MANAGEMENT OF SUSTAINABLE TOURISM IN TOURIST DESTINATION PORTS: THE USE OF SUSTAINABLE INDICATORS IN THE CASE STUDY OF PIRAEUS PORT, GREECE

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ABSTRACT

The main study of this research is a combined framework for effective management of tourist flows in the Port of Piraeus, Greece. The purpose is to highlight the necessity of introducing a holistic management of the tourism product of Piraeus and the development of a dynamic tourism knowledge base that will show any social, economic and environmental impacts caused by cruise and ship passengers to Piraeus. Achieving sustainability is challenging without practical policy options that can translate ideas into action. The strategic location of the Port of Piraeus makes it a crucial hub for transport, trade, logistics, tourism and communication, linking the Greek islands with the mainland and serving as an international centre for maritime tourism and cargo transport. The Port of Piraeus is essential to the Greek economy and significantly impacts the quality of life and economic performance of the islands it serves. Nevertheless, the services provided to maritime passengers and the overall quality of the maritime travel experience have been somewhat neglected or undervalued for many years. Indicators play a key role in the development of both quantitative and qualitative research, providing researchers with key tools for investigating, measuring and analysing complex phenomena. Sustainability indicators are of significant importance to the cruise industry due to the multifaceted nature of their impacts on environmental, social and economic dimensions. This case study underscores the importance of using sustainable indicators as tools for assessing and guiding the sustainable development of tourism in Piraeus Port. By adopting comprehensive management strategies, Piraeus Port can serve as a model for other ports aiming to achieve sustainable tourism.
Keywords: sustainable tourism, sustainability, strategic management.

1 INTRODUCTION

Understanding how people choose to enjoy cruise tourism and the use of passenger ships is necessary for inspiring port planners and managers of these destinations. Cruise tourism is an important source of economic activity and passenger ships are the means of transport connecting travellers to their desired destinations.

Data generated from the experience of cruise passengers and passenger ship traffic is a very good source for developing data-based knowledge that can be useful for strategic management. Although previous studies have looked at cruise tourism and passenger ship use, there is still a need to develop new methods – especially for recording passenger traffic flows and details of passenger behaviour.

The aim of this research is to highlight the necessity of introducing a holistic management of the tourism product of Piraeus and the development of a dynamic tourism knowledge base that will show any social, economic and environmental impacts caused by cruise and ship passengers of Piraeus.

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2 THE 'CRUISE TOURISM' PHENOMENON IN THE MODERN PORT DESTINATION

For decades, many European port cities have invested in the 'transformation' of their beaches and the revitalisation of their historic centres, thus creating highly attractive cities that compete with other tourist destinations worldwide [1], [2]. Some of these cities, such as Barcelona and Venice, act as ports used by many shipping companies. Other port destinations, such as Lisbon, Malaga and Naples, have focused their efforts on increasing the cultural offer and are trying to become ports of the main cruise routes, aspiring to become 'home ports', a quality that significantly and incrementally benefits the local economy [3]–[6]. Rosa-Jiménez et al. [5] report in their research on the territorial imbalance of cruise activity in the main Mediterranean port destinations, the construction of cruise terminals (CT) has improved the value of nearby historic centres [7] with the subsequent upgrade of the cultural resources of the destination [8]. At the same time, these cities are implementing strategies aimed at attracting more cruise passengers. However, the increase in the docking of large cruise ships and low-cost tourism have led to more mass tourism in these European port cities, which threatens their identity and worsens their tourism [9]–[11].

The World Tourism Organization et al. [12] characterises the phenomenon of overtourism, and by extension overcrowding, as the negative impact of tourism on a tourist destination or parts of it, which excessively affects the perceived quality of life of residents and/or the quality of visitor experiences. According to Picard [13], hypertourism can be understood as the reaction of the society that welcomes tourists to external agents of change, turning it into an inert object that passively undergoes the influences. As described by Andrade et al. [2], this phenomenon blurs the boundaries between the internal and external worlds of society, as well as between elements belonging to culture and those related to tourism.

The adverse effects of tourism development have been linked to concepts such as 'touristophobia' [14], 'hypertourism' [15] and 'overpopulation' [16]. The historic centre of a port city often finds itself confined within a 'tourism bubble', a term first introduced by Cohen in 1972 [17], later described by Judd [18] as a theme park, and more recently refined by Jaakson [19]. These bubbles are typically small in scale, lacking local activity and character [18], and are generally inadequate for accommodating all visitors, making it challenging for residents to maintain their daily lives.

It is no surprise that Phi [20] highlights Barcelona, Venice, and Dubrovnik as the most frequently cited cities in hypertourism studies, serving as prime examples of 'tourist ports'. In response, some of these port cities, including Venice, Barcelona, Lisbon, and Amsterdam, have introduced measures to manage tourist traffic, such as regulating digital rental platforms, raising tourist taxes, and controlling housing prices [16]. Beyond these challenges, port cities must also address the unique issues associated with cruise tourism, which is increasingly scrutinised for its impact on destinations [21]. This often leads to overcrowding at cultural heritage sites, transportation complexities [22], strained tourism infrastructure, limited spending by cruise passengers onshore [23]–[25], and disruptions to local life. The recent surge in anti-cruise sentiment among local communities in cities like Venice, Dubrovnik, and Santorini is understandable in this context [21]. Numerous studies have questioned the economic benefits [26] of cruise tourism, also highlighting its social and environmental costs [27], [28]. Consequently, local governments in cities such as Barcelona, Amsterdam, Venice and Dubrovnik are beginning to implement municipal policies that take these short-term visitors into account while balancing the interests and needs of local residents. The ongoing debate revolves around finding a balance between societal concerns and local economic priorities, with the COVID-19 crisis offering a moment to explore best

practices [29], [30] and an opportunity to align economic recovery with social, environmental, and cultural sustainability. As Dodds and Butler [16] observe, the forces driving the continuous growth of tourism in cities generally outweigh those attempting to limit or reduce travel to these impacted communities.

Effective management of responsible cruise tourism is crucial, given that it is the fastest-growing segment of the leisure-wellness industry. Recognising the port as a vital aspect of the city's identity, many port cities have recently encouraged tourism-related activities that align with the city's other port functions [31].

The cruise industry is integral to both tourism and port activities [2], [32]. These port cities have undertaken major initiatives within both the port and the city, equipping them with the essential infrastructure and cultural attractions needed to be featured on cruise itineraries. As a result, these cities have taken on the role of 'tourist ports' [31]. With the significant growth of cruise tourism in these areas, its impact on local development requires careful consideration. This has led to a substantial increase in recent literature examining the positive and negative effects of cruise tourism on port cities [33]–[38].

Many researchers have explored the negative aspects of cruise tourism [38]–[40], focusing primarily on its true economic impact on cities, pollution from ships, congestion, and the risks it poses to architectural heritage. Cruising is a highly complex tourism product, and its management is equally challenging [7], often leading to conflicts between the city and its residents. It tends to generate fewer economic benefits for the local economy compared to other forms of tourism or local residents themselves, as passengers typically spend most of their time (and money) on the cruise ship [2]. In recent years, it has become common to see up to 20,000 cruise passengers disembark at once. This, coupled with the rise of low-cost tourism, has led to a significant shift from local to global dynamics in historic centres. Here, services, amenities, and shops are increasingly tailored exclusively to tourists rather than residents, resulting in what is known as 'tourist gentrification' [9] or 'touristisation' [11].

On one hand, the threat that tourism poses to built heritage has been recognised for nearly two decades [40]. However, on the other hand, tourism also facilitates the restoration of abandoned buildings (even if they are repurposed as tourist accommodations) that might otherwise have been lost, and it contributes to cultural preservation [41]. Foroudi et al. [42] highlighted tourism's role in enhancing a city's image and fostering a stronger sense of identity. It is important to recognise that a city's appeal to tourists lies not only in its built heritage but also in its citizens, their customs, cuisine, local culture, and the everyday activities of its residents [2].

According to Brito [43] and Barrera Fernández [44], cultural tourism encompasses activities that involve experiencing historical and cultural heritage and appreciating and promoting both tangible and intangible cultural assets. However, mass tourism undermines this essence by transforming the city into a stage for tourism, with the genuine urban experience relegated to distant, non-tourist areas. In essence, the real risk is not to the city itself but to the vibrant life and daily existence of the city.

Cruise operators select itineraries and specific ports based on the positive experiences they can offer their customers [45]. However, this concentration of destinations and the resulting resident dissatisfaction can lead to negative experiences for visitors, potentially causing business decline or even closures [46]. Additionally, satisfied cruise passengers are more likely to return as tourists to further explore the highlights of their previous visit [46], [47]. Given that cruise tourism is a persistent trend, it is crucial to develop policies that enhance the benefits of cruise tourism while addressing its negative effects. Such policies should aim to harmonise the interests of both visitors and residents, ultimately supporting the long-term sustainability of both tourism and local community activities.

3 MANAGEMENT OF SUSTAINABLE TOURISM IN TOURIST DESTINATION PORTS

Achieving sustainability is challenging without practical policy solutions that can transform ideas into actionable steps [48], [49]. The effort to advance sustainable tourism in destinations requires a collective commitment from national and provincial governments, international agencies, tourism operators, stakeholders, and travellers. Effective governance entails a framework of rules, norms, and procedures designed to regulate behaviour [50].

The characteristics of effective tourism governance and known barriers to the implementation of sustainable practices are listed in Table 1.

Table 1: Characteristics of effective tourism governance in contrast with known barriers to the implementation of sustainable practices [49].

Characteristics of effective tourism governance [51]–[53]	**Known barriers to implementing sustainable practices [54], [55]**
• Coordination and monitoring of activities; • Involvement of multiple sectors and stakeholders collective action; • Public participation; • Use a consensus-based approach; • Shared strategy and vision; • Responding to stakeholders; • Effectiveness, efficiency and accountability; • Transparency; and • Law and justice.	• Preference for short-term financial benefits versus of long-term social and environmental concerns; • Absence of planning process; • Lack of stakeholder involvement.; • No shared understanding of sustainability goals; • Lack of integration and coordination of government agencies; • Lack of accountability; and • The absence of capacity or political will to implement the policy.

New approaches are needed to integrate the interests of site managers, stakeholders, industry and government institutions at multiple levels and across multiple sites, particularly approaches that integrate inputs from multiple spatial scales [56].

Cerveny et al. [49] conducted research indicating that environmental strategies for cruise ships aimed at upgrading technology to minimise waste, emissions, and fuel consumption. These strategies included establishing spatial or temporal guidelines for cruise ship operations in ‘sensitive’ tourism spots like port destinations. Additionally, there were suggestions for using big data to monitor visitor activities and implementing educational programs for tourists. Economic strategies were geared towards creating local jobs and developing revenue programs to reinvest in the community. Socio-cultural approaches highlighted the importance of local guides and interpreters in providing cultural insights and managing visitor numbers in crowded areas. Lastly, site administrators discussed the need for mechanisms to engage stakeholders, improve communication with cruise lines, and enhance dialogue between public and private sectors. At the UNESCO conference, site managers sought specific guidelines or standards to foster sustainable cruise ship practices in sensitive tourism areas, emphasising the need for adaptable standards tailored to local conditions.

4 CASE STUDY: THE PIRAEUS PORT

Greece boasts one of the world’s densest maritime transport networks and holds the second-largest share of total passenger traffic at EU ports (Italy: 85.4 million passengers, accounted

for 20.8% of the total in 2018; Greece: 72.5 million passengers, represented 17.7% of the total in 2018) [57]. The Port of Piraeus was selected for this study due to its prominence. As one of Europe's five largest ports and among the largest globally, Piraeus handles over 20 million passengers and more than 24,000 passenger ships annually. It serves as the principal passenger hub connecting mainland Greece with the Aegean Islands and Crete, as well as the main maritime gateway to southeastern Europe.

Athens News Agency [58] reports that, according to the data of the Piraeus Port Authority, during the 9 months and third quarter of 2023, compared to the same period of 2022, there was a spectacular increase in the cruise sector. This happened due to the increase in the number of cruise ships using the Port of Piraeus as a starting point (homeport/ship arrival and departure from the same port) from 340 to 455 (+33.8%), while the increase in homeport cruise passengers was approximately 129.3% (from 378,899 to 627,017 passengers). In particular, in the first 9 months of 2023, 588 cruise ships with 1,148,017 passengers had sailed in the Port of Piraeus, compared to 511 cruise ships in the same period of 2022 and 632,642 passengers. The coastal shipping sector also showed an increase where in the 9 months of 2023 a total of 13,137,700 million passengers were handled compared to 12,244,288, in the same period of 2022 (7.3% increase).

As for the usual range of air pollution, this was between 3,000 and 5,000 parts per cubic centimetre (ppc) [59], while the environmental damage from cruise ships arriving at the Piraeus terminal is reported to be over 100,000 ppc. This number does not include damages caused by municipal solid waste, public nuisance, noise pollution, etc. It has been observed that despite the numerous arrivals, only a few of the visitors (40%) spend the night in Piraeus (compared to the average overnight stay in the country). Most of them choose to spend the night in other areas of Attica, leaving Piraeus with only environmental damage caused by visitors. Therefore, Piraeus seems to be preferred as a place of transit, rather than a place of overnight stays. A priority for any modern destination, such as Piraeus, is the attraction of quality and sustainable tourism, not only with the protection, but also with the measurable support of the local residents from the tourist activity [60], [61].

Of the eight port organisations of Greece, the largest passenger traffic took place in the Port of Piraeus, which served 1,098,091 passengers, occupying first place in the country as a whole. Compared to 2018, Piraeus showed an increase of 14.2%. In second place was Corfu and in third was Heraklion. A total of five organisations showed an increase in traffic compared to 2018 and three organisations closed 2019 with a negative sign. In total traffic of the 13 port organisations, Piraeus holds 50% while in second place is Corfu with 35% and third is Heraklion with 14%.

The Port of Piraeus is the largest port in Greece, which extends along a coastline of more than 24 km and a total area of more than 5,000,000 square metres. The geographical position of the Port of Piraeus makes it a vital transport, trade and logistics, tourism and communication hub connecting the Greek islands with the mainland, as well as an international centre for maritime tourism and goods transport. As part of the core network of the Trans-European Transport Networks (TEN-T), the port hosts a complex variety of port activities, among which are: cruises, coastal shipping, cargo handling (mainly containers and vehicles), ship repairs, as well as the type I free customs control zone. The Port of Piraeus has quays with a total length of 2.8 km to serve passenger traffic (coastal shipping and cruises).

The Port of Piraeus is crucial to the Greek economy and significantly impacts the quality of life and economic performance of the islands it serves [57]. However, for many years, the provision of services for maritime passengers and the overall travel experience have been somewhat neglected or undervalued [62].

A key factor in assessing the health impacts of air pollution at ports is the population density of nearby residential areas [63]. Piraeus, with a population of 163,688 spread over 11.2 km^2, is one of Greece's most densely populated areas, with a density of 14,615 people per km^2 [64]. Similarly, the Port of Barcelona presents an interesting case. It has two main cruise ship areas: one very close to the city centre (854 m away) and another, which houses the primary terminals for daily cruise ships, located further out (approximately 2–2.5 km from the centre). Air pollution from cruise and ferry activities is likely to affect the broader urban area of Barcelona and its residents [65].

It has been observed that despite the numerous arrivals, only a few of the visitors (40%) spend the night in Piraeus (compared to the average overnight stay in the country). Most of them choose to spend the night in other areas of Attica, leaving Piraeus with only environmental damage caused by visitors. Therefore, Piraeus seems to be preferred as a place of transit, rather than a place of overnight stays. A priority for any modern port and tourist destination, such as Piraeus, is the attraction of quality and sustainable tourism, not only with the protection, but also with the measurable support of the local residents from the tourist activity [66]. A thorough and specific analysis of research findings from other regions is essential for developing an effective plan. Coastal tourism areas that see cruise ship tourism as a critical component for local development should regularly study the purchasing behaviour of cruise travellers using established indicators and research methods [67]. This approach enables comparisons with other competitive coastal regions.

Smart technology represents an integrated intelligent system designed to manage all aspects, controls, and systems to optimise ship operations and management, while delivering value efficiently to guests and crew [68]. The main challenge is to provide a comprehensive view of the smart cruise tourism sector, focusing on innovations, interfaces, dependencies, and the associated constraints and challenges related to the port-tourism destination of Piraeus.

5 DEFINITION OF INDICATORS

Indicators play a key role in the development of both quantitative and qualitative research, providing researchers with key tools for investigating, measuring and analysing complex phenomena [69]. In the realm of quantitative research, indicators serve as building blocks for operationalising variables into measurable entities. These numerical representations not only allow researchers to quantify the characteristics under investigation, but also facilitate the application of statistical methods for robust analysis. The precision that indicators provide in quantifying variables ensures a systematic and standardised approach to data collection, reducing the potential for bias and enhancing the reliability of study results.

In addition, indicators contribute significantly to the comparability of findings between different studies in quantitative research [70]. Standardised indicators create a common ground for researchers, promoting consistency in measurement and allowing meaningful comparisons between different data sets. This comparability enhances the generalisability of research findings, making them applicable beyond the specific context of a single study. Consequently, indicators not only shape the very structure of quantitative research studies, but also play a key role in the broader scientific discourse, enabling the synthesis and meta-analysis of accumulated knowledge [71].

In the field of qualitative research, indicators serve a different but equally critical purpose [72]. In qualitative research, where the focus is on understanding the depth and complexity of human experiences, indicators guide researchers in delving deeper into specific aspects of the phenomena under investigation. Rather than numerical values, qualitative indicators often manifest as themes, patterns, or recurring concepts. These indicators help in the systematic

analysis of qualitative data by providing a framework for coding and categorising information. They help to create rich and nuanced descriptions, allowing researchers to draw important insights from the intricacies of qualitative data.

In addition, indicators in qualitative research enhance the validity and reliability of the study [73]. Clear and well-defined indicators help to establish the credibility of the research process and findings. They provide a transparent roadmap for interpreting the data, allowing other researchers to follow the analytic path and assess the rigor of the study. This transparency is essential to establishing the credibility of qualitative research in academic and scientific communities.

Sustainability indicators are of significant importance to the cruise industry due to the multifaceted nature of their impacts on environmental, social and economic dimensions [73]. These indicators serve as key tools to assess and guide industry practices, ensuring that cruise activities are aligned with the principles of sustainability and responsible tourism.

5.1 Environmental impact [74]

Sustainability indicators play a key role in monitoring and mitigating the environmental footprint of the cruise industry. By monitoring indicators related to energy consumption, waste management and emissions, cruise operators can assess their impact on the ecosystems they cross. These indicators may be air quality, water quality, waste management, energy consumption, noise pollution. These indicators are vital for promoting environmentally conscious practices such as the adoption of cleaner technologies, fuel efficiency measures and waste reduction strategies. At a time when environmental sustainability is a global imperative, these indicators are guiding the cruise industry towards minimising its ecological impact.

5.2 Social responsibility [37]

In the social dimension, sustainable indicators relate to the industry's responsibilities towards local communities and cultural heritage. These indicators may be community well-being, cultural preservation, community engagement, visitor satisfaction. Cruise tourism often involves interactions with different communities and indicators measuring economic benefits, employment opportunities and cultural preservation efforts become imperative. By prioritising community engagement, respecting local cultures and promoting social inclusion, the cruise industry can make a positive contribution to the societies it encounters. Sustainable indicators serve as benchmarks for assessing and reinforcing social responsibility, promoting a harmonious relationship between cruise operators and local communities.

5.3 Economic sustainability [75]

Economic sustainability is a key aspect of the long-term success of the cruise industry and sustainable indicators help to assess and enhance economic sustainability. Indicators that measure the industry's contribution to local economies, job creation and economic diversification provide information on its overall economic impact. These indicators may be tourism revenue, employment generation, local business development. Cruise lines can use these indicators to make informed decisions that not only benefit their bottom line, but also support the economic resilience and growth of their host communities. It is also very important to measure the purchasing power of travellers and whether this contributes to the growth of the local economy. Economic sustainability indicators therefore contribute to the industry's ability to thrive, while promoting prosperity at the local level.

5.4 Regulatory compliance and international standards [76]

Sustainability indicators are an integral part of demonstrating regulatory compliance and industry accountability. As environmental regulations become more stringent and consumers increasingly prioritise sustainable practices, the cruise industry must comply with and exceed these standards. Certification programs using sustainable indicators allow cruise companies to demonstrate their commitment to responsible practices. This not only enhances their reputation, but also ensures alignment with global sustainability goals and regulatory expectations, strengthening the credibility and confidence of the industry.

5.5 Stakeholder trust and transparency [77]

Stakeholder trust is of paramount importance for the cruise industry, including passengers, local communities, regulators and investors. Sustainable indicators contribute to transparency by allowing stakeholders to assess and understand the industry's impact and commitment to sustainable practices. Transparent reporting on sustainability performance builds trust and confidence, demonstrating that cruise operators are actively addressing environmental and social concerns. This confidence is vital to maintaining a positive image of the industry, attracting environmentally conscious travellers and ensuring continued support from regulators.

In conclusion, sustainability indicators are essential in shaping the cruise industry's path towards responsible and sustainable practices. They provide a comprehensive framework for assessing and improving the industry's impact on the environment, society and the economy, ensuring that cruise tourism evolves in a way that is sustainable.

6 CONCLUSIONS

The publication presents a combined framework for effective management of tourist flows in the Port of Piraeus, services and products. Emphasis is placed on sustainable, responsible and viable tourism, by all groups of visitors, local and regional stakeholders, who are invited to make appropriate decisions based on information, data and analysis derived from the indicators that have been described. This is a very demanding study which has to approach the project from the perspective of sustainable tourism data as described in this publication. Methodologically, a multi-methodological research technique at the level of indicators has been presented in order to achieve a cross-sectoral approach, as all businesses included in the value chain of tourism and the Port of Piraeus and the destination of Piraeus more broadly are part of the analysis. The utilisation of the indicators in a holistic way will bring important information and data for destination managers, cruise companies as well as for the professionals and citizens of Piraeus.

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