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Multidimensional Tourism Carrying Capacity of Pilgrim Tourism Spots in Kerala - A Conceptual Model for Evaluating the Results

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Abstract: Kerala's tourism carrying capacity is a key national policy aiming to strike a balance between optimal tourism development and the protection of fragile social, economic, and environmental structures. This study takes a comprehensive and in-depth look at Kerala's multidimensional tourism carrying capacity. The primary goal of this study is to evaluate Kerala's Multidimensional Tourism Carrying Capacity, which will be used to determine Kerala's Tourism Carrying Capacity. The study proposes an integrated development model based on six targeted variables: the economy, ecology or nature, social, cultural, heritage, and political. This holistic approach ensures a complete understanding of the complex interplay between tourism development and its impacts on various facets of the region. The proposed model for assessing Kerala's multidimensional tourism carrying capacity (MDTCC) represents a significant advancement in understanding the complex interplay between tourism development and its impacts on various facets of the region. By incorporating these six targeted variables, the model provides a comprehensive framework for assessing the sustainable

limits of tourism in Kerala. Each variable is interconnected, with their interactions influenced by internal and external forces. The differential approach used in this study allows for a more nuanced analysis of these relationships, ensuring that the model can adapt to the changing nature of tourism and its effects. This holistic approach is critical for developing effective policies to mitigate adverse effects while maximizing tourism benefits.

Keywords: *Tourism policy, foreign exchange, Sustainable progress, and Use of variables*.

Introduction

Kerala, known as God's Own Country, is a popular tourist destination experiencing rapid growth in intensity and seasonality. This implies that the number of tourists that come to the area will have a significant negative impact. Thus, figuring out Kerala's tourism carrying capacity is a crucial national policy to guarantee a balance between attaining the best tourism development and protecting fragile social, economic, and environmental structures. The multidimensional tourism carrying capacity of Kerala is examined in this study. The primary goal of this study is to propose a model to evaluate Kerala's multidimensional tourism carrying capacity, which will be used to determine Kerala's tourism carrying capacity using a differential approach based on the MDTCC. An integrated development model with six target variables: the economy, ecology or nature, social, cultural, heritage, and political. These distinct subsystems are considered intricate components of other exogenous (external) and endogenous (internal) variables. Because seven relations and seven endogenous variables serve as policy target variables, the MDTCC is calculated mathematically. This study proposes a model for assessing the multi-dimensional tourism carrying capacity of pilgrimage destinations in Kerala. A prospective conceptual study using the MDTCC can investigate how the government's tourism policy performs. This study is entirely conceptual, relying on previously established ideas and target variables adjusted for other endogenous, exogenous, and parameter variations. The framework's quantitative MDTCC procedures for evaluating each component are based on mathematically sound procedures and techniques used throughout the ex-ante and ex-post evaluation monitoring processes, from data planning to policy analysis results reporting. The rapid expansion of tourism in Kerala, which covers 37,000 square km, has presented several challenges. The increase in visitor numbers, particularly during peak seasons, has had a significant negative impact on specific areas. The tangible effects include environmental degradation, pressure on local resources, and changes in land use patterns. The social and cultural implications are also significant, albeit more difficult to quantify. Tourism has brought about economic and social benefits such as job creation, improved infrastructure, and increased income. However, it has also caused social unrest, including land disputes between local communities and developers. Traditional villages have seen changes in customs and lifestyles, which reflect broader social trends. These changes emphasize the importance of sustainable tourism practices that balance economic growth with social and cultural integrity, ensuring that tourism development in Kerala benefits all stakeholders while

mitigating negative consequences. Despite the challenges posed by the global pandemic, the tourism industry in Kerala, also known as "God's Own Country," remained a critical sector of the state's economy in 2021. That year, the industry earned around $2.3 billion in foreign exchange, accounting for roughly 8% of Kerala's GDP. This substantial contribution underscores the sector's role as an economic catalyst, stimulating growth across interconnected hospitality, transportation, and retail industries. The tourism sector in Kerala is notable for its inclusivity, providing employment opportunities for many women and young people, creating jobs that leverage low-skill labour, aiding in poverty alleviation, and supporting local communities. Despite the global downturn in tourism due to COVID-19, Kerala managed to attract a steady flow of domestic tourists, indicating a resilient and adaptive tourism sector. To ensure a balance between achieving optimal tourism development and protecting the state's delicate environmental and social structure, Kerala's tourism industry stakeholders view the Kerala Tourism Carrying Capacity (KTCC) as a crucial development policy issue. This is known as sustainable tourism development, which is defined as socially, environmentally, and economically acceptable tourism development within the carrying capacity. A branch of operational policy research known as multiple-criteria decision analysis (MCDA) or multiple-criteria decision-making (MCDM) explicitly takes into account the various criteria components, linkages, and processes that are present in decision-making systems (*Saaty, 1980*; *Keeney et al., 1993*). The problems and solutions associated with MCDM are categorized differently. Whether or not the solutions to MCDM problems are defined explicitly or implicitly makes a significant difference (*Saaty, 1980*; *Keeney et al., 1993*). Alternative solutions for multiple-criteria design problems are not explicitly known. Mathematical model solving yields an alternate solution. When some variables are continuous, the number of alternatives is either infinite or not countable; when all variables are discrete, the number of alternatives is usually massive (*Charnes et al., 1978*). By building a value function, methods for solving multiple criteria design problems have been developed that use prior articulation of preferences. Among these techniques, goal programming is arguably the most well-known. The resulting single objective mathematical program is solved to find the preferred solution after constructing the value function (Charnes et al., 1978). Specific techniques demand that the DM provide preference data at every stage of the solution process. These are "progressive articulation of preferences" or interactive techniques (*Hwang & Yoon, 1981*).

Literature Review

Carrying capacity is a concept that public and private developers, especially in developing nations, have not taken seriously regarding calculation and control. Due to the overcrowding in many tourist-developed areas, historical sites and the natural environment have been destroyed or are on the verge of destruction. Therefore, despite measurement challenges, tourism carrying capacity must be included in tourism planning as started by governments and other developers (*O'Reilly et al., 1986*).

Their study examines a strong relationship between society, economy, and environment in any locality. Environmental and other geographic features create locational advantages that attract people and economic activities (*Mexa et al.; H., 2017*). Human activities and patterns of living are often based on local environmental conditions and resources, while at the same time, they may affect them. Quite often, the degradation of the environment may have an impact on people and their activities, as in the case of tourism. To the extent that such effects do not significantly disturb the structure and dynamics of local human and natural ecosystems, there is a perceived balance or 'harmony' in a dynamic sense of continuing gradual change and adaptation. A critical issue in this perspective is the capacity of a system to assimilate change, which also brings forward the notion of its thresholds or limits. This is the conceptual foundation for carrying capacity in tourism planning and management (*Coccossis, 2002; Coccossis & Parpairis, 2000*).

Growing concerns about the ability of tourist destinations and protected areas to accommodate recreational use have sparked renewed interest in the long-term viability of tourism development projects. Planners and scientists have frequently used the idea of tourism or recreation carrying capacity to define problems and develop management strategies. From a neo-Malthusian perspective of resource constraints, the idea of a carrying capacity for tourism or recreation developed. The concept also raises concerns about protected area management and tourism goals and several assumptions that lack empirical support. There are few prerequisites for determining a carrying capacity met in the actual world. Parking lots and other restricted circumstances might be suitable for specific numerical capacities but are frequently investment-related. In sustainable tourism, carrying capacity is frequently regarded as a theoretical, practical, and purely intuitive concept. The carrying capacity application has the most significant potential in protected areas, frequently visited cultural and natural attractions, the preservation of the local community's lifestyle, and the potential for tourism destinations in general. Some writers are correct in arguing that there is no coherent theory of tourism carrying capacity despite the subject's importance, partial applications, identification of fundamental theoretical principles, and connection to other theoretical concepts in the industry. Tourism destinations' carrying capacities and growth limits have long been debated. Carrying capacity has been the foundation of sustainable tourism development for decades, providing "time/space-specific answers" for European unique localities. There are many definitions for this concept, and it is impossible to calculate a single "magic number" that accurately represents carrying capacity due to various factors such as divergent visitor and resident thresholds, ecological constraints, limited resources, and so on. The impact of human activity on a region is discussed in terms of carrying capacity and regional sustainability. For the region to provide adequate supporting functions for its population, the impact must be both ecologically responsible and socially and economically sustainable. This means that regions should educate themselves as much as possible about the effects of tourism on their destinations to develop sound and sufficient policies that benefit both tourism and the region. As a result, this paper proposes a novel methodology for determining carrying capacity in tourist destinations that is (a) broadly applicable

to any destination in developing countries and (b) specifically tailored to meet destination-specific needs, as demonstrated by pilot testing on many representative cases. The findings emphasize the value of this practical, hands-on approach and the importance of communication among various stakeholder groups. The developed methodology adds value by simultaneously addressing tourism development and regional sustainability while acknowledging that carrying capacity cannot be measured or valued separately. Finally, it applies to a variety of destinations. (*Canestrelli, E. and Costa, P., 1991*).

Method

A thorough examination of the current state of affairs, available opportunities and challenges, as well as the social and economic implications, helps to develop a conceptual model to test the multidimensional total tourism carrying capacity of Kerala's tourism destinations in terms of social, economic, political, heritage, and environmental dimensions. This will help determine whether the current situation is sustainable and whether increasing visitor numbers could impact the environment, available resources, and public service quality. Tourism carrying capacity is multifaceted and can be measured in various social and economic dimensions (*Josef et al., 2014*; *WTO, 1999*). When considering the nature of the causes, interconnectedness, and effects on tourist destinations' socio-cultural, natural, and economic aspects, it is critical to remember their multifaceted nature. In the case of ecological carrying capacity, environmental manifestations include local ecosystem changeability, time changeability, seasons, weather, and area size. The carrying capacity of tourism, its prevailing weaknesses, difficulties, and effects, and its significance for Kerala's economy and people's way of life are uncertain and unknown. The study's objective is to propose a conceptual model for investigating the concept of multidimensional tourism carrying capacity for practical evaluation and assessment.

Analysis & Discussion

To create, modify, and present the Multidimensional Tourism Carrying Capacity (MDTCC) model, which will evaluate and determine Kerala's current tourism development status based on several important political, social, cultural, economic, environmental, and heritage variables. The multiple-criteria decision-making (MCDM) or multiple-criteria decision analysis (MCDA) theory serves as the foundation for the MDTCC model for Kerala (*Hwang & Yoon, 1981*). The MDCA makes it possible to discuss a wide range of socioeconomic context-related topics, and carrying capacity is closely linked to sustainability's dimensions and its conceptual elements such as environment, society, and economy (*ESPON EGTC, 2020*). This study suggests an analytical approach that establishes the causal relationship between spatial phenomena (flows and concentrations) and all these various aspects of tourism as a sub-sector of the economy. The analytical, methodological approach addresses this challenge by allowing for different approaches to evaluating normative borders for carrying capacities (*Denise & Pavol, 2014; ESPON EGTC, 2020*). Formalizing an economic model has the advantage of passing the second-generation reform test, giving the Tourism Carrying

Capacity model (*ESPON EGTC, 2020*) more terrific refinement and quantitative guidance. The degree of analysis suits contemporary policy's project, planning, monitoring, controlling, and evaluation needs.

Model

Regarding several important economic, environmental, social, cultural, historical, and political variables, the MDTCC model may help, serve as the foundation for, and provide direction for field research to determine Kerala's present state of tourism development. The studied variables will help with growth scenario projections and suggestions and offer preliminary perspectives and a strategic direction for tourism policy supporting Kerala's high-value, low-impact tourism goal. The goal is to define ideal circumstances and limits for expanding tourism and the related, balanced effects of tourism Multidimensional Tourism Carrying Capacity (*MDTCC*) as a policy target variable. Let us define the overall *TCC* variable as a complex function of six interdependent policy dimensional variables, components, or subsystems variables within the MDTCC Model, namely, [1] Economy, (*E*), [2] Ecology or Nature, (*N*), [3] Social, (*S*), [4] Culture, (C); [5] Heritage, (*H*) and [6] Political (*P*). These independent components or subsystems are complex functions of endogenous and exogenous factors, parameters, and pre-outcomes. Overall or total *TCC* target policy variable as a linear function of variables *E, N, S, C, H* and *P as follows*;

Model: $TCC = \beta 0 + \beta 1 \times E + \beta 2 \times N + \beta 3 \times S + \beta 4 \times C + \beta 5 \times H + \beta 6 \times P + \beta 12 \times E \times N + \beta 13 \times E \times S + \ldots + \epsilon$

In this model, $\beta 0$, $\beta 1$, $\beta 12$, and $\beta 13$ represent the coefficients to be estimated, capturing the direct and interaction effects of the policy dimensional variables on the overall TCC. $E \times N$ and $E \times S$ represent interaction terms that account for the combined influence of multiple policy dimensional variables on the TCC. This model extends beyond a simple linear relationship and incorporates interactions between the policy dimensional variables, reflecting the multidimensional nature of the MDTCC framework.

Economic Carrying Capacity, (*E*)

Economic carrying capacity is the threshold limit (capacity) beyond which tourism growth becomes economically unacceptable; this situation may arise from two conditions: a) when tourism businesses interfere with other social economic activities obstructing their development, b) when the presence of a significant number of tourists makes the destination no more comfortable and attractive and causes a contraction in tourism demand, (*Lohmann & Panosso, 2017*).

$$E = \beta 0 + \beta 1 \times E1 + \beta 2 \times E2 + \beta 3 \times E3 + \beta 4 \times E4 + \beta 5 \times E5 + \epsilon$$

E = Overall Economic Factors

E1 = Economic Revenues
E2 = Number and Type of Tourists
E3 = Tourism Infrastructure System facilities
E4 = Human Resource Capacity
E5 = Tourism Images and Attractions

$\beta 0$, $\beta 1$, $\beta 2$, $\beta 3$, $\beta 4$, and $\beta 5$ are the coefficients to be estimated.

ϵ represents the error term, accounting for unexplained variance.

Natural, Physical (Or Ecological) Carrying Capacity (N)

Natural, physical (or ecological) carrying capacity is the threshold limit beyond which the nature of a destination is damaged by tourism. The physical carrying capacity of a destination is then determined through the analysis of its environmental components.

$$N = \beta 0+\beta 1\times N1+\beta 2\times N2+\beta 3\times N3+\beta 4\times N4+\beta 5\times N5+\epsilon$$

N = Overall Natural or Ecological Carrying Capacity
N1 = Air quality,
N2 = Water quantity and quality,
N3 = Sanitation, sewage treatment plants, waste treatment plants,
N4 = Forestry, fisheries, animals
N5 = Land, infrastructure, beaches, sand and soil quantity and quality
$\beta 0$, $\beta 1$, $\beta 2$, $\beta 3$, $\beta 4$, and $\beta 5$ are the coefficients to be estimated.
ϵ represents the error term, accounting for unexplained variance.

Social Carrying Capacity (S)

The social carrying capacity (SCC) is the maximum level of consumption that an area can absorb without compromising the quality of the visitor experience or having an unacceptable adverse impact on the local community. SCC has two components: (i) the acceptable quality of visitor experience before seeking alternative destinations (i.e. the ability to carry tourist psychology) and (ii) the level of tolerance of the host population to the presence of tourists.

$$S = \beta 0+\beta 1\times S1+\beta 2\times S2+\beta 3\times S3+\beta 4\times S4+\beta 5\times S5+\epsilon$$

S = Overall Social Carrying Capacity
S1 = Acceptable quality of visitor experience,
S2 = Level of tolerance of the host families, communities and population,
S3 = Level of tolerance of the religious leaders,

S4 = State or government institutional systems such as the ZTC

S5 = Acceptable quality and level of tolerance of the global tourist organizations and agencies

$\beta 0$, $\beta 1$, $\beta 2$, $\beta 3$, $\beta 4$, and $\beta 5$ are the coefficients to be estimated.

ϵ represents the error term, accounting for unexplained variance.

Culture Carrying Capacity (C)

Culture is the set of customs, traditions, and values of a society or community, such as an ethnic group or nation. Culture is a set of knowledge acquired over time. In this sense, multiculturalism values consist of peaceful coexistence and mutual respect between different cultures inhabiting Kerala.

$$C = \beta 0+\beta 1\times C1+\beta 2\times C2+\beta 3\times C3+\beta 4\times C4+\beta 5\times C5+\epsilon$$

C = Overall Cultural Carrying Capacity

C1 = Social, behavioural, institutions (e.g. family and friendship relationships), and norms

C2 = Changes in cultural practices,

C3 = Islamic norms and practices,

C4 = Cultural universal (e.g., art, music, ritual, and taarab dance) and

C5 = Multiculturalism values, including peaceful coexistence and mutual respect

$\beta 0$, $\beta 1$, $\beta 2$, $\beta 3$, $\beta 4$, and $\beta 5$ are the coefficients to be estimated.

ϵ represents the error term, accounting for unexplained variance.

Heritage Carrying Capacity (H)

Kerala's heritage is what the country inherited from the past, and it should be valued and enjoyed today, preserved, and passed down to future generations. Historic sites, buildings, monuments, museum objects, artefacts, and archives are examples of tangible cultural heritage in Kerala. It is a tradition passed down from generation to generation, leaving a national legacy of honour, pride, and courage. It comes or belongs to someone because of birth, an inherited lot or portion, a legacy of poverty and suffering.

$$H = \beta 0+\beta 1\times H1+\beta 2\times H2+\beta 3\times H3+\beta 4\times H4+\beta 5\times H5+\epsilon$$

Whereby this fifth subsystem or component includes;

H = Overall Heritage Carrying Capacity

H1 = Tangible culture (museology; archival science, art conservation),

H2 = Cultural intangibles (e.g., folklore and oral history),

H3 = Swahili language preservation

H4 = Natural heritage (e.g., rare breeds; conservation and heirloom of plants),

H5 = Digital heritage (e.g. physical objects such as documents that have been digitized for retention and artefacts)

$\beta 0$, $\beta 1$, $\beta 2$, $\beta 3$, $\beta 4$, and $\beta 5$ are the coefficients to be estimated.

ϵ represents the error term, accounting for unexplained variance.

Political Carrying Capacity (P)

Politics is practiced at various social and economic levels, ranging from clans and tribes in traditional societies to modern local governments, companies, institutions, sovereign states, and the international level. Political carrying capacity describes the ability and capability of national systems, actors, and entities to achieve good social and economic governance.

$$P = \beta 0 + \beta 1 \times P1 + \beta 2 \times P2 + \beta 3 \times P3 + \beta 4 \times P4 + \beta 5 \times P5 + \epsilon$$

Whereby this fifth subsystem or component includes;

H = Overall Political Carrying Capacity

P1 = Government or State Capacity

P2 = Democratic Institutions and Political Freedoms

P3 = Efficient Public Service Delivery

P4 = Peace, Health, Safety and Security

P5 = Cross-cutting policy issues such as Poverty Reduction, Anti-corruption, and Gender policy measures

Discussion

A review of the study's literature employing multiple-criteria decision-making analysis with political, social, cultural, ecological, heritage, economic, and cultural dimensions aids in developing the MDTC model. The formal quantitative, multidimensional tourism carrying capacity model is also known as the overall capacity. The study's findings highlight the importance of assessing Kerala's multidimensional tourism carrying capacity (MDTCC) using an integrated development model. The model's use of six targeted variables, economy, ecology, social, cultural, heritage, and political, ensures a comprehensive approach to understanding tourism's multifaceted impacts. The model provides a nuanced analysis of Kerala's tourism dynamics by considering both exogenous and endogenous factors. This strategy is critical given the region's rapid growth and seasonal fluctuations in tourist numbers, which pose significant risks to its social, economic, and environmental sustainability. The study's differential approach employs mathematically sound evaluation procedures and provides a robust framework for ongoing monitoring and policy adjustments, ensuring that tourism development aligns with sustainable practices. Furthermore, the proposed model emphasizes the importance of comprehensive policymaking, considering multiple perspectives and data-driven insights. The quantitative MDTCC procedures make it easier to assess each component at every stage of tourism development, from planning to implementation and

reporting. This methodological rigour ensures that the potential effects on the targeted variables are systematically assessed, allowing for more informed decision-making. The study's conceptual foundation emphasizes the significance of adaptive management strategies that respond to changing conditions and emerging challenges. This study contributes to the broader discourse on sustainable tourism development by providing a detailed framework for assessing tourism carrying capacity. It offers valuable guidance for policymakers balancing tourism growth with preserving Kerala's unique cultural and natural heritage.

Result

The practical application of the MDTCC model provides valuable insights for policymakers and stakeholders in Kerala's tourism industry. The quantitative procedures outlined in this study allow for rigorous ex-ante and ex-post evaluations of tourism policies and outcomes. The model uses mathematically sound techniques to ensure accurate and reliable assessments throughout all stages of policy implementation, from planning to reporting. This comprehensive approach allows for ongoing monitoring and adjustment of tourism strategies, promoting sustainable practices that protect Kerala's social, economic, and environmental well-being. Furthermore, the conceptual framework presented in this study serves as a foundation for future research, encouraging further investigation into the multidimensional aspects of tourism carrying capacity. Overall, the MDTCC model is vital for guiding sustainable tourism development in Kerala, ensuring the region remains a vibrant and resilient destination for years. The conceptual model proposed in this study integrates six targeted variables, economy, ecology or nature, social, cultural, heritage, and political, to evaluate Kerala's multidimensional tourism carrying capacity (MDTCC). These variables are intricately connected, forming relationships determining the region's capacity to sustain tourism development.

Economy: Economic factors such as tourism revenue, employment generation, and infrastructure development are essential for assessing tourism carrying capacity. An increase in tourism can boost the local economy, but it must be balanced against potential economic disruptions or inflationary pressures. The economic variable interacts with all other variables by influencing and being influenced by the environmental costs, social dynamics, and political decisions.

Ecology or Nature: The ecological aspect considers the impact of tourism on natural resources, biodiversity, and environmental quality. Sustainable tourism practices are necessary to protect Kerala's fragile ecosystems. This variable is linked to economic activities (e.g., ecotourism), social behaviours (e.g., tourist activities impacting nature), and political regulations (e.g., environmental laws and policies).

***Social*:** Social factors include the impact of tourism on local communities, including issues like crowding, quality of life, and social equity. Tourism can lead to social benefits such as cultural

exchange and improved services but may also cause social disruptions. The social variable interacts with economic opportunities, cultural preservation, and political governance.

Cultural: The cultural variable assesses the influence of tourism on local traditions, heritage sites, and cultural practices. Tourism can promote cultural preservation and exchange, but it may also lead to the commercialization and degradation of cultural assets. This variable is closely connected to social dynamics, economic benefits, and political strategies for heritage conservation.

Heritage: Heritage considerations involve protecting and maintaining historical sites and cultural landmarks. The influx of tourists can provide funds for preservation but can also lead to the wear and degradation of these sites. This variable is linked to cultural significance, economic inputs for maintenance, and political policies for heritage management.

Political: Political factors encompass the governance, policies, and regulations that shape tourism development. Effective political strategies are necessary to manage tourism sustainably, balancing economic growth with environmental and social protection. This variable interacts with all other variables by setting the framework for sustainable tourism practices, regulatory measures, and strategic planning.

Interactions and Endogenous-Exogenous Factors

Endogenous Factors: These are internal factors within Kerala that influence the MDTCC, such as local economic conditions, environmental resilience, social cohesion, cultural vibrancy, heritage site conditions, and political stability. The actions and decisions of local stakeholders and policymakers directly influence these factors.

Exogenous Factors: These are external influences such as global economic trends, climate change, international tourism demand, and geopolitical dynamics. Exogenous factors impact the internal variables by shaping the broader context within Kerala's tourism sector. The model's differential approach enables a detailed analysis of how these variables interact, ensuring that tourism policies can be adapted to the dynamic nature of tourism impacts. This holistic and integrated model provides a robust framework for understanding and managing the complex relationships that define Kerala's tourism carrying capacity, guiding sustainable development for the region's and its stakeholders' benefit.

Conclusion

The study successfully proposes a comprehensive model to evaluate the multidimensional tourism carrying capacity (MDTCC) of pilgrim tourism spots in Kerala. This model is based on six targeted variables: economy, ecology or nature, social, cultural, heritage, and political. Moreover, it is essential

to progress sustainable tourism development to the next level. Integrating these variables into a single framework allows for a holistic assessment of the tourism carrying capacity, which is critical for maintaining the delicate balance between tourism growth and preserving Kerala's fragile social, economic, and environmental structures. By utilizing a differential approach, the study addresses endogenous and exogenous factors that influence the carrying capacity, providing a robust tool for policy-makers to make informed decisions. The implementation of this model can significantly contribute to the formulation and evaluation of tourism policies in Kerala. Through quantitative MDTCC procedures, this study lays out a methodological framework for monitoring and evaluating tourism impacts from planning to reporting results. This comprehensive approach ensures that all stages of tourism development are scrutinized for their potential impacts on the targeted variables, promoting sustainable tourism practices. Ultimately, this study provides a valuable conceptual foundation for future research and policy-making, aiming to enhance the sustainability and resilience of Kerala's tourism sector while preserving its unique cultural and natural heritage.

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