultural heritage conservation, etc. CVM is a survey-based, stated preference methodology that provides respondents with the opportunity to make an economic decision concerning the relevant non-market good.

The four commonly known elicitation methods are open-ended questioning, bidding games, payment cards, and dichotomous formats. The Dichotomous Choice Contingent Valuation Method can be used in either the single- or double-bound formulation. The former is easier to implement, while the latter is known to be more efficient (Bateman, Langford, Jones, and Kerr, 2001). In this study, we used double-bounded, dichotomous choice questions, which are those most commonly used in practice (Ibid). Respondents are asked if they would be willing to pay amount X for an amenity, and if so (or if not) would they be willing to pay amount Y as well (instead)? It is possible to obtain more information from this type of question format than from others. Under this method, each respondent is given two bids, the first bid (Pf), and the second higher (PH) or lower (PL) bid, depending on whether the individual responds "yes" or "no" to the first bid. This means that we have the following four possible outcomes for each respondent:

A. if respondent i say ‘yes’ and ‘yes’ to the 1st and 2nd higher bids, respectively
B. if respondent i say ‘yes’ and ‘no’ to the 1st and 2nd higher bids, respectively
C. if respondent i say ‘no’ and ‘yes’ to the 1st and 2nd lower bids, respectively
D. if respondent i say ‘no’ and ‘no’ to the 1st and 2nd lower bids, respectively.

To formulate the model, the study assumes two WTP functions, which can be represented as follows: Let Yi1* indicating the decision of a given individual i on WTP for a given bid price which depending on a set of economic and social characteristics Xi1, and other unobserved variables ei1. The relation can be written as

$Y^*i1 = Xi'\beta + ei_1$……………………………………………………………………………5

$Yi1=1$ if $Y^*i_2>0$, 0 otherwise

Similarly, Yi_2** indicating the decision of a given individual i on WTP for a given bid price which depending on a set of economic and social characteristics Xi_2, and unobserved variables ei_2.

$Y^*i_2=Xi'\beta+ei1$ ……………………………… ………………………………………………6

$Yi_2=1$ if $Y^*i_2>0$, 0 otherwise

The probability of occurrence can be found as:

Prob $[y_1=1, y_2=1]$ = prob $\{y_2 \leq \max WTP\}$

= prob $[y_2=1|y_1=1]$ X prob $[y_1=1]$

$=\frac{\phi(y1=1,y2)}{prob[y1=1]} x\ prob[y1 = 1]$

$=\frac{\phi(xy1i\beta y1,xy2i\beta y2,p)}{\phi(xy1i\beta y1=1)} x\ \phi(Xy1\beta y1]$

Prob $[y_1=0, y_2=1] = \phi\ (Xy_1i\beta y_1, Xy_2i\beta y_2, p)$ ……………………………………………….…7

The remaining probabilities that enter to the likelihood function are then:

Prob $[y_1=0, y_2=0]$ = prob $\{0< \text{Max WTP}< y_2\}$

= prob [y2=0|y1=0] X prob [y1=0]

$=\phi_2\ (-Xy1i\beta y1, -Xy2i,)$ ……………………………………………………………………8

Prob [y1=0.y2=0] = prob $\{y1\leq \max WTP\leq Y2\}$

=prob $[y_2=0|y_1=0]$ X prob [y1=1]

$= \phi_2\ (Xy1i\beta\text{-}Xy2i\text{-}\beta y2\text{-}p)$ …………………………………………………………...9

Prob $[y_1=0.y_2=1]$ = prob $\{y2\geq \max WTP\geq Y1\}$

=prob [y2=1|y1=0] X prob [y1=1]

$=\phi_2\ (-Xy1i\beta y1, Xy_2i\text{-}\beta y_2\text{-}p)$ …………………………………………………………10

The double-bound dichotomous choice model bases on the two observed dichotomous variables, which are the first bid price answer and the following follow-up question. The BID1i is for the first question, and the BID2i is for follow-up questions. The dichotomous variables y1i's are assigned the values one and zero based on responses offered to bid BIDi's. Regarding the estimation procedures, different models can be used depending on the situation.

A probit model is used with dichotomous or binary outcome variables. This study identifies three probit models (independent probit model, bivariate probit model, and seemingly unrelated bivariate probit model) for estimating the mean willingness to pay. The choice of an appropriate model depends on the relationship between the two dependent variables.

The value of rho for the bivariate probit model is -1, which is a significantly different value from zero, so the probability in which the null hypothesis of no correlation is rejected is high. More importantly, the Wald test of rho = 0 shows the correlations between the two error terms are statistically different from zero at the 1% level of significance. Which indicates that the estimation of the bivariate probit model resulted in greater efficiency. Therefore, the study chooses a bivariate probit model since it gives a better fit than other probit models; a regression of the two equations separately will produce inconsistent results because the correlation between these two dependent variables is weak; therefore, an independent probit model is rejected.

The bivariate normal distribution estimated by this model takes the form (Harrison, 2013)

$YNS1^{*}=\alpha1+\beta iBID1+\sum \beta xi + \varepsilon 1$ … 11

$YNS2^{*}=\alpha2+\beta iBID2+\sum \beta xi + \varepsilon 2$ … … … … … … … … … … … … … … … … … … ….…………12

Correlation $[\varepsilon1, \varepsilon2] = \rho$

Where YNS1 and YNS2 are the binary WTP responses, BID1 and BID2 are the corresponding first and second bid values; xi is a vector of respondent characteristics; the β and α are the coefficients to be estimated. The covariance between the error terms from the estimated equations is denoted ρ (rho). The value of ρ provides a measure of the extent to which YNS1 and YNS2 are jointly determined.

Results and Discussions

Descriptive Statistics for Travel Cost Method

From the descriptive statistics Table 1, the average number of visits that sample visitors made to the historical site of Menelik II in the previous year was 3.12, while the minimum and maximum numbers of visits were 1 and 6, respectively. When we see the age of sample visitors, with the minimum age being 18 and the maximum being 46, the mean age of respondents was found to be 26.1 years. The average monthly income ranges between 1,000 Birr for the minimum and 33,000 Birr for the maximum.

Table 1

Descriptive Statistics for TCM

Variable	Description of variables	Mean	Std.dev	Min	Max
V	Number of visits those visitors made to historical site of Menelik II's in the last twelve months	3.12	1.578	1	6
AGE	Age of the sample visitor in years	26.15	7.926	18	46
INC	Average monthly income of sample visitors in Birr	3.14	2.42	1000	33,000
TD	Distance covered from starting point to the destination of sample visitors	19.1	14.2	5	65
TC	Travel cost of sample visitors	183.8	165.1	20	797

Source: Survey data, 2018

On the other hand, the average cost of sample visitors was calculated to be 183.8 birr. The distance traveled from their starting place to their destination ranges from a minimum of 5 KM to a maximum of 65 KM, with an average value of 14.2 KM. Sample visitors made these trips from Addis Ababa and Debre Zeit.

As it is seen from Table 2 out of the total sample of 120 visitors, 83 (69.17%) were male and 37 (30.83%) were female. According to the table, 57.5% of the sampled respondents have a first degree or higher, while 42.5% have a lower level of education. When we see the job distribution of the respondents, 27.5% were government organization employees, and the remaining were either non-government organization employees, private organization workers, or self-employed. Public transportation and rental cars were the modes of transportation for 61 (49% of the sample visitors), whereas 59 (50.83%) of the sample visitors used their own vehicles.

Table 2

Descriptive Statistics of Dummy Variables TCM

variable	Description of variables		Frequency	Percentage
SEX	Dummy variable for sex of the sample visitor, where “1” is for being male and “0” for being female	Female	37	30.83
		Male	83	69.17
EDU	Dummy variable for education level of the sample visitor, where “1” is for degree and above and “0” for below degree	Below Degree	51	42.5
		Degree and above	69	57.5
OCC	Dummy variable for the type of employment of sample visitors where “1” is for government employ and “0” otherwise	Government employ	33	27.5
		Otherwise	87	72.5
TRM	Dummy variable for mode of transportation where “1” is for using own vehicle and “0” otherwise	Own vehicle	59	50.83
		Otherwise	61	49.17

Source: Survey data, 2018

Descriptive Statistics for Contingent Valuation Method

Here we discuss and describe the information regarding the socio-economic and demographic characteristics of 119 sample WTP respondents.

Table 3

Descriptive Statistics for CVM

variable	Description of variables	Mean	Std.dev	Min	Max
BID1	First bid	22.98	9.706	10	45
BID2	Second bid	28.78	10.636	15	50
INC	Average monthly income of sample of respondent in birr	8,798.4	5519.8	1500	25,000
DST	Distance from historical site	26.32	10.65	10	60
AGE	Age of the respondents	30.37	7.36	18	44
FISZ	Family size of respondents	3.09	2.135	1	9

Source: Survey data, 2018

Table 3 shows the mean value of the first bid price and the second bid price, which are 22.98 and 28.78, respectively. The average family size of respondents was calculated to be 3.1, while the average monthly income ranged between 1,500 Birr for the maximum and 25,000 Birr for the minimum. The distance from their living village to the historical site of Menelik II's ranges from a minimum of 10 km to a maximum of 60 km, with a mean value of 10.65 km. From the distribution result, it can be concluded that the majority of visitors came from Addis Ababa and the nearby cities.

Table 4

Descriptive Statistics of Dummy Variables CVM

variable	Description of variables		Frequency	Percentage
Y1	WTP answer for the first bid price as dummy variable (1=agreed to pay for the first bid price, 0= denied to pay the designed bid price)		N/A	NA
Y2	WTP answer for the second bid price as dummy variable (1=agreed to pay for the second bid price, 0= denied to pay the designed bid price)		N/A	N/A
EDU	Dummy variable for education level of the sample visitor, where "1" is for degree and above and "0" for below degree	Below Degree	41	34.45
		Degree and above	78	65.55

Source: Survey data, 2018 ** *N/A non-applicable*

The educational level of the respondents showed that 43.3% of the visitors interviewed have attained university-level education, while the remaining 56.7% were reported to have attained non-university-level education, including primary, secondary, polytechnic, and community colleges.

Results of Travel Cost Method

The Count Data Models (Poisson and Negative binomial model) are mostly applied for ITCM[10] since the dependent variables of the ITCM are non-negative integer. As noted earlier, the recreation demand function is approximated using the number of visits to the site as a dependent

[10] Individual Travel Cost Method

variable and the travel cost associated with the trip and other socio-economic characteristics as independent variables. The truncated Poisson model is used to estimate the demand function since the dependent variable has only integral values and the values are greater than or equal to one (truncation), and the linear specification is employed to estimate the benefit of a recreation area. This is due to the poor results captured by the other functional forms (Tang, 2009). The functional relationship is presented below:

$$Vi = \beta 0 + \beta_1 TC + \beta_2 AGE + \beta_3 DSEX + \beta_4 DEDU + \beta_5 DOCC + \beta_6 DTRM + \beta_7 TD + \beta_8 INC + \varepsilon i \quad (13)$$

Where,

Vi = Individuals' number of visits.

TC = visitors' travel cost.

AGE = visitors' age.

SEX = visitors' gender as dummy variable. (1 for male, 0 for female)

EDU =visitors' level of education as dummy variable (1 for degree and above 0 for below degree)

OCC= visitors' occupation as dummy variable. (1 for government employee, 0 otherwise)

TRM= visitors' mode of transport dummy variable (1 for own car, 0 otherwise).

INC = visitors' monthly income

TD= total travel distance in kilometers, including a return

β_0 = constant term

εi = Error term

The regression results obtained from this model are estimated using ML estimator. As noted earlier, this is because OLS estimation results in biased estimation for truncated cases. Table 5 presents the robust regression results of the truncated Poisson model.

Table 5

Maximum Likelihood regression results of Truncated Poisson Model

Explanatory variable	Expected coefficient Sign	Truncated Poisson coefficient	p-value	Marginal Effect
AGE	-	-0.0083	0.622	-0.0134
SEX		0.0130	0.941	0.0209
INC	+	0.000021	0.01***	0.000033
TDV	-	-0.0292	0.06*	-0.0471
TC	-	-0.0047	0.003***	-0.0076
EDU	+	0.0128	0.945	0.0205
OCC	-	-0.0305	0.832	-0.0491
TRM	+	0.0080	0.949	0.0128
Constant		1.8362	0.000	N/A
Number of observations = 120 **LRchi2 (8) =145.25** **Pseudo R2= 0.3331**		**Log likelihood = -146.33406**		

Source: Survey data, 2018

LR = -2(Restricted Log - Unrestricted Log L) In this case, the unrestricted log likelihood is -146.33406 and the restricted log likelihood is -218.95897 Thus, LR is equal to 145.25. On the other hand, the table (critical) value of the test with 8 degrees of freedom ($X^2 8$), at 1% significance level is 20.90 when compared; the calculated LR is higher than the critical (tabled) value. Hence, we can reject the null hypothesis which says all independent variables are irrelevant at 1% significance level. Therefore, the model used in this study is significant at 1% significance level. Over-dispersion is a critical issue for the modeling of count data that occurs when the variance is larger than the mean for the data. The mean of the visitation which is 3.12 is higher than the variance of the visitation 2.45, an indication of absence of the over dispersion problem Furthermore test of over dispersion was made and the result shows that the dispersion coefficient alpha (ά) is 3.64e-16 and the p-value fails to reject the null hypothesis that says the value of alpha equal to zero or there is no over dispersion problem.

Determinants of Recreational Demand for Historical Site of Menelik II

The demand function of the independent variables includes age, sex, travel cost, travel distance, income, mode of transportation, occupation, and educational level. The regression results indicate that travel cost and the income of visitors' travel distance are statistically significant variables that affect the demand for visits to the historical site of Menelik II.

Travel cost (TC), the main and important variable in the demand functions, shows a negative and significant effect at a 1% significant level, as expected prior to the econometric analysis. Other things being constant, when TC increases by 1 birr, the number of visits to the site will decrease by 0.76. The travel cost coefficients are consistent with the demand theory. Similarly, visitors 'income has a positive and significant effect at the 1% significant level. The regression result shows that the increase in the level of income of visitors by 1 birr will result in a change in the number of visits by 0.003 in the same direction. i.e., income affects the number of visits positively. Distance from the historical site had a negative coefficient at the 10% level. According to this coefficient, with increasing the distance by one km, the number of visits will decrease by 0.0471. Other explanatory variables such as visitor occupation, gender, age, mode of transportation, and educational level are found to be insignificant determinants of visits to Menelik II's historical site, but all variables have the expected sign.

Recreational Benefit Estimation of the historical site Menelik II

The use value refers to the consumer surplus benefits derived from the direct use of the resources or the consumer surplus achieved from actual recreational use of the resources (Togridou 2006). The demand function for visits to historical site of Menelik II's is constructed by relating visitors' travel costs (TC) with their number of visits to the recreation sites (V). The estimated demand function is:

Vi = 3.12-0.0047TCi……………………………………………………………………14

The study uses the estimated coefficient of travel cost to calculate the welfare measures, following the work of Veli, Burhan and Osman (2001)

The following formula was used to estimate the consumer surplus:

$$ICS = -\frac{ro}{\beta 1} \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots 15$$

Where;

CS: individual Consumer surplus,

ro; Average of the total annual number of visits,

β_1 Curve of the demand function (cost coefficient).

When the values were put into the formula, the individual consumer surplus was estimated to be ICS = 3.12 / - (-0.004697) =664

As 15,645 persons visit historical site of Menelik II in 2017 fiscal year according to the Entoto museum administration data, this value was multiplied by the individual consumer surplus to estimate total consumer surplus (TCS):

TCS = ICS x 15,645 = 664 x 15,645 = 10,388,280

The value of the consumer surplus represents the annual recreational use value of historical site of Menelik II. In other words, this historical site provides a social benefit of some 10.39 million birr each year.

Results of Contingent Valuation Method

The idea of non-use values essentially serves as the basis for categorizing the willingness to pay estimates (Lee and Han, 2002). The benefits obtained from the intangible or abstract worth that society attributes to natural resources and cultural heritage are referred to as non-use value. The contingent valuation method uses indirect questions about people's willingness to pay for site preservation to determine the non-use value contribution of historical sites. Menelik II. After performing a preliminary specification test, the study employs a linear-linear functional form. Because the data is dummy, this functional form performs better than semi-log or log-log functional forms. The functional connection is shown below:

$$Y1= \beta_0+ \beta_1 BID_1+\beta_2 AGE+ \beta_3 EDU+ \beta_4 FSIZ+ \beta_5 INC+ \beta_6 DST+ + \varepsilon i \qquad (16)$$

$$Y2= \beta_0+ \beta_1 BID_2+\beta_2 AGE+ \beta_3 EDU+ \beta_4 FSIZ+ \beta_5 INC+ \beta_6 DST+ + \varepsilon i \qquad (17)$$

Where:

Y1 =WTP answer for the first bid price as dummy variable (1=agreed to pay for the first bid price, 0= not agree to pay the designed bid price)

Y2 = WTP answer for the second bid price as dummy variable (1=agreed to pay for the second bid price, 0= not agree to pay the designed bid price)

BID1= first offered bid price; BID2= second offered bid price; AGE= age of respondent; EDU= educational level of respondent as dummy variable (1 for degree and above 0 for below degree); FSIZ = family size of respondent; INC= monthly income of the respondent, and DST= distance from historical site in kilometers.

To select the appropriate model, first the study checked the significance level of rho (ρ), which shows the correlation between the two willingness to pay answers. The rho value estimated for the bivariate probit model measures the correlation between the error terms from the two response equations, taking on a value between -1 and 1, where -1 indicates perfect negative correlation, zero indicates that the responses are separately determined, and 1 indicates perfect joint-determination. Based on this the estimated correlation (row) -1 is far away from zero and which is statistically discernable, so the probability in which the null hypothesis of no correlation is rejected. Therefore, the first and second bid answers are jointly determined. So, we can use bivariate and Seemingly Unrelated Bivariate Probit model, however the model specification test shows that the model estimated using the Bivariate Probit model fits better the data than the Seemingly Unrelated model. Therefore, this study uses Bivariate Probit model.

Table 6

The Robust Bivariate Probit Model Regression Result

	1st bid answer (Y1)			2nd bid answer(Y2)			
Explanatory variable	**Expected sign**	**Coefficient**	**P-values**	**Expected sign**	**Coefficient**	**P-values**	**Marginal Effect**
BID1	-	-0.1475	0.000***				-0.011
BID2				-	-0.1218	0.000***	-0.015
AGE	+	0.0009	0.98	+	0.0314	0.133	0.0049
EDU	+	1.4198	0.05**	+	0.8160	0.047**	0.1872
FSIZ	-	-0.2385	0.11	-	-0.1723	0.059*	-0.0369
INC	+	0.00014	0.03**	+	0.00011	0.008***	0.00002
DST	-	-0.0364	0.04**	-	-0.0144	0.351	-0.0038
Constant		1.931178	0.38		0.11409	0.91	N/A
Number of observation = 119 **LR chi 2(7) =163.136** **Log likelihood = -58.164359** **Wald chi2(14) = 60.71** **rho = -1**							

The log-likelihood ratio test is used to test the significance of bivariate probit the model. The calculated LR chi 2(7) is 163.13 and the critical value of the test with 7 degrees of freedom ($\chi2$ 7) at one percent significance level is 18.4. The calculated value is higher than the tabulated value at one percent significance level. Thus, the model used in this study is significant at 1% significance level. This implies that the estimated model exhibits an overall significance.

Determinants of Willingness to Pay

As shown in the above table, there are two dependent variables: the first bid price answer and the second bid price answer. In the first bid price (Y1), all variables have the same sign as expected. The first bid price is an important variable with negative coefficients that affect willingness to pay at the 1% level of significance, the negative sign implying that an increase in the initial bid reduces the likelihood that respondents are accepting the proposed bid price level, which is logical and theoretically acceptable. A one-birr increase in the bid amount will decrease the respondent 's willingness to pay for the conservation of historical sites by 0.015; other things will remain constant. The other determining factor was income. The variable income positively affects willingness to pay at a 5% level of significance. Individuals who have a high monthly average income were found to have a high willingness to pay, which is theoretically valid and acceptable. Education is another determinant of willingness to pay at the 5% level of significance, which is a dummy variable that takes a value of one if the individual degree and above. There is a positive relationship between the level of education and the willingness to pay for conservation. At the 5% level of significance, distance from the site was also found to be a significant determinant of willingness to pay.

The negative relation between distance and willingness to pay for conservation is explained by the substitution of visiting other alternative nearby parks or historical site areas. In the second bid price (Y2), all variables have the same sign as expected in the definition and importance of variables under Chapter 3. The second bid price is statistically significant at the 1% level of significance because, as the negative relationship with willingness to pay for conservation increases and the bid price increases, the proportion of saying yes to the proposed bid is decreasing. This improves the fact that, as the price of goods and services increases, the demand for purchasing those products will decrease. The coefficient on income is significant at the 1% level and has a positive relationship with willingness to pay. This revealed that those with a higher income have a higher probability of paying a premium for conservation than low-income earners.

Regarding educational level, the coefficient is positive and significant at a 5% level of significance, as theoretically expected due to the fact that individuals become more aware of the importance of historical sites and conservation as they become more educated. The other determining factor was family size. The variable family size of individuals negatively affects willingness to pay at a 10% level of significance. This is because an individual with a large family spends a relatively higher proportion of its income on the consumption of composite goods, other things being equal.

Estimation of the Mean WTP

The mean WTP was estimated using the two bid price answers. It was conducted in two steps. The first step was estimation of the probit model, followed by finding the mean by using the wtpcikr1 command in Stata 13. The Krinsky-Robb procedure was implemented to estimate the mean WTP. The estimated mean WTP is presented in Table 7.

Table 7

Reporting Krinsky Robb Estimation Results of Mean WTP

Mean WTP	LB	UB	ASL	CI/MEAN
25.59	20.22	31.34	0.000	0.31

Source: Survey data, 2018

As seen in the above table, the mean WTP is 25.59 ETB per annum. It is bound by 20.22 birr and 31.34 ETB. The achieving significant level is 0.000, which means the value is significant at the 1% level of significance. To calculate the total WTP, the total population in the scope area must be included. According to the Ethiopian central statistics 2017 population estimation reported, from the total population of Addis Ababa, 3,434,000 people, 1,754,774 people are over 18. This can be taken as the desired population; therefore, the estimation result of 1,754,774 people x 25.59 ETB gives 44,904,666.66 ETB per annum. The total economic value of the historical site of Menelik II is therefore found by summing the use value and the nonuse value of the site. Based on the above findings, the use value contribution of the historical site was estimated to be 10,388,280 ETB, and the nonuse value of the site is 44,904,666.66 ETB, making the total economic value of this historical site 55,292,946.66 ETB.

Summary and Conclusion

Economic valuation studies on the benefits of natural and cultural heritage areas have been done for many years in many developing countries. In Ethiopia, the values of recreation sites, cultural heritage, and other natural resources are not properly examined with appropriate and well-defined scientific approaches. The quality of these resources is therefore deteriorating due to a lack of proper management. The primary goal of this study was to analyze and estimate the total economic value of Menelik II's historical site using a scientific calculation procedure. To estimate the total economic value of this historical site, the individual travel cost method and contingent valuation method have been adopted among the various economic valuation techniques in economics. Maximum likelihood estimation was preferred to ordinary least squares estimation because of the nature of the data: the dependent variable (visits per year) is counting data (an integer). The truncated Poisson model was employed for the use benefit estimation as the data was a count truncated above zero and it was free from over dispersion. In addition, a bivariate probit model was used to estimate the nonuse value of the historical site of Menelik II.

Travel expenses, visitor income, and journey distance were significant drivers of the site's demand for recreation, according to the regression results from TCM. From the results, there is a negative relationship between the visit rate and Travel expenses and a positive relationship between the visitor income and the visit rate. This result is consistent with theory of Clawson and Knetsch (1966) and Randal (1994) and other empirical works such as Yachkaschi (1975), Cooper (2000), Kavianpour and Esmaeili (2002). The positive intercept of the demand function indicates a normal demand curve for KNP.

CVM results revealed that factors such as offer bid price, education level, income level, family size, and proximity to Menelik II historical site were significant predictors of willingness to pay. The analysis discovered that the average consumer surplus per person is 664 ETB per year, as predicted by the count data model, and that the site's overall use value is roughly assessed to be 10,388, 280.ETB. Yet, the Bivariate Probit model's projected mean WTP is 25.59 ETB, and the site's overall nonuse value is roughly assessed to be 44,904, 666.66 ETB.

Hence, a total economic value of 55,292,946.66 ETB is determined for this historical site. The historical site Menelik II has enormous potential for the growth of heritage tourism, however owing to many obstacles, this potential is not fully realized. Lack of tourist amenities including hotels, lodges, and restaurants as well as a lack of marketing efforts are some of the key causes. Challenges include a lack of qualified tour guides, improper conservation, ignorance of the site's potential for heritage tourism, and a lack of a well-organized management body for the growth of the site's heritage tourism resource.

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