

Article

Sustainable Tourism Assessment in Urban Green Spaces: The Case of Khung BangKachao, Thailand

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Abstract: Sustainable tourism planning is essential for understanding an area's potential for sustainable development. However, the tourism sector struggles with adopting sustainable practices due to limited research on practical implementation, particularly in Thailand. Khung BangKachao, a vital green space near Bangkok, provide recreation for urban residents, but faces threats from urbanization, environmental degradation, and loss of traditional lifestyles. This study applied all four criteria and 41 indicators from the Global Sustainable Tourism Council (GSTC), a rare and rigorous approach in sustainability research that offers a model for other regions. A qualitative method was used, with content analysis based on 33 in-depth interviews and observations. Results show Category A is effective due to seasonal tourism management and legal adherence, though monitoring is weak. Category B demonstrates positive economic and social impacts. Categories C and D reveal gaps in tourism standards and environmental reporting. Tourism planning in Khung BangKachao should prioritize monitoring, community involvement, and structured management to support long-term sustainability.



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1. Introduction

Sustainable tourism planning requires a multifaceted approach that integrates environmental, economic, and social dimensions. Effective strategies include long-term planning, stakeholder engagement, and the use of quantitative indicators to measure sustainability. Despite various challenges, successful case studies have demonstrated the potential for sustainable tourism to contribute to regional prosperity and cultural preservation [1–3]. Sustainable tourism planning must be comprehensive, considering long-term impacts on the environment, economy, and society [4,5]. Additionally, emphasize that the involvement and empowerment of local communities in tourism planning and decision-making processes are key principles of sustainable tourism planning [2,6].

Urban green space, often known as UGS, is a fundamental component of the urban framework that improves the quality of life for people who live in and near these regions [7]. There is a large connection between UGS and sustainable tourism (ST), as well as an important interplay between the various components of UGS and ST. Both of

these connections are major relationships. Within the tourism industry, UGS provides a multitude of benefits, and these include economic, social, and environmental advantages [8]. Additionally, UGS has the potential to improve local economies by attracting tourists, which in turn contributes to the growth of local businesses and makes employment possibilities available [9,10]. Therefore, sustainable tourism in urban green spaces fosters a green economy by encouraging eco-friendly practices and diminishing greenhouse gas emissions. This strategy is consistent with international sustainability objectives and assists urban areas in managing tourism in a sustainable manner [8]. Studies on UGS and tourism generally employ various approaches, making comparisons and understanding difficult. Therefore, sustainable tourism assessment and urban green spaces play a crucial role in promoting environmental health, social equity, and economic viability. There is a need for standardized procedures and terminologies to promote better comparison and synthesis of study findings [11,12].

Rapid urbanization in USG poses significant risks, including environmental degradation, deforestation, and pollution [13]. Urban development projects often lead to community relocations and land use conflicts [14]. Such issues could severely impact USG, where maintaining a balance between development and conservation is essential. While tourism contributes to the local economy, inadequate visitor management often results in overcrowding and environmental harm. Moreover, the growing commercialization of tourism threatens to erode traditional ways of life and cultural practices in the area. Although sustainable tourism assessment has been widely examined in rural and natural environments, there is a noticeable lack of research focusing on urban green spaces, particularly in rapidly urbanizing regions like Southeast Asia.

Often referred to as the “Green Lung of Bangkok”, Khung BangKachao is renowned for its rich natural environment and cultural heritage. This vital green space, located amidst Bangkok’s urban sprawl, serves as a natural refuge that mitigates the urban heat island effect, improves air quality, and provides a habitat for diverse species of flora and fauna [15]. Furthermore, studies by Van De Bogart [16] highlight the importance of Khung BangKachao in conserving cultural heritage within urban areas. The area also offers recreational opportunities for residents and tourists, supporting activities such as cycling, walking, and birdwatching. This aligns with a broader trend of urban green spaces being used for public recreation and well-being. In addition, Khung BangKachao contributes to the local economy by attracting tourists, underscoring its environmental, cultural, recreational, economic, and social significance. As a model for integrating green spaces into urban environments, BangKachao promotes biodiversity and enhances the quality of life for both residents and visitors.

Khung BangKachao is an absence of empirical research assessing its sustainability performance, stakeholder involvement, and the efficacy of current conservation and tourism management strategies. Furthermore, studies examining the equilibrium between tourism development and ecological conservation in Khung BangKachao are limited, resulting in ambiguities regarding optimal strategies for promoting sustainability while preserving the integrity of this essential green space. In addition, although sustainability remains a prominent focus for researchers, entrepreneurs, and policymakers, the tourism sector continues to lag in the adoption of sustainable practices [17]. One of the primary challenges is balancing tourism development with the conservation of natural and cultural resources. Sustainable tourism strategies must address this challenge by promoting responsible tourism practices and ensuring that development does not compromise environmental integrity or local culture [18,19]. Improving standards and practices within the tourism industry is crucial, given the sector’s significant potential for economic growth in Khung BangKachao.

This study's goal is to fix these problems by using a thorough evaluation framework based on GSTC standards to look at the sustainability of tourism and find the most important problems and chances for putting GSTC-compliant sustainable tourism practices into action in Khung BangKachao. The findings will provide insights into the strengths and challenges of current practices, offering recommendations for policymakers and stakeholders to enhance the sustainability of urban green space tourism. Assessing and analyzing current conditions and effectiveness is particularly important, especially as global initiatives like the GSTC standards gain momentum with widespread industry support [20,21]. Therefore, this research aims to enhance comprehension of the implementation of environmentally friendly practices in urban green destinations by exploring the following research questions:

(1) Which aspect of sustainable tourism, according to GSTC criteria should be prioritized in BangKachao, both currently and in the future?

(2) What level is the tourism operation in BangKachao according to GSTC criteria?

Furthermore, this explorative study investigates the effectiveness of state sustainable tourism certification programs using the Global Sustainable Tourism Council (GSTC) criteria. These criteria serve as a baseline for assessing sustainable tourism performance in BangKachao, a region distinguished by its abundant natural resources and cultural heritage.

2. Literature Review

2.1. Urban Green Space (UGS) Management for Sustainable Tourism (ST)

Urban green space (UGS) is an essential element of the urban framework that enhances the quality of life for residents living in and around these areas [7]. Furthermore, UGS can enhance local economies by drawing tourists, thereby boosting local enterprises and generating employment opportunities [8,9]. In the study by Lv, Hao, Sarker, Zeng and Hu [8], it was shown that there was a significant connection between UGS and ST, as well as an important interrelationship between the various components of UGS and ST. UGS offers numerous advantages, including economic, social, and environmental benefits, in the sector of tourism. In social benefits, UGS provides recreational opportunities, augments the aesthetic attraction of urban environments, and increases the quality of life for residents and visitors together [22]. UGS provides multiple benefits, including economic gains through tourism, social benefits by enhancing community well-being, and environmental benefits by supporting biodiversity and ecological sustainability [8,10].

Overall, UGS are important for sustainable tourism. Green destination can promote a balance between environment, society, and economic dimensions. Sustainable tourism practices in urban green spaces cover reducing environmental impact, enhancing local economic vitality, and conserving cultural diversity. Therefore, Khung BangKachao can enhance their attractiveness as an environmentally responsible destination and contribute to long-term sustainability.

2.2. The Importance of GSTC in Tourism Management

The Global Sustainable Tourism Council (GSTC) is an organization that establishes and monitors global baseline standards for sustainable travel and tourism, known as the GSTC criteria. These criteria define the fundamental standards for any tourism enterprise to protect and conserve the planet's natural and cultural resources and ensure the functionality of tourism. The GSTC has formulated comprehensive criteria that cover various aspects of sustainability. There are three dimensions including environmental, social, and economic dimensions. The criteria are utilized globally to guide and validate tourism industry practices, ensuring the mitigation of negative impacts while augmenting benefits for local communities and ecosystems as a strategy for conservation and poverty alleviation [23–25]. The GSTC criteria facilitate the formulation and assessment of sustainable tourism management

strategies, guaranteeing that tourism endeavors are advantageous for local communities and the ecosystem. For instance, the research of Hamimah, Nurul Huda, Uni Kamlun, Rosmalina and Jennifer [25] in Indonesia demonstrates that GSTC standards are employed to evaluate and monitor tourism destinations, emphasizing environmental management and disaster risk mitigation. Moreover, numerous settings, such as U.S. national parks, have utilized the GSTC criteria to formulate and enhance sustainability plans [26]. On Cozumel Island, the GSTC criteria were employed to pinpoint high-risk areas and formulate strategies for responsible tourism management [27].

The key literature-related research shows the importance of GSTC in using tourism management, which can be summarized as in Table 1.

Table 1. Importance of Global Sustainable Tourism Council (GSTC) criteria in tourism management.

Importance of GSTC in Tourism Management	References
The framework is comprehensive and encompasses environmental, sociocultural, and economic dimensions of sustainability.	(Bricker et al., 2022 [26]; Bricker & Schultz, 2011 [28])
Assessment tool to facilitate the evaluation and enhancement of sustainability practices	(Bricker et al., 2022; Kemavuthanon et al., 2023 [29]; Wagenseil et al., 2024 [30])
Monitoring and evaluation to facilitate the ongoing assessment and improvement of tourism practices.	(Kemavuthanon et al., 2023 [29]; Muhamad and Khabibi, 2021 [21])
Implementation guidance provides pragmatic directives for sustainable tourism management.	(Hamimah et al., 2022 [25]; Muhamad and Khabibi, 2021 [21]; Tulbure and Eduard, 2024 [31])
International standards offer universally acknowledged criteria for sustainable tourism.	(Bricker and Schultz, 2011 [28]; Muhamad and Khabibi, 2021 [21]; Wagenseil et al., 2024 [30])

2.3. Key Components of the Global Sustainable Tourism Council's Criteria

The Global Sustainable Tourism Council (GSTC) have developed an extensive framework of criteria to advance sustainable tourism practices. These criteria aim to guarantee that tourism enterprises and destinations function in a way that protects and sustains natural and cultural resources while supporting conservation and poverty reduction. The principal elements of the GSTC criteria can be defined in four pillars as follows:

1. **Sustainable Management:** GSTC emphasizes the necessity for a comprehensive management framework to supervise sustainable tourism initiatives. This encompasses planning, monitoring, and ongoing enhancement processes [25,28].
2. **Socioeconomic impacts:** Enhancing economic advantages for the host community by promoting local enterprises and guaranteeing equitable remuneration and working conditions [25,32]. Additionally, advancing social equity, safeguarding cultural heritage, and enhancing community health and safety [33].
3. **Cultural impacts:** Conserving and advancing cultural heritage and traditions while ensuring that tourism activities do not adversely affect cultural sites and practices [24].
4. **Environmental sustainability:** Enacting strategies to mitigate pollution, preserve natural resources, and safeguard biodiversity [25]. Furthermore, advocating for the diminishment of greenhouse gas emissions and endorsing the utilization of renewable energy sources [24].

The GSTC is important for promoting and managing sustainable tourism by providing a framework for assessing, guiding, and implementing sustainable practices. The GSTC helps tourism destinations and businesses to align their operations with global sustainability standards. Therefore, in this study in BangKachao, Thailand, the GSTC criteria were applied to assess tourism in the area, which will ensure that the environment, local communities, and the tourism industry will benefit in the long term.

2.4. Study Area

Khung BangKachao is an urban green space located in Phra Pradaeng District, Samut Prakan Province. The Chao Phraya River surrounds this large green area in the shape of a pig's stomach (Figure 1). Khung BangKachao comprises six sub-districts: BangKachao, Bang Kobua, Bang Nam Phueng, Bang Krasop, Bang Yo, and Song Khanong. The area spans a total of 18.91 km² (1891 ha.) and is home to a population of 39,264 residents, distributed across 13,144 households. Khung BangKachao is located near Bangkok's central business district; therefore, this green conservation area serves as an ecological and cultural haven. In 2006, Time Magazine recognized Khung BangKachao as the “Best Urban Oasis of Asia” [34]. Khung BangKachao is celebrated for its abundant natural environment and cultural heritage. This essential green area, situated within Bangkok's urban expanse, functions as a natural sanctuary that alleviates the urban heat island phenomenon, enhances air quality, and offers a habitat for various species of flora and fauna [15]. Consequently, this region is a distinction that markedly enhanced its appeal to both domestic and international tourists. The tourism sector in the Khung BangKachao generates significant revenue for the local populace across all subdistricts ecosystems as a means of conservation and the alleviation of poverty.



Figure 1. Khung BangKachao, Samut Prakan Province, Thailand.

In the case of Khung BangKachao, evaluating its tourism capacity helps prevent overexploitation of natural resources, maintain ecological balance, and preserve its cultural heritage. Moreover, tourism generates significant revenue for local communities; a sustainable approach ensures that economic benefits are equitably distributed while minimizing negative impacts on the environment. Therefore, Khung BangKachao needs to conduct thorough assessments in accordance with international standards. As a result, policymakers and stakeholders can implement strategies that enhance visitor experiences, support conservation efforts, and foster community well-being, ultimately securing the role of Khung BangKachao as a sustainable urban green tourism destination.

3. Materials and Methods

To reflect on how tourism evaluation in Khung BangKachao can be managed for sustainability, this study used an exploratory research design to understand the level of tourism potential under GSTC criteria. The study employed qualitative research to gather data from stakeholders in Thailand’s tourism industry, thereby bringing together multiple perspectives on the tourism potential. The sustainability assessment of Khung BangKachao’s tourist attractions, based on the Global Sustainable Tourism Council (GSTC) criteria, involved analyzing documentary and empirical evidence through field observations and 33 in-depth interviews with local tourism stakeholders (Table 1). Typically, in-depth interviews engage between 5 and 25 participants [35,36].

Two key tools were employed for coordination with destination liaisons: the document and stakeholder analysis. Secondary data were collected by reviewing documents relevant to Khung BangKachao, including communication plans, crime statistics, health and safety records, and tourist safety reports. Primary data were gathered through studies on sustainability standards and consultations with stakeholders using the following methods:

3.1. Stakeholder Analysis

Stakeholder analysis is a crucial instrument for assessing sustainability criteria within the GSTC framework. It assists in identifying, analyzing, and engaging essential stakeholders in sustainable tourism development in Khung BangKachao. Therefore, this study was conducted with key individuals, including local representatives, tourism agencies, regulatory agencies, environmental and public utility agencies, cultural agencies, and economic agencies. Key informants were selected through purposive ling to ensure suitability, with GSTC criteria requiring local residents to provide complete, accurate, and consistent data. This study included five stakeholder groups, each contributing unique insights, are shown in Table 2.

Table 2. List of key informants interviewed.

Target Key Informants	No. of Key Informants	Contribution	GSTC Criteria
1. Tourism agencies	6	Provide perspectives on tourism management, visitor experience, and sustainable tourism practices.	Section A
2. Regulatory agencies	5	Ensure compliance with laws and policies, influencing sustainable tourism governance.	Section A, B, C and D
3. Environmental and public utility agencies	8	Assess environmental impact, conservation strategies, and infrastructure sustainability.	Section A and D

Table 2. *Cont.*

Target Key Informants	No. of Key Informants	Contribution	GSTC Criteria
4. Cultural agencies	4	Preserve and promote local heritage, ensuring cultural sustainability in tourism development.	Section A and C
5. Economic agencies	18	Evaluate economic benefits, business sustainability, and financial impacts on the local community.	Section A and B
Total	33		

Researchers analyzed the roles and responsibilities of these agencies within the Khung BangKachao area according to Thai law. Specific duties, missions, and legal mandates of the agencies were examined to understand their contributions to the region's development.

3.2. Document Analysis

As the GSTC indicators need the information for evaluation, there are many related documents from several works that deal with the GSTC indicators. For example, the Special Area Development Administration for Sustainable Tourism (Public Organization) (SATDA 1), the Sustainable Tourism Strategic Plan (which needs to show how it connects with plans from other organizations), and local government groups that have tourism-focused development plans. The Tourism Authority of Thailand (TAT) implements various measures to promote off-season tourism activities, such as campaigns, posters, and brochures. Additionally, the provincial tourism and sports offices provide monthly tourist statistics, both before and after COVID-19.

The collected data were analyzed using qualitative analysis. Thematic analysis was utilized for data analysis and interpretation through an iterative process [37]. Interview data from 33 key informants and document analyses were transcribed and formatted into a transcript. Furthermore, practitioner perspectives were incorporated into the data analysis process to enhance comprehension of the data from an insider's viewpoint. Codes were allocated and reviewed to eliminate duplicate codes. Moreover, all themes were reevaluated until the iterative procedure was finalized. In addition, the data were subsequently utilized for discussions to amalgamate the data with the GSTC criteria across four pillars (41 criteria). Data analysis was conducted using practitioner viewpoints and current management and corporate tourism status in the sustainable context. Findings were presented through tables showcasing information on tourism characteristics and management practices in Khung BangKachao.

3.3. Instrumentation for Assessment

The instrumentation utilized for this study is based on the GSTC criteria Version 1, an international standard developed through a comprehensive review of sustainability standards and consultations with stakeholders in the tourism sector. To conclude the evaluation results, the project conducted an evaluation on 41 criteria using structured interviews with 33 stakeholders, field surveys, and related documents. These criteria emphasize that sustainable tourism development must address four main pillars. While minor adjustments have been made to indicator numbers between different versions of the criteria, they remain consistent with the original framework. These four pillars form the foundation for the sustainability assessment of Khung BangKachao's tourist attractions, encompassing a total of 41 criteria divided into four categories, as depicted in Table 3.

Table 3. Number of GSTC criteria for tourist destinations, categorized by four pillars of sustainable tourism.

Criteria	Indicators
Section A: Sustainable management. (Effective Sustainability Management Systems)	A1: Strategic plan for sustainability of tourist attractions A2: An effective representative or group of representatives from the public sector A3: Monitoring, supervision, and progress reporting system A4: Seasonal tourism management A5: Adapting to climate change A6: Database of tourist sites and resources A7: Compliance with regulations, requirements, and policies A8: Tourist attractions and facilities for everyone A9: Laws and regulations for the preservation of tourist attractions A10: Inspection and reporting of tourist satisfaction A11: Supporting sustainable tourism criteria in the business sector A12: Security and safety system A13: Response to an emergency situation A14: Public relations
Section B: Socio-economic sustainability (Promoting Benefits and Reducing Negative Economic and Social Impacts)	B1: Monitoring economic benefits B2: Opportunities for local people to pursue careers B3: Participation in society B4: Opinions of the local community B5: Access to local people's areas B6: Understanding of tourism B7: Preventing the exploitation of unfair advantages B8: Community support B9: Supporting local businesses and fair trade
Section C: Cultural sustainability (Promoting Benefits and Reducing Negative Cultural Impacts)	C1: Protecting and caring for tourist attractions C2: Tourist management C3: Tourist behavior C4: Protecting cultural heritage C5: Providing accurate information about tourist attractions C6: Intellectual property
Section D: Environmental sustainability (Promoting Benefits and Reducing Negative Environmental Impacts)	D1: Environmental risks D2: Protecting the environment at risk D3: Protecting wildlife D4: Greenhouse effect D5: Energy conservation D6: Water efficiency D7: Water usage control D8: Water quality D9: Wastewater management D10: Reducing waste D11: Light and noise pollution D12: Low-impact transportation

3.4. Procedure for Assessing Tourist Sites' Sustainability Using the GSTC Criteria

The sustainability assessment of tourist attractions is conducted based on the GSTC indicators and criteria, utilizing evidence from documents, interviews, and participatory field observations by three assessors. The process of data analysis involves five distinct steps, as illustrated in Figure 2:

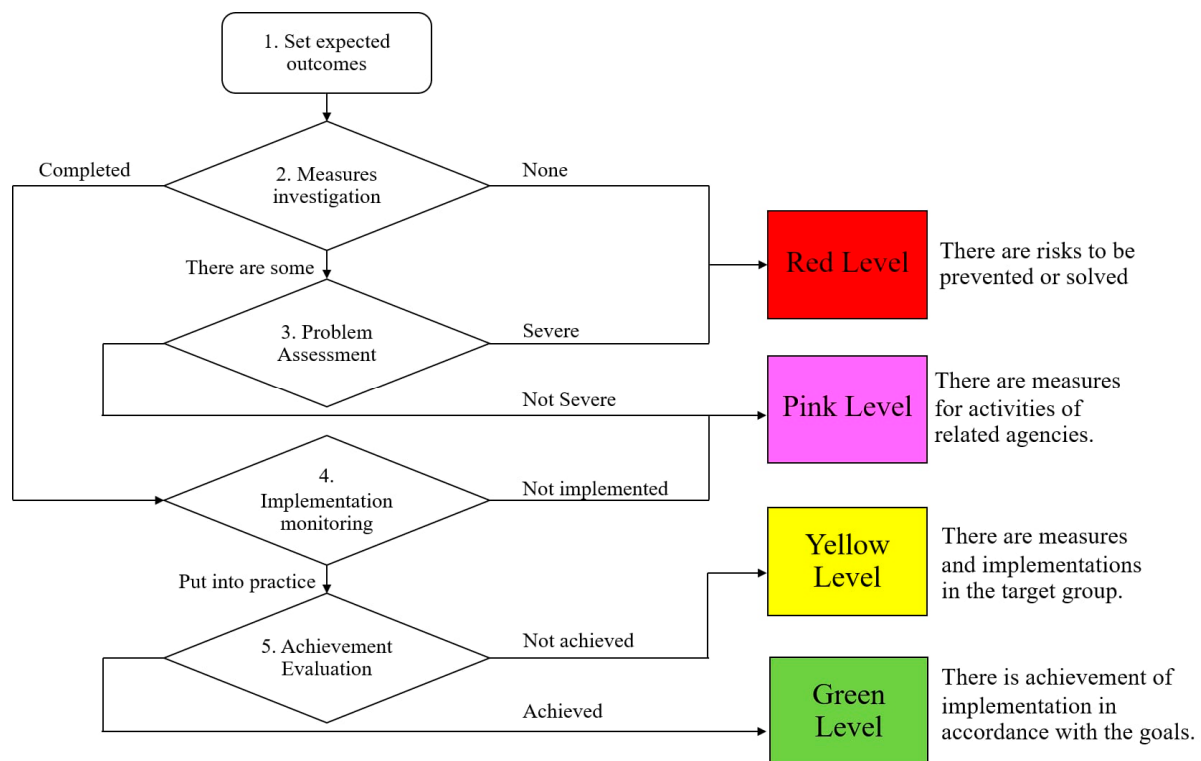


Figure 2. Process for evaluating sustainability of tourist destinations based on GSTC criteria.

1. Identifying Intended Results

Collaborate with stakeholders to define the intended results for each sustainability component. Ensure that these intended outcomes align with the GSTC-D standards by referencing criteria that address the relevant dimensions.

2. Examining Measures for Relevant Agencies

Review the list of measures applicable to the relevant agencies. If all items align with the criteria, proceed to Step 4. If any items are incomplete, highlight these gaps in red. In such cases, the problem condition must be examined in Step 3 to address the missing measurements.

3. Assessing Problem Severity

Conduct a self-assessment with stakeholders to evaluate the severity of issues in the area. If the problem is severe, the assessment result will be marked at the red level. If it is less severe, it will be marked at the pink level.

4. Verifying Implementation

Check whether the measures have been implemented by the relevant agencies in the tourist attractions. Verify if target groups have improved their behavior or technology related to tourism operations. If measures remain unimplemented, the evaluation outcome will fall into the pink category. However, if evidence of implementation exists, proceed to the final step.

3.5. Evaluating Results

Provide the inspection and evaluation results to the relevant agencies to determine whether the implementation achieved the intended outcomes defined in Step 1. If the desired results are not met, the evaluation results will fall into the yellow category. If evidence shows that the implementation successfully achieved the set goals, the results will be categorized at the green level.

4. Results

4.1. Sustainability Assessment of Tourist Attractions in Khung BangKachao

The sustainability assessment of tourist attractions in the BangKachao Special Area was conducted using all 41 criteria of the GSTC (Table 3). As the evaluation criteria are currently undergoing revision, the organizing committee compared the results from Version 1, currently in use, with Version 2, which will be implemented in the future. This comparison allows the area to prepare for the next evaluation.

Initial findings revealed the following current status levels across the criteria:

- Red level (problems posing risks to sustainability): remaining areas (2%)
- Pink level (supporting measures in place): 15 areas (37%)
- Yellow level (evidence of implementation by the target group): 16 areas (39%)
- Green level (successful implementation with measurable results): 9 areas (22%)

4.1.1. Section A: Sustainable Management

This category consists of 14 indicators. The Khung BangKachao area has performed well in achieving goals related to seasonal tourism management, adherence to laws and regulations, and maintaining tourist attractions while disseminating relevant information. However, a key area of concern lies within Category A3, which addresses inspection, supervision, and progress reporting systems. There is currently no evidence demonstrating how the sustainable tourism management plan is being monitored in the Khung BangKachao area, as highlighted in Table 4.

Table 4. Sustainability assessment results for BangKachao under Criteria A.

Version 1	Version 2	Criteria/Level	Results
A1	A2	A1 Strategic plan for sustainability of tourist attractions	The evaluation results indicate the current management level of the Khung BangKachao tourism area. While several strategic development plans have been comprehensively developed in the past, there is still a lack of mechanisms to monitor whether these plans have been effectively implemented according to the P-D-C-A (Plan–Do–Check–Act) cycle.
A2	A1	A2 An effective representative or group of representatives from the public sector	Tourism clubs have been established in each sub-district, and a provincial committee has been appointed. However, the area lacks a central agency to coordinate budget allocation across the entire region. The Designated Areas for Sustainable Tourism Administration (Public Organization) (DASTA) is currently preparing to establish a special area office under DASTA 1 to manage and develop tourism across all six sub-districts.
A3	A3	A3 Monitoring, supervision, and progress reporting system	Monitoring, management, and progress reporting systems are insufficient, as Khung BangKachao lacks a development evaluation and monitoring framework. This leads to stakeholders having differing data and perspectives on current conditions and past development results, increasing the risk of conflicts.

Table 4. Cont.

Version 1	Version 2	Criteria/Level	Results
A4	A8	A4 Seasonal tourism management	A sluice gate has been constructed to reduce flooding problems, enabling Khung BangKachao to support year-round tourism activities. These include health tourism in public parks, activities at the Sri Nakhon Khuean Khan Botanical Garden, community cycling, and weekend visits to the floating market.
A5	A10	A5 Adapting to climate change	Efforts to adapt to climate change at the Khung BangKachao tourist site include relevant agencies assessing site-specific risks and providing knowledge and understanding to local people and businesses.
A6	A2	A6 Database of tourist sites and resources	Surveys of tourist attractions and resources, such as those conducted during the OUR Khung BangKachao project, have identified sites beneficial to tourism. However, there is a lack of integration of this data into a cohesive system and an entity responsible for updating the information to keep it current.
A7	A9	A7 Compliance with regulations, requirements, and policies	Land use zones in Khung BangKachao are clearly defined, and most operators adhere to usage agreements. However, no mechanisms exist to monitor how land use changes impact zoning objectives over time.
A8	B8	A8 Tourist attractions and facilities for everyone	Most attractions in Khung BangKachao are designed to accommodate individuals with physical limitations, such as those using wheelchairs. However, there is a lack of infrastructure or facilities for other groups, such as visually impaired individuals, who may face dangers while navigating the area.
A9	B6	A9 Laws and regulations for the preservation of tourist attractions	The Khung BangKachao area serves as a model for participatory development. Initial disputes between the community and the Forestry Department have evolved into collaborative efforts, with both parties sharing the benefits of conserving the green space, including its designation as a recreational area.
A10	A6	A10 Inspection and reporting of tourist satisfaction	Relevant agencies operate within the area, but there is no systematic evaluation system for assessing overall tourist satisfaction at Khung BangKachao.
A11	A4	A11 Supporting sustainable tourism criteria in the business sector	Efforts to promote sustainable tourism include the Thai Homestay Standard CBT Thailand and DASTA's training sessions, which aim to help operators understand the Global Sustainable Tourism Council (GSTC) guidelines.
A12	B7	A12 Security and safety system	Various safety points, such as first aid stations, have been installed with support from local administrative organizations and private sector agencies. Bicycle rental services have also implemented transparent pricing. However, comprehensive statistics to evaluate safety improvements are lacking.

Table 4. Cont.

Version 1	Version 2	Criteria/Level	Results
A13	A11	A13 Response to an emergency situation	There is no evidence of disaster prevention drills, particularly for fires and emergency situations, which could face complications such as traffic congestion when emergency responders need access to the area.
A14	A7	A14 Public relations	The tourism identity of Khung BangKachao is well-defined and effectively communicated to its target audience.

4.1.2. Section B: Socio-Economic Sustainability

The Khung BangKachao area has performed exceptionally well in this category, demonstrating significant contributions to the local economy and society. However, an important issue requiring attention is B7, which addresses the prevention of exploitation, particularly concerning clear communication to tourists about the prohibition of using women and child labor. While actions have been taken to address this issue, there has been insufficient publicity or notification provided to tourists regarding these measures (Table 5).

Table 5. Sustainability assessment results for Khung BangKachao under Criteria B.

Version 1	Version 2	Criteria/Level	Results
B1	B1	B1 Monitoring economic benefits	Data on community income, community enterprises, and local businesses, such as the number of vendors at the floating market and enterprises producing health handicrafts, are available for assessing and monitoring economic benefits and trends. These data help mitigate risks affecting the sustainability of tourism in the area. However, Khung BangKachao should ensure continuous collection of tourism-related data and publicly report it at least once a year.
B2	B2	B2 Opportunities for local people to pursue careers	Local employment opportunities are being generated, such as hiring community members to produce incense sticks for the Ban Thup Hom Samunphrai community enterprise or employing staff at the Phob Rak restaurant. Distributing income-generation opportunities across all sectors in Khung BangKachao reduces sustainability risks. However, safety education related to the tourism industry, such as bicycle safety, should be provided to ensure the well-being of workers and visitors.
B3	A5	B3 Participation in society	Local stakeholders actively participate in determining the direction of tourism development in the area, including through initiatives like the Bang Kobua Community Tourism Promotion Club. Additionally, several organizations promote tourism in the area through the Khung BangKachao Area Development Operations Oversight Committee for Sustainability.

Table 5. *Cont.*

Version 1	Version 2	Criteria/Level	Results
B4	A5	B4 Opinions of the local community	Guidelines for improving and managing tourism are based on input from the local community. These align with the strategic plan for sustainable tourism development in Khung BangKachao for 2023–2027, as outlined in the final report on the feasibility study for declaring the area as a special zone. However, some aspects of the plan remain unimplemented, and there is no significant evidence of changing community attitudes toward tourism.
B5	C4	B5 Access to local people's areas	Locals benefit from access to tourism and natural conservation areas, including public parks, the Srinakarin Botanical Garden, and the Khung Khen Dam. Both government and private sectors actively contribute to protecting and restoring these sites under the committee overseeing the sustainable development of Khung BangKachao.
B6	A5	B6 Understanding of tourism	Government and private sectors promote tourism knowledge, organize training, and provide funding to support community enterprises. However, the integration and systematic management of information about tourism impacts, both positive and negative, remain unclear
B7	B5	B7 Preventing the exploitation of unfair advantages	Measures to prevent exploitation, including addressing the use of women and child labor, have been introduced but are not yet fully implemented by the target groups. Insufficient communication mechanisms and law enforcement, particularly for foreign tourists, have led to limited awareness of illegal activities. Complaints of exploitation or harassment persist, and integrated efforts by relevant agencies to address these issues are lacking.
B8	B4	B8 Community support	Concrete measures and mechanisms are in place to ensure economic benefits from tourism directly support the community. Collaborative efforts by the government, private sector, and educational institutions—such as projects organized by the OUR Khung BangKachao project committee—have resulted in desirable outcomes for the area.
B9	B3	B9 Supporting local businesses and fair trade	Systematic measures support local tourism products and entrepreneurs. Most products and services are sourced locally, with designated spaces in venues like the Bang Nam Phueng floating market. Unique items include fragrant incense, herbal compress balls, and the GI-certified BangKachao Nam Dok Mai mango.

4.1.3. Section C: Cultural Sustainability

Criteria C, focusing on the cultural arts of the Khung BangKachao area, emphasizes the importance of Indicator C2: Tourist Management. Presently, there are no established guidelines to direct tourists on appropriate behavior when visiting various cultural sites. For instance, visitors to temples lack clear instructions on how to behave in ways that respect and preserve the cultural and artistic heritage of these destinations. The absence of such guidelines poses a challenge to maintaining the integrity of Khung BangKachao's cultural resources (Table 6).

Table 6. Sustainability assessment results for Khung BangKachao under Criteria C.

Version 1	Version 2	Criteria/Level	Results
C1	C1	C1 Protecting and caring for tourist attractions	Monitoring and maintenance are in place for Nakhon Khun Khaeng Park. However, there is currently no monitoring system for cultural tourist attractions, which are managed solely by the responsible agencies. This could lead to potential negative impacts.
C2	C6	C2 Tourist management	Khung BangKachao lacks a system to monitor the entry and exit of tourists in the area. During the implementation of COVID-19 prevention measures, a visitor limit was set, but it was not strictly enforced.
C3	C6	C3 Tourist behavior	Guidelines for tourists are available, and bicycle rental services provide basic conduct recommendations to users. If more structured tourism activities are organized in the future, further development and refinement of these guidelines are likely.
C4	C3	C4 Protecting cultural heritage	Khung BangKachao has preserved its local wisdom heritage through initiatives like the OUR Khung BangKachao project, which includes activities such as coconut sugar production. However, there is a risk of losing this cultural heritage if it is not actively passed down. This heritage could also be promoted as a unique highlight for creative tourism.
C5	C7	C5 Providing accurate information about tourist attractions	A permanent exhibition has been set up at Sri Nakhon Khuean Khan Park to educate tourists about the history and conservation efforts of the area.
C6	C5	C6 Intellectual property	The intellectual property of the community and local individuals used in tourism is protected by law. Additionally, Khung BangKachao has registered local products, such as GI-certified items, to safeguard and promote the community's unique cultural and economic assets.

4.1.4. Section D: Environmental Sustainability

Criteria D, focusing on the environment of the Khung BangKachao, largely falls within the pink range, indicating that measures and activities have been implemented by the relevant agencies. The indicators rated as pink include:

- D1: Environmental Risk
- D4: Greenhouse Effect
- D5: Energy Conservation
- D6: Water Management
- D7: Water Usage Control
- D8: Water Quality
- D9: Wastewater

The evaluation team highlights the need for a comprehensive report on water quality, particularly for water provided to tourists for consumption and water in recreational areas. This is critical as some tourism activities involve water-based experiences, and addressing waste reduction is essential for sustainability. An example of effective waste management and reduction is seen at Wat Chak Daeng, a notable site in the Khung BangKachao area, which serves as a model for environmental stewardship (Table 7).

Table 7. Sustainability assessment results for Khung BangKachao under Criteria D.

Version 1	Version 2	Criteria/Level	Results
D1	D1	D1 Environmental risks	Environmental risk measures exist but have not been fully utilized by target groups to achieve the desired outcomes. The “Master Plan for the Conservation and Development of the Green Area of Khung BangKachao Towards Sustainability” provides planning and operational principles for engaging the government, business sectors, citizens, and stakeholders in protecting and developing Khung BangKachao’s green spaces sustainably. However, environmental impacts and risk management related to tourism have not been assessed. Technology is being used to detect wave erosion and adjust water salinity to combat riverbank erosion.
D2	D1	D2 Protecting the environment at risk	Ecosystem protection has been implemented successfully. The Forest Department’s “Srinakarinwittaya” public park includes birdwatching towers and long benches for fish feeding by the pond. Animals within the park further demonstrate ecosystem conservation efforts.
D3	D3	D3 Protecting wildlife	Measures to protect plant and wildlife species in tourist areas have been successfully implemented. The master plan to conserve and enhance Khung BangKachao’s green space includes comprehensive biodiversity data covering plant species, animal species, human impacts, and natural environmental elements.
D4	D10	D4 Greenhouse effect	Steps to reduce greenhouse gas emissions are being taken by related agencies in Khung BangKachao. However, creating a greenhouse gas emissions inventory at the provincial or tourism sector level is recommended. This inventory would serve as a foundation for a reduction plan and provide precise, reliable data for communication with tourists and the public.
D5	D5	D5 Energy conservation	Accommodation establishments in Khung BangKachao do not have measures to reduce energy consumption or participate in the Green Hotel certification. They lack measures that encourage investment in alternative energy technologies or behavioral changes to reduce energy use.
D6	D6	D6 Water efficiency	Measures for efficient water usage have been implemented in Khung BangKachao’s tourist areas, but target groups have not applied them effectively. Water conservation efforts remain insufficient, and information about conservation practices has not reached tourists. It is recommended to install water-saving signs and promote awareness campaigns.
D7	D6	D7 Water usage control	Techniques for managing water usage in tourist areas are in place, but they have not been utilized effectively by target groups. Prolonged brackish and saline water incursion threatens the water supply for consumption and use, potentially leading to future conflicts between community tourism entrepreneurs and farmers. The OUR Khung BangKachao initiative has established automatic water monitoring stations, but proposals for integrated water allocation management across all local sectors are needed.

Table 7. Cont.

Version 1	Version 2	Criteria/Level	Results
D8	D7	D8 Water quality	Water quality measures exist but have not been implemented effectively by target groups. In some areas along the Khung BangKachao coastline, large amounts of floating debris have been observed. Interviews with operators revealed significant water deterioration, with conditions changing from clear to murky black.
D9	D8	D9 Wastewater management	Wastewater management includes standard installation and inspection procedures. Large establishments are required to measure and report compliance, and enforcement of regulations is strict. However, Khung BangKachao could establish a wastewater treatment system as a model, partially reusing treated wastewater to improve sustainable tourism management. Some establishments have adopted measures, but many are not yet treating or reusing wastewater effectively.
D10	D9	D10 Reducing waste	Waste reduction efforts by some target groups in Khung BangKachao's tourism region are in place, but results remain unsatisfactory. Notable examples of waste management exist, such as hotels and cafes reducing plastic and paper use, but these practices are not widespread. Expanding waste management practices across all establishments is essential to reduce waste disposal beyond the immediate area.
D11	D12	D11 Light and noise pollution	Light and noise pollution in Khung BangKachao is at level 3 (yellow), indicating that measures exist but have not fully achieved the desired results. Some accommodations have posted signs requesting noise reduction, but there are no formal regulations or community rules to limit noise levels.
D12	D11	D12 Low-impact transportation	Low-impact mobility initiatives in Khung BangKachao's tourist areas have been adopted by some target groups but have not reached the expected benefits. Bicycle tourism benefits from good road conditions and detailed maps showing destinations. Many establishments, particularly hotels, provide bicycle parking and offer bicycles for tourists, but further promotion is needed to maximize low-impact mobility.

5. Discussion

5.1. Managerial Implication

5.1.1. Management Guidelines for Tourist Destinations in Khung BangKachao

The management guidelines for tourist destinations in the Khung BangKachao are categorized into four groups, tailored to the varying levels, unique local characteristics, and specific management actions required (Figure 3).

				GSTC Destination Assessment	Result-based Management		
A14	B9			Good, proceed with the next steps.	Achievement of implementation in accordance with the goals		
	B8						
	B5					D3	
A9	B1						
A4				D2			
				C6			
A12	B6			C5			
A11	B4			C4	D12		
A8	B3			C3	D11		
A7	B2			C1	D10		
				D9			
A13					D8		
A10					D7		
A6					D6		
A5					D5		
A2					D4		
A1	B7			C2	D1		
A3							
Sustainable management	1	Socio-economic sustainability	2	Cultural sustainability	3	Environmental sustainability	4

Still need improvement	Measures and implementation in the target group
There is a risk	Measures for activities of related agencies
High risk	There are risks that need to be mitigated/problems that need to be solved

Figure 3. Classification of management level based on assessment levels.

5.1.2. Implementation of Strategies for Sustainability Management

Sustainable tourism depends on collaboration among public administrations, the commercial sector, local communities, and tourists. Collaboration helps balance priorities and optimize resource allocation [38–40]. However, assessment results from GSTC-D 15 criteria show a pink risk level, particularly in Category A and Category D, which focus on reducing environmental impacts.

Management should involve comprehensive planning to balance economic, social, and environmental considerations, aligning with industry and community needs [41]. Effective strategies reduce resource costs, create market differentiation, and preserve natural and cultural resources, which are essential for destination uniqueness [42,43]. Khung BangKachao requires a clear tourism plan encompassing management, environmental conservation, and greenhouse gas reduction. Improvements in energy efficiency across sectors and the adoption of renewable energy sources can further minimize environmental impacts [44,45].

5.1.3. Implementation to Align with Destination Goals

Revitalizing mature destinations and maintaining competitiveness requires implementing sustainability measures and smart tourism projects [46]. Despite having a strategic plan for 2023–2027, key actions in the plan remain unimplemented, as outlined in the final feasibility report for the special area of Khung BangKachao. There is no evidence of shifts in community attitudes toward tourism. While land use zones are clearly defined, there is no monitoring system to evaluate how expansions impact zoning goals. Accessible design considerations for people with physical limitations are present, but infrastructure for individuals with other limitations remains insufficient. Successful plan implementation depends on active participation and cooperation from communities, businesses, and government agencies [47,48]. Adaptive management approaches that tailor strategies to local circumstances and overcome barriers, such as stakeholder engagement and data collection, are essential for success [49,50].

5.2. Theoretical Implications

Maintaining Standards and Continuous Inspections of Tourist Destinations

Adhering to GSTC guidelines can reduce risks from natural disasters and minimize environmental impacts [21]. Assessment results show excellent practices in areas such as information dissemination, laws for preservation, seasonal tourism management, and protection of wildlife and at-risk environments. Effective communication with tourists about conservation and environmental protection is critical for minimizing negative impacts [51,52]. Seasonal tourism management is crucial for conserving resources and ensuring consistent conservation practices [53,54]. Enforcing rules and regulations to manage tourism's environmental impacts and ensure sustainable practices is essential [55,56]. Khung BangKachao requires a holistic strategy for managing tourism and conserving wildlife. This includes information dissemination, enforcement of regulations, seasonal tourist management, habitat protection, and sustainable activities involving local communities.

5.3. Implementing GSTC Standards for Sustainable Urban Green Space

GSTC criteria can align local practices with sustainable urban green space, ensuring effective sustainable management in urban green space. Implementing GSTC standards in urban green spaces is a strategic method to improve sustainability. The GSTC standards provide a complete framework that puts an emphasis on long-term management, economic benefits, protecting cultural heritage, and reducing negative effects on the environment. Moreover, GSTC standards prioritize cultural and social sustainability, promoting the conservation of local heritage and fostering active community engagement [57]. This is especially pertinent in urban environments, where green spaces function as cultural and social centers. In the context of urban green spaces, these standards guide the creation and maintenance of parks and gardens [58], ensuring a balance between environmental sustainability and community well-being [59].

Beyond their application in a single locale, these standards present a scalable and adaptable framework for managing urban green spaces globally. With the growing emphasis on sustainable urban development, GSTC standards can function as a universal guideline for policymakers and urban planners striving to incorporate sustainability into green infrastructure effectively.

6. Conclusions

Managing green spaces to promote sustainable tourism requires management to achieve sustainability through the evaluation of tourist attractions. The international standard for evaluation is the GSTC, which is the global standard that helps manage tourist attractions sustainably. Khung BangKachao assessment results based on GSTC-D criteria (A3) indicate that Khung BangKachao is at high risk and requires robust management to prevent severe damage or negative impacts. Unregulated tourism can degrade the environment, and the absence of early consideration for local resources and environmental implications may harm natural and cultural heritage sites [60]. Surpassing environmental carrying capacities can result in crowding, erosion, and littering, damaging ecosystems and visitor experiences [61]. Additionally, inefficient resource deployment may hinder economic and sustainable development opportunities [62,63]. Addressing these issues requires systematic actions to establish an effective evaluation and monitoring system. Using GSTC-D criteria, a dashboard should be developed to monitor the strategic plan under DASTA. This dashboard would track operational progress, budget expenditures, and achieved outputs against project goals. Effective destination management systems (DMS) improve competitiveness and drive informed decision-making [64,65]. Therefore, Khung BangKachao's tourism requires a multifaceted approach and improved standards and

practices. In addition, increasing awareness and ensuring strong government support. By addressing these areas, Khung BangKachao can enhance its tourism sector's sustainability and contribute to economic growth while preserving its natural and cultural resources.

7. Limitations

While qualitative methods provided rich, in-depth insights into stakeholder's perceptions, values, and practices related to sustainable tourism in Khung BangKachao, this approach also presents some limitations. Qualitative data relies on interpretation, it can be influenced by the researcher's personal views, and without numerical evidence, it is difficult to assess wider effects or back up policy choices with statistics. Additionally, qualitative methods are time-intensive and may not capture temporal or seasonal variations in tourism activity. These limitations suggest that future research could benefit from incorporating mixed methods to provide a more comprehensive and balanced assessment of sustainability outcomes.

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