Challenges for Smart Tourism from Overtourism: A Case Study between Seville, Spain and Kyoto, Japan

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Abstract: A rapid increase in foreign visitors has led to overtourism in Kyoto. Given this situation, the promotion of smart tourism is expected to contribute to addressing overtourism. This study involves a comparative analysis between Kyoto and Seville, examining advanced cases to identify aspects that can serve as references from successful instances. We used a new insight on smart tourism destinations (STDs) defined by the European Commission, which began from 2018: Accessibility, Sustainability, Digitalization, and Cultural Heritage. Based on the previous discussion, here we will also propose the following three aspects of Kyoto's future development: (1) A City Accessible for everyone—Advisory Boards; (2) Enhance Digital Management of Tourist Attractions; (3) Enhance Disaster Awareness in Tourism—Disaster Education with VR.

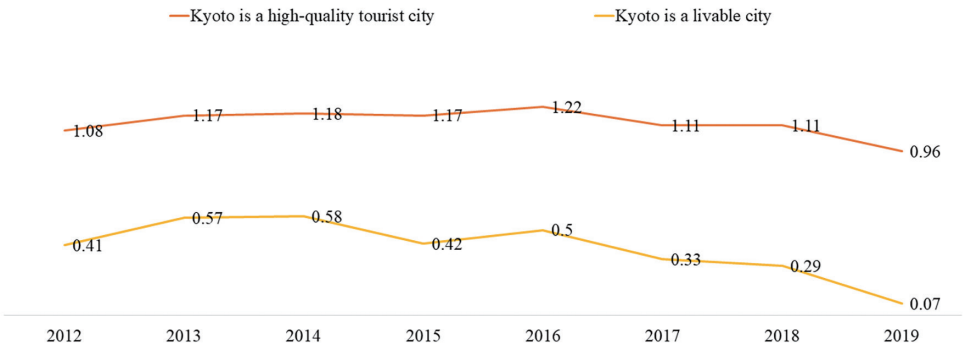
Keywords: *accessibility, sustainability, digitalization, cultural heritage*

1. Introduction

(1) Background and Objective

Before the COVID-19 pandemic, Kyoto welcomed over 50 million tourists annually (Kyoto City Tourism Association 2022). The surge in foreign visitors led to overcrowded bus routes and noise from suitcases, exemplifying "overtourism" (Suzuki and Asahi 2020). Kyoto's annual citizen survey shows a decreasing trend in positive responses to tourism, indicating growing negative sentiment.

Graph 1. Trends of Changes in Public Sentiment toward Tourism



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Kyoto's annual survey gauges citizen sentiments on tourism through two key questions: "Kyoto is a high-quality tourist city for tourists" and "Kyoto is a livable tourist city for residents." Since 2012, average scores of the two questions have been positive but show a decreasing trend, indicating growing negative sentiment towards tourism. (Graph 1)

The COVID-19 pandemic impacted tourism, reducing its global GDP contribution by USD 766 billion in 2020 (World Travel and Tourism Council 2020). Changing travel restrictions not only further decreased travel desire (Marine-Roig and Clavé 2015) but also demonstrated that regulating tourist flows for sustainability is feasible (Romagosa 2020). The crisis, in turn, provided valuable lessons by underscoring smart tourism as a potential solution.

The "Smart Resort Handbook" by Japan's Ministry of Economy, Trade and Industry (2020) defines smart tourism as using digital technology to expand tourism, prolong stays, and promote consumption. It offers real-time information on congestion, routes, weather, and evacuation support. This allows cities to provide digital tourism and hotel information, products, services, and experiences for both tourists and residents, which can be helpful in preventing overtourism (Chen 2024). It also facilitates information sharing through big data analysis, supporting decision-making and enhancing safety during crises (Bethune et al. 2022), making travel planning more convenient.

(2) Literature Review

Research interest in Kyoto has been high among scholars due to its various tourism-related challenges, even before the concept of "overtourism" gained recognition in the 2010s. Studies have examined smart tourism, overtourism, and aspects specific to Kyoto.

Foreign research on smart tourism, by scholars such as Ulrike Gretzel, Lopez de Avila, and Hunter, has focused on the impact of information technology (IT) on tourism and sought solutions to promote tourism development through IT. Key areas include the impact of IT development on smart tourism, destination construction, and internal structure interactions (Gretzel et al. 2015; Lopez 2015; Hunter et al. 2015).

Sataki (2019) addresses overtourism in Kyoto, noting changes due to increased inbound tourists. Factors such as affordable cruise ships from Asia, widespread internet access, and government initiatives have led to "tourism pollution," with tourists exceeding local capacity and a decline in Japanese tourists. Japanese research, including Abe et al. (2020) and Takasaka (2020), has explored these challenges before COVID-19, highlighting the shift in Kyoto's tourism dynamics.

Globally, solutions to overtourism include dispersion, pricing, and regulation (Horita 2020). These methods face challenges such as seasonal limitations, pricing concerns, and potential negative reputations from prohibitions (Choi 2020). There is little comprehensive research on how Kyoto addresses these challenges through smart tourism. Thus, this thesis compares Kyoto, a city of pride in Japan, with Seville, Spain, known for its smart tourism management. The goal is to explore effective strategies to enhance tourism in Kyoto.

(3) Methodology

This study compares Kyoto and Seville to identify successful aspects that can guide Kyoto's smart tourism development and provide practical policy recommendations. We will explain why we chose Seville in the second part. The analysis uses the European Commission's framework for smart tourism destinations (STDs), focusing on Accessibility, Sustainability, Digitalization, and Cultural Heritage.

Accessibility ensures services are multilingual and digitally accessible to all travelers. This enriches the spiritual and cultural life of the disabled, increases the social participation of

disadvantaged groups and promotes the harmonious development of the society (Wang et al. 2022).

Sustainability encompasses more than just the responsible management and preservation of a city's natural resources; it also involves mitigating seasonal impacts on the environment and actively engaging with the local community. "Various initiatives are being undertaken by governments, relevant organizations, and the private sector to achieve the goals of the Sustainable Development Goals (SDGs) and create a sustainable society" (Japan National Tourism Organization 2023).

Digitalization leverages technology to improve all aspects of the tourism experience, facilitating easier access to services and fostering local enterprise expansion. "Post-COVID, the importance of tourism driven by IT and stakeholder collaboration has grown, leading to regional rediscovery" (Kobayashi 2022).

Cultural Heritage focuses on safeguarding and leveraging cultural assets to enhance experiences for tourists and the industry. It requires proper utilization and public engagement to maintain its vitality.

2. Case Studies

(1) Outline of Seville, Spain and Kyoto, Japan

This section compares Kyoto and Seville based on accessibility, sustainability, digitalization and cultural heritage for STDs.

Firstly, we will introduce the two cities in terms of their geographical location and tourist numbers. Seville, the capital of Andalusia in Spain, welcomed over 2.9 million visitors in 2019 (6.7 million overnight stays) in hotels and tourist accommodation, and was certified as the smartest city in Europe in 2023 (Seville City Office 2023). Kyoto, located in central Honshu, Japan, welcomed over 53.52 million visitors in 2019 and 50.28 million in 2023, remaining at the 50 million mark (Kyoto City Official Website 2019; 2023). It should be noted that there are significant differences between the two cities in terms of size, economic structure and tourism market composition. In order to eliminate the potential bias introduced by a direct comparison of visitor numbers, we adopted a normalization method by comparing the number of visitors to the resident population and urban area of each city. Specifically, Kyoto has a visitor density of 60,025 people per square kilometer, while Seville has a visitor density of 20,596 people per square kilometer. Furthermore, by analyzing the ratio of international to domestic tourists, we found that in both cities, the number of foreign tourists far exceeds the number of domestic tourists. Based on these normalized data and the comprehensive consideration of structural differences, we will focus in the following discussions on the qualitative effects of smart tourism management strategies, avoiding a one-sided comparison based solely on absolute visitor numbers.

Both cities have a long history as capitals and are rich in cultural heritage, with Kyoto serving as Japan's capital from 794 to 1868 and Seville dating back to Roman times. The Kamo River in Kyoto and the Guadalquivir River in Seville play an important role in their cityscapes. They host famous festivals such as Kyoto's Gion Festival and Seville's Feria de Abril and Semana Santa, which attract large numbers of tourists. Both cities face seasonal peaks in tourism, leading to pressure on infrastructure and problems associated with overtourism. The key challenge is to manage overtourism, preserve cultural heritage and balance the needs of local communities with the demands of tourists. Overtourism can threaten cultural sites, contribute to urban problems, and lead to the commercialization of traditional cultural activities (Yamashita 2019).

The choice of Seville and Kyoto for comparative analysis is compelling because of these similarities and challenges.

(2) Comparison of the Current Situation

Table 1. Current Situation of Kyoto, Japan

Accessibility	Sustainability
Public Transportation-Japan Rail Pass	Environmental Education
Bicycle Rentals	Green Tourism Plan
Accessible accommodations	Water Conservation
Tourist Information Center	Bicycle-Friendly City
Attractions with pathways and ramps	Waste Management Initiatives
Multilingual Information	Security Assurance Plan
Digitalization	**Cultural Heritage**
My Number Card	Cultural Festival and Events
Digital Cultural Preservation	Cultural Workshops
Free Wi-fi in Public Areas	Kyoto Cuisine
Digital Arts and Events	Cultural Preservation and Restoration
Environmental Monitoring	

Source: Kyoto City Official Website and Kyoto City Tourism Association

Table 2. Current Situation of Seville, Spain

Accessibility	Sustainability
Seville Accessible Application with multiple languages	Horizonte Sevilla Intelligent: Converts 264 public structures into smart, energy-efficient facilities.
Bike Sharing Service	eCity-Sevilla: Converts Cartuja district into a low-emission environment.
Municipal Accessibility Commission	Life Water-cool: Addresses elevated temperatures in public areas and buildings.
Pedestrianization of its historic center and UNESCO World Heritage Axis	PES 2030, SUMP, SECAP: Projects aiming for climate neutrality by 2030.
Wheelchair-adapted Taxis and AVE (High-Speed Train)	Gardens in the Air: Enhancing botanical legacy as a tourist resource.
Sevilla Smart Accessibility Tourist and Events	Arbo-map: App for locating forest species and their cultural value.
Accessible and safe celebrations	Sustainable Urban Tourism Lab
Digitalization	**Cultural Heritage**
Smart Tourist Destination Network (DTI) and Spanish Smart City Network (RECI)	Horizonte Sevilla Intelligent
5G Forum or Tourism Innovation Summit	The Institute of Culture and the Arts (ICAS)
Seville Tourist Portal	Unique cultural-based tourism products
Hypermedia Promotion: Converts all formats from paper to digital.	Creative City of Music by UNESCO (2006)
CRM software for Sevilla City Office management	Flamenco Biennial: UNESCO Intangible Cultural Heritage (2010).
Info Tourist Web: Tourist information management platform.	Legado Andalusi Route: Cultural and celebratory events.
Fi-ware: Platform for developing applications and internet services.	Audiovisual Hub: One of the largest film and television platforms in Europe.
Sustainable Urban Tourism Lab: Public-private innovation hub.	

Source: Seville City Office Website

Tables 1 and 2 above summarize the policies implemented by Seville and Kyoto, followed by an analysis of Seville's strengths and potential areas where Kyoto can learn and improve.

1) Accessibility

To mitigate the adverse effects of tourism on communities and improve the residents' quality of life, Seville launched the "SEVILLE ACCESSIBLE" app. This app enhances the experience for both tourists and residents by guiding tourists to historical attractions and hidden gems while minimizing disruptions. It integrates real-time accessibility and mobility data with tourist information and is available on multiple platforms and in various languages (Seville City Office 2023). Seville aims for inclusivity, ensuring all citizens and tourists feel welcome and can use regular transport and services (Gillovic and Mclntosh 2020). The city's long-term goal is to be fully accessible, especially through technological innovation (European Commission n.d.).

Kyoto, with its many historic buildings and traditional sites, faces challenges in improving accessibility. According to the Kyoto City Official Website in 2016, the primary issues for people with disabilities were stairs and steps on streets (48.1%) and obstacles like bicycles (21.5%). To address these challenges, Kyoto has implemented various initiatives, such as providing advance consultations and wheelchair access at temples such as Kinkaku-ji.

2) Sustainability—Fight against Disasters

Seville has been identified as one of the cities most vulnerable to the impacts of global warming (Lara and Moral 2023). The Seville Smart Tourism Office is at the forefront of initiatives such as the Sustainable Urban Tourism Lab, an innovation laboratory addressing the challenges of Shared Seville and post-pandemic tourism, as well as Smart Space, an incubator fostering entrepreneurship and training in sustainable urban tourism (Seville City Office 2023).

Japan, particularly Kyoto Prefecture, faces various natural disasters beyond earthquakes. In Kyoto City, plans such as the "Difficult-to-Return Evacuation Plan for Tourists" in the popular Kiyomizu-Gion area, as well as the "Urban Regeneration Safety Assurance Plan for Kyoto Station Area," have been established. However, tourism in Kyoto exhibits signs of overtourism, potentially affecting the local community's lives. "Tourists unfamiliar with the local conditions are particularly vulnerable. For sustainable tourism, tourists themselves need to consider disaster prevention" (Yamashita 2019). Like Seville, it is essential to raise disaster awareness among both Kyoto residents and tourists. In addition to natural disasters, measures against tourism-related disasters and promoting responsible tourism are becoming necessary.

3) Technology and Innovation in the Service of the Public

Seville has implemented the "Seville Smart Accessibility Tourist & Events" project to improve accessibility and urban management using ICT (Information and Communication Technology), including GIS and AI tools, to analyze data, establish measures, and design accessible routes. This information is available through the Seville Accessible Application (European Commission n.d.). The city has also enhanced connectivity, making public buildings IoT nodes to feed information to the City Platform.

However, some tourists may not be fully aware of or do not use digital tourism applications due to insufficient promotion, unfriendly interfaces, or a lack of familiarity with digital technology. To address this, Kyoto can strengthen the promotion of these applications and enhance tourists' digital literacy, ensuring more people can fully utilize these tools. In Kyoto, tourism-related information is scattered, and the uniformity of tourism websites, especially regarding transportation issues, is relatively poor. According to a 2019 survey by the Kyoto Tourism Association,

transportation issues accounted for 16.9% of the factors affecting tourist satisfaction, ranking first, followed by insufficient sightseeing time at 16.5% (Kyoto City Tourism Association 2022).

4) Cultural Heritage with Technology

The key to Seville's strategy for cultural heritage is the Horizonte Seville Intelligent Project. This initiative is dedicated to the preservation, safeguarding, and promotion of historical heritage through integrating technologies that enable smart management, offering enhanced accessibility to cultural richness for both visitors and citizens. A total of 274 structures, including 8 museums and 27 cultural buildings, are equipped with augmented reality tools and sensors to facilitate intelligent tourism management (Seville City Office 2023). This initiative curates personalized suggestions for visitors based on factors such as building occupancy, schedules, and events.

Given Kyoto's wealth of historical buildings and traditional sites, digitalizing these places may pose challenges in terms of renovation and transformation. However, as Oomen and Aroyo (2011) suggest, "digital technology helps cultural heritage move from the level of mere artifacts to the level of values by digitizing elements of cultural heritage, in other words, moving cultural heritage from data to asset, and exploring sustainable development models for cultural heritage."

3. Conclusion and Future Work

As we discussed before, to address overtourism, it is essential to balance the protection and use of natural and cultural heritage and understand local acceptance of tourism. Promoting smart tourism faces challenges like nurturing digital talent and utilizing data. This paper has examined Kyoto's approach, using Seville as a reference, as a first step in creating a Kyoto-centered tourism model. In the second section, Kyoto's visitor data show a degree of stability. Although the number of international tourists may decrease due to external factors such as the pandemic, the proportion of domestic tourists has increased accordingly, making the total number of visitors appear stable. According to statistics from the Japan Tourism Agency, the number of domestic tourists in Japan increased by as much as 57.6% from January to March 2023 compared to the previous year (Japan Tourism Agency 2024). We acknowledge the limitations in our paper and plan to further disaggregate and adjust domestic and international tourist data in future research to ensure the rigor of our analysis and the validity of our data interpretation.

Based on our discussion, we propose three aspects for Kyoto's future development.

(1) A City Accessible for Everyone—Establish Advisory Boards

Efforts to address accessibility concerns are being undertaken extensively and systematically by municipal authorities, businesses, and in collaboration with regional stakeholders, including representatives from commerce, industry, and property owners. Kyoto City can establish Advisory Boards focusing on disability, the elderly, and LGBT issues. These boards can serve as consultative bodies closely associated with the City Executive Board, fostering the exchange of knowledge and information between representative organizations and the city. By integrating multi-source data (such as visitor flow, traffic, and environmental monitoring data) with cross-departmental collaboration, an effective smart tourism management mechanism can be established to more accurately regulate tourism activities and optimize resource allocation. Moreover, the involvement of local residents and businesses is essential; their insights and feedback are collected and analyzed to ensure that tourism strategies attract visitors while preserving the quality of life and cultural heritage of the community. This collaborative approach aims to provide a solid foundation for decision-making and action at

various levels.

(2) Enhance Digital Management of Tourist Attractions

In line with Seville's approach, visitors can access comprehensive tourist information. During COVID-19, travelers sought ways to avoid crowded areas, but Japan lacked real-time congestion and route information (Ministry of Land, Infrastructure, Transport, and Tourism in Japan 2023). This gap led to ineffective dissemination of tailored recommendations due to the inability to gather travelers' locations and preferences.

With expanding traveler activities and needs, transforming sightseeing spots into wide-area attractions is essential. Enhancing cooperation between destinations can synergize resources, connecting lesser-known spots with popular ones, raising their profiles, and contributing to regional revitalization. As competition among tourist destinations intensifies in Japan and abroad, such strategies can enhance the attractiveness of individual resources and support sustainable tourism growth.

(3) Enhance Disaster Awareness in Tourism—Disaster Education with VR

Disaster preparedness is challenging because individuals find it difficult to imagine harmful situations. Effective disaster preparedness requires individuals to imagine experiencing a disaster, recognize its personal impact and make appropriate judgments. Immersive technology, such as VR, enhances disaster preparedness education by providing vivid, informative experiences. Participants can experience emergencies such as fires, floods and earthquakes first-hand, increasing safety awareness and coping skills. This method strengthens the understanding of emergency situations and response methods. In addition, as the tourism industry values content, this innovative form of tourism experience has significant growth potential.

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