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Utility Analysis of Sacred Site Pilgrim Visitors: Evidence from Pashupatinath Sacred Site, Kathmandu, Nepal

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Abstract

Human beings are inherently attached to theological belief system that motives them to visit their respective religious shrines far and wide around the globe as pilgrims giving shape of pilgrimage tourism. These millions of pilgrims visiting sacred sites create opportunity for employment creation, revenue generation for business entities and government, and smooth functioning of national and international economy. The objective of the study is to estimate the consumer surplus (CS) and total use value of pilgrimage sites and to calculated social welfare bestowed by the Pashupatinath Sacred site of Kathmandu, Nepal. The study conducted cross-sectional survey using structured questionnaire to elicit data from 385 pilgrim respondents Nepali, Indian and other than Nepal and Indian pilgrim respondents during 2025/2026 following convenience sampling. The study compares linear and log-linear ordinary least squares models of annual visitation rate. The dependent variable is annual visits rate in the sacred site and explanatory variables include total travel cost, income level, education, age, nationality status, and festival participation. At the aggregate level, the estimated annual consumer surplus is NPR 29.575 billion, represents a substantial non-market welfare benefit that is not captured in conventional market expenditure or GDP measures. The study findings indicate that the Pashupatinath Temple Sacred site should be understood not merely as religious destination but also as a significant cultural heritage asset generating measurable socio-economic welfare to the nation. The study contributes empirical evidence on pilgrimage tourism analysis in South Asian sacred-site context and provides a foundation for travel-cost valuation and sacred site management policy.

Keywords:*Pilgrimage tourism, travel cost method, consumer surplus, total use value, Pashupatinath sacred site, Nepal*

JEL Classification: C21, D11, Q26, Z12, Z32

Introduction

Human beings are inherently attached with the theological belief system with various forms almighty having their unique shrine places whereby devotees of respective religion tour frequently. The religious shrine sites are visited by millions of pilgrims and spiritual devotees having various category of spiritual belief system annually around the world. Moreover, pilgrimage tourism is driven by religious faith, spiritual fulfillment, ritual obligation, the expectation of religious merits and family tradition. Therefore, pilgrims are profoundly motivated to travel their respective sacred destination sites as Temples, Churches, Mosques, Monasteries and so on to worship devoted almighty with a

view to fulfill vows, achieve blessings, perform rituals, seek healing, commemorate ancestors, participate in festivals, and maintain a cordial connection with a religious community. This religious tour enhances distinctive form of human mobility thereby creating substantial scope of economic activities in the national and international economy. In the perspectives of economics science, this type of tourism creates both market and non-market benefits to society and economy. The market benefits are reflected in the various forms of explicit expenditure such as transportation, food and accommodation, guiding services, local religious product, donations, and visitor-related services. These expenditures are source income for respective economic entities and also contributes to government revenue through taxes, service charges, licensing fees, and so on. This clearly indicates that the demand for pilgrimage tourism contributes substantially to the marketable economic transactions. However, the total economic value of sacred site cannot be identified solely such explicitly recorded transactions as they are external to market. In some sacred sites, access is free or highly subsidized because the sites are treated as public religious cultural good or service.

The Pashupatinath sacred site is visited by millions of domestic and foreign pilgrims each year. The study of Ghimire et al. (2023) underscore that the Pashupatinath sacred site is visited by millions of domestic and foreign pilgrim visitors and support substantially to the business entities operating along the premises of the Sacred site. However, the spiritual satisfaction, ritual fulfilment, cultural belongingness, and emotional benefits generated by a pilgrimage tour at the Pashupatinath sacred site largely absent from conventional marketable accounting estimation. This clearly indicates that the Pashupatinath religious sacred sites and heritage resources do not have a conventional market price that adequately reflects the spiritual utility visitors derive from assessing them. This situation gives clear indication of appropriate valuation problem. The situation demands for non-market valuation methods to be employed to estimate theses benefit indirectly.

The Travel Cost Method has traditionally been applied to survey the visitors of recreational sites such as national parks, forests, lakes, public recreational parks, and environmental resources. In this context, Parsons (2017) underscore random utility analysis designed to estimate the direct use value public goods based on observed behaviour and its commonly employed cost-benefit analysis as travel cost incurred for trip generating function. Similarly, Shah (2005) argues that the method differs from stated-preference techniques because it derives value based on the actual expenditure incurred to complete the trips to destination rather than from respondents' declarations about hypothetical WTP to access to the sites. Beyond the natural and environmental recreational sites, this analogy has

also been extended to sacred and cultural destinations to assess their economic contribution in the society and national economy (Torres-Ortega et al., 2018).

However, the application of this approach to pilgrimage tourism requires a particular attention because recreation visit demand analysis and pilgrimage behavior may not fully confirm the common assumptions. Intuitively, a pilgrims may continue to visit a sacred site despite rising costs because the pilgrimage journey is connected to religious duty, and spiritually valued festivals. In this regard, the availability of substitute destinations may be limited when a site has unique theological secrets and importance. For example, pilgrims may not regard another temple as a perfect substitute for Pashupatinath because the spiritual identity, and religious status with ritual and historical value. These features may cause pilgrimage demand to be relatively price inelastic, implying that visit rate decreases proportionately than the increase in travel cost. Nevertheless, even spiritually motivated demand for pilgrim visit is subject to resource constraints. Total travel cost to the sacred sites is inversely correlated to annual visit frequency and length of stay is also affected by the visit expenditure.

The current study has taken Pashupatinath sacred site as case to study the that provide an important setting for examining this relationship. Located on the banks of the Bagmati River in Kathmandu, Pashupatinath is widely recognized as Nepal's most revered temple by devotees of Hindu theological philosophy. The sacred site attracts millions of domestic pilgrims as well as visitors from Indian and other countries annually. Obviously, the pilgrims travelling to the site create demand for buses, taxis, hotels, guesthouses, restaurants, religious materials, flowers, ritual services, and informal venders. Therefore, these expenditure produces economic effects extending beyond the sacred site and temple institution to surrounding communities and service providers. This means the economic value of Pashupatinath cannot be represented only by donations and other institutional revenue. For pilgrims, access to the temple sacred site is not purchased through an ordinary commercial transaction. In this context, the principal economic sacrifice consists of transportation cost, travel time, accommodation, food and beverage, and other out-of-pocket expenses. These observable costs create an implicit an implicit price that can be used to estimate the behavioural demand for the visit of the sacred sites. This is the analogy of Revealed Preference Method (RPM) of estimating utility derived from non-market public goods. The ITCM is developed as an appropriate method for analyzing how difference in cost across pilgrims are associated with differences in annual visit frequency.

The central research question of this study is whether higher travel cost significantly reduces the number of visits made by pilgrims to Pashupatinath and how pilgrims' demand is responsive to changes in the cost. Moreover, the study also examines whether income, age, education, gender, national status (domestic/ foreign), and festival participation influence visit frequency. These variables are proxies of both the economic capacity and demographic characteristics of the respondent pilgrims. The purchasing power of respondent is reflected by income, religious attachment and life-cycle effected is expected to captured by age, education may reflect social conscience, and festivals participation may capture the intensified religious motivation.

Literature Review

Theoretical perspectives

The current study is grounded in standard consumer-demand theory of microeconomics. Within the realm the theory, the individual pilgrims visiting the Sacred sites are to be taken as a rational consumer and spends his scarce resources to reach the sacred site and this act gives him/her spiritual satisfaction. Moreover, a rational individual is assumed to allocate income and time among alternative goods and activities in a manner that maximizes utility subject to budget and time constraints. A visit will be undertaken when the expected utility derived from the destination is at least as large as the full cost of the trip, including the opportunity cost of time. As the implicit price of access rises, the quantity demanded usually measured by the number of trips is expected to fall, other factors remaining constant. The resulting inverse relationship between trip frequency and travel cost is analogous to an ordinary downward-sloping demand curve. Because it is based on observed journeys rather than hypothetical statements, TCM is especially useful for estimating direct-use values and consumer surplus associated with environmental, recreational and cultural resources (Parsons, 2003). Therefore, in theoretical perspective, the revealed preference method (RPM) is desirable to capture the benefits external to the market. Intuitively, the out-of-pocket expenditure in the form of total travel cost to visit the sacred site is regarded as the revelation of their utility function based on the microeconomic theoretical underpinning. Particularly, the Individual Travel Cost Method (ITCM) is suitable because it uses visitors' actual behaviour rather than relying on hypothetical responses. It treats the total travel expenditure incurred in reaching the Sacred site as an implicit cost of assessing the Sacred site. This approach examines how visitation changes as the effective price varies across individuals. Pilgrimage site visitation demand function is estimated by relating the number of trips to travel cost and other socioeconomic characteristics of pilgrims. In this context, the inverse relationship expected between travel cost and trip frequency at sacred sites to compliance with the analogous to the downward-slopping demand relationship for ordinary economic goods (Nepal et al., 2018; Hughes et al., 2013).

Empirical Literature Review

Poor and Smith (2004) conducted study of Historic St. Mary's City, Maryland. USA adopting TCM using three years of visitor's data Historic St. Mary's City, Maryland, USA. The study estimated

annual consumer surplus between US$ 8 to US$ 19.26, depending on functional form and annual aggregate social benefits were estimated at approximately US$ 75492 to US$ 176,550. Bedate et al. (2004) conducted study using TCM to calculate the consumer surplus value of four different cultural goods and services in the Castill y Leon region of Spain and derive demand curves. The findings asserted that cultural heritage produces a significant economic benefit even where there is no conventional market price. They concluded the suitability of TCM for non-market valuation of such cultural goods.

Alberini and Longo (2006) conducted study combing TCM and Contingent behaviour methods to value culture heritage sites called Garni, Haghardzin, Khor Virap and Tavet in Amenia surveying domestic visitors. The researcher combined three scenarios in the study as actual trip with hypothetical future trips under conservation and infrastructure-improvement scenarios. The results show a significant use value for all dimensions as improvement in conservation, cultural experience, infrastructure and accessibility increased expected visitation rate. Indeed, this study provides a strong model for evaluating questions such as 'if the religious site is better conserved, safer, cleaner and more accessible, how would visitations change'?

Tourkolias et al. (2015) carried out study using TCM for estimating consumer surplus and total values attributed to the Poseidon temple in Sounio in Greece. The results of the analysis show that the consumer surplus for visiting the Poseidon temple ranges from Euro 1.5 – 24.5 million per year. Voltaire et al. (2017) evaluated the economic value of cultural world heritage sites namely Mont-Saint-Michel in France using the ZTCM. The empirical findings yield key insights. First, the Sie generates substantial consumers surplus, demonstrating the significant nonmarket economic benefits of preserving cultural world heritage site. Second, the study findings provide richer insights into how explanatory variables influence trip demand. Nepal et al. (2018) used TCM to value cultural site Kailash Sacred Site Landscape (KSL) which covers 31,252 km^2 and estimated USD 2.9 million as per year average value of KSL cultural site. Torres-Ortega et al. (2018) underscores that TCM is based on the demand theory which assumes that the demand for the sacred site visit is inversely correlated with total travel cost given the resource constraint. The study estimated annual economic value of the National Museum and Research Centre of Altamira between Euro 4.75 to 8.0 million per year. Intuitively, TCM or ITCM is suitable for single-purpose visits like sacred sites (Armbrecht, 2014).

Parenti et al. (2020) estimated two models with aim of estimating consumer surplus of site visitors and total use value of Pisa Charterhouse. The individual consumer surplus (CS) was estimated to be Euro 67.945 per visitor per trip for model 1 and Euro 13.942 for model 2. The total use value for the site is estimated to be Euro 1,478,823 and Euro 303,448 for model 1 and model 2 respectively. Sadik and Suer (2020) conducted study to estimate the economic value of the Pergamon Ancient City in Turkey using the ITCM. Based on the survey of 400 visitors of the site, they estimated individual travel CS of TRY 26,306 per visit. The annual CS is estimated to be site's annual visitation of 393376 times individual CS as TRY10.349 billion, representing the estimated annual use value of the cultural heritage site.

Pramono and Saptutyningsih (2023) conducted study to calculate the economic value of Sonobudoyo Museum of Yogyakarta in Indonesia and analyze the effect of independence variables associated with

visit rate in the site. The TCM was used to estimate the economic value and the estimated result of the regression model indicated that total travel cost, income, satisfaction, and time spent have a significant effect on the visit rate. The study estimated economic value of the site is IDR 5,461,932,433 per year. Arumugam et al. Likewise, Bhatt et al. (2025) provides a precise theoretical insights and empirical evidences to choose a TCM to estimate social welfare bestowed by the Pilgrimage sites based on their total travel cost incurred to access the sacred sites as non-market valuation technique. (2026) conducted study on visitors' behaviour and economic valuation of spiritual tourism in Rameshwaram Island of India using ITCM. The primary data were collected from 400 spiritual tourist through field survey. The study estimated consumer surplus INR 20,833 per visitor per trip, reflecting substantial welfare gain. The systematic review conducted by Subedi (2026) for exploring appropriated methodological selection indicates that the ITCM is appropriate for estimating use value of religious scared sites based on the visitors or pilgrim behaviour.

The comprehensive literature provides empirical gap regarding the study of the Pashupatinath Temple Sacred sites using TCM. Moreover, the reviewed studies provide profound insight in three perspectives. First, systematic identification and screening of the literatures that applied non-market valuation techniques to sacred, religious or spiritual sites. Second, synthesizes the methodological choices, variables of interest, sample characteristics, and value estimates reported across these studies. Third, TCM as the popular and robust method for estimation consumer surplus of site visitor pilgrims and total use value generated by the sites. Finally, the identification of gaps that guides empirical work on the economic valuation generated by the Pashupatinath Temple Sacred sites in terms of CS of Pilgrims and estimation total use value.

Data and Methodology

Research Design

The study is based on the cross-sectional research design as it is appropriate to fulfil the principal objective of the current study the estimation and analysis in the variation between total travel cost and individual characteristics associated with variations in pilgrimage frequency in the study site. In the microeconomic perspective, the visit frequency is to be treated as a demand outcome. Essentially, the pilgrims face different costs depending on their place of origin, distance travelled, mode of transportation, accommodation requirements and other expenses relating to trips. Obviously, Theses differences create observable variation in the implicit cost of visiting the Pashupatinath Sacred sites. The TCM as a revealed-preference method is used to capture the utility for accessing economic contribution the sacred site Pashupatinath temple by pilgrims. The theoretical underpinning of this is based on the demand theory and assumes that the demand for a site is inversely related to total travel cost incurred (Subedi, 2015). Therefore, under TCM, the utility maximization framework for the optimization problem can be presented as:

Maximization of utility: Max U(q, I, z); …(1)

Subject to the resource constrains: TCq + z= I, …(2)

In equation (1) and (2), U represents utility obtained from consuming a quantity of a good q; I stand for income; TCq captures the total travel costs, and z stands for the consumption of other goods.

From above equation (1), and (2) the Marshallian demand for a site is:

$$R = f(q, TC, z, I) \qquad \ldots(3)$$

Based on above, change in welfare change may be expressed as:

$$\Delta W = \int_{TC=1}^{TC=n} f(TC, I, z, q)\, dTc \qquad \ldots(4)$$

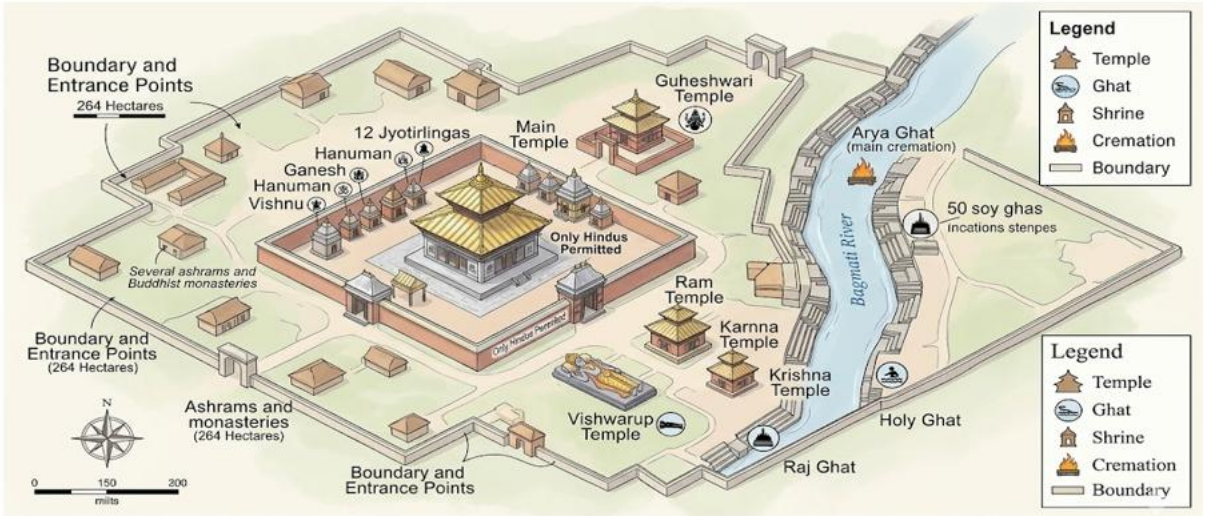
In equation (4), ΔW is estimated change in social welfare bestowed by sacred site.

Description of the Study Site

The Pashupatinath Temple's GPS coordinate is approximately 27.7104-degree North latitude and 85.3486-degree East longitude at the bank holy Bagmati Rever. Moreover, the Pashupatinath Sacred site premises is stretched in the area about 83.55 hectares that locates a broader coordinate range of 27°42′25″ to 27°42′36″ N and 85°20′12″ to 85°21′29″ E. The area encompasses a rich array of temples, shrines, ghats, and spiritual structures (Shrestha et al., 2020). The principal Pashupatinath Temple with a magnificent two-tiered pagoda having golden roof, silver doors, and four silver-plated entrance doors, is located at the core area as most revered for Hindu devotees. Alongside, there is Bagmati River, approximately 50 stone ghats facilitate ritual bathing and cremations, most notably the Arya Ghat for funeral pyres, the Holy Ghat for ritual offerings. Beyond the central core, the broader complex incorporates significant surround shrines like Guheswari Temple, and the Vishwarup Temple. Completing this sacred landscape are several spiritual ashrams and Buddhist monasteries, reflecting a diverse continuum of religious devotion with the site. In 1979, the Pashupatinath Temple complex was inscribed as a UNESCO World Heritage Site as part of the broader Kathmandu Valley World Heritage Site (UNESCO World Heritage Centre, 2026). The Pashupatinath Sacred sit map is visualized in the following figure.

Figure 1

Pashupatinath Temple Complex Layout



Individual Tavel Cost Method

This study adopts ITCM to estimate the total social welfare bestowed by the Pashupatinath sacred site based on the premises that the number of visits a given user makes to a cultural site a function of the total cost of the trips to sacred destination and other possible variables that contribute to explain the user's behavior. Therefore, ITCM can be expressed as follows:

$$Vi = f(TCi, Xi) + \varepsilon i \quad \ldots(5)$$

In the equation (5), Vi denote the number of visits to the sacred site by ith pilgrim, TCi captures total travel cost incurred to access the sacred site by i^{th} visitor, and Xi implies other socio-economic, and demographic characteristics associated with i^{th} pilgrim. Worth mentioning that, when estimating the function, the number of visits (Vi) cannot take continuous values. The simple solution is to estimate Poisson regression model.

Nature and Sources of Data

The research is based on the primary data collected from pilgrims of Pashupatinath Temple during the period Septembers 2025 to March 2026. The individual pilgrim visitors of Pashupatinath Sacred site are regarded as unit oof observation during the study period.

Study Population, Sample and Sample Size determination

The pilgrims visiting the Pashupatinath Sacred site during the study period is regarded as study population. The individual pilgrims are the unit of observation. Therefore, each respondent provides information relating to the pilgrimage such as visit frequency, total travel expenditure, level of income, and other relevant selected socio-demographic characteristics. This study is based on the primary cross-sectional data collected from 385 pilgrim respondents at the Pashupatinath sacred site surveyed during October to 2025 March 2026.

Operational Definition of the Variables and their Measurements

The operational definition of the variables and their measurements are presented in the following Table 1

Operational Definition of the Variables Used in the Regression Model

Variable Code	Operational Definition	Measurement Scale	Expected Sign

Vij	Visit rate of 'i' th pilgrim at Pashupatinath Sacred site	Count in frequency	Dependent variable
TCi	Total trave cost incurred by 'i' th pilgrim at Pashupatinath Sacred site	Total expenditure on transportation, accommodation, food, entry fees, donations (NPR)	(-)negative
HHi	Total Household income 'i' th pilgrims	Ratio scale	(+) positive
Edui	Years of formal schooling of 'i' th pilgrim	Ratio	Positive (+)
Agi	Age in years of 'i' th pilgrim	Years (completed)	Positive(+)
NSi	Nationality Status of 'i' th pilgrim	Dummy: 1=Domestic, 0=International	Positive for domestic
FV	Festival visit of 'i' th pilgrim	Dummy: 1=Festival visit, 0=Regular	Ambiguous (+/-)

Model specification

The based on the literature review, model is specified as the visit frequency of the pilgrimage site is the function total travel cost to visit the sire, household income of pilgrims, and other control variables such as age, education, nationality status.

Linear Pilgrimage Demand Model

The first empirical specification is the linear demand model:

$$Vi = \beta_0 + \beta_1 TCi + \beta_2 HHi + \beta_3 Age_i + \beta_4 Edui + \beta_5 NSi + \beta_6 FV + \varepsilon_i \quad \text{.....(6)}$$

In equation (6), Vi denotes annual visitation frequency for pilgrim i. The term β0 is the intercept, while β_1 to β_6 are the partial regression coefficients. The symbol εi captures error term.

The linear specification is straightforward and easy to interpret. It assumes, however, that the marginal effect of an explanatory variable remains constant throughout the sample. In other words, an equal increase in travel cost is assumed to produce the same absolute change in visitation for both

low-cost and high-cost pilgrims. This assumption may not fully reflect pilgrimage behaviour when proportional responses are more economically meaningful.

Log-Linear Pilgrimage Demand Model

The log-linear pilgrimage demand model be expressed as:

$$Ln(Vij) = \alpha 0 + \alpha_1 \ln(TCi) + \alpha_2 \ln(HHi) + \alpha_3 Agei + \alpha_4 Edui + \alpha_5 NSi + \alpha_6 FVi + ui \ldots (7)$$

In equation (7), Ln is natural logarithm, ui denotes stochastic error term, α_0 is the estimated coefficient of the relevant binary variable and other variables are defined above. where α_0 is the estimated coefficient of the relevant binary variable.

Diagnostic Test for Robustness of Estimated Model

The estimated regression model is subjected to a series of diagnostic tests to ensure robustness of the estimated coefficients. To ensure this, key diagnostic tests such as Jarque-Bera residual normality, Breusch-Pagan Test, heteroscedasticity test, Variance-Inflated Factor (VIF) tests, and Ramsey RESET test were done.

Empirical Results and Discussion

Empirical Results

The linear model is statistically significant overall, with an F-statistic of 29.45 ($p < 0.001$). It explains 38.5 percent of the variation in annual visit frequency, while the adjusted R-squared is 0.372. The Durbin-Watson statistic of 1.89 is close to two, providing no indication of problematic residual autocorrelation in the reported model.

Table 2

Linear regression results (dependent variable: number of visits)

Dependent variable (Vij) = Visit rate				
Variable	**Coefficient (SE)**	**t-statistic**	**p-value**	**VIF**
Travel Cost (NPR '000)	-0.089**(0.018)	-4.94	<0.001	1.89
Income (NPR '000)	-0.002(0.004)	-0.50	0.617	1.92
Age (years)	0.078**(0.022)	3.55	<0.001	1.12
Education (years)	-0.045(0.038)	-1.18	0.238	1.34

Dependent variable (Vij) = Visit rate				
Variable	**Coefficient (SE)**	**t-statistic**	**p-value**	**VIF**
NS (1 = domestic, 0 otherwise)	3.215**(0.789)	4.08	<0.001	1.78
FV(1 = festival visit, 0 otherwise)	0.234(0.567)	0.41	0.680	1.03
Constant	8.452**(1.234)	6.85	<0.001	-

Note. Table 3 presents the estimated result of linear regression model, SE stands for standard and R^2 = 0.385; adjusted R^2 = 0.372; F = 29.45 ($p < 0.001$); Durbin-Watson = 1.89; N = 385. ** $p < 0.01$.

Source: Author's calculation based on field survey data (2025/2026).

The coefficient of variation (R^2) and adjusted coefficient of variation (R^2) of estimated model are 0.385 and 0.372 respectively. It means the explanatory variables of the model explains 38.5 percent to 37.2 percent of the variation in the visitation frequency with statistical significance F=29.45($p<0.001$). Moreover, Darwin-Watson test result 1.89 also reflects that the estimated result is free from autocorrelation problem. This means first order auto-correlation or uncorrelated error term (i.e. Cov (ei,ej =0)

Travel cost has the expected negative sign and is statistically significant at the 1 percent level. The estimated result implies that holding other variables constant, an increase of NPR 1,000 in travel cost is associated with a decline of visits frequency by 0.089 times per year. Likewise, the coefficient of age of pilgrims is positive and significant which can be interpreted as each additional year of age is associated with 0.078 additional annual visits in the sacred site. Similarly, domestic pilgrims make approximately 3.215 more visits per year than international pilgrims, other factors held constant. However, other control variables such as income, education, gender, and festival participation are not statistically significant at the 5 percent level.

The estimated result of log-linear model is presented in Table 3. The coefficient of variation (R^2) and adjusted coefficient of variation (R^2) of estimated model are 0.412 and 0.399 respectively. It means the explanatory variables of the model explains 41.2 percent to 39.9 percent of the variation in the visitation frequency with statistical significance F=34.12($p<0.001$). Moreover, Darwin-Watson test result 1.92 also reflects that the estimated result is free from autocorrelation problem. This means first order auto-correlation or uncorrelated error term (i.e. Cov (ei,ej =0)

Table 3

The Estimated Result of Log-linear Regression Model

Dependent variable (Vij) = Visit rate				
Variable	**Coefficient (SE)**	**t-statistic**	**p-value**	**VIF**
Ln (Travel Cost)	-0.423**(0.065)	-6.51	<0.001	1.92
Ln (Income)	-0.045(0.078)	-0.58	0.562	1.88
Age (years)	0.015**(0.004)	3.75	<0.001	1.12
Education (years)	-0.008(0.012)	-0.67	0.503	1.34
NS (1 = domestic, 0 otherwise)	0.567** (0.145)	3.91	<0.001	1.78
FV (1 = festival)	0.045 (0.098)	0.46	0.645	1.03
Constant	2.845**(0.345)	8.25	<0.001	-

Note. Table 3 presents the estimated result of linear regression model, SE stands for standard error, and $R^2 = 0.412$; adjusted $R^2 = 0.399$; $F = 34.12$ ($p < 0.001$); Durbin-Watson = 1.92; N = 385. ** $p < 0.01$. Source: Author's calculation based on field survey data (2025/2026).

The estimated coefficient of total travel-cost is -0.423 and is significant at the 1 percent level. This implies that a 1 percent increase in travel cost is associated with an approximately 0.423 reduction in annual visit frequency. The estimated coefficient is less than unity indicating pilgrimage demand is relatively inelastic. The coefficient for age remains is positive and statistically significant. Since the dependent variable is logarithmic and age is in levels, a one-year increase in age is associated with an approximate 1.5 percent rise in visit frequency. The coefficient for dummy variable nationality status (i.e. domestic pilgrim =1, and 0 otherwise) is 0.567 and statistically significant. This indicates that domestic pilgrims are expected to visit 0.567 times than other foreign visitors.

The log-linear model is preferred. It has higher R-squared and adjusted R-squared values, lower AIC and BIC values, and a higher log-likelihood. These criteria consistently indicate that the log-linear specification provides a better balance of explanatory power and model parsimony.

Table 4

Diagnostic tests for the preferred log-linear model

Diagnostic test	**Statistic**	**p-value**	**Decision**
Jarque-Bera residual normality	2.45	0.294	Normality not rejected

Diagnostic test	Statistic	p-value	Decision
Breusch-Pagan heteroskedasticity	8.21	0.312	Homoskedasticity not rejected
Variance inflation factor	Maximum = 1.92	N/A	No severe multicollinearity
Ramsey RESET functional form	1.23	0.298	Misspecification not detected

Note. Table 4 presents the diagnostic test result. Source: Author's calculation based on field survey data (2025/2026).

The diagnostic evidence supports the adequacy of the preferred specification. The Jarque-Bera test does not reject residual normality. The Breusch-Pagan test does not reject constant error variance. All variance inflation factors are below five, with a maximum of 1.92, indicating that multicollinearity is not severe. The Ramsey RESET test does not reject the null of correct functional form. Taken together, these findings indicate that the model satisfies the main reported ordinary least squares assumptions.

Consumer Surplus and Welfare Gain

The use value as economic benefits bestowed by the temple is to be measured based on Consumer surplus (CS). Moreover, CS is the economic benefit that pilgrims derive from visiting Pashupatinath over and above what they actually pay. It represents the difference between what pilgrims are willing to pay for the pilgrimage experience and what they actually pay. Consumer surplus is calculated from the travel cost demand function.

Following standard TCM practice (Garrod & Willis, 1999), the consumer surplus per visit is:

$$\text{CS per visit} = \frac{-1}{\beta_{TC}} \qquad \ldots (8)$$

In equation (8), β_{TC} is the coefficient on travel cost in the demand function. Alternatively, consumer surplus can be estimated using the linear travel-cost model as (CS= Alternatively, consumer surplus can be estimated using the linear travel-cost model as (CS= $\frac{-1}{\beta_{TC}}$). Given the travel-cost coefficient of (-0.089), where travel cost is measured in thousands of Nepalese rupees, the estimated consumer surplus per visit is (11.236) thousand NPR, equivalent to NPR 11,236. In the log-linear model, however, consumer surplus is calculated at the mean visitation level of 4.2 visits per year. Since the

sample contains a comparatively high proportion of international pilgrims, this mean may exceed the actual population average. Therefore, a more appropriate estimate is obtained by calculating the area under the estimated pilgrimage-demand curve through numerical integration, using the sample mean values of the control variables.). Given the travel-cost coefficient of (-0.089), where travel cost is measured in thousands of Nepalese rupees, the estimated consumer surplus per visit is NPR 11.236 thousand, equivalent to NPR 11,236. In the log-linear model, however, consumer surplus is calculated at the mean visitation level of 4.2 visits per year. Since the sample contains a comparatively high proportion of international pilgrims, this mean may exceed the actual population average. Therefore, a more appropriate estimate is obtained by calculating the area under the estimated pilgrimage-demand curve through numerical integration, using the sample mean values of the control variables.

Table 5

Consumer Surplus Calculation

Method	CS per visit (NPR)	Basis for Judgement
Linear model	11,236	Based on coefficient -
Log-linear	8,450	Preferred estimate

Note. Table 5 presents the welfare calculation procedure under linear and log-linear model.

Source: Author's calculation based on field survey data (2025/2026).

The estimated individual pilgrim's CS NPR 11,236 per visit for linear model and 8,450 per visit for log-linear model. In realm of microeconomics, this amount represents the net gain derived from access of the sacred site. It may be reflected as the value of religious satisfaction, spiritual fulfilment, cultural experience, and other non-market benefits that are not account by direct expenditure.

Calculation of Total Social Welfare Gain

The contribution of the Pashupatinath Temple Sacred site as total use value measured in terms of social welfare gain or CS can be measured as:

Total CS = CS Per Visit * Total Annual Number of Pilgrim Visits

The record maintained by Pashupatinath Area Development Trust (PADT) for (2023-2024) shows that 3.5 million pilgrims visited the site. Based on this reference, Total Social Welfare Gain calculation procedure is presented in Table 6.

Table 6

Social Welfare Gain from Pilgrimage Tourism

Pilgrim category	Annual visits (est.)	CS per visit (NPR)	Total CS (NPR million)
Domestic	3,000,000	8,450	25,350
Indian	400,000	8,450	3,380
Other International	100,000	8,450	845
Total	**3,500,000**	**8,450**	**29,575**

Note. Table 6 presents calculation procedure of Social Welfare gain from the Pashupatinath Temple Sacred Site. Source: Author's calculation based on field survey data (2025/26)

Table 6 estimated result shows that total social welfare gain from pilgrimage tourism at Pashupatinath is about NPR 29.575 billion (Approximately USD 228 million for the study year.

Discussion

The findings of the current study indicate that religious or spiritual tourists derive substantial economic benefits from the visiting the Pashupatinath Temple Sacred site as reflected by individual consumer surplus and total use value to the society. The estimated result clearly suggest that the use value of the Pashupatinath sacred site as spiritual and cultural experience extends beyond the direct revenue generated through market transactions. Nevertheless, these benefits vary considerably across visitor groups based on the nationality status in terms of Domestic, Indian and other internation as presented in Table 6. At the aggregate level, the annual CS of NPR29.575 billion (approx. USD 228 million) represents a substantial non-market value (NMV) or welfare benefit that is not captured in conventional market expenditure. The estimated CS for the Pashupatinath Sacred site of NPR 29.575 billion per year demonstrates a substantial non market welfare benefit and this consistent with the several international studies. In the context of similar nature of study by Poor and Smith (2004) and Badate et al. (2004) demonstrated that the cultural heritage sites generate significant economic benefits that are not reflected by conventional market transactions. The magnitude of the

Pashupatinath estimate is considerably lower than the values reported for smaller sites such as Historic St. Mary's and Pisa Charterhouse, but this differentiate given Pashupatinath's exceptionally both visitation and international religious significance. Similarly, Nepal et al. (2018), Voltaire et al. (2017), and Tourkolias et al. (2015) found substantial annual welfare values in their studies, reinforcing the relevance of TCM for estimating non-market benefits. At the visitor level, the findings also compare favourablely with Sadik and Suer (2020), who estimated substantial consumer surplus for Pergamon Ancient City, and the more recent evidence from Rameshwaram, where Arumugam et al. (2026) reported significant level of welfare gains from spiritual tourism. Notably, the positive consumer surplus among both Indian and other international pilgrims indicates that spiritual motivation does not eliminate economic responsiveness to travel costs, consistent with the demand-theoretic foundation by Armbrecht (2014) and Torres-Ortega et al. (2018). The estimated CS for the visitors' of the Pashupatinath Temple Sacred site for preferred model is NPR 8,450 (approx. USD 6) per visit. This value is comparatively higher than the CS estimates reported for several cultural-heritage destinations Merciu et al. (2021).

To sum up, the Pashupatinath Temple Sacred site bestows substantial benefit to national and international pilgrims annually in terms of use value as religious, cultural and spiritual experience they derive from it. This evidence rationalizes to the concerned government authority to maintain its quality by preparing appropriate plan and policy from their side to preserve this most revered scared site.

Conclusions

This study concludes that the Pashupatinath Temple Sacred site generates substantial social and economic welfare for pilgrims based on use value measured in terms of non-market valuation techniques too. Moreover, ITCM is demonstrates that pilgrimage demand is responsive to the generalized cost of access, while the positive consumer surplus indicates that pilgrims obtain benefits from their visits that exceeds the costs incurred in reaching and experiencing the site. The estimated annual CS of NPR 29.575 billion (approx. USD 228 million) provides evidence of the considerable non-market economic use value generated by the Pashupatinath Temple Sacred site. This use value represents an important component of social welfare that is generally overlooked or omitted from market-based measures. Therefore, the findings establish that the Pashupatinath Temple Sacred Site should be understood not merely as a religious destination but also as a significant cultural heritage asset generating measurable substantial economic welfare. This provide strong economic rationale

for the proper attention into the heritage management and religious tourism planning for the long-term conservation, visitor management, and sustainable development.

Policy Implications

Based on the insights gained through this study, policy implications are:

- First, religious and cultural heritage should be considered investment in social welfare, rather than merely as an administrative expenditure based on the substantial CS derived from the study site.
- Second, policy should be focused on the improvement of visitor infrastructure, accessibility, pedestrian facility, crowed management, without compromising heritage value.
- Third, the substantial welfare value provides an economic basis for developing sustainable pilgrimage tourism policies, including appropriate visitor management during major festivals and peak periods.
- Finally, the estimated NMV should be incorporated into benefit-cost analyses of conservation and infrastructure projects, since conventional financial indicators substantially understate the site's contribution of social welfare.

Limitations of the Study

The interpretations of the findings are to be carefully done considering some limitations that were beyond the researchers:

- First, the travel cost in general and ITCM in particular captures the use value of the sacred religious and cultural sites, and non-use value like existence value, bequest value are beyond its measurement range.
- Second, report on total travel cost, travel time and other information may be subject to recall and reporting from the side of pilgrims as respondents.
- Third, separating the cost associated to the Pashupatinath Temple sides are difficult to exactly measure when pilgrims visit several religious or tourist destinations during the same trips.
- Fourth, the cross-sectional survey design captures visitor behaviour during the study period and may not be fully reflect seasonal or long-term change in pilgrimage demand.
- Finally, the findings presented in this study should not be interpretated as a complete estimate of the total economic value generated through the visit of the pilgrims of the Pashupatinath

Temple sacred site, because broader cultural, spiritual, ecological, local employment, and non-use benefits are not fully captured by the method applied in this study.

Declarations

The authors declare that this paper did not receive any external fundings

Conflict of Interest

The authors declare that there is no conflict of interest related to the research, analysis or preparation.

Author Contribution

Conceptualization, K.R.-S, and S.D.-B.; Methodology, K.R.-S. Data collection, S.D.-B, Formal analysis, K.R.-S.; Investigation, K.R.-S. and S.D.-B.; Data curation, K.R.-S.; Original draft write-up, K.R.-S.; review & editing write-up, K.R.-S. and S.D.-B.; Project administration, K.R.-S. and S.D.-B.

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