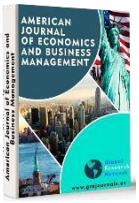

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Article

Methodological Aspects of Effective Models for Sustainable Tourism Development

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Abstract: Using Hazrati Dovud Cave in Uzbekistan as a case study, this study explores the economic, environmental, and social aspects of sustainable tourist development. Despite tourism's importance on a worldwide scale, there is still disagreement over how to strike a balance between its economic advantages and sustainability issues. This study finds weaknesses in the way infrastructure impacts and visitor influx are managed. Using theoretical analysis, methodical techniques, and carrying capacity models, the study emphasizes how resource and environmental constraints cause the site's actual and effective capabilities to fall short of ideal levels. In order to guarantee ecological preservation, cultural heritage conservation, and fair economic advantages, the findings suggest implementing global sustainability models that are adapted to local situations. These observations provide policymakers with a framework for advancing cultural resilience, sustainable tourism, and Uzbekistan's economic development.

Keywords: tourism, tourism infrastructure, tourism companies, guides and translators, tour leaders

1. Introduction

The tourism sector holds a significant strategic position in the global economy today and plays a critical role in the economic, environmental, and social sustainable development of nations. Beyond contributing to economic growth, tourism also aids in the preservation of natural resources, the protection of cultural heritage, and the improvement of local communities' well-being. International experience shows that implementing "green economy" principles and optimizing infrastructure through modern management models are essential for sustainable tourism management and development.

This article evaluates the carrying capacity of tourism sites, using the Hazrati Dovud Cave in Uzbekistan as an example, and examines the impact of tourist flows on local infrastructure. The study also explores ways to adapt international best practices to local contexts to ensure the ecological, economic, and social sustainability of tourism.

Relevance of the Topic

Today, the rapid global growth of tourism and the increasing flow of travelers highlight the necessity of effectively managing the environmental sustainability and infrastructural capacity of tourism sites. Alongside maximizing the economic benefits of tourism, countries are increasingly focusing on minimizing its negative impacts on local

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environments and communities. Issues such as environmental safety, preservation of natural resources, protection of cultural heritage, and preventing excessive strain on local infrastructure have become some of the most pressing challenges.

In Uzbekistan, religious and tourism sites like the Hazrat Dovud Cave are attracting significant visitor numbers, driven by a growing public interest in notable landmarks. This influx necessitates careful management of ecological sustainability and infrastructural limitations. This study examines international best practices and adapts them to local conditions, proposing solutions to ensure sustainable development at tourism sites. Therefore, analyzing this topic is crucial for advancing Uzbekistan's sustainable tourism potential.

Mavzuga oid adabiyotlar tahlili

Various definitions of tourism development have been provided by scholars. For instance, Canadian economist Richard Butler describes tourism as an industry with a life cycle. According to him, "tourism goes through different stages of development, from the initial stage to the recovery stage after war or crisis". Butler emphasizes the importance of developing appropriate strategies for each stage of tourism, as the stable growth of the sector depends on this factor [1]. Jonathan Davidson highlights the need to apply sustainability principles more broadly in tourism development. In his view, given climate change and the depletion of natural resources, focusing on sustainable tourism is essential. He suggests monitoring energy efficiency and the use of natural resources at the regional level [2]. Liang Wang, focusing on the significance of digital technologies in tourism, points out that their development accelerates industry growth. He considers the automation of services through digital tourism, enhancing tourists' personalized experiences, and increasing industry competitiveness as progressive steps [3]. In her recent studies, Sofia Lopes-Gonzalez regards "encouraging community involvement to preserve local culture and traditions as a key factor in tourism development" [4]. She particularly proposes new strategies for harmonizing tourism with the preservation of cultural heritage.

2. Methodology

This scientific article analyzes the methodological aspects of effective models for sustainable tourism development. Various methods were effectively employed, including theoretical reflection, a systematic approach, observation, generalization, comparative analysis, and synthesis, utilizing official tourism statistical data.

3. Analysis and Results

The World Travel & Tourism Council (WTTC) [5] considers travel and tourism as one of the world's largest industries, employing approximately 230 million people globally. Additionally, the UNWTO (World Tourism Organization) reports that this sector accounts for about 9% of global GDP. The WTTC includes not only the tourism industry in its figures but also acts as an industrial lobbying group. A lobbying group is an organization or assembly formed to protect the interests of a specific industry or interest group within governmental institutions. Lobbyists advance their interests by influencing lawmakers, government officials, or other political decision-makers to align specific laws, policies, or government decisions with the interests of their clients or represented groups. While their claims can sometimes be exaggerated, these figures align with other sources, reaffirming that tourism is a vast and rapidly growing industry.

However, can the planet sustain such growth? Does modern tourism practice align as a model for economic development that secures income sources for future generations without destroying the associated environment? Are the UNWTO (World Tourism Organization) forecasts inevitable? The following section will address some of the social, cultural, economic, and environmental issues arising from the industry and its practices.

Inspired by the 1992 Rio de Janeiro Earth Summit, framework models were developed that focused on sustainable tourism development, specifically applying a sustainable lifestyle approach to create positive development models in tourism. These modern models, like many others, serve as a foundation for understanding development challenges and their implications. They are constructive in that they seek to offer solutions aimed at resolving development issues, particularly striving to reduce poverty. For this reason, they hold unique significance for new forms of tourism in developing countries. They differ from older models, which tend to base their strategies on prescriptive actions rather than a thorough understanding of existing conditions and case studies. As emphasized by the United Nations International Fund for Agricultural Development (IFAD), a sustainable livelihood approach is "a means to better understand the lives of the poor" [6].

The primary features of research in the tourism field highlight two crucial aspects. First, there are numerous textbooks that provide a detailed description of existing approaches to tourism analysis. Second, it is notable that discussions on tourism include very few approaches and how these have influenced subsequent research directions. These approaches often recur or are examined in case study materials.

Efforts to identify the main stakeholders and structures in the tourism industry usually take the form of block diagrams. One of the most frequently cited is Mathieson and Wall's conceptual tourism scheme [7].

The conceptual tourism scheme from Mathieson and Wall's book, "Tourism: Economic, Physical, and Social Impacts" (1982), includes three main aspects covering tourism's impact on destinations:

Economic Impacts: This includes tourism's influence on the local and national economy, such as job creation, currency inflows, income enhancement, and infrastructure development. It also covers negative impacts like economic instability due to tourism dependency and seasonality or reduced tourism activities.

Environmental Impacts: This encompasses changes to the natural environment resulting from tourism activities. Tourism can lead to landscape degradation, pollution, and the disruption of ecosystems and cultural landmarks. However, with a sustainable approach, tourism can also contribute to nature conservation and the restoration of natural resources.

Social and Cultural Impacts: These impacts relate to changes in the life of the local community and the cultural environment. Tourism can lead to the loss of traditions, shifts in values, and increased social tensions. However, it can also promote cultural exchange, help restore local cultures, and improve the standard of living for the local population.

This model aids in analyzing tourism by allowing the study of the interconnections between its economic and social impacts on local communities and the environment.

There is a positive effort to link tourism development with sustainability and poverty alleviation. This approach serves as a compilation of recommendations for understanding and overcoming poverty. It is connected with sustainability models or frameworks like Spangenberg and Valentine's sustainability prism, and models of sustainable rural lifestyles [8]. In this model, poverty and sustainability issues are studied in conjunction, and this area is gaining significant importance in scientific and practical research. Currently, this approach is becoming popular among researchers and has turned into a "trend" in contemporary science and tourism development strategies.

Another approach that has attracted the attention of scholars is the study of the progression of tourism destinations from development to decline. In the model developed by Doxey [9], destination communities transition from "euphoria" to "antagonism". Meanwhile, Butler's resort life cycle model illustrates the process of destinations moving from the initial "exploration" phase to a stage of "stagnation" [10]. These models can interpret tourist behavior through the lens of ideology and political changes. An example of this is the concept of the work ethic. Although it has been a contentious issue in political debates for many years, the work ethic is frequently referenced and utilized to explain work models and practices in industrializing and industrialized societies.

Overall analyses indicate that the improper exploitation of natural resources can lead to their depletion, resulting in not only environmental but also economic and social harm in the long term. Various initiatives are being promoted by international and local partner organizations, such as the World Wide Fund for Nature (WWF) [11], the International Union for Conservation of Nature (IUCN) [12], Friends of the Earth International (FOEI) [13], the International Ecotourism Society (TIES) [14], and the Climate Change Committee (CCC) [15]. Their initiatives focus on nature conservation, biodiversity protection, combating climate change, promoting sustainable tourism, and fostering collaboration with local communities.

According to Reyel and Grasse [16], the ethics of travel and marketing activities should operate within specific boundaries. This ethical framework encompasses key elements such as raising public awareness about environmental issues, maximizing economic benefits for local communities, promoting cultural sensitivity, and minimizing the negative environmental impact of travel.

Jim Butcher notes that such tendencies reflect what he describes as the concept of "New Moral Tourism" [17]. According to him, the central characteristics of this ethical view include striving for spiritual enrichment in other places and a strong desire to protect these areas to preserve cultural diversity and environmental integrity. However, David Fennell points out that tourism research lacks comprehensive ethical principles — in a theoretical context — that would guide an understanding of the importance of human values in tourism decision-making processes.

Undoubtedly, the opportunity to take vacations and make use of leisure time has significantly expanded since the 1960s. The rise in accessibility to foreign travel through package tours has had a substantial impact on many regions around the world, establishing these areas as primary tourist destinations. The global growth of tourism has had both positive and negative effects on the economic, cultural, and ecological development of these regions.

Over time, certain styles of consumption, fashion, or lifestyle trends tend to diffuse downward within the socio-economic structure of society. Inspirational elites set the trends, which the broader public aspires to follow, striving to emulate the behavior and style of the elite as circumstances allow. As this process unfolds, early travelers and elites, constantly seeking novelty, uniqueness, and exclusivity, continue to advance by discovering new destinations.

In our view, the development of alternative forms of tourism has partly arisen from the need to address existing challenges in traditional tourism. Additionally, other factors have influenced this process. For instance, the increasing demand within the tourism industry, along with the growing knowledge and awareness of tourists regarding leisure activities, has been cited as a crucial factor. These elements, to varying degrees, play a significant role in explaining the emergence and growth of new forms of tourism.

While we do not deny the presence of these factors, we consider the assumed link between the growth of new forms of tourism and the issues caused by traditional mass tourism to be somewhat misplaced. These issues may, at times, have been used to justify the growth of new tourism types. However, in our view, this growth has emerged as a

"natural" continuation of the historical disparities between developed and developing countries. As Fernandes notes, many of the routes now regarded as new forms of tourism emerged because the mainstream tourism industry essentially sought to re-legitimize itself—this includes promoting "sustainable" and "rational" environmental use, which often entails preserving nature as a privilege accessible only to a few.

Whatever the reasons for the growth of these tourism forms, it is clear that many of them currently position themselves as alternatives to or in opposition to the negative impacts of mass tourism, branding themselves as distinct or sustainable. Among the fastest-growing sectors within the tourism industry are travels to protected areas and untouched wilderness. E. Boo [18] refers to this as the "ecotourism sector", "noting that" ecotourism quickly evolved from an activity for a select few into a broad spectrum of activities encompassing diverse interests in nature.

Although we do not deny the existence of these factors, we consider the correlation between the rise of new forms of tourism and the issues caused by traditional mass tourism to be misleading. These issues have perhaps, at times, been used to justify the growth of new tourism types. However, in our view, this growth has manifested as a "natural" continuation of the historical imbalance between developed and developing countries. As Fernandes [19] noted, many of the destinations now regarded as "new forms of tourism" emerged because the primary tourism industry was, in essence, attempting to re-legitimize itself — incorporating "sustainable" and "rational" use of the environment, including the conservation of nature as a convenience for those who already possess certain privileges.

The importance of ecological sustainability is undeniable and is often regarded as a fundamental component of the sustainability concept. The need to reduce or completely avoid the negative environmental impact of tourism activities is clear. T. Maldonado [20] and his colleagues recommend calculating carrying capacity as an essential method for assessing environmental impacts and ensuring the sustainability of tourism. This method helps determine the extent and effectiveness with which the environment can respond to tourism activities. In other words, this approach plays a crucial role in identifying the level at which tourism can develop without causing damage to environmental resources.

In our opinion, while Maldonado's research is valuable for measuring carrying capacity, it is essential to consider that this concept may sometimes be used to justify social or economic restrictions under scientific terminology. For instance, calculations often rely on certain assumptions that, in some cases, are chosen arbitrarily (such as the maximum number of people in a group or the ideal manageable capacity) and in other cases, vary significantly (such as the slope of the land). Moreover, conservation organizations promoting new forms of tourism may tend to support higher carrying capacities to protect nature and safeguard economic interests. Additionally, other factors influencing the physical and managerial capacity of an area (such as guides, maps, availability of recreational areas, and low cloud cover) may also be significant but are often overlooked. A single change in an assumption or input data can significantly impact the final calculated carrying capacity.

The Hazrati Dovud Cave, located in the village of Oqsoy near Samarkand City in the Samarkand region, has been selected as the site for conducting calculations. Situated 40 kilometers from Samarkand, this cave is recognized as a sacred pilgrimage site, an extraordinary archaeological monument, and a natural marvel. Hazrati Dovud is a revered figure in three major religions: he is known as Hazrat Dovud in Islam, while Orthodox Christians and Jews refer to him as David. His life, shrouded in mystery and legend, is marked by his prophetic and healing abilities.

At the age of 33, Hazrati Dovud ascended to the throne as the ruler of the United Kingdom of Israel and Judah, where he reigned for forty years. The cave associated with his name draws numerous pilgrims as a sacred site, with dozens of people visiting daily to offer their prayers. To reach Hazrati Dovud Cave, pilgrims must climb a 1,303-step

staircase up to the mountain's peak. At the summit, there is an ancient mosque, and 200 steps below it lies the Hazrati Dovud Cave. However, not everyone can manage the ascent of over 1,500 steps, so “standby” camels and horses are available near the mausoleum. Along the staircase, vendors offer a variety of souvenirs, water, perfumes, food, medicinal herbs, and other goods.

Three main routes have been established in this area, designed to facilitate movement for visitors and create comfortable conditions for both pilgrims and tourists.

In order to assess the extent of sustainable tourism development in the Samarkand region, we analyzed both the socio-economic and environmental aspects of the areas leading to Hazrati Dovud Cave in Oqsoy village, which becomes crowded during the peak season.

Based on our research findings and calculations to determine carrying capacity, the following issues have been identified in the Hazrati Dovud Cave and its surrounding area: insufficient funding from the state for preserving the cave and its adjacent sacred sites, an increasing number of tourists, deforestation in the buffer zone around the pilgrimage site, deterioration of infrastructure due to the tourist influx, and the absence of a clear management plan specific to this area.

Addressing these issues is crucial for ensuring a healthy ecological environment for pilgrims and guaranteeing the long-term preservation of the sacred site. Therefore, we conducted an in-depth analysis of the carrying capacity along the route leading to this cave.

Figure 1 illustrates the relationship between each type of carrying capacity load and various influencing factors. This approach enables the identification of the optimal load for a particular system, area, or process. These loads represent the following:

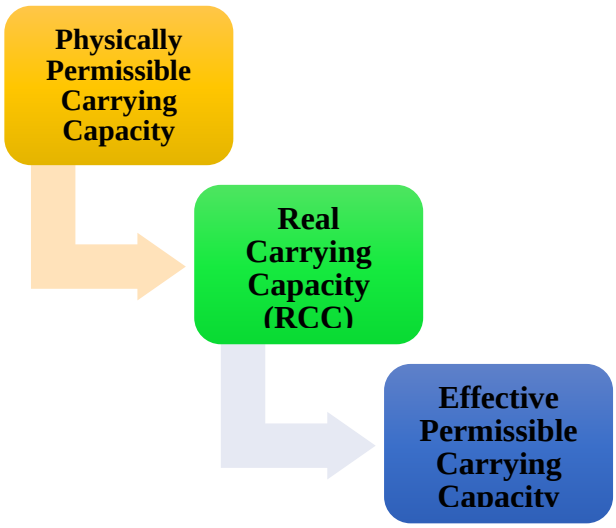

Figure 1. Types of permissible carrying capacities for tourist routes [21]

Physically Permissible Carrying Capacity (PCC) — this is calculated based on the area needed for a person to move freely. It is assumed that each person requires 1 square meter of space. With the average path width being 1 meter, each visitor occupies 1 linear meter of the path. For one of the paths, the following assumptions were made:

Visitors move along the path in groups of up to 25 people, led by a guide.

The distance between groups must be at least 100 meters.

The path length is 1,250 meters.

The average time to traverse the path is 1.5 hours.

The cave is open to visitors 8 hours per day and 300 days per year.

The Physically Permissible Carrying Capacity **(PCC)** is calculated using the formula:

FS= the length of the road × number of visitors per meter × daily duration (hours/day) (1)

Calculation process:

= 1,250 × 1 × 8

= 10,000 daily visit = 10,000 × 300

= 3 000 000 per year of visit

These calculations indicate that up to 10,000 visitors can be accommodated daily, resulting in a total of 3 million visits annually. This physical load represents the maximum number of visitors the site can handle without any limiting factors.

Real Carrying Capacity (RCC) – This is determined by adjusting the physical carrying capacity based on various natural and infrastructural factors. Here, three primary factors are considered:

- **Rainfall (FR = 1.39%)**: This factor shows the extent to which rainfall reduces the usability of the area. For instance, rainfall can deteriorate pathways or make movement within the area more challenging.
- **Erosion Susceptibility (FE = 38.28%)**: The risk of erosion in the area is accounted for. Erosion can erode soil and natural resources, significantly reducing the usability of the site.
- **Slope Degree (FS = 38.28%)**: The slope of the area is also of crucial importance. Steep or inclined areas can be hazardous for visitors and may limit the area's carrying capacity.

Correction coefficients are calculated individually for each factor and are expressed as percentages. These coefficients were determined based on data from scientific research and surveys. By taking these factors into account, calculations can accurately represent the real carrying capacity of the area. The Real Carrying Capacity (RCC) is calculated using the following formula:

RCC=PCC×100(100−FR)×100(100−FE)×100(100−FS) (2)

Calculation Process:

Step 1: Calculate the impact of precipitation days:

(100−FR)/100=(100−1.39)/100=0.9861(100 - FR)/100 = (100 - 1.39)/100 = 0.9861(100−FR)/100=(100−1.39)/100=0.9861

Step 2: Calculate the impact of erosion susceptibility:

(100−FE)/100=(100−38.28)/100=0.6172(100 - FE)/100 = (100 - 38.28)/100 = 0.6172(100−FE)/100=(100−38.28)/100=0.6172

Step 3: Calculate the impact of slope steepness:

(100−FS)/100=(100−38.28)/100=0.6172(100 - FS)/100 = (100 - 38.28)/100 = 0.6172(100−FS)/100=(100−38.28)/100=0.6172

Step 4: Calculate the Real Carrying Capacity (RCC):

RCC=PCC×0.9861×0.6172×0.6172=3,756RCC = PCC \times 0.9861 \times 0.6172 \times 0.6172 = 3,756RCC=PCC×0.9861×0.6172×0.6172=3,756

Thus:

Daily RCC: 3,7563,7563,756 visitors per day

Annual RCC:

3,756×300=1,126,9223,756\times 300=1,126,9223,756×300=1,126,922 visitors per year

These calculations indicate that the site's real carrying capacity **(RCC)** significantly decreases when taking into account various natural and infrastructural factors — such as rainfall, erosion, and slope. As a result, approximately 3,756 visitors can be accommodated daily, with an annual capacity of 1,126,922 visitors. These figures accurately reflect the site's realistic capabilities, highlighting the necessity of considering its ecological and infrastructural limits.

Effective Permissible Carrying Capacity (EPC) — This is an indicator determined by comparing the site's current capacity with its ideal manageable capacity. It assesses the site's visitor accommodation potential by considering the gap between currently available resources, particularly the number of staff, and the resources required under ideal conditions.

- **Current Capacity (F):** This represents the number of staff currently working at the site. For example, along the path from Hazrati Dovud to the Cave, there are currently 200 staff members assisting tourists and visitors.
- **Ideal Capacity (I):** This represents the number of staff required under ideal conditions to perform all necessary functions effectively. In this case, 290 staff members would be needed to operate under optimal conditions.

This comparison allows for an evaluation of the site's capacity to accommodate visitors based on available resources versus the ideal scenario.

Effective Permissible Carrying Capacity (EPC) — This indicator is determined by comparing the site's current manageable capacity with its ideal manageable capacity. It evaluates the site's visitor accommodation potential by considering the difference between currently available resources, particularly the number of staff, and the resources required under ideal conditions.

- **Current Capacity (F):** This represents the number of staff currently working at the site. For example, along the path from Hazrati Dovud to the Cave, there are currently 200 staff members assisting tourists and visitors.
- **Ideal Capacity (I):** This represents the number of staff needed under ideal conditions to perform all necessary functions effectively. In this case, 290 staff members would be required for optimal operation.

The following formula calculates the Effective Permissible Carrying Capacity (EPC) based on the difference between the current capacity and the ideal manageable capacity (FM):

FM = (I-F)/I×100 (3)

Calculation Process:

= (290−200)/290×100=90/290×100≈31.03%

= 100-31,03=68,97

This calculation indicates the percentage difference between the current and ideal capacity. The deficit is 31.03%, meaning the site operates at 31.03% below its ideal capacity or is currently functioning at 68.97% of its optimal level.

Formula for Effective Permissible Carrying Capacity (SS):

SS=HS×(100−FM)/100 (4)

where:

- **HS** represents the Real Carrying Capacity, which is the maximum load the site can support (in this case, 3,756 daily visits).

Calculation Process:

= 3,756 × (100 – 31,03)/100 = 3,756 × 0,68

= 2554,08 daily visits

= 2554,08× 300

= 766,307

This result shows that the site can realistically accommodate approximately 2,554 visitors daily, resulting in an annual total of about 766,307 visits.

The reduction in the Effective Permissible Carrying Capacity (EPC) is due to the impact of current versus ideal management capabilities, as well as natural and infrastructural limitations. There is a significant gap between the current number of staff (F) and the number of staff required under ideal conditions (I). For instance, while 290 staff members are needed in ideal conditions, only 200 are currently available, reducing the site's operational efficiency by 31.03%. This decrease lowers the daily visitor capacity from 3,756 to 2,554. Annually, this means the site can accommodate only 766,307 visitors.

In our view, social sustainability represents the ability of local or national tourism communities to absorb changes, such as a short-term or long-term increase in tourist numbers, without creating social imbalance. Such changes can either prevent social disruption or mitigate it by adapting relationships and functions to new circumstances. Some negative impacts of tourism are related to the emergence or intensification of social disparities. If we accept that tourism initially creates artificial and misleading social distinctions between service providers and tourists, it is natural that tourism development may lead to such divisions. The primary purpose of tools like carrying capacity assessments, environmental impact evaluations, and sustainability indicators in sustainable tourism is to minimize these disparities.

From this perspective, Clarke suggested calculating social carrying capacity as a means of maintaining social harmony despite new influences, particularly those brought by tourists. Societies can maintain their cohesion and continue functioning even with the changes introduced by tourism. However, this process often alters relationships, norms, lifestyles, customs, and traditions under the influence of visitors. Although the community may persist, its culture may undergo irreversible changes. Since culture is a dynamic part of human life, adaptation and cultural change are not always perceived negatively. Cultural sustainability, therefore, refers to the ability of people to preserve or adapt their cultural elements. Even a small influx of tourists inevitably leads to cultural influence, which is often subtle. However, controlling the most harmful effects, promoting responsible tourist behavior, and protecting local culture from degradation are essential aspects of sustainable tourism. Cultural adaptation may lead to assimilation into the dominant culture. Over time, cultural impacts become more apparent and harder to measure.

Economic sustainability is as crucial in tourism development as other aspects. In this context, sustainability refers to the level of economic benefit that must be sufficient to cover the costs necessary to meet tourists' needs and mitigate the impacts arising from their involvement. Additionally, it provides income to compensate for inconveniences caused to the local community, making it necessary to address both aspects simultaneously. This approach may seem to “buy off” other sustainability aspects; that is, regardless of the cultural, social, or environmental harm, if the project generates sufficient economic profit, these damages are considered compensated.

We emphasize that economic sustainability should not be viewed as competing with other sustainability factors but rather as an independent and essential element. However, this does not imply that economic sustainability alone is the foundation of sustainable development. Acknowledging economic sustainability as part of sustainable development does not diminish the importance of other factors, such as environmental and social aspects, nor does it exclude them from consideration. Furthermore, issues of control and

authority over tourism activities remain significant. Thus, questions about who gains financially and who suffers financially often help to clarify issues of power and control more distinctly compared to other sustainability factors.

4. Conclusion

This article provides a comprehensive analysis of sustainable tourism development, focusing on the economic, environmental, and social sustainability aspects critical to managing popular sites, such as the Hazrati Dovud Cave in Uzbekistan. By evaluating the tourism carrying capacity and the impact of visitor flows on local infrastructure, the study underscores the importance of implementing sustainable tourism practices based on international models adapted to local contexts.

The findings highlight that effective management of tourism sites requires a balanced approach that ensures economic benefits while mitigating negative impacts on the environment and local communities. Implementing a sustainable infrastructure that aligns with ecological standards, conserving resources, reducing waste, and safeguarding cultural heritage are identified as essential steps to achieving sustainable tourism. The study also points out the need for tailored management methods that reflect the specific social, cultural, and economic conditions of Uzbekistan.

By incorporating best practices from international experiences, Uzbekistan can enhance its tourism potential, increase economic opportunities for local communities, and preserve natural and cultural heritage for future generations. This research provides a valuable framework for policymakers, offering practical solutions to support sustainable tourism development in Uzbekistan, thereby contributing to the country's long-term economic growth and cultural preservation.

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