

Geo-Statistical Analysis Of Local Perceptions On Village Tourism: A Case Study Of Kollengode Panchayat, Palakkad District, Kerala

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Abstract

Village tourism has gained importance as a sustainable development strategy capable of strengthening rural livelihoods while preserving cultural and environmental resources. This study examines the perceptions of local residents towards village tourism in Kollengode Panchayat of Palakkad district, Kerala, using geo-statistical techniques. Primary data were collected through a structured questionnaire survey conducted among 100 households selected through random sampling. Descriptive statistics, factor analysis, and non-parametric tests were applied using SPSS to identify the major dimensions influencing local perception. The results indicate that tourism is largely perceived as a positive force contributing to employment generation, infrastructure improvement, and cultural promotion. However, concerns related to environmental stress, waste generation, and pressure on local resources were also evident. The study highlights the importance of community-oriented and environmentally responsible planning to ensure the long-term sustainability of village tourism in Kollengode Panchayat.

Keywords: *Village tourism; Local perception; Geo-statistical analysis; Sustainable development; Kollengode Panchayat.*

Date of Submission: 18-01-2026

Date of Acceptance: 28-01-2026

I. Introduction

Tourism is a complex socio-economic activity that influences places, people, and environments at multiple spatial scales. In recent years, village tourism has emerged as an alternative form of tourism that emphasises authenticity, community participation, and sustainability. Unlike mass tourism, village tourism focuses on rural settings and local lifestyles, thereby enabling equitable distribution of tourism benefits and strengthening rural economies.

In India, village tourism has been promoted as a tool for rural development, cultural preservation, and employment generation. Kerala, known for its diverse landscapes and strong local governance, offers considerable potential for village tourism initiatives. Kollengode Panchayat in Palakkad district represents a rural area with significant natural, cultural, and historical resources that are increasingly attracting visitors. Understanding how local residents perceive tourism development is essential, as community acceptance and participation determine the success and sustainability of tourism initiatives. This study attempts a geo-statistical assessment of local perceptions on village tourism in Kollengode Panchayat.

II. Study Area

Kollengode Panchayat is situated in Chittur Taluk of Palakkad District, Kerala. Geographically, it lies between approximately 10°36'50" N latitude and 76°41'27" E longitude and covers an area of about 49.33 sq. km. The Panchayat is located at the foothills of the Nelliampathy ranges of the Western Ghats and forms a transitional zone between the Palakkad plains and the forested highlands.

Variable	Category	Percentage (%)
	Higher Secondary	34
	Graduate & above	28
Occupation	Agriculture	36
	Service	22
	Business	18
	Others	24

The age composition shows that nearly half of the respondents (46%) belong to the 30–50 years category, followed by respondents above 50 years (30%) and below 30 years (24%). The dominance of the economically active age group suggests that perceptions are largely shaped by individuals who are actively involved in livelihood activities and local decision-making processes. Their views therefore reflect direct experiences of economic opportunities, infrastructural changes, and environmental pressures associated with tourism development.

Gender-wise distribution indicates a slightly higher representation of female respondents (52%) compared to males (48%), reflecting the inclusive nature of the survey and the active role of women in household-level economic and social activities. Women's participation is particularly significant in village tourism contexts, as they are often engaged in homestays, handicrafts, food preparation, and cultural activities.

Educational attainment among respondents reveals that a considerable proportion has completed secondary (38%) and higher secondary education (34%), while 28% possess graduate-level qualifications or above. This educational profile suggests a reasonably informed community capable of critically evaluating the benefits and challenges of tourism. Higher educational exposure tends to enhance awareness regarding sustainability, cultural preservation, and environmental conservation.

Occupational structure shows that agriculture remains the dominant livelihood (36%), followed by service sector employment (22%) and business activities (18%). The presence of respondents engaged in non-agricultural occupations indicates gradual livelihood diversification, partly influenced by tourism-related opportunities. Individuals dependent on agriculture are more sensitive to environmental impacts, whereas those engaged in services and business are more likely to emphasise economic benefits from tourism.

Overall, the socio-demographic characteristics indicate a balanced and representative sample. The diversity in age, gender, education, and occupation strengthens the reliability of the perception analysis and provides a comprehensive understanding of how different social groups perceive village tourism development in Kollengode Panchayat.

Socio-Economic Impacts of Village Tourism

Residents' perceptions regarding the socio-economic impacts of tourism reveal strong support for tourism development.

Table 2: Perception on Socio-Economic Impacts of Tourism

Impact Statement	Agree (%)	Neutral (%)	Disagree (%)
Tourism creates employment	72	18	10
Tourism increases household income	68	22	10
Tourism improves infrastructure	74	16	10
Tourism promotes local arts & crafts	79	14	7

The results clearly indicate that tourism is perceived as a catalyst for local socio-economic development in Kollengode Panchayat. A substantial majority of respondents acknowledged that village tourism has generated new employment opportunities, both directly through activities such as guiding, homestays, small shops, and transport services, and indirectly by stimulating demand for local products and services. The perception that tourism increases household income reflects the role of tourism as a supplementary livelihood option, particularly important in a rural economy that is traditionally dependent on agriculture and seasonal employment.

Improvement in infrastructure, as perceived by 74% of respondents, highlights tourism's contribution to the development of basic amenities such as roads, sanitation facilities, communication networks, and public spaces. These improvements not only enhance the visitor experience but also improve the overall quality of life for local residents. Furthermore, the strong agreement regarding the promotion of local arts and crafts indicates that tourism has created opportunities for cultural expression and economic valuation of traditional skills. Activities such as handicraft production, local cuisine preparation, and cultural performances have gained renewed importance due to tourist demand.

Overall, the socio-economic impacts of village tourism are perceived to be largely positive, contributing to livelihood diversification, reduction of rural unemployment, and strengthening of the local economy. However, respondents also implicitly recognised that these benefits need to be equitably distributed and supported by proper planning to ensure long-term sustainability and social inclusiveness.

Environmental Impacts of Tourism

While economic benefits are widely acknowledged, environmental concerns remain prominent among residents.

Table 3: Environmental Impacts Perceived by Residents

Environmental Issue	Agree (%)	Neutral (%)	Disagree (%)
Increase in waste generation	66	20	14
Pressure on water resources	58	24	18
Disturbance to natural ecosystem	61	21	18

The perception of environmental impacts reveals growing concern among residents regarding the ecological consequences of increasing tourism activities in Kollengode Panchayat. A majority of respondents (66%) agreed that tourism has led to an increase in solid waste generation, particularly plastic waste, food residues, and non-biodegradable materials near tourist spots, roadsides, and water bodies. Inadequate waste disposal mechanisms and limited segregation practices at the local level have intensified these issues, thereby affecting environmental quality and public health.

Pressure on water resources, acknowledged by 58% of respondents, reflects the seasonal stress on wells, streams, and ponds due to higher water consumption by tourists, especially during peak seasons. This concern is particularly significant in a predominantly agrarian village where water availability is crucial for irrigation and domestic use. The diversion of water resources for tourism-related facilities such as homestays and eateries has heightened local sensitivity towards equitable resource use.

Disturbance to the natural ecosystem, perceived by 61% of respondents, is linked to increased human interference in ecologically sensitive areas such as forest fringes, hill slopes, and waterfall zones. Activities such as uncontrolled trekking, noise pollution, and vehicular movement were reported to disrupt local biodiversity and natural tranquillity. These findings indicate that while village tourism contributes to economic development, its environmental impacts require careful regulation.

Overall, the environmental perception analysis highlights the need for environmentally responsible tourism practices, including effective waste management systems, regulation of tourist flow in sensitive areas, water conservation measures, and greater community involvement in environmental monitoring. Addressing these concerns is essential to ensure that tourism development in Kollengode Panchayat remains ecologically sustainable in the long term.

Factor Analysis of Local Perception on Village Tourism

To identify the underlying dimensions influencing residents' perceptions, factor analysis was carried out using Principal Component Analysis with Varimax rotation.

Table 4: KMO and Bartlett's Test

Test	Value
Kaiser–Meyer–Olkin Measure	0.812
Bartlett's Test of Sphericity (Sig.)	0.000

The Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy obtained a value of 0.812, which is considered "meritorious" and indicates that the correlation patterns among the variables are sufficiently compact to yield reliable and distinct factors. This high KMO value suggests that the sample size and variable selection are appropriate for factor analysis. Bartlett's Test of Sphericity was found to be statistically significant ($p < 0.001$), rejecting the null hypothesis that the correlation matrix is an identity matrix. This confirms that there are significant inter-correlations among the variables, making them suitable for dimension reduction through factor analysis. Together, the KMO and Bartlett's test results validate the robustness of the dataset and justify the application of Principal Component Analysis to identify the underlying dimensions of local perception on village tourism in Kollengode Panchayat.

Table 5: Total Variance Explained

Factor	Eigen Value	Variance (%)	Cumulative (%)
1	4.32	28.6	28.6
2	3.14	21.2	49.8
3	2.26	15.4	65.2
4	1.41	9.3	74.5

Four factors with eigenvalues greater than one explain 74.5% of the total variance, indicating a strong explanatory model. The high cumulative variance suggests that the extracted factors effectively summarise the original set of perception variables without substantial loss of information. The first factor alone accounts for 28.6% of the variance, demonstrating that socio-economic considerations such as employment, income, and infrastructure dominate residents' evaluation of village tourism. The addition of the second factor increases the cumulative variance to nearly 50%, highlighting the importance of cultural values and community participation alongside economic benefits. The third and fourth factors further enhance the explanatory power of the model by incorporating environmental stress and governance-related aspects. In social science research, a cumulative variance exceeding 60% is generally considered satisfactory; therefore, the 74.5% variance explained in this study confirms the robustness and reliability of the factor structure and validates its suitability for interpreting local perceptions on village tourism in Kollengode Panchayat.

Table 6: Rotated Component Matrix (Factor Loadings)

Variable	F1	F2	F3	F4
Employment generation	0.812			
Income improvement	0.786			
Infrastructure development	0.741			
Promotion of culture		0.804		
Heritage conservation		0.768		
Community participation		0.721		
Environmental degradation			0.831	
Resource pressure			0.792	
Tourist behaviour				0.765
Local government management				0.723

The rotated component matrix presents the factor loadings after Varimax rotation, which enhances interpretability by maximising the variance of factor loadings across variables. Loadings greater than 0.70 are considered statistically significant and indicate a strong association between variables and their respective factors. The rotation results reveal a clear and meaningful factor structure with minimal cross-loadings, confirming the distinctiveness of the extracted components.

Variables related to employment generation, income improvement, and infrastructure development load highly on Factor 1, signifying that economic outcomes form the core dimension influencing residents' perceptions of village tourism. This concentration of high loadings demonstrates that tangible livelihood benefits are central to community support for tourism initiatives.

Factor 2 is characterised by high loadings on promotion of culture, heritage conservation, and community participation. This indicates that cultural preservation and social cohesion are closely interlinked in the context of village tourism. The absence of significant cross-loadings suggests that cultural and community-related perceptions form an independent and coherent dimension.

Environmental degradation and resource pressure exhibit strong loadings on Factor 3, reflecting a distinct environmental stress dimension. The separation of this factor from economic and cultural components highlights residents' ability to differentiate between developmental benefits and ecological costs of tourism.

Factor 4 shows strong loadings on tourist behaviour and local government management, representing governance and institutional effectiveness. This factor underscores the importance of regulatory mechanisms, administrative efficiency, and responsible tourist conduct in shaping overall perception. Poor governance or unmanaged tourist behaviour may weaken positive outcomes generated by tourism.

Overall, the rotated component matrix confirms that residents' perceptions of village tourism in Kollengode Panchayat are structured around four clearly defined and statistically robust dimensions. The clarity of factor loadings and absence of overlapping variables strengthen the validity of the factor model and support its use for policy-oriented interpretation and planning.

Collectively, the four extracted factors explain 74.5% of the total variance, indicating a robust model with strong explanatory power. The results demonstrate that residents' perceptions of village tourism are multidimensional, integrating economic benefits, cultural values, environmental sustainability, and governance effectiveness. These findings emphasise the need for an integrated planning approach that simultaneously addresses economic development, cultural preservation, environmental protection, and institutional capacity building.

Interpretation of Factors

The factor analysis reveals that local perception towards village tourism in Kollengode Panchayat is shaped by multiple interrelated dimensions rather than a single dominant influence.

- Factor 1: Socio-Economic Development (Eigen value: 4.32; Variance explained: 28.6%) emerges as the most influential factor. High loadings on employment generation, income improvement, and infrastructure development indicate that residents primarily evaluate tourism through its tangible economic outcomes. This suggests that tourism is perceived as an important mechanism for livelihood diversification, reduction of rural unemployment, and improvement in basic facilities. The dominance of this factor highlights the centrality of economic considerations in shaping community support for tourism initiatives.
- Factor 2: Cultural and Community Dimension (Eigen value: 3.14; Variance explained: 21.2%) reflects the social and cultural implications of village tourism. Strong loadings on promotion of culture, heritage conservation, and community participation indicate that residents value tourism for its role in revitalising traditional practices and strengthening community identity. This factor underscores the significance of participatory and culturally sensitive tourism models, where local traditions and social structures are preserved rather than commodified.
- Factor 3: Environmental Stress (Eigen value: 2.26; Variance explained: 15.4%) captures residents' concerns regarding ecological degradation and pressure on natural resources. High factor loadings for environmental degradation and resource pressure reveal that while tourism is economically beneficial, its environmental consequences are clearly recognised by the local community. This factor reflects increasing environmental awareness among residents and highlights the need for regulatory mechanisms to prevent overuse of fragile ecosystems.
- Factor 4: Governance and Management (Eigen value: 1.41; Variance explained: 9.3%) represents institutional and behavioural aspects of tourism. Variables related to tourist behaviour and local government management load strongly on this factor, indicating that effective governance, rule enforcement, and responsible tourist conduct play a crucial role in shaping residents' overall perception. Weak governance and unmanaged tourist behaviour can undermine positive economic and cultural outcomes.

Collectively, the four extracted factors explain 74.5% of the total variance, indicating a robust model with strong explanatory power. The results demonstrate that residents' perceptions of village tourism are multidimensional, integrating economic benefits, cultural values, environmental sustainability, and governance effectiveness. These findings emphasise the need for an integrated planning approach that simultaneously addresses economic development, cultural preservation, environmental protection, and institutional capacity building.

Non-Parametric Test Results

The Friedman test was applied to rank major tourism impacts based on respondents' perceptions.

Table 7: Friedman Test – Ranking of Tourism Impacts

Impact Dimension	Mean Rank
Economic benefits	3.92
Infrastructure improvement	3.68
Cultural promotion	3.54
Environmental impact	2.86

The Friedman test results provide deeper insight into the relative importance assigned by residents to different dimensions of village tourism. The highest mean rank obtained by economic benefits (3.92) clearly indicates that livelihood-related outcomes such as employment generation and income enhancement are the most influential factors shaping local perception. This finding reinforces the results of factor analysis, where socio-economic development emerged as the dominant factor influencing residents' attitudes towards tourism.

Infrastructure improvement, with a mean rank of 3.68, occupies the second position, highlighting residents' recognition of tourism-induced improvements in roads, public amenities, and basic services. Such infrastructure development is particularly valued in rural areas, as it contributes not only to tourism growth but also to overall community welfare and accessibility.

Cultural promotion ranks third (mean rank 3.54), suggesting that while cultural revitalisation and heritage conservation are important, they are perceived as secondary benefits when compared to direct economic gains. This reflects a pragmatic outlook among residents, where cultural values are appreciated but economic security remains a priority.

Environmental impact receives the lowest mean rank (2.86), indicating comparatively lower prioritisation in residents' overall evaluation of tourism impacts. However, this does not imply a lack of concern; rather, it suggests that environmental issues are often considered acceptable trade-offs for economic and infrastructural benefits. This ranking pattern points to a potential risk, as undervaluation of environmental impacts may lead to long-term ecological degradation if appropriate safeguards are not implemented.

Overall, the Friedman test confirms statistically significant differences in residents' perception across impact dimensions and highlights a clear hierarchy of priorities. The findings emphasise the need for policy interventions that balance economic aspirations with environmental protection, ensuring that short-term economic benefits do not compromise long-term sustainability.

VI. Findings

The study reveals that village tourism in Kollengode Panchayat has generated notable socio-economic benefits and enjoys broad support among local residents. Tourism has contributed positively to employment generation and income enhancement by creating both direct and indirect livelihood opportunities, thereby supporting diversification of the rural economy. Improvements in infrastructure such as roads, sanitation, and public amenities have further strengthened residents' quality of life while simultaneously enhancing the attractiveness of the area as a tourism destination. In addition, tourism has played a meaningful role in promoting local culture and heritage by encouraging the revival of traditional arts, crafts, cuisine, and cultural practices, thus reinforcing community identity and pride.

At the same time, the findings indicate emerging environmental challenges associated with tourism development. Increased waste generation, pressure on water resources, and disturbance to natural ecosystems were identified as key concerns, particularly in ecologically sensitive areas. The factor analysis confirms that residents' perceptions are multidimensional, shaped by socio-economic development, cultural and community aspects, environmental stress, and governance and management effectiveness. The results further highlight that while economic benefits are prioritised, sustainable tourism development depends heavily on effective local governance, responsible tourist behaviour, and active community participation. Overall, the findings underscore the need for a balanced approach that maximises socio-economic gains while minimising environmental impacts to ensure the long-term sustainability of village tourism in Kollengode Panchayat.

VII. Suggestions

The findings of the study suggest that village tourism in Kollengode Panchayat requires a carefully planned and community-oriented development approach. Strengthening community-based tourism initiatives should be prioritised to ensure active participation of local residents in planning, decision-making, and benefit-sharing processes. Greater involvement of local self-government institutions, women's groups, and youth organisations can enhance ownership and long-term sustainability of tourism initiatives.

Environmental management measures need immediate attention to address issues such as waste accumulation, water resource stress, and ecosystem disturbance. Establishing effective solid waste management systems, promoting waste segregation at source, and encouraging eco-friendly practices among tourists and service providers are essential. Regulating tourist flow in ecologically sensitive areas and promoting water conservation measures will help minimise environmental degradation.

Planned and eco-sensitive infrastructure development is crucial to balance tourism growth with environmental protection. Infrastructure projects such as roads, sanitation facilities, and accommodation should adhere to sustainability principles and carrying capacity considerations. In addition, awareness programmes and capacity-building initiatives should be conducted for both residents and tourists to promote responsible tourism behaviour, cultural sensitivity, and environmental stewardship. Collectively, these measures can ensure that village tourism contributes to inclusive economic development while preserving the environmental and cultural integrity of Kollengode Panchayat.

VIII. Conclusion

Village tourism in Kollengode Panchayat possesses considerable potential to support sustainable rural development. While local residents largely support tourism due to its socio-economic benefits, environmental concerns necessitate careful planning and regulation. Incorporating local perceptions into tourism planning and policy formulation is essential to ensure balanced and inclusive development. A community-centred and environmentally responsible approach can enable village tourism to function as a sustainable development strategy in Kollengode Panchayat.

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