

DEVELOPING GREEN TOURISM IN THE CONTEXT OF 4.0 OPPORTUNITIES AND CHALLENGES FOR HO CHI MINH CITY

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ABSTRACT

Developing green tourism in the Industry 4.0 era is now a pressing requirement for localities striving to meet economic, social, and environmental sustainability goals. Ho Chi Minh City is a locality in the Southeast region of Vietnam, with a favorable geographic position and diverse resources for tourism development. The article analyzes the current situation, opportunities and challenges in green tourism development in Ho Chi Minh City in the era of Industry 4.0. By synthesizing secondary documents and statistics from 2020–2024, the study identifies key factors influencing green tourism and proposes policy recommendations to promote its sustainable development. The results show that the city has great potential in natural resources and invested infrastructure, but still faces the problem of environmental pollution and lacks a unified set of green tourism evaluation criteria. The study recommends stepping up awareness and education efforts, developing evaluation criteria, refining the legal framework, and enhancing state management to protect natural resources and ensure sustainable development.

Keywords: Green tourism, Industry 4.0, sustainable development, Ho Chi Minh City.

1. INTRODUCTION

In Vietnam, the development of green tourism is an issue of great concern and is considered a strategic factor in tourism development. The importance of green tourism was highlighted in Vietnam's Tourism Development Strategy to 2020, Vision 2030 [1]. This strategy proposed "developing green tourism products, respecting natural factors and local culture" as a key solution for sustainable tourism development, closely linked with preserving national cultural values, protecting landscapes and the environment, and ensuring security and social order. With these advantages and the attention of the state, the development of green tourism offers Vietnam's tourism industry many opportunities to develop sustainably along with various accompanying benefits.

Ho Chi Minh City is known as one of the economic centers of the country, and a locality with an extremely important position in the development of Vietnam's tourism industry. Therefore, developing green tourism in Ho Chi Minh City under the current Industry 4.0 context is considered a pivotal approach to spur the city's tourism growth towards economic, cultural, social, and environmental sustainability.

2. THEORETICAL BACKGROUND

Not only does Vietnam identify green tourism as a core factor to maintain balance and sustain tourism activities, but other countries in the world today also consider this a necessary approach to increase competitive advantage in tourism development. The MAF stated that “Green tourism is a leisure activity to enjoy the nature and culture of tourist destinations and interact with local people in rural areas with rich natural scenery” [2]. At Agenda 21 on tourism, the view that “Green tourism is a positive approach to ensure sustainable tourism development” was also affirmed [3].

According to the OECD, “Green growth is the driving force behind economic growth and development, while ensuring that natural capital continues to provide resources and environmental services essential for human survival” [4]. Discussing the issue of green tourism, Jafar Jafari and Honggen Xiao said that “Green tourism is an alternative form of tourism that is often related to rural tourism, is a form of nature tourism, is environmentally friendly and hardly creates an ecological impact at tourist destinations” [5].

According to Chengcai et al., green tourism is understood in both broad and narrow senses. In a narrow sense, green tourism is a tourism activity that pays attention to the protection of natural resources and the ecological environment, often micro and associated with the development of tourism products. In a broad sense, green tourism is a method of developing the tourism economy according to... (the text likely continues, but we keep original content unchanged here) [6].

In Vietnam, there are also many studies on green tourism, each with its own approach that affirms the necessary role of this form. Nguyen Van Dinh stated that “Green tourism is a type of tourism based on nature and culture, with environmental education, contributing to conservation and sustainable development efforts, with the active participation of local communities. The core of green tourism is a green tourism product. To ensure a product is green, it needs to meet criteria such as being created from environmentally friendly materials; providing safe solutions for the environment and health; reducing environmental impact during use; and creating a friendly and safe environment for health” [7].

Nguyen Thi Tue Anh said that “Green tourism development is essentially tourism development in the direction of green growth, which is a model and method of tourism development on the basis of greening tourism management, business and consumption activities in order to achieve the goal of sustainable tourism development. Thus, it can be understood that green tourism development is a development method based on respecting and protecting green tourism management, business and consumption activities; low energy consumption, development and use of renewable energy; at the same time, create jobs, improve livelihoods, contribute to building a green economy and realize the goal of sustainable tourism development and effectively promote the value of natural resources” [8]. Green tourism requires the coordination of many stakeholders, not just one department or a few factors. This coordination includes government agencies, local communities, businesses, and tourists in the process of participating in tourism activities. Green tourism also requires ensuring many aspects such as economy, culture–society, environment, and the rational and sustainable use of resources.

Industry 4.0 and Tourism 4.0: Industry 4.0 (the Fourth Industrial Revolution) refers to the integration of advanced digital technologies (e.g., IoT, Big Data, AI, blockchain) into industries. In the tourism sector, the adoption of these technologies – often termed “Tourism 4.0” or smart tourism – is seen as a catalyst for innovation and sustainability. Internationally, initiatives like the Tourism 4.0 Partnership in Slovenia illustrate how stakeholder collaboration and data-driven approaches can pave the way for sustainable tourism [9]. This model uses

modern IT solutions to place local residents' quality of life at the center, reimagining tourism with sustainability in mind. For example, the Tourism Impact Model (TIM) is an award-winning tool that uses real data to create an objective picture of tourism's impact in a region, helping planners make greener decisions. These examples show that Industry 4.0 technologies can be leveraged to develop new models of green tourism where resource efficiency, community benefit, and minimal environmental footprint are key objectives.

3. METHODOLOGY

This study employed a qualitative research design, mainly using secondary data sources. Methods of collecting and processing information included collecting secondary documents, previously published scientific reports, and tourism statistics from 2020–2024 for Ho Chi Minh City, as well as other tourism-related data over the years. Key sources of data were official reports from the Ho Chi Minh City Department of Tourism and relevant policy documents, alongside academic literature on green tourism and Industry 4.0.

Analysis and synthesis method: The analysis and synthesis method was utilized to select, organize, and interpret the collected data in line with the research objectives. Collected information was reviewed and, where possible, quantified or summarized to ensure an accurate and adequate basis for assessment of the research subject. The data analysis involved describing trends (such as tourist arrivals and revenue changes) and comparing findings with literature to identify influencing factors, opportunities, and challenges. From there, solutions for green tourism development in Ho Chi Minh City are proposed.

4. RESULTS AND DISCUSSION

4.1. Results

4.1.1. Overview of Ho Chi Minh City

Ho Chi Minh City is currently one of the largest and most populous cities in Vietnam, and it is an important economic, cultural, and social center of the country. It borders Tay Ninh and Binh Duong to the north, Dong Nai to the east, the East Sea and Tien Giang to the south, and Long An to the west. In Ho Chi Minh City, there are hundreds of rivers and canals, though not many large rivers; the largest is the Saigon River, which flows through the city with a length of 106 km. The river system from Ho Chi Minh City to the East and down to the western provinces and to Cambodia is very convenient for transport and connectivity. Ho Chi Minh City's population reached more than 8,99 million people in 2021 [10], making it the most populous locality in the country—an increase of 1,8 million people compared to 2009. The city plays a leading role in Vietnam's economy, accounting for only 0,6% of Vietnam's land area and 8,34% of the population but contributing about 20,5% of GDP, 27,9% of industrial production value, and 37,9% of foreign-invested projects [11].

Ho Chi Minh City has determined that by 2030, the city's tourism industry will truly be a key economic sector, creating a driving force for the city's socio-economic development and strongly spurring the growth of other industries and fields. The goal is to have professional and synchronous infrastructure and modern technical facilities; to offer high-quality, diverse, branded tourism products imbued with national cultural identity that can compete with major cities in the region; to welcome 10 to 11 million international tourists and 33 to 35 million domestic visitors; and to reach tourism revenue of 165,000 to 170,000 billion VND [12]. The city is striving to be among the leading cities in Southeast Asia in terms of tourism development.

4.1.2. The current situation of green tourism development in Ho Chi Minh City

The number of tourists to Ho Chi Minh City in recent years has fluctuated markedly. The number of domestic and international tourists tended to increase steadily from the post-pandemic period to the present.

Table 1. Revenue and number of visitors to Ho Chi Minh City in the period of 2020 - 2024

Year	International Visitors (turns)	Domestic Visitors (turns)	Total visitors (turns)	Turnover (billion VND)
2020	1,300,000	15,000,000	16,300,000	84,000
2021	0	9,300,000	9,300,000	44,000
2022	3,500,000	25,000,000	28,500,000	131,000
2023	5,000,000	35,000,000	40,000,000	160,000
2024	6,000,000	38,000,000	44,000,000	190,000

Source: Ho Chi Minh City Department of Tourism, 2025

From 2020 to 2024, the number of domestic and international tourists showed a steady increase (with the exception of 2021 due to the COVID-19 pandemic). In 2021, during the height of the pandemic, there were almost no international tourists (down from 1,3 million in 2020), and the number of domestic visitors dropped to 9,3 million (from 15 million in 2020), with tourism revenue only reaching 44,000 billion VND (a 50% decrease from 2020). By 2022, the tourism industry had basically begun to recover after the pandemic was controlled, but travel sentiment remained cautious. That year, Ho Chi Minh City received 29 million visitors (3,5 million international and 25 million domestic), and tourism revenue reached 131,000 billion VND. In 2023 and 2024, the city’s tourism saw a remarkable rebound, with 40 million visitors in 2023 (5 million international, 35 million domestic, revenue 160,000 billion VND) and 44 million in 2024 (6 million international, 38 million domestic, revenue 190,000 billion VND). Although visitor numbers continued to grow in 2024, the growth rate was modest due to wider economic difficulties.

The facilities serving tourism activities in Ho Chi Minh City have been gradually improved and modernized to international standards. Currently, in terms of infrastructure and amenities, the city is the most developed tourism locale in Vietnam. A wide system of restaurants, hotels, and shopping centers has been put into operation and is attracting tourists. In addition, tourism human resources in Ho Chi Minh City are of high quality and are also being distributed to support other localities’ tourism development. Not only is the workforce sufficient in quantity, but it is also increasingly well-trained in quality and skills for operational processes.

Tourism activities in recent years, however, have also significantly affected the environment. For example, the water environment (rivers and sea) around Ho Chi Minh City is highly polluted due to domestic wastewater and waste generated by tourism and other activities. Air pollution at crowded sites (due to concentrated tourists, vehicle emissions, and dust from transportation) is also a pressing problem that requires specific solutions. Despite the strong growth post-pandemic that confirms Ho Chi Minh City’s status as the country’s leading tourism hub, tourism activities in the city still have many limitations, leading to ineffective development generally - and green tourism in particular - such as unsustainable exploitation of natural resources, numerous unresolved environmental issues, and a priority on

economic benefits without adequate consideration for sustainability and green tourism principles.

Therefore, the challenge for this locality is how to achieve high tourism profits while still maintaining sustainable development. The development of green tourism in Ho Chi Minh City is a matter that needs attention and a long-term orientation in the current 4.0 trend that is strongly influencing the industry.

4.1.3. Assessment of opportunities and challenges in green tourism development in Ho Chi Minh City

Ho Chi Minh City is a locale with a lot of potential for tourism development. The city is well known among a large community of international and domestic tourists for its vibrancy as well as unique features. In terms of tourism resources and conditions, Ho Chi Minh City is the leading tourism center of Vietnam and contributes greatly to the economy; it is a branded destination that attracts both domestic and foreign tourists. With the strength of diverse cultural and natural tourism resources, the city can support many types of tourism, contributing to a wide range of tourism products. Moreover, being the nation's leading economic center means attracting investment capital for tourism activities is also advantageous. Additionally, the emergence of Industry 4.0 technologies offers new opportunities for green tourism. For example, IoT sensors can be used to monitor and optimize resource usage in hotels and tourist sites, reducing waste and energy consumption. Big Data analytics and AI can provide insights into tourist behavior and flows, helping planners improve visitor distribution, avoid overcrowding, and tailor services toward more sustainable tourism patterns.

However, significant challenges persist. The city's tourism development has yet to fully align with green tourism principles; efforts to prevent resource degradation have been ineffective, and environmental pollution continues to rise. In this context, environmental protection is a fundamental requirement for any green tourism development orientation moving forward. Moreover, the rapid advancement of Industry 4.0 technologies in Ho Chi Minh City is transforming many aspects of daily life and tourist activities. This trend requires appropriate solutions and a sustainable development orientation for the city to remain competitive with other destinations.

4.1.4. Implications of green tourism development in Ho Chi Minh City in the context of 4.0

Education and propagation of green tourism development policies

The development of green tourism needs a long-term and stable plan, so education and awareness-raising need to be focused on and carried out regularly. This effort should not only target those directly involved in tourism activities but also the community of residents, tourists, tourism and non-tourism businesses, and suppliers of related products and services. Ho Chi Minh City should partner with reputable media agencies in the tourism sector and diversify communication and promotional channels to ensure accurate information reaches all target audiences.

Developing a set of criteria for evaluating green tourism

Ho Chi Minh City needs to urgently develop a set of green tourism assessment criteria to apply uniformly in practice. This set of criteria should be required for business systems such as hotels, restaurants, accommodations, transportation services, and other enterprises involved in tourism activities. Moreover, in the coming time, it is necessary to review planning and activities of relevant organizations and individuals, and have clear plans to handle any violations of the city's regulations on green tourism development. When developing this set of criteria, it is important to incorporate input from tourism experts to ensure objectivity and

alignment with current 4.0 trends. During the implementation of this set of criteria, information about the overseeing body should be made public to relevant stakeholders, and there should be deterrent measures for organizations and individuals that violate green tourism standards.

State management of tourism

Green tourism requires specific direction and plans, so the role of the government is indispensable. Ho Chi Minh City needs to strengthen state management in green tourism development, specifically by developing incentive tariff policies for businesses that commit to green tourism, encouraging protection of natural resources and culture in line with sustainable growth goals. Tourism management personnel need to regularly update their knowledge and receive training on green tourism to keep pace with evolving Industry 4.0 trends. Many leading tourism countries have successfully implemented green tourism, highlighting the need for a capable workforce well-versed in green tourism principles to manage and operate sustainable initiatives.

Protection of natural resources and environment – sustainable development

Ho Chi Minh City needs to take strong measures to protect natural resources and the environment. Educational and awareness programs should be developed for residents and tourists about the importance of natural resources in economic development in general and tourism development in particular. In addition, it is necessary to establish a warning system about the harm tourism activities can cause to the environment in order to raise the awareness of people and tourists in environmental protection at tourist attractions. Such communication should utilize mass media channels (posters, the internet, official information portals) to effectively educate the public about resource protection, ensuring that tourism development goes hand in hand with environmental conservation and long-term sustainability.

4.2. Discussion

The study has clarified many issues related to the development of green tourism in Ho Chi Minh City. Currently, local tourism has made many breakthroughs in the period when the whole country is focusing on Industry 4.0 as it is now. However, the issue of green tourism development has not been given adequate attention, and there are not yet specific plans to maintain the sustainability of the city's tourism industry in the future. In order to strongly promote the development of green tourism, it is necessary to focus on and closely follow a number of important issues as well as address existing limitations.

In the coming time, Ho Chi Minh City needs to carry out education and communication about green tourism to those directly and indirectly involved in tourism activities, so that these subjects understand the role of green tourism and its mission for the tourism industry. In addition, tourism management agencies need to urgently implement detailed plans to develop a set of evaluation criteria for green tourism and put them into practice. The development of a set of criteria and legal framework for green tourism, combined with monitoring by technology (IoT, GIS), will help Ho Chi Minh City effectively exploit resources while protecting the environment [6]. At the same time, raising awareness of the community and businesses through continuous training and communication programs is crucial [8]. The state management of tourism activities also needs specific changes; management personnel must be knowledgeable about green tourism and have a long-term vision to promote and develop green tourism in the coming time. Moreover, the environment is a vital factor for tourism - it not only directly affects people's lives but its degradation can harm biodiversity and reduce the quality of destinations - so specific solutions and strict measures are needed for all stakeholders.

These findings are consistent with existing research on green tourism development. For instance, Jafari and Xiao described green tourism as an environmentally friendly form of tourism with minimal ecological impact, reinforcing our study's emphasis on protecting the environment [5]. Nguyen Van Dinh also emphasizes the importance of clear criteria and community participation in green tourism development, which echoes our finding about the need for a standardized set of green tourism criteria and broad stakeholder involvement [7]. Similarly, our recommendations on education and stakeholder awareness parallel the conclusions of Nguyen Thi Tue Anh, who highlighted the greening of tourism management and continuous community education as keys to sustainable tourism [8]. Globally, the integration of modern technologies in our proposed solutions aligns with Chengcai et al., who stress the use of technological monitoring and robust evaluation tools in the tourism industry's green development [6]. Unlike some studies that remain at a conceptual level, our research provides practical, locale-specific recommendations for Ho Chi Minh City, thereby contributing a concrete case to the broader discourse on sustainable green tourism in the Industry 4.0 context.

5. CONCLUSION

The study has raised the issue of green tourism development in the context of 4.0, examining the opportunities and challenges, and providing an overview of the current state of green tourism in Ho Chi Minh City in recent years. The study also points out the opportunities and challenges that the city faces in implementing green tourism development, thereby offering several policy recommendations for the locality in tourism development in general and green tourism in the coming time, contributing to making this destination a sustainable and distinctive tourism brand in the future.

The development of green tourism in Ho Chi Minh City in the context of Industry 4.0 needs to be based on three main pillars: evaluation criteria, management technology, and community capacity. First, the development of a set of criteria for measuring energy consumption, waste management, and biodiversity conservation according to international standards will create a legal basis and enforcement monitoring tools [5], [4]. Second, the application of the Internet of Things (IoT), GIS, and big data analytics helps monitor the environment in real time, optimize planning, and improve service quality [6]. Finally, continuous training and communication programs for governments, businesses, and communities are key factors to promote awareness and cooperation, thereby creating unique and sustainable green tourism products [8].

To maintain the growth momentum, Ho Chi Minh City should adjust tax incentives and credit support for green projects and establish a periodic inspection mechanism. The close combination of a solid legal framework, modern technology, and capacity building of stakeholders will help the city become a leading green tourism destination in Southeast Asia.

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TÓM TẮT

PHÁT TRIỂN DU LỊCH XANH TRONG BỐI CẢNH 4.0 CƠ HỘI VÀ THÁCH THỨC ĐỐI VỚI THÀNH PHỐ HỒ CHÍ MINH

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Phát triển du lịch xanh trong kỷ nguyên Công nghiệp 4.0 hiện là một yêu cầu cấp thiết đối với các địa phương nhằm hướng tới các mục tiêu phát triển bền vững về kinh tế, xã hội và môi trường. Thành phố Hồ Chí Minh là một địa phương thuộc vùng Đông Nam Bộ của Việt Nam, có vị trí địa lý thuận lợi và nguồn tài nguyên đa dạng để phát triển du lịch. Bài viết phân tích thực trạng, cơ hội và thách thức trong việc phát triển du lịch xanh tại Thành phố Hồ Chí Minh trong kỷ nguyên Công nghiệp 4.0. Thông qua việc tổng hợp các tài liệu thứ cấp và số liệu thống kê giai đoạn 2020–2024, nghiên cứu xác định các yếu tố chính ảnh hưởng đến du lịch xanh và đề xuất các khuyến nghị chính sách nhằm thúc đẩy sự phát triển bền vững của loại hình này. Kết quả cho thấy thành phố có tiềm năng lớn về tài nguyên thiên nhiên và cơ sở hạ tầng được đầu tư, nhưng vẫn còn đối mặt với vấn đề ô nhiễm môi trường và thiếu một bộ tiêu chí đánh giá du lịch xanh thống nhất. Nghiên cứu khuyến nghị cần đẩy mạnh công tác tuyên truyền, giáo dục nâng cao nhận thức, xây dựng bộ tiêu chí đánh giá, hoàn thiện khung pháp lý và tăng cường quản lý nhà nước nhằm bảo vệ tài nguyên thiên nhiên và đảm bảo phát triển bền vững.

Từ khóa: Du lịch xanh, Công nghiệp 4.0, phát triển bền vững, Thành phố Hồ Chí Minh.