



JOURNAL OF TOURISM, SUSTAINABILITY AND WELL-BEING

Tourism Territories and Sustainable Practices and Policies

The Comparative Study of Connectivity, Performance and Socio-Economic Impact of Low-Cost Carriers in Poznan and Wroclaw (Poland)

Andrei Bezruchonak

Smart Management of Tourist Coastal Areas in a Reborn Tourism Era: Transitioning from Safe to Sustainable Beaches within the Spanish Sun and Sand Model

Ginesa Martínez del Vas, Miguel Puig-Cabrera, Maricruz Cádiz-Gómez and Asier Amilibia de Diego

Ten Sustainable Planning Principles for Second Home Areas

Anne-Mette Hjalager

Sustainable Tourism Policies and Overtourism Risk in Destination Management: The Case of Alanya

Muhammet Necati Çelik and Aydın Çevirgen

**The Application of Artificial Intelligence in the Tourism Industry:
A Systematic Literature Review Based on Prisma Methodology**

Henrique José Gonçalves Henriques, Cláudia Ribeiro de Almeida and Célia Maria Quitério Ramos



VOLUME 12
NO 1/24

CIN
TURS

Guest-Editors: Cláudia Ribeiro de Almeida | Carlos Ferreira | Cláudia Seabra | Sofia Almeida | Editor-in-Chief: Patrícia Pinto

TECHNICAL INFORMATION

JOURNAL OF TOURISM, SUSTAINABILITY AND WELL-BEING

2024, VOL. 12, NO. 1

Authors:

Andrei Bezruchonak | Anne-Mette Hjalager | Asier Amilibia de Diego | Aydın Çevirgen | Célia Maria Quitério Ramos | Cláudia Ribeiro de Almeida | Ginesa Martínez del Vas | Henrique José Gonçalves Henriques | Maricruz Cádiz-Gómez | Miguel Puig-Cabrera | Muhammet Necati Çelik

Editor-in-Chief:

Patrícia Pinto

Associate Editors:

Alfonso Vargas Sánchez, Dora Agapito, Luis Nobre Pereira and Noel Scott

Publisher:

Research Centre for Tourism, Sustainability and Well-being - CinTurs

University of Algarve, Gambelas Campus, Faculty of Economics, Building 8, 8005-139, Faro | cinturs@ualg.pt | www.cinturs.pt

Editorial Board:

Alexandre Panosso Netto, Escola de Arte, Ciências e Humanidades, Universidade de São Paulo, Brasil.

Alfonso Vargas Sánchez, Management and Marketing Department, University of Huelva, Spain.

Ana Cláudia Campos, CinTurs, University of Algarve, Portugal.

Carlos Costa, Department of Economics, Business, Industrial Engineering and Tourism, University of Aveiro, Portugal.

Célia Ramos, CinTurs, School of Management, Hospitality and Tourism, University of Algarve, Portugal.

Chung-Shing Chan (Johnson), Department of Geography and Resource Management, The Chinese University of Hong Kong, Hong Kong, China.

Dora Agapito, CinTurs, Faculty of Economics, University of Algarve, Portugal.

Elisabeth Kastenholz, Department of Economics, Business, Industrial Engineering and Tourism, University of Aveiro, Portugal.

Emily Ma, Department of Hospitality & Tourism Management, Isenberg School of Management, University of Massachusetts Amherst, USA.

Eric Vaz, Department of Geography, Ryerson University, Canada.

Guy Assaker, Adnan Kassab School of Business, Lebanese American University, Lebanon.

Jafar Jafari, School of Hospitality Leadership, University of Wisconsin-Stout, USA.

João Albino Silva, CinTurs, Faculty of Economics, University of Algarve, Portugal.

Jorge Ramos, CinTurs, University of Algarve, Portugal.

José António Santos, CinTurs, School of Business, Hospitality and Tourism, University of Algarve, Portugal.

Juan Tobal, Department of Psychology, Universidad Complutense de Madrid, Spain.

Kyle Maurice Woosnam, Warnell School of Forestry and Natural Resources, University of Georgia, USA.

Luis Nobre Pereira, CinTurs, School of Management, Hospitality and Tourism, University of Algarve, Portugal.

Manuel Alector Ribeiro, School of Hospitality and Tourism Management, University of Surrey, UK.

Manuela Guerreiro, CinTurs, Faculty of Economics, University of Algarve, Portugal.

Miguel Moital, Department of Sport & Events Management, Bournemouth University, UK.

Neil Ormerod, CinTurs, University of Algarve, Portugal.

Nelson Matos, CinTurs, Faculty of Economics, University of Algarve, Portugal.

Noel Scott, Sustainability Research Centre, University of the Sunshine Coast, Australia.

Renata Tomljenovic, Institute for Tourism, Croatia.

Robin Nunkoo, University of Mauritius, Mauritius.

Saúl Neves de Jesus, CinTurs, Faculty of Human and Social Sciences, University of Algarve, Portugal.

Theano S. Terkenli, University of the Aegean, Greece.

Thomas Panagopoulos, CinTurs, Faculty of Sciences and Technology, University of Algarve, Portugal.

Open Access Policy:

This is a blind peer-reviewed journal.

Articles submitted to this journal should not have been published before in their current or substantially similar form.

The JTSW is diffused by all links related to the Research Center for Tourism, Sustainability and Well-being and is continually online

(<https://www.jsod-cieo.net/journal-tsw/index.php/jtsw/index>)

This journal is supported by the Portuguese Foundation for Science and Technology (FCT).

Indexation:

RePec-Ideas | Directory of Open Access Journals | Emerging Sources Citation Index (ESCI) - Clarivate | Latindex | Academia.edu | Google Scholar | RCAAP

Networking and Indexing:

Silvia Fernandes

Marlene Fernandes

Editorial Assistant:

Marlene Fernandes

Design and Cover Concept:

Bloco D, Design e Comunicação

Cover Image:

Photo by Sergey Pesterev on Unsplash

Quarterly Edition

ISSN: 2795-5044

CinTurs, Faro, Portugal

AIMS & SCOPE

The **Journal of Tourism, Sustainability and Well-being (JTSW)** is an international open-access academic journal in the tourism field that publishes high-quality, refereed articles that advance science widely available so that tourism can serve the society, enhance a sustainable development of the destinations, and positively impact the well-being of stakeholders.

JTSW offers itself a multidisciplinary and all-inclusive bridge between theoretical and practical aspects of tourism and the emerging interdisciplinary aspects that can revolutionise the tourism and hospitality industries. While the JTSW maintains its traditional focus on original research, both conceptual and empirical, that clearly contributes to the theoretical development of the tourism field, it also has a far more inclusive and broadened scope to keep up with the new problems that challenge academics and practitioners working in private, public and non-profit organisations globally. JTSW encourages research based on a variety of methods, qualitative and/or quantitative, based on rigorous theoretical reasoning and supported by a strong methodology. Criteria for evaluation include significance in contributing new knowledge, conceptual quality, appropriate methodology, technical competence (of theoretical argument and/or data analysis), and clarity of exposition.

JTSW promotes research on a broad range of topics that explore major trends in the study of relationships between tourism, sustainable development of destinations and well-being of tourism-related stakeholders. Contributions can be from all disciplinary perspectives, with interdisciplinary approaches especially welcomed as far as they apply to the tourism research field. All policy, planning and management aspects of tourism are also encouraged.

The journal is published as a quarterly international review in open access, mainly composed of thematic special issues. The publishing schedule is the last working day of March, June, September and December. Any interested scholar can submit a proposal for the guest-edition of a special issue to the Editor-in-Chief. The proposal should follow the guidelines provided in the Guide for Guest Editors. Each article must follow the publication rules as in the Author Guidelines. The Guest-Editors and the Editor-in-Chief are responsible for the implementation of a double-blind review process. This method ensures that the author(s) and the reviewers remain anonymous to guarantee a fair and impartial review of the submitted manuscripts.

JTSW is published by the Research Centre for Tourism, Sustainability and Well-being (CinTurs), settled at the University of Algarve, Portugal. This journal is funded by National Funds provided by FCT- Foundation for Science and Technology through project UIDB/04020/2020.

The Editorial Board gathers world-renowned experts in different scientific areas, with a striving balance in geographic and gender diversity.

EDITORIAL

In this edition, we explore diverse methodologies used in tourism research, reflecting the multifaceted challenges and opportunities this sector presents. Article 1 presents a comprehensive study that leverages comparative, statistical, and geographic methods to assess the socio-economic impacts of low-cost carriers in Polish airports, demonstrating the nuanced effects of air travel on regional development. This approach underscores the importance of multidimensional analysis in understanding the interplay between transportation and tourism. Article 2 reflects an investigation into Spanish beaches, employing an online survey methodology, gathering insights from Destination Management Organisations to evaluate the efficacy of the Safe Tourism Certification. This study highlights the complexities of managing tourist spaces in a post-pandemic world, pointing to the need for innovative solutions in spatial management and sustainability. Article 3 uses a mixed-methods approach in examining Danish second homes and combines quantitative data with qualitative insights, offering a holistic perspective on sustainable planning. This research underlines the significance of integrating various data sources to inform policy and planning, ensuring that tourism development aligns with broader sustainability goals. Article 4 adopts a qualitative analysis in Alanya, Türkiye, addressing the pervasive issue of overtourism through document analysis, emphasizing the need for sustainable tourism policies that balance economic growth with cultural and environmental preservation. Lastly, Article 5 employs the PRISMA methodology in their systematic review of Artificial Intelligence in tourism. This structured approach enables a comprehensive synthesis of existing research, highlighting the transformative potential of AI in enhancing tourist experiences while cautioning against ethical pitfalls. Together, these articles showcase the diverse methodologies employed in contemporary tourism research, each contributing to a deeper understanding of the sector's dynamic nature. They remind us of the critical role of methodological rigor and interdisciplinary approaches in advancing our understanding of tourism's impacts and potentials.

TABLE OF CONTENTS

Aims & Scope/Editorial.....	i
--	----------

The Comparative Study of Connectivity, Performance and Socio-Economic Impact of Low-Cost Carriers in Poznan and Wroclaw (Poland)	1
---	----------

Andrei Bezruchonak

1. Introduction and Theoretical Framework	2
2. Literature Review	3
3. Methodology	4
4. Results and Discussions	6
5. Conclusion	16

Smart Management of Tourist Coastal Areas in a Reborn Tourism Era: Transitioning from Safe to Sustainable Beaches within the Spanish Sun and Sand Model	21
--	-----------

Ginesa Martínez del Vas

Miguel Puig-Cabrera

Maricruz Cádiz-Gómez

Asier Amilibia de Diego

1. Introduction	22
2. Beaches: The Key Tourism Resource for Sun and Sand Destinations	22
3. Materials and Methods	23
4. Results	24
5. Discussion	28
6. Conclusion	31

Ten Sustainable Planning Principles for Second Home Areas	35
--	-----------

Anne-Mette Hjalager

1. Introduction	36
2. Literature Review	36
3. Research Approach and Methods	38
4. Planning in Denmark – An Overview	39
5. Sustainability Principle 1: Optimizing Land Resource Utilization	40
6. Sustainability Principle 2: Planning for Second Homes Beyond the Immediate Coastal Zone	41
7. Sustainability Principle 3: Enhancing the Accessibility of the Second Home Areas through Sustainable Modes of Transportation	41
8. Sustainability Principle 4: Decreasing Energy Consumption and Reducing the Carbon Footprint	41
9. Sustainability Principle 5: Ensuring Flooding Protection	42
10. Sustainability Principle 6: Mitigating Insufficient Wastewater Treatment to Prevent Pollution	42
11. Sustainability Principle 7: Facilitating Efficient and Convenient Solid Waste Treatment	42
12. Sustainability Principle 8: Reducing the Carbon Footprint in Second-Home Construction and Disposal of Materials	43
13. Sustainability Principle 9: Enhancing Biodiversity	43
14. Sustainability Principle 10: Involving the Owners and Tourists	44
15. Discussion and Conclusion	44

Sustainable Tourism Policies and Overtourism Risk in Destination Management: The Case of Alanya48

Muhammet Necati Çelik

Aydın Çevirgen

1. Introduction	49
2. Literature Review.....	50
3. Methodology.....	51
4. Findings and Results.....	53
5. Implications and Conclusion	59

The Application of Artificial Intelligence in the Tourism Industry: A Systematic Literature Review Based on Prisma Methodology65

Henrique José Gonçalves Henriques

Cláudia Ribeiro de Almeida

Célia Maria Quitério Ramos

1. Introduction	66
2. Theoretical Foundations.....	66
3. Research Methodology.....	67
4. Results of Literature Review.....	71
5. Discussion	80
6. Conclusion	81

The Comparative Study of Connectivity, Performance and Socio-Economic Impact of Low-Cost Carriers in Poznan and Wroclaw (Poland)

Andrei Bezruchonak  ¹

1. Faculty of Geography and Geoinformatics, Belarusian State University, Minsk, Belarus.

ABSTRACT

This article reviews the dimensions of the low-cost carriers' (LCC) spatial development and socio-economic impact in the Polish cities of Poznan and Wroclaw. The LCC spatial effect, measured via the connectivity and network structure analysis in 2005-2019, figured out that both airports experienced connectivity growth due to rapid network development of the leading budget airlines in Central and Eastern Europe – Ryanair and Wizz Air, and Wroclaw developed higher connectivity over Poznan. The airports' passenger traffic analysis showed that the LCC entered the market after Poland's accession to the European Union and that type of carriers represents a significant share of total passenger traffic at both airports (approximately 60%), and the numbers have had a positive dynamics of growth, but the LCC passenger traffic was higher in Wroclaw due to local demographics, state of the economy, better tourism potential, better financial conditions offered to the airlines (i.e., landing and passenger fees). Despite the fact, that there is a statistical connection between passenger traffic growth and socio-economic indicators, including tourism variables, both in Poznan and Wroclaw, further research on the role of such factors, as business environment, local governance, state of the economy is needed. The entrance of the LCC provided socio-economic benefits to the studied airports. The opening of the operational bases of Ryanair and Wizz Air increased numbers of investments and potential jobs supported at both airports. The data shows that Wroclaw, succeeding in attracting the LCC, had better performance and had more economic benefits over Poznan.

KEYWORDS

Low-Cost Carriers, Airports, Connectivity, Socio-Economic Impact, Ryanair, Wizz Air, Tourism.

ARTICLE HISTORY

Received 26 October 2023 Accepted 28 February 2024

1. Introduction and Theoretical Framework

Since the early 2000s, low-cost carriers (*hereafter LCC abbreviation is used, as well as terms budget airlines or budget carriers*) entry and rapid growth in Europe have resulted in their market share increase from 5% in 1998 to 30% in 2008. According to Akgüç, Beblavý & Simonelli (2018) by 2015 the LCC have represented 48 % of intra-European capacity. Over the last two decades, LCC market had increased significantly in Central and Eastern Europe (CEE), and Poland, in particular, due to the accession to the European Union (EU, in 2004), and that resulted in market liberalization and more leisure and business trips between the East and the West. Wrocław, Warsaw Chopin, and Poznań were among the first airports to welcome the Irish and Hungarian LCC in 2005. In 2004, the LCC seat supply in international flights was 4.6 million, of which only 9% came from LCC, while in 2017, that number for Poland had increased to 59% (ANNA, 2018). In 2004 the LCC carried 14% of the passengers in the scheduled regular traffic; in 2005, the share was 31,4%, in 2009 – 51,8%, in 2019 – 55,1% (Pijet-Migoń, 2012; Civil Aviation Authority (ULC), 2020). The leading airline in the CEE in 2019 was Wizz Air (Wizz Air, 2020), but the leader in the Polish market was Ryanair (50,9% of LCC traffic). Two major budget airlines operating in Poland in 2019 were Ryanair and Wizz Air, accounting for 91,1% of all the LCC traffic and 55,1% of total regular scheduled traffic (see table 1).

Table 1. The LCC ranking by low-cost and total market share in Poland, 2009-2019

2009			2014		2019	
No.	Total	LCC	Total	LCC	Total	LCC
1	LOT (29,1)	Wizz Air (44,3)	Ryanair (29,9)	Ryanair (54,9)	LOT (28,1)	Ryanair (50,9)
2	Wizz Air (21,5)	Ryanair (40,5)	LOT (22,7)	Wizz Air (34,9)	Ryanair (27,5)	Wizz Air (40,2)
3	Ryanair (19,6)	easy Jet (7,2)	Wizz Air (19)	Norwegian (5,2)	Wizz Air (21,8)	easy Jet (4,2)
4	Lufthansa (6,7)	Norwegian (5,8)	Lufthansa (7,4)	easy Jet (3,6)	Lufthansa (5)	Norwegian (3,5)
5	easy Jet (3,5)	Germanwings (2,2)	Norwegian (2,9)	Eurowings (1,4)	easy Jet (2,3)	Eurowings (0,8)
Share of all LCC (49,4%)			Share of all LCC (56,2%)		Share of all LCC (55,1%)	

Source: Civil Aviation Authority (ULC), Wizz Air.

According to theoretical assumptions, air transportation reflects and measures dynamic socio-economic relations and connections between actors and places at global and regional scales, making it essentially geographical. Therefore, airports' LCC connectivity was analyzed in this research, as an indicator, showing the ability to move a passenger faster from one point to another with the lowest possible number of connections (ICAO, 2013). The main objective is to prove that budget airlines (the LCC point-to-point network model avoids connecting stops) had increased it, by connecting the cities directly to major economic centers and tourist destinations. Therefore, the city with better LCC connectivity has a better access to markets, capital, ideas, labor force, or tourism destinations.

Budget airlines support urban and regional socio-economic development through several contributions, including employment in companies at the airport, which is considered a direct impact. The creation of additional jobs at the companies, operating in the city, and in the region within the local supply chain, as well as contribution to the local economy via expenses on goods and services, can support employment and Gross Domestic Product (GDP) growth of the city and the region (*indirect* and *induced* economic impacts). According to the Airport Council International (ACI) Europe estimations, at middle-sized airports (1 to 10 million passengers) 1 million passengers carried support 950 onsite direct jobs. However, due to the cost-cutting business model correction the budget airlines could support up to 20% fewer jobs (thus, 760) (ACI Europe, 2015; Ryanair 2017).

The LCC, while creating significant passenger traffic, have a strong impact on tourism, providing substantial economic benefits for all those involved in the tourism sector value chain. According to IHGL report, approximately 1,4 billion tourists were crossing borders every year before COVID-19 pandemics (57% of whom arrived by air). Through a synergetic relationship, aviation supports almost 37 million jobs

within the tourism sector, contributing roughly 897 billion USD a year to global GDP (IHGL, 2019). Thus, the research's overall objective is to systematically study, analyze and compare the spatial (connectivity) and socio-economic changes caused by the low-cost carriers' entrance and performance in cities and airports of Poznan and Wroclaw in Poland. Specific research aims are the following:

- a) to analyze and visualize the factors behind historical development and current spatial structure of LCC connectivity in Poznan and Wroclaw within the general context of the LCC business model origin and development peculiarities;
- b) to analyze the dynamics of LCC passenger traffic growth and to discuss the factors affecting it (i.e., demographic potential, city attractiveness, airport governance and fees), as well as the benefits to the cities of Poznan and Wroclaw;
- c) to discuss and to test the methodology of evaluation of the potential socio-economic impact of LCC, based on the time-series data and the statistical relationship between the selected indicators on transportation, economic, demographical, tourism, and migration (using correlation analysis and Johansen cointegration test);
- d) to estimate the benefits from the LCC to the studied airports.

2. Literature Review

Out of significant amount of research on LCC that had influenced the general research methodology of this article, this review structures and discusses the most crucial existing publications about: a) the general peculiarities of the LCC business model; b) geographic analysis of the LCC development and socio-economic impact; c) the existing literature on the LCC in Wroclaw and Poznan.

The existing literature analysis showed that economic topics usually prevail when it comes to the scientific discourse about low-fare airlines. Classical works in airline or airport economics by Doganis (2006) and Gross & Schröder (2007) or Rekowski (2012) provide a general overview of the origin and development of various airline business models. They explain the approach towards costs cuts, networks development, airports' selection, and competition between full-service carriers (FSC) and low-cost carriers. Whyte & Lohmann (2016), Almeida, Costa & Abrantes (2020) also deliver a characterization of airline business models, including LCC. Magdalina & Bouzaima (2021) carried out an empirical investigation of European airline business models. Lange & Bier (2019) analyzed business models of 58 European airlines and their network structures.

Bowen (2019) traces the geographic peculiarities of low-cost carriers' development in the established markets in the USA, Europe (including Eastern Europe), Asia, Latin America, the Middle East, and Africa. The spatial analysis of the LCC performance in Eastern Europe was carried out by Bjelicic (2016). Dobruszkes (2009) analyzed the LCC market, and the geography of the newly emerged west-east routes, that reflected the new forms of mobility, such as migration flows from Eastern to Western Europe (thus, pointing to the impact of the LCC on migration flows). Olipra (2011) and Wenerowska (2016) studied the development of low-cost airlines in the European Union and, briefly, in Poland, describing the LCC impact on the market competition, while Trzepacz (2007, 2014) presented an analysis of the LCC influence on the airport hierarchy in Europe, as well as the overview of the Polish airports' development in 2003-2013. The work of Pijet-Migoń (2012) contains a detailed economico-geographic analysis of the changes that happened with the passenger aviation market in Poland after joining the European Union (the timeframe covers the years 2004-2009), as well as the analysis of the development of the Polish airports (including Poznan and Wroclaw), analyzing the aspects of the entrance, network development, and performance of the LCC.

The publications on LCC direct and indirect effects mainly discuss economic development, migration, and tourism. The cost-benefit analysis model, discussed by Almeida & Costa (2015), proved the positive impact of LCC on the Portuguese local economy in 2005-2012 (through job creation, increased consumption in the tourism and other sectors) in Lisbon, Porto, Faro, and Funchal. The same authors later (2018) presented the detailed results of the LCC impact on tourism destination development (the case of Porto, Portugal). Rey, Myro & Galera (2011) investigated the effect of low-cost airlines on tourism in Spain. Huderik-Glapska (2013) studied the employment and income benefits of airport operations in Warsaw (the case of Chopin airport). Lassen, Smink & Smitt-Jensen (2015) explains the complexity of the impact of the

largest LCC in Europe on the socio-economic development of regional communities and cities (i.e., the case of Ryanair and the Stockholm Skavsta airport on Nyköping). Some works analyze the impact of the LCC entrance on the airport performance (the case study of Croatian airports by Mandić & Petric, 2017). Some existing research on the topic indicate, that there is a statistical relationship between LCC and tourism (Chung & Wang, 2011; Alsumairi & Hong Tsui, 2017). Still, there is little research about the impact of LCC operational base being opened or closed – on the network development and airport performance.

The geographic literature on the LCC in Poznań and Wrocław is scarce, and this article aims to fill the existing gap and enhance the current discourse with a geographic accent and perspective, based on the case studies of Poznań and Wrocław. The economic impact of the Wrocław airport, based on the estimation of the arriving tourists' expenses, was explained by Olińska (2016). Pancer-Cybulska, Szostak & Olińska (2011) studied the relationship between the migration from Poland and the LCC routes development, and the direct impact of chosen airports (including Wrocław airport) on Poland's regional labour markets (Pancer-Cybulska, Cybulski & Olińska, 2014).

3. Methodology

3.1 The Methodological Algorithm of the Research

The research procedure includes the analysis of two selected regional airports in Poland. There were several justification criteria for the airports' selection. Firstly, both airports are characterized by a significant share of the LLCs in the structure of passenger traffic and network geography during the period of investigation. Secondly, both airports have similarities in *geographic location and proximity* towards each other and bigger capital cities (Berlin, Warsaw, and the case of Wrocław – Prague). That geographic location feature affects the competition between the airports, as far as their catchment areas intersect (Augustyniak & Olińska, 2014). Additionally, the airport cities have similar *demographic and economic potential, airport class* by traffic figures. After the LLCs started operating from these airports, they have upgraded their status (Wrocław in 2007, Poznań in 2008) from the category D (small regional airports with less than 1 million passengers) to category C (large regional airport with 1 to 5 million annual passengers). The classification is based on the European Commission's Atlas of the Sky airport traffic database (European Commission, 2020).

This research methodology incorporates several general (comparative, logico-structural, statistical analyses) and particular geographic (network and connectivity analysis, GIS (Geographic Information System) modeling, and cartographic visualization) research methods. The goal of the comparative analysis was to distinguish, describe and explain similarities and variances between LCC network development, performance and socio-economic impact in Wrocław and Poznań. Based on the results of the content analysis of various data sources (see section 3.2), the following methods have been used depending on the specific research aims.

In order to analyze the LCC impact on the geographic structure of connectivity, the method of network analysis was used to study how LCC routes changed in time to assess the connectivity evolution (the detailed results for 2009, 2014, and 2019 are presented). The spatio-temporal data from airports' and airlines' schedules (destinations, carriers, frequencies) was collected and processed in ArcGIS software to create a model of the past and existing connections. The network analysis had helped to visualize the geography of spatial interactions between the origin airports and destination cities/countries.

The connectivity was analyzed within the context of passenger traffic growth in 2003-2020 (total and LCC). The general and LCC air mobility indexes for 2004-2019 were calculated, in order to show the increase in the number of total and LCC passengers per population of the selected cities.

To quantitatively evaluate other forms of the impact of the LCC in Poznań and Wrocław, a comparative analysis of two blocks of indicators in dynamics was conducted. The first block was related to airports performance and connectivity and the second - to socio-economic data of the cities. The original hypothesis was that trends and changes of indicators may reflect the LCC impact on airports, tourism, investments, economics. The data had been analyzed for the following years: 2005 (entrance of the LCC in Poznań and

Wroclaw), 2010, 2015, and 2019. On several occasions, if the data was not applicable for the pivotal year, the data from the nearest available year was used, which was sufficient to analyze the occurring change.

In order to investigate the possible statistical relationship between the performance of the LCC and selected 12 indicators, the standard correlation analysis was performed (using the non-stationary time-series data for 2005-2019; as expressed in table 4). Some methods can be used to access statistical connection between time-series variables: i.e., causality test (i.e. with Granger causality test; but the data needs to be stationary, which is not the case of the collected data for Poznan and Wroclaw cities and airports) or cointegration test (Johansen cointegration test establishes if there is a correlation between non-stationary time series data). In this research, Johansen cointegration test was performed in EViews software to see if there is a statistical relationship (cointegration) between the LCC passenger traffic and the number of foreign tourists. The assumption was that a short-run (considering the number of observation years) dynamic includes trend, and cointegration exists when the probability coefficient is less than 0,05, as well as Trace and Max-Eigen statistic values being higher than the Critical value.

The LCC's socio-economic impact at the airport level was measured by calculating the benefits (investments, potential jobs created or supported, general financial performance) from the operational base's opening or closures. Additionally, the airports' financial performance and the terms and conditions of their cooperation with the airlines were discussed.

Limitations of the research methodology include the results of the calculation of potential direct jobs that are related to the passenger traffic. The Airports Council International (ACI) calculations have been changing over the years, therefore, the number from the most recent available ACI report (760 jobs for LCC traffic) was used for calculations. One more research limitation is the absence of classification of tourists by type due to lack of official data available. Another limitation is the attitude towards the status of aircrafts which are based at operational bases, which are often positioned by the airlines as investments, which is not methodologically correct and should be analyzed with caution.

While this research delivers mostly geographic results and discussions on spatial dynamics of connectivity and comparison of LCC performance and impact between Poznan and Wroclaw, further in-depth research on the key factors behind, such as business environment, role of local authorities, demographics, state of the economy, foreign direct investments (FDI) will positively contribute to the research topic.

3.2 Data

The actual and historical data on the LCC entrance, development, and performance was collected from various statistical sources including *Civil Aviation Authority (ULC) official statistics and reports, national and local statistic databases, airlines' and airports' press-releases, press-conference materials, and data bulletins, other media publications*. Additional airports' data, besides the named above, included reports from *Pasazier.com* analytical portal.

The data of the LCC network structure is based on the results of the analysis of the direct regular routes during the summer season (as the busiest during the annual airport performance). The data for 2004 and 2009 (Poznan) was obtained from the works of the Polish researchers (Pijet-Migoń, 2012), and the data for 2009, 2014, and 2019 was gotten from the published airport schedules.

Additional statistical and analytical data on the performance of LCC in general and in Poznan and Wroclaw was collected through the content analysis of open access publications and reports, provided by the following international agencies and institutions: European Parliament, EUROCONTROL, IATA (International Air Transport Association), ICAO (International Civil Aviation Organization), ANNA (was a weekly e-journal and website devoted to airline and airport network planning), and Centre for European Policy Studies (CEPS). Additional socio-economic data was collected from the national (GUS – Statistics Poland) and local (Statistic offices in Poznan and Wroclaw) statistic databases, local data portals (Badam in Poznan), and Public Information Bulletins (BIP).

4. Results and Discussions

4.1 Brief Characteristics of Poznan and Wroclaw Airports

Poznań-Ławica Henryk Wieniawski Airport (IATA code: POZ) was built in 1913 for the German army's needs (and partly performed the military functions until 2009). Prior to 1993 the Poznan airport served only internal routes, with regular connections to Warsaw (particularly, during the Poznan International Fair events), and non-scheduled to Szczecin, Krakow, Katowice, and Rzeszow. In 1993, Poznan's first international connection was established by LOT airline to Dusseldorf (Germany), followed up by two more routes in 2005 to Dresden by a then traditional carrier Eurowings, and to Copenhagen, by SAS. In 1998 and 2000, the Polish LOT airline had started operating the flights to Hannover and Brussels (closed in 2001-2002), and later – to Cologne and Munich. In 2002, the Austrian Airlines renewed and closed the operations to Vienna. The connectivity and network development before 2004 can be characterized as unstable, with routes being opening and closing unsystematically. In 2003 the first low-cost carrier Air Polonia (bankrupted in 2004) entered Poznan offering connections to London Stansted and Brussels (Pijet-Migoń, 2012).

The airport is located 7,8 km west from the city centre, and it takes 20-40 minutes to access it by car, or 1 hour by public transportation. Considered as one of Poland's oldest airports, POZ serves the city of Poznan (with a population of 534 thousand people in 2020) and the Greater Poland Voivodeship (3,5 million people). The city is known as the centre for "business, sport, and education" and specialized in trade, logistics, business services, science and education (more than 102 thousand students in 2019), innovations, information, and communication technologies (Stan Turystyki, 2016).

The airport's catchment area includes approximately 3,2 million people within a 1,5-hour drive, or 4,5 million people within 2-hour drive (Brol, 2014). The airport served 2,4 mln passengers in 2019 (showing 496% growth in comparison with 2005, although it is important to understand that *at both airports the starting point was low*). The largest closest competing regional airport is Wroclaw, located 189 km (2-2,5-hr drive) away.

The share of Poznan airport in total traffic of the Polish airports in 2004 was 4%, as in Wroclaw, and by 2009, the percentage had reached 7%. However, after 2010, Poznan's share in total passenger traffic started decreasing to 5,4% in 2014 and to 4,9% in 2019.

Wroclaw Strachowice Nicolaus Copernicus Airport (IATA code: WRO) was built in 1938 and started serving the city since 1958. In 1992 the joint-stock company "Wroclaw Airport" was established, owned by the city, the region, and the state enterprise "Polish Airports". Until 1993 the airport served only regular domestic routes, when the first international connection to Frankfurt had been established. In 1998 the connections to Copenhagen (operated by SAS) and to Vienna (Austrian, closed in 2002) had been opened, and in 1999 Lufthansa started flying to Munich. The network of connections from Wroclaw airport was concentrated on business and transit connections to Germany's hubs (37,5% of all connections), Denmark, and Austria. As in Poznan, the first LCC to start operations at WRO was Air Polonia (also opened the operational base there), offering domestic connections to Warsaw and Gdansk and international flights to Paris (Pijet-Migoń, 2012).

The airport is located 13,3 km west from the city centre, and it takes 30 minutes to get there by car, or 1 hour - by public transport. The airport serves Wroclaw's city (with a population of 643,8 thousand people in 2020) and the Lower Silesian Voivodeship (2,9 million people). The city is known as the largest labour market in South-Western Poland, the third-largest market for business services, one of the largest academic centres with more than 112 thousand students at 25 higher educational institutions (HEI) in 2018, a popular tourist destination, the host city of EURO 2012 (like Poznan), and the European Capital of Culture 2016. According to Książek & Suszczewicz (2017), the city positions itself as a "meeting place." The airports' catchment area serves approximately 3,9 million people within a 1,5-hour drive. In 2019 the number of passengers reached 3,55 mln, which indicates a 681% growth compared to 2005. The largest nearest competing regional airports are at a distance of 189 km in Poznan and 212 km in Katowice (2-hour ride).

The Wroclaw airport traffic data shows its relatively stable position among the Polish airports, with the following dynamics: 4% in 2004 (as in Poznan), 7% in 2009, 7,7% in 2014, and 7,2% in 2019.

4.2 The Entrance of the First Foreign LCC, Fast Traffic, and Network Growth

The first foreign low-cost airline to fly from *Poznan* in September, 2005 was the Hungarian carrier Wizz Air, followed by the Irish Ryanair. Both airlines started flying to London (Luton and Stansted, respectively).

Before that, in late March 2005, the Irish low-cost carrier Ryanair inaugurated the first-ever flight from Poland, from *Wroclaw* to London Stansted. Later that year, Wizz Air started operations from WRO to Dortmund. In 2006, Ryanair expanded the network, offering connections to more places in the UK and Ireland, as well as to Germany (Frankfurt-Hahn) and Italy (Milan Bergamo).

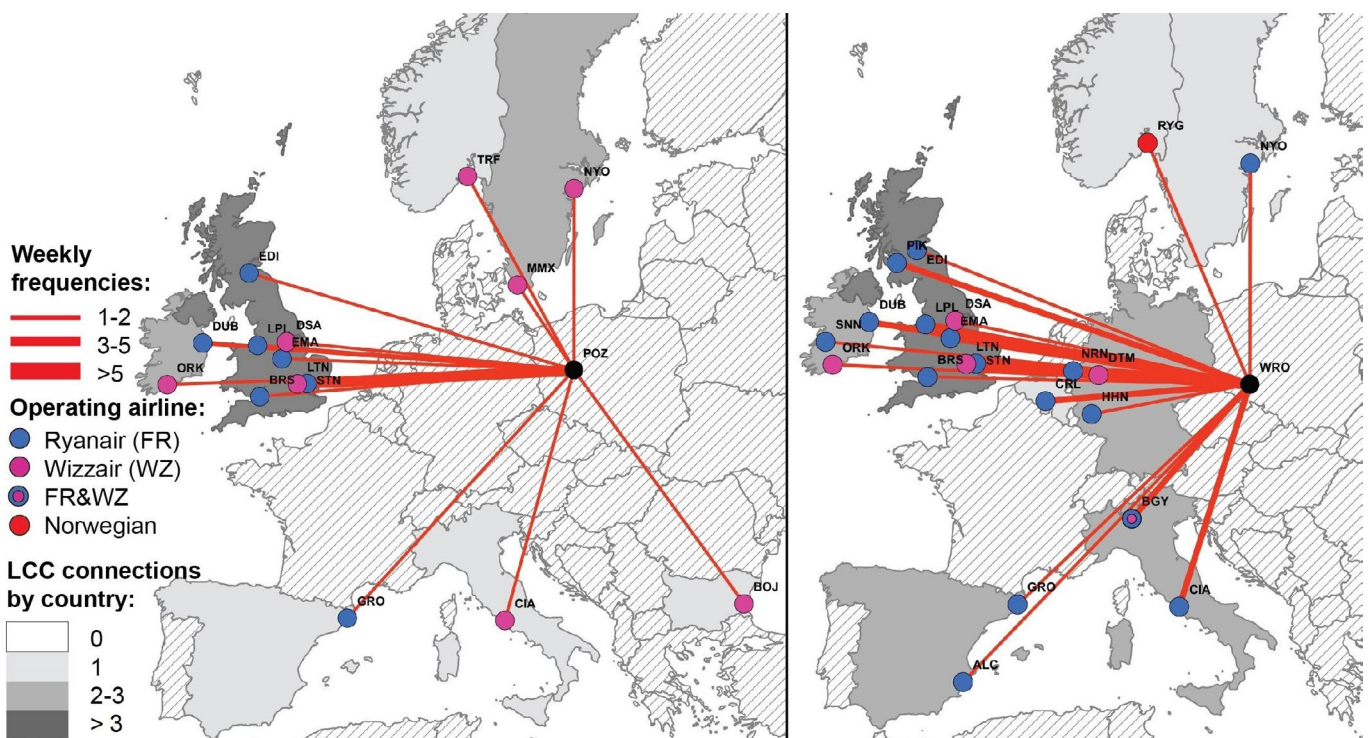
Both airports recorded significant growth in numbers of total passengers in between 2005 and 2009, from 0,4 to 1,3 million in Poznan (225% growth) and 0,4 to 1,4 million in Wroclaw (250% growth). The airports had also recorded a significant increase in the LCC passenger traffic during that period: 1339% growth for POZ, and 787% in WRO.

In 2009, Wizz Air and Ryanair had offered 14 destinations (78% of total destinations) to 7 countries from *Poznan*. The top destination country was the United Kingdom (almost 50% of routes), followed by Ireland and Sweden, explained by the Poles' migration flows' spatial patterns. The leading LCC by the number of destinations offered was Wizz Air (57% of all POZ routes).

The number of LCC connections from *Wroclaw* airport in 2009 was 21 (81% in total), covering 8 countries, with the largest number of connections to the UK (38%), Germany, and Ireland (14% each). That year, 3 LCC (Ryanair, Wizz Air, and Norwegian) operated flights from WRO, with most of network destinations being operated by Ryanair (74%, as shown in fig. 1).

There was no direct competition between the airlines, except the WRO-BGY (Milan-Bergamo) route. The indirect competition was over the UK's economic and financial centre – London – with connections to Stansted (Ryanair base) and Luton (Wizz Air base) airports. It is worth noticing that Ryanair was more cautious regarding the geography of Poznan's network development than from Wroclaw. From POZ, the airline targeted the UK mostly, while from Wroclaw, the network has had broader expansion to the "low-cost airports" in Germany (Frankfurt-Hahn, Dusseldorf Weeze), Italy (Milan Bergamo, Rome Ciampino), Belgium (Brussels Charleroi), and Sweden (Stockholm Skavsta).

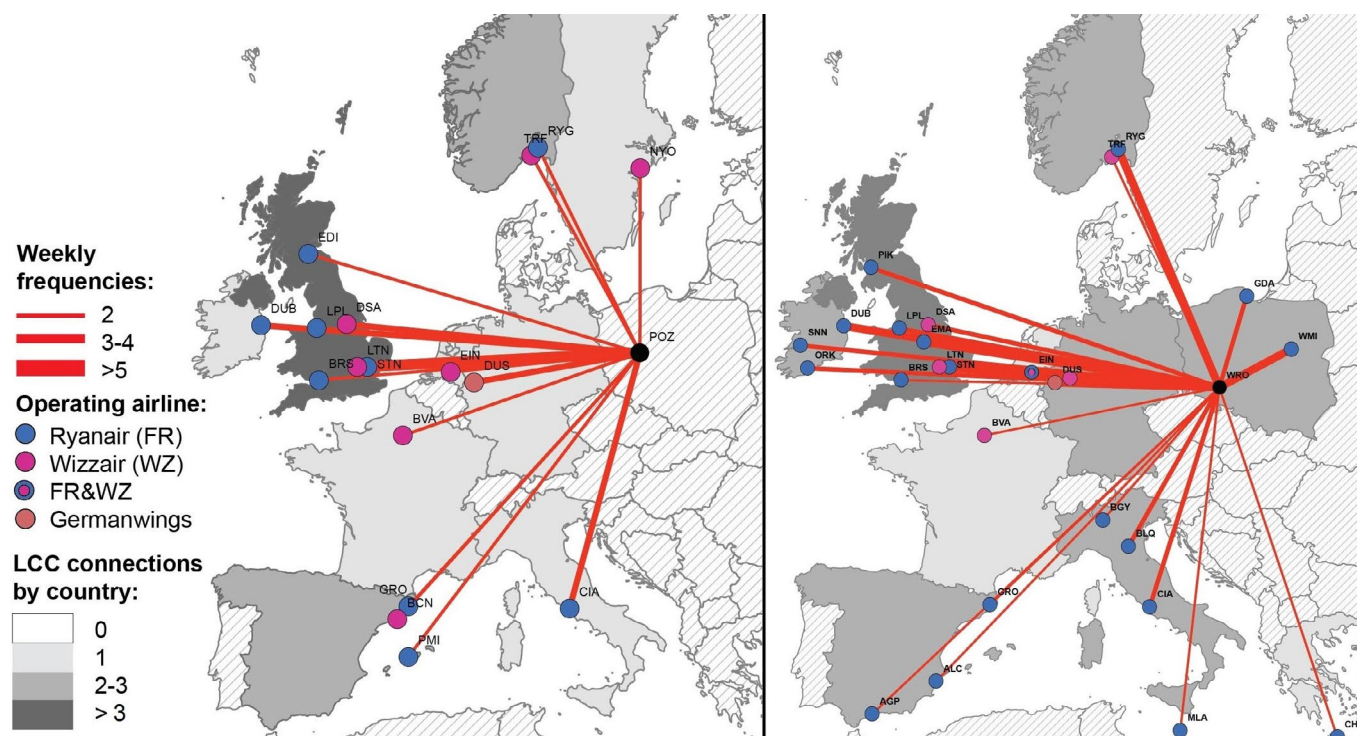
Figure 1. The LCC connections from Poznan and Wroclaw airports, 2009



Source: Pijet-Migoń (2012). Airports' magazines and schedules.

In 2014 the number of the LCC destinations from *Poznan* had increased to 17 (74% of the entire network), connecting the city with nine countries, with the leading destination still being the UK, accounting for 35,6% of all routes, Spain, and Norway. The airlines indirectly competed over London, Oslo (flying to Torp and Rygge), and Barcelona (El Prat and Girona). Ryanair offered 53% of connections from POZ, while Wizz Air accounted 41%, as in fig. 2 below.

Figure 2. The LCC connections from Poznan and Wroclaw airports, 2014

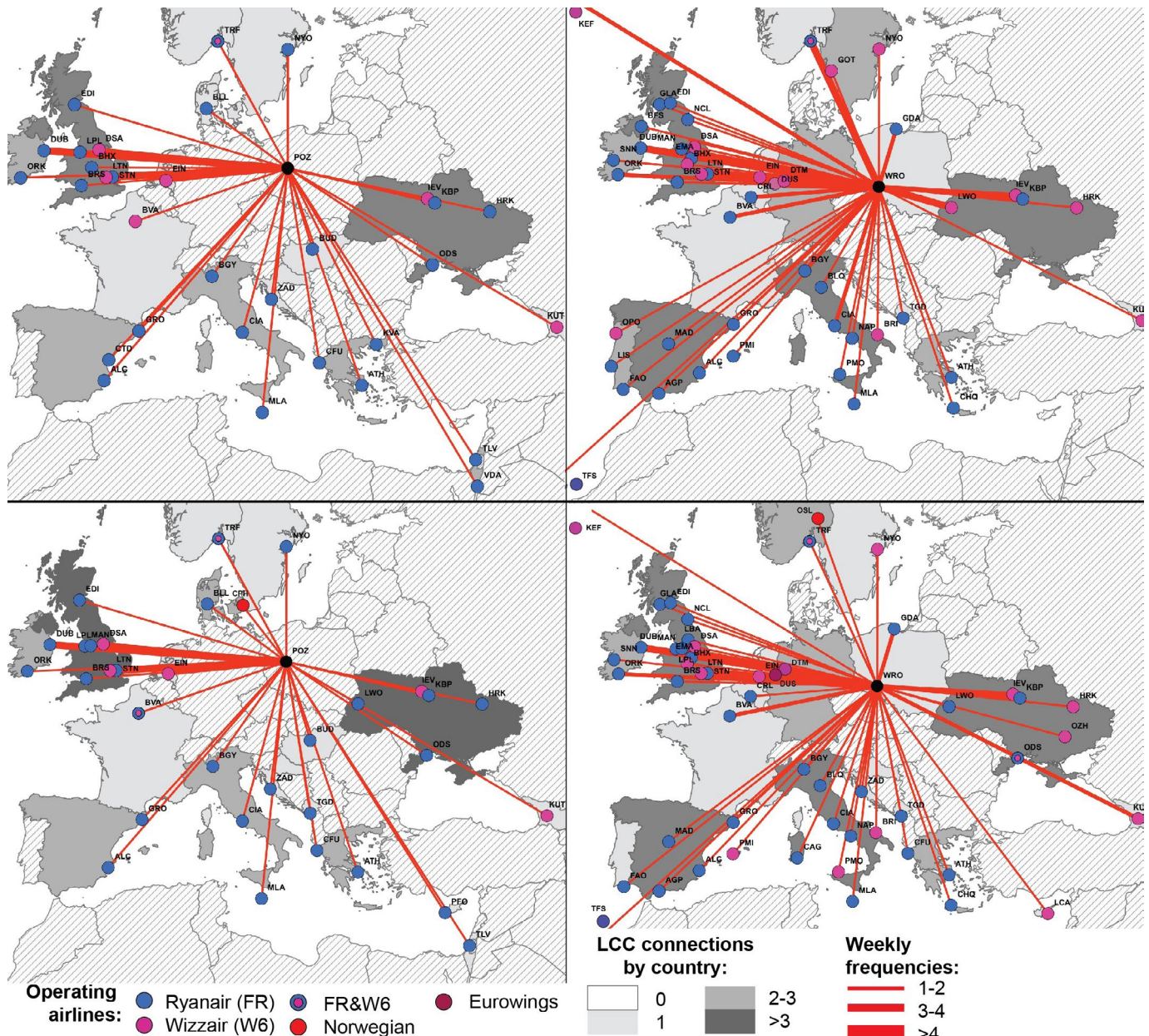


Source: Airports' magazines and schedules.

The network of LCC connections from *Wroclaw* airport grew to 26 destinations (79% of total) in 11 countries in 2014, with the UK accounting for 27% of all routes. Ryanair was operating 75% of the network, directly competing with Wizz Air over Eindhoven (and indirectly – over Oslo and London, as in Poznan). Ryanair also started operating domestic flights from WRO to Gdansk and Warsaw (Modlin). The number of the LCC had increased to 3 – Germanwings (operating as LCC in 2014) was the new airline flying both from POZ and WRO, connecting the cities to Dusseldorf.

The LCC passenger traffic in both airports in 2009-2014 showed growth, which was higher at WRO (28%) and lower at POZ (4,5%, what can that be explained by higher charges, and, as a result, smaller network with fewer destinations).

In 2014-2019 Wroclaw airport experienced higher growth (95,6%) over Poznan (66,5%). Higher fees can explain this difference, combined with a smaller network, closure of the Wizz Air operational base in 2018, and an increase in the Ukrainians' presence in Wroclaw (the city had historically a significant presence of the Ukrainian diaspora). A noticeable annual increase in Poznan's passenger traffic was recorded in 2017 after Ryanair opened the base. In 2019 the number of the LCC destinations from *Poznan* had increased to 32 (86% of the network, see fig. 7), connecting the city with 16 countries, with the leading destination being the UK (18,8% of all routes) and Ukraine (12,5%).

Figure 3. The LCC connections from Poznan and Wroclaw airports, 2019 and 2021 (plans)

Note: maps on top are for 2019; maps below are for summer 2021 (monitored in Nov. 2020).

Source: Web pages of the LCC (date of access – 06-15/10/2020), airport schedule (WRO), Let's Fly airport mag (POZ).

The geography of countries served by the LCC more than doubled since 2009, providing the customers with new destinations and following the general trend of expansion of the LCC to the Balkans (Croatia, Montenegro), Eastern Europe and Caucasus (Ukraine and Georgia), and the Eastern Mediterranean (Cyprus, Israel), as expressed in fig. 3. The share of LCC routes within the network of the regularly scheduled destinations from POZ exceeded 85% in 2019, with the most frequent destinations being London (Stansted and Luton) and Dublin. The spatial expansion towards the East, to Ukraine, a country with significant demographic potential, was a logical strategy of the LCC, responding to the market liberalization and growing demand from migrants and tourists on affordable transportation to and from Poland. Ryanair and Wizz Air did directly compete on the one route only (Oslo Torp), and the new destination of the indirect competition of the airlines appeared – Kyiv (the largest city and capital of Ukraine with two airports – Boryspil (KBP) and Zhuliany (IEV)). Ryanair offered 78% of POZ routes in 2019, Wizz Air – 22% (significant reduction of 10 destinations after the airline decided to close the base in 2018).

The network of LCC connections from *Wroclaw* airport grew to 49 destinations (88% of total) in 17 countries in 2019, with the UK accounting for 22,4% of all connections, followed by Spain (14,3%) and Italy (12,2%). Ryanair was operating 68,4% of the network, directly competing with Wizz Air (29,6%) only over

Oslo (Torp), with the only domestic connection left – Gdansk - due to the conflict with the airport operator in Warsaw. The number of the LCC had remained the same with Eurowings, connecting Wroclaw with Dusseldorf.

Table 2. Dynamics and geographic structure of the LCC performance in Poznan and Wroclaw

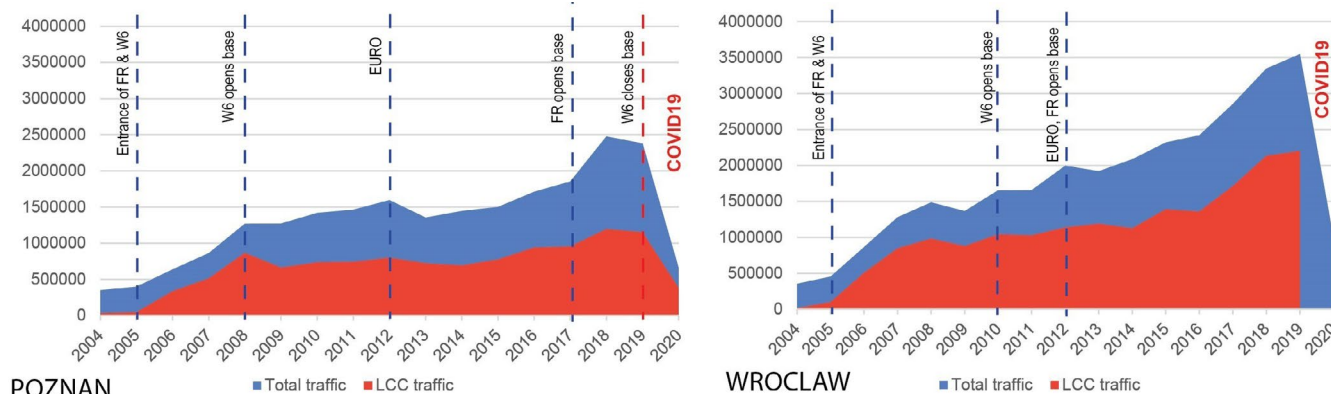
Indicators	Poznan Airport								Wroclaw Airport																							
	2004**		2009		2014		2019		2004		2009		2014		2019																	
Share of total Polish air pax. traffic, %	4		7		5,4		4,9		4		7		7,7		7,2																	
No. of Airlines*	5		5		7		7		6		7		7		10																	
Share of LCC (of total no. of airlines), %	20		40		42,8		42,8		17		43		42,8		40																	
Destinations, total	10		18		23		37		8		26		33		56																	
Countries (LCC)	2		7		8		16		2		8		11		17																	
Share of LCC destinations, %	20		77,8		73,9		86		24		81		78,8		88																	
Most frequent LCC destination (per week)	-		STN		STN, LTN		STN, LTN, DUB		-		STN		STN, WMI		STN																	
No. of passengers, mln.	0,4		1,3		1,5		2,4		0,4		1,4		2,1		3,55																	
Share of LCC pax., %	12,8		71,7		47,8		48,4		5,7		64		54		62																	
Annual growth of the LCC traffic at the selected airports, % (2004 = 100 %)																																
Year (2000s)	05		06		07		08		09		10		11		12		13		14		15		16		17		18		19		20	
Poznan	44		639		53		69		-24		11		1		8		-10		-4		12		21		2		25		-4		-65	
Wroclaw	505		412		67		16		-11		19		-1		11		5		-5		24		-2		26		25		3		ND	

Note: * - Regular traditional and low-cost carriers only; ** - data for 1993-2004 network; STN – London Stansted, LTN – London Luton, DUB – Dublin, WMI – Warsaw (Modlin).

Source: Airports' magazines, web pages, schedules, ULC.

It is important to mention that in 2014-2019 in both cities the geography of the LCC destinations partly corresponded with the origin of accommodated foreign tourists: tourists from Germany, the UK, Spain, Ukraine and the USA were leading in the structure in Poznan, while tourists from Germany, Russia, the UK, Ukraine, and the USA - in Wroclaw.

Both airports have had a significant increase in total passenger traffic after 2005 when Ryanair and Wizz Air have started operating from them. A positive trend of general traffic growth was observed afterward, with exemptions during the 2008 economic crisis and after EURO 2012. As seen in the figure 4, Wroclaw had a more sustainable performance and better traffic numbers over the years, including the LCC traffic. In 2019, WRO served 1,2 million more passengers than POZ, mostly at the cost of the LCC traffic. Share of LCC passenger traffic was 48% in POZ and 62% in WRO in 2019, what should be considered as an important factor, determining the role and impact of LCC on connectivity and socio-economic development, comparing to other carriers.

Figure 4. Structure of scheduled passenger traffic at Poznan and Wroclaw airports in 2004-2020

Note: FR – Ryanair IATA code, W6 – Wizz Air; 2020 data for LCC in Wroclaw is not available.

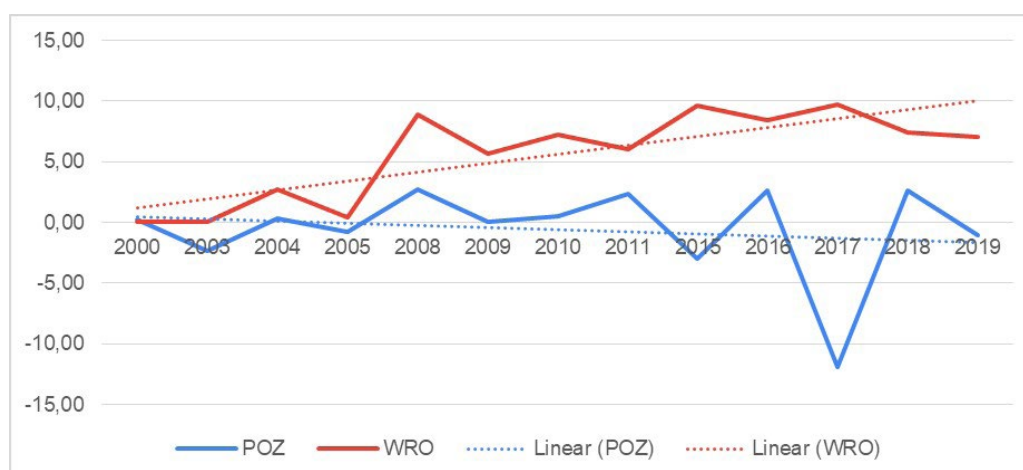
Source: Own calculations based on data from UCL, Olipra (2011), Wroclaw and Poznan airport websites.

4.3 Social and Economic Impact of the LCC on Cities and Airports

Both Poznan and Wroclaw hosted the matches of the EURO 2012 football championship, which attracted thousands of tourists. The airports were supposed to receive funds for investments from both State and the EU levels to upgrade the infrastructure. It is interesting, that the final investments were almost two times lower in Poznan than in Wroclaw – 209 mln. Polish Zloty (PLN) vs. 448 million PLN, according to Rejestr.io (2020).

It is important to understand additional external factors affecting passenger traffic and financial results, like the airport business strategy on landing, parking, and departing passenger charges. Those costs are essential for the LCC, making the airport more or less attractive for the airline. Even considering the airports' discount schemes to the airlines that provide significant passenger traffic and connections, the landing charges were more than two times higher in Poznan (3400-3950 PLN vs. 1560 PLN per aircraft) in 2019. Parking charges were also lower in Wroclaw. Additionally, Wroclaw offers free parking for 4 hours, a good economic benefit for LCC, known for a short turnaround time.

The analysis of both airports' financial performance reveals that Wroclaw has achieved better goals than Poznan Lawica to sustain a positive trend of net income dynamics (the difference between income and expenses) in 2005-2019. The worst financial result of Poznan airport (a loss of more than 11 million PLN) was registered in 2017, a year when Ryanair had opened an operational base, followed by a profit of 2,6 million PLN in 2018. The closure of the operating base of Wizz Air may have had a negative impact on the airport finances in 2019 (1 million PLN loss was registered, as in fig. 5).

Figure 5. Financial results of Poznan and Wroclaw airports (net income/loss), million PLN

Note: Linear is a trend line for the selected airport.

Source: ULC

Wizzair stationed 2 Airbus A320 aircrafts in *Wrocław* until 2018, with 78 employees. It is interesting that airlines often position those aircraft as an investment, worth approximately \$101 million each. During 10 years the airline had performed 12425 take-offs and carried approximately 4,2 mln passengers, stimulating the related sectors' local job market.

In March 2017, Ryanair had announced the opening of new operating base in Poznań, 5th in Poland. The airline stationed one Boeing 737-800 at the airport (an "investment" of \$100 million) and added 14 new routes to the schedule. By February 2020, there were 3 Ryanair aircraft based in Poznań, and the airline had declared the plan to add one more aircraft (increasing it to potential \$400 mln of investments). The opening of the operational base at POZ had resulted in 25% LCC traffic growth in 2018, comparing to 2017.

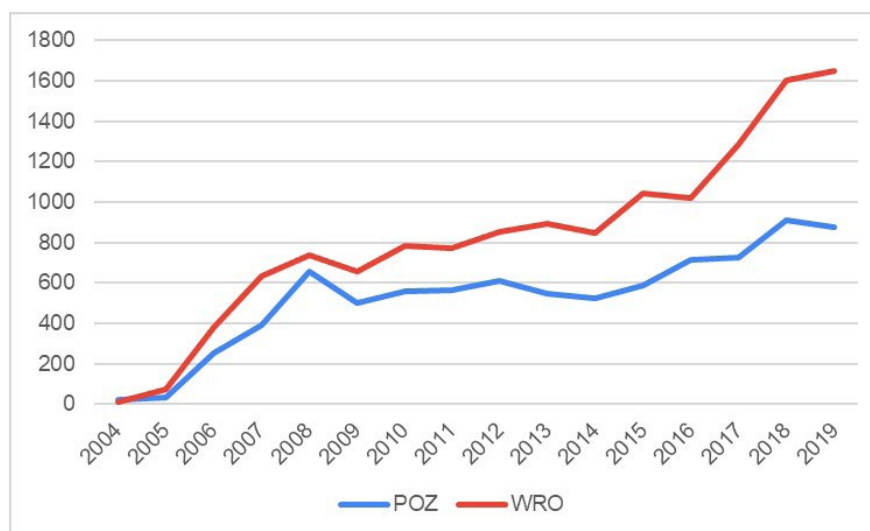
In 2018 Wizz Air has decided to close the Poznań base with the following consequences: 1) fleet relocation with direct (relocation of 78 employees to other bases) and indirect job losses; 2) reduction of the connectivity: liquidation of 6 connections (50% of all Wizz Air routes, and further cuts in 2019); decrease in connectivity competition with the Wrocław airport (i.e., the route to Reykjavik); 3) inconvenient connecting times to London (Luton) and general loss of elasticity: all routes were served from other bases; 4) risk of Ryanair's monopoly regarding the network development and passenger traffic (SIP, 2019).

The first airline to open an operational base in *Wrocław* was also Wizz Air. In 2010 the airline inaugurated its 12th base, adding 6 new routes and increasing service to the most frequent destination – London (Luton) airport. The carrier stationed one Airbus A320, employing approximately 35 people. In 2018 Wizz Air announced an expansion of the base and added one more aircraft (2 in total). Developing its operations in 2018, Wizz Air increased the number of the based crew team to 71 (Wizz Air, 2018).

Ryanair opened its first Polish base in Wrocław in 2012, stationing one aircraft, employing 37 people (ANNA, 2011). In 2013 the airline decided to station second aircraft. In 2018 the carrier had 4 aircraft at WRO, and in 2019 the airline was the leader by the number of destinations offered - 88% of total.

According to the ACI estimations on direct jobs created per 1 million passengers carried (on annual basis), the approximate amount of jobs for Poznań related to LCC traffic varied from 35 (in 2005) to 908 (in 2018), while the numbers for Wrocław vary from 74 (in 2005) to 1650 (in 2019) as mentioned in fig.6.

Figure 6. Number of potential direct jobs, related to LCC traffic at Poznań and Wrocław airports, 2004-2019



Source: Own Elaboration

Further Ryanair investments in Wrocław resulted in the opening of a maintenance base in 2015-2016 with two aircraft hangars for Boeing 737-800. The airline had declared that it would invest 6 million euros in that project, officially called Wrocław Aircraft Maintenance Service, what will lead to the creation of approximately 150 jobs. The airline also conducted negotiations with the Aviation Education Center in 2015 to start specializations in aviation for the positions on the new base (HiFly, 2015). Also, in 2016, Ryanair opened the digital hub IT Lab – Ryanair Labs Wrocław, employing 120 people.

Overall, a few research had evaluated the opening or closure of the operational base before. Malighetti, Pairelli & Redondi (2016) studied base abandonments by LCC and concluded that the impact of LCC downsizing on airports depends on the carrier level of dominance, and presence of alternative regional airports. The closure of Wizz Air's base in Poznan led to network, employment, and financial cuts, and the opening of Ryanair's base resulted in traffic growth in Poznan in 2017-2018.

The mechanisms of collaboration between the airports and cities with the budget carriers remain, normally, commercially classified. Still, the available evidence shows that airport charges may strongly affect the LCC plan on cooperation with the airport regarding network development and traffic (Francis, Fidato & Humphreys, 2003). Wrocław, with lower airport charges, demonstrated better LCC network development, higher passenger traffic, more sustainable financial performance, and economic input from the airlines, than Poznan.

The data presented in table 3 shows the change of the selected indicators in Poznan and Wrocław in 2005-2019. The cities with similar GDP (approximately 56 billion PLN in 2019) and slightly different demographic potential (536 thousand inhabitants in Poznan versus 641 thousand in Wrocław in 2019) deliver different results of LCC passenger traffic, airport's financial performance, number of foreign tourists, the number of hotels, development of hotel industry, migration, etc. That is also applicable to the indicators of tourism development (numbers of foreign tourists accommodated, tourists per capita, hostels, overnight stays).

Table 3. Change of selected indicators related to the impact of the LCC, 2019 vs. 2005

Indicator		Impact type*	Block type*	The change of the indicator	
				Poznan	Wroclaw
General impact on the airport					
1	Airport revenue	D	T	-428%	1760%
2	Number of passengers, total	D	T	496%	681%
3	Share of LCC passengers	D	T	188%	156%
4	LCC air mobility index	D	T	2682%	2039%
5	Connectivity (2003-2019)	D	T	240%	525%
6	Investments into the airport from the LCC	D	T	Decline	Growth
Socio-economic impact on the city					
7	GDP total	C	E	83%	142%
8	GDP per capita	C	E	94%	141%
9	City budget (revenue)	C	E	119%	108%
10	Employed in the transportation sector, total	I	E	15%	5%
11	Employed in the hotel and catering sector, total	C	E	-13%	55%
12	The monthly average salary in Transportation	Induced	E	177%	148%
13	Tourists per 1000	IC	SE	124%	199%
14	No of hotels	IC.	E	68%	58%
15	No. of hostels (2010-2020)	IC.	E	-43%	133%
16	No. of foreign tourists (FT) accommodated	IC.	E	26%	79%
17	No. of overnight stays (FT); WRO - 2018	IC.	E	33%	64%
18	Population, total	IC	SE	-6%	1%
19	Number of Students, HEIs, total	IC	SE	-25%	-21%
20	Immigration from abroad	IC.	SE	-59%	44%
21	Emigration abroad	IC.	SE	-99,9%	-53%

Note: * D – direct, I – indirect, C – cumulative, T – transportation, E – economic, SE – combined socio-economic.

Source: National and cities statistical data portals (GUS, Badam), UCL.

However, it is clear that, in reality, these indicators' growth dynamics can be the result of many factors. It is difficult to assess to what extent it is affected by the increase in LCC traffic (or vice versa). State of the economy, urban and regional governance, touristic attractiveness, demand for direct LCC connections, demographics of the city play a crucial role for the LCC, and the final results of network development and passenger traffic depend on the combination of those factors, as well as on confidential terms and conditions for the LCC entrance to the airport.

The existing research papers show that the impact of air transportation and the LCC on the city's economic situation may have several forms and dimensions. For instance, it can lead to the growth of GDP, as observed in Nyköping, Sweden (Lassen et al., 2015). In Poznan and Wroclaw, the GDP, GDP per capita, and the city budget revenue have had a trend of growth in 2005-2019. The last indicator had shown a high correlation with the LCC traffic, but it is important to be careful while analyzing that statistical relationship.

As discussed above, the LCC impact as carriers, delivering a significant number of tourists to the city (known as a catalytic impact), has a broad explanation in the academic literature. However, considering the existing data on the LCC passenger numbers, significant share in total passenger traffic (around 60% in both cities), and the correlation analysis results, it is possible to make an assumption that the LCC traffic have had a relatively positive impact on Poznan and Wroclaw's tourism sector in 2005-2019. As seen from the table 3, some indicators had shown growth in 2005-2019: number of tourists per city inhabitant (124% in Poznan and 199% in Wroclaw accordingly), number of foreign tourists accommodated (26% and 79%), number of overnight stays (33% and 66%), and number of hotels (68% and 58%). To measure probable statistical relationship between the selected indicators (with available time-series data for 2005-2019) the correlation analysis was performed, and the probable statistical associations between the LCC traffic and the rest of the database was calculated. Such indicators, as number of foreign tourists accommodated, number of overnight stays, and number of hotels significantly correlate with the LCC traffic, with coefficients varying from 0.5 to 0.9, with higher results in Wroclaw, which attracts more tourists, than Poznan, as expressed in table 4.

Table 4. Correlation matrix of 12 parameters for Poznan and Wroclaw cities

POZNAN		1	2	3	4	5	6	7	8	9	10	11	12
1	LCC traffic	1.00											
2	LCC AM index	1.00	1.00										
3	City budget revenue, mln	0.85	0.87	1.00									
4	Employed in the transportation sector, total	-0.55	-0.56	-0.54	1.00								
5	Employed in the hotel and catering sector, total	-0.63	-0.65	-0.83	0.69	1.00							
6	No of hotels	0.84	0.85	0.94	-0.69	-0.83	1.00						
7	No. of foreign tourists (FT) accommodated	0.57	0.60	0.86	-0.25	-0.73	0.75	1.00					
8	No. of overnight stays (FT.)	0.72	0.74	0.87	-0.38	-0.82	0.82	0.91	1.00				
9	Airport revenue	0.00	-0.01	-0.30	0.10	0.38	-0.26	-0.39	-0.29	1.00			
10	Transport Tax	0.20	0.21	0.36	0.39	-0.10	0.18	0.59	0.51	-0.35	1.00		
11	Students	-0.58	-0.61	-0.88	0.48	0.80	-0.83	-0.91	-0.87	0.33	-0.38	1.00	
12	Net Migration	-0.25	-0.22	0.05	-0.30	-0.21	0.08	0.33	0.23	-0.22	0.13	-0.34	1.00
WROCLAW		1	2	3	4	5	6	7	8	9	10	11	12
1	LCC traffic	1.00											
2	LCC AM index	1.00	1.00										
3	City budget revenue, mln	0.92	0.93	1.00									
4	Employed in the transportation sector, total	0.03	0.02	-0.10	1.00								
5	Employed in the hotel and catering sector, total	0.91	0.91	0.85	-0.03	1.00							
6	No of hotels	0.85	0.85	0.96	-0.21	0.76	1.00						
7	No. of foreign tourists (FT) accommodated	0.82	0.82	0.89	0.17	0.80	0.84	1.00					
8	No. of overnight stays (FT.)	0.76	0.75	0.85	0.22	0.75	0.80	0.99	1.00				
9	Airport revenue	0.34	0.34	0.36	-0.39	0.35	0.42	0.39	0.34	1.00			
10	Transport Tax	-0.23	-0.22	-0.44	-0.30	-0.05	-0.47	-0.61	-0.66	-0.01	1.00		
11	Students	-0.76	-0.76	-0.91	0.04	-0.68	-0.89	-0.94	-0.93	-0.39	0.70	1.00	
12	Net Migration	0.52	0.52	0.63	-0.16	0.61	0.63	0.62	0.64	-0.02	-0.35	-0.69	1.00

Note: the colours indicate the strength of the relationship, according to the correlation coefficient number. Numbers from 0,7 to 1 are highlighted in green, from 0,4 to 0,7 – in orange.

Source: Own Elaboration

Unlike in Wroclaw with 55% growth and stronger statistical correlation with the LCC traffic, the number of people employed in the hotel and catering sector had decreased over the same period in Poznan (-13%), as well as the number of hostels (-43%). That type of budget accommodation can be considered as primary accommodation option for the LCC passengers.

Wroclaw is also a place of temporal or permanent residence to a growing number of foreigners, many of whom come from Eastern Europe, including Ukraine. In 2019 there were 21370 officially registered Ukrainians in Greater Poland Voivodeship and 16285 – in the Lower Silesia (the Italians were in the 3rd place, which can explain the LCC connections to Italy (migracje.gov.pl, 2020). Besides, the negative correlation dependency between the LCC traffic and the number of students and the positive correlation with net migration is higher in Wroclaw, which may result in an assumption that the migration (general and educational, as far as students prefer the LCC over the traditional carriers for economic reasons) has a stronger connection with the LCC traffic there.

The impact on migration processes results in significant flows of labor pass through the primary regional airports, which offer a network of regular international connections to meet the demand (and to adjust to its geographic patterns), i.e., in the case of Greater Poland, mainly via the Poznan Airport, in case of Lower Silesia – via Wroclaw. The existing research on the impact of the migration processes on the LCC routes (Pancer-Cybulska et al., 2011) states that the creation of the demand for fast and cheap connections between Poland and the destinations of the economic migration resulted in the LCC network (in case of Poznan and Wroclaw that is seen via the LCC networks to the UK, Ireland, Norway, and Italy). After 2014 the analogical situation was with the impact of Ukraine's migration flows on developing the LCC routes to Kyiv (2 airports), Odesa, and Kharkiv (the airport officials admit increase in passenger numbers from Ukraine in Poznan). That increase can also be partly explained by the visa liberalization agreement between Ukraine and the EU. It came into force in 2017, and introduced the visa-free regime for short trips (like visiting friends or touristic purposes) for the Ukrainians into the EU. Based on the results of the correlation analysis, 8 indicators have had a strong statistical relationship (as presented in fig. 7), and 2 of them (LCC traffic and number of foreign tourists) had been selected for Johansen cointegration test.

Figure 7. Time-series data dynamics for the selected socio-economic indicators, 2005-2019



Note: indicators ending with 1 – Wroclaw; with 2 – Poznan; see indicators changes and correlation in tables 3-4.

Source: ULC, GUS

The results of Johansen cointegration test are presented in the table 5. They show that there is a statistical cointegration (when Trace and Max-Eigen statistics values are higher than critical value, and probability is less than 0,05) between the 2 variables (LCC traffic and the number of foreign tourists) in Poznan and Wroclaw. It is interesting, though, that hypothetical assumptions (based on lags interval) indicated two cointegrating equations at the 0,05 level for Poznan, and only one cointegrating equation in Wroclaw.

Table 5. Johansen cointegration test for Wroclaw and Poznan

POZNAN				
Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.** Critical Value
None *	0.894	27.075	18.398	0.0024
At most 1 *	0.368	4.593	3.841	0.0321
Unrestricted Cointegration Rank Test (Max-eigenvalue)				
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.** Critical Value
None *	0.894	22.481	17.147	0.0076
At most 1 *	0.368	4.594	3.841	0.0321
Max-Eigen and Trace tests indicate 2 cointegrating equation(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) <i>p</i> -values				
WROCLAW				
Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.** Critical Value
None *	0.957	35.362	18.397	0.0001
At most 1	0.311	3.732	3.841	0.05336
Unrestricted Cointegration Rank Test (Max-eigenvalue)				
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.** Critical Value
None *	0.957	31.630	17.147	0.0002
At most 1	0.311	3.732	3.841	0.0533
Max-Eigen and Trace tests indicate 1 cointegrating equation(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) <i>p</i> -values				

Source: Own Elaboration

However, Johansen cointegration test results (as well as measurements of pairwise correlations) should be interpreted cautiously. Like many mathematical data-analysis tools, they may show some statistical relationship, but not provide the detailed insight into the true causal relationship between the selected variables. More complex theoretical models behind the time-series data are, probably, preferable for further in-depth analysis.

5. Conclusion

Liberalization of the air transportation market in the European Union had a significant impact on passenger mobility, airport's connectivity, tourism and other related areas. The accession of Poland into the EU in 2004 and the entrance of the LCC in 2005 had led to the increase in connectivity, growth of the LCC traffic, direct and indirect socio-economic impact on airports and cities, including the studied cities of Poznan and Wroclaw.

This study confirms the common in the *academic literature* investigations, that market deregulation and liberalization attracts the LCC. It contributes the existing scientific discourse with a comparative case study of 2 Polish airports. Deregulation results in rapid network development and passenger traffic growth (Gabor, 2010; Dobruszkes, 2013). The research shows that the similar processes occurred in Poznan (496% total passenger traffic growth) and Wroclaw (681% growth) – right after the first LCC, namely Ryanair and Wizz Air, initiated their operations in 2005 (the time-frame of this research covers the period until 2019). The results of this investigation enrich the existing geographic and other literature, related to the network development, traffic analysis at POZ and WRO airports, delivering an update on connections (last geographic works date 2011) and analyzing the changes of the development and contemporary structure of spatial interaction links with European destinations and countries. The results prove that there is still a strong demand for connections between Poznan and Wroclaw and the UK and Italy (defined by migration flows, as demonstrated by Pancer-Cybulska et al. (2011)), but the recent spatial changes indicate the “shift to the East” caused by the increased number of connections with Ukraine for the similar reasons.

Once the research was conducted in 2020-2021, an important update on the situation in Ukraine is essential here, as far as it was an essential LCC destination from Poznan and even more - from Wroclaw. The war of Russia against Ukraine, started in February 2022, had a devastating effect on the civil aviation sector in the country. All airlines had ceased their operations, cut off all connections, some of the fleet based at the airports was grounded (Wizz Air performed some fleet evacuations in 2023), and the martial law in Ukraine had significantly reduced the cross-border mobility of male population. The further research, though, can be held on how the war had changed traffic patterns and connectivity in the Polish airports near the Ukrainian border (Rzeszow, Lublin).

This research *methodology* incorporated general (comparative, logico-structural, statistical analyses) and particular geographic (network and connectivity analysis, GIS modelling, cartographic visualization) research methods. That multidisciplinary approach helped to emphasise the complexity of interactions between dimensions of socio-economic development and LCC presence and impact. The comparative analysis was useful to distinguish, describe and explain similarities and variances between LCC network development, performance and socio-economic impact in Wroclaw and Poznan.

The existing *limitations* on the methodology, besides the ones, mentioned in the chapter 3, expand the horizons for further research on the topic. The important part of discussion here is the selection of methods and instruments for better assessment of the LCC socio-economic impact. The previous research on the subject used mostly econometric approach towards the evaluation of the economic impact (i.e., by using a cost-benefit analysis, as in Almeida & Costa (2015, 2018), or descriptive case study analysis as Lassen et al. (2015)). The spatial aspect is missing there, and this study aims to partially fill that gap, incorporating primarily geographical, but also a multidisciplinary approach. However, more time-series data is useful for better evaluation and further testing of the existing econometric, as well as spatial models.

The analysis of the *spatial impact* of the LCC in Poznan and Wroclaw confirmed the importance of the budget carriers for the growth of transport connectivity, in particular, in 2009-2019 (105% increase in Poznan and 115% - in Wroclaw). The increase in the number of destination countries was 128% and 113%, respectively. The LCC accounted for approximately 80% of the network in both airports, significantly defining the spatial patterns of access to the international and domestic (in Wroclaw) destinations. The overall spatial picture was similar for both airports, with the most frequent destination countries being the UK, Ireland, and Italy, with the significant increase of the Ukrainian destinations in 2014-2022. That increase can also be explained by the visa liberalization agreement between Ukraine and the EU in 2017, what introduced visa-free regime for short visits (like visiting friends or touristic purposes).

The increase in passenger traffic was observed at both airports. However, the LCC share and the total LCC traffic numbers were higher in Wroclaw due to slightly higher demographic potential, better tourist attractiveness, and airport policies (i.e., lower airport charges).

The results of correlation analysis altogether with Johansen cointegration test on data from Poznan and Wroclaw data highlighted probable statistical associations between the LCC traffic and the indicators of tourism development, and cointegration between LCC traffic and number of foreign tourists. That corresponds with the existing research on the topic about statistical relationship between LCC and tourism. The LCC have had an impact on Poznan's and Wroclaw's tourism sector, which is observed from several in-

dicators' growth. In 2005-2019 the number of tourists per capita (in the city) had grown by 124% in Poznan and 199% in Wroclaw, number of foreign tourists accommodated – 26% and 79% accordingly, number of hotels – 68% and 58%.

The figures of investments of the major budget carriers at POZ and WRO (as their operational bases) reveal that Wroclaw received better financial and employment benefits than Poznan. Additionally, the Wizz Air operational base's closure in Poznan in 2018 resulted in network cuts, financial and employment losses (due to fleet and staff relocation). More research on the LCC-airport-city interaction is needed to see a broader picture of the impact on local communities, which can be valuable for both researchers and practitioners (city administration, airport authorities, tourism offices, etc.). Further research on conditions and terms of public subsidies or financial support can contribute towards better understanding of stakeholders' socio-economic interactions. For example, it is a common practice for the local governing authorities to pay the airlines to promote the place. In 2015 Lublin airport paid EUR 550 thousand to Wizz Air to promote connections from the airport. Ryanair received PLN 17 mln from Subcarpathian Voivodeship for three years of promotion of the region. After Wizz Air closed its base and removed four connections from the Poznan airport network in 2018, the city of Poznan and the Greater Poland Voivodeship had announced that they are willing to spend 26 million PLN on new connections from the airport (Fly4free, 2018). Within this implication, the further methodology development and analysis of airports and airlines competition (and its impact on urban or regional positioning and competitiveness) can be useful for both researchers and stakeholders, involved in air transportation and related activities.

ACKNOWLEDGEMENTS

This original research was conducted in the fall semester of 2020 in Poznan (Poland) with the support of the Kirkland research program, under the professional scientific supervision of prof., dr. hab. Paweł Churski, from the Faculty of Human Geography and Planning, University of Adam Mickiewicz. The author also wants to express a note of gratitude to prof. Paweł, as well as to dr Łukasz Olipra, from Wroclaw University of Economics and Business for help and valuable comments during the work on the first version of the article.

REFERENCES

- ACI Europe (2015). *The Economic Impact of European Airports*. Airports Council International. https://issuu.com/intervistas-consulting/docs/economic_impact_of_european_airport
- Akgüç, M., Beblavý, M., & Simonelli, F. (2018). *Low-Cost Airlines: Bringing the EU closer together, Research Report*, CEPS. <https://www.ceps.eu/wp-content/uploads/2018/05/LowCost%20Airlines%20Bringing%20the%20EU%20closer%20together.pdf>
- Almeida, C., & Costa, V. (2015). Low-cost Carriers, Local Economy and Tourism Development at Four Portuguese Airports. A Model of Cost-benefit Analysis. *Journal of Spatial and Organizational Dynamics*, 3(4), 245-261.
- Almeida, C., & Costa, V. (2018). Low-cost carriers and tourism destinations development: case study of Oporto, Portugal. *Tourism & Management Studies*, 14(2), 7-15. DOI: 10.18089/tms.2018.14201
- Almeida, C., Costa, V., & Abrantes, J. (2020). Airline Business Models and Tourism Sector. In L. Calisto, L. Carvalho & N. Gustavo (coord.), *Strategic Business Models to Support Demand, Supply, and Destination Management in the Tourism and Hospitality Industry* (pp. 216-239). IGI Global.
- Alsumairi, M., & Hong Tsui, K. W. (2017). A case study: The impact of low-cost carriers on inbound tourism of Saudi Arabia. *Journal of Air Transport Management*, 62, 129-145. <https://doi.org/10.1016/j.jairtraman.2017.04.001>
- ANNA (2011). *Ryanair finally announces first Polish base in Wrocław and negotiates for major Modlin/Warsaw announcement*. <https://www.anna.aero/2011/10/20/ryanair-finally-announces-first-polish-base-in-wroclaw/>
- ANNA (2018). *LCC capacity in Europe, Airline Network News and Analysis*. OAG Schedules Analyser. <https://www.anna.aero/2018/07/18/lcc-capacity-in-europe-set-for-half-a-billion-seats-in-2018/>
- Augustyniak, W., & Olipra, Ł. (2014). The potential catchment area of Polish regional airports. *Journal of International Studies*, 7(3), 144-154. DOI: 10.14254/2071-8330.2014/7-3/13
- Bowen, J. (2019). *Low-Cost Carriers in Emerging Countries*. Elsevier.
- Bjelcic, B. (2016). Low Cost Carriers in Eastern Europe. In Gross, S., & Lück, M. (Eds.), *The Low-Cost Carriers Worldwide*. Routledge.

- Brol, W. (2014). *Population potential of Polish airports* [WBData]. https://wbdata.pl/en/potencjal_ludnosciowy_polskich_lotnisk/
- Chung, J., & Wang, T. (2011). The impact of low-cost carriers on Korean Island tourism. *Journal of Transport Geography*, 19(6), 1335-1340. <https://doi.org/10.1016/j.jtrangeo.2011.07.004>
- Civil Aviation Authority – ULC (2020). Official statistics, Civil Aviation Authority of Poland - Urząd Lotnictwa Cywilnego. <https://www.ulc.gov.pl/pl/>
- Dobruszkes, F. (2009). New Europe, new low-cost air services. *Journal of Transport Geography*, 17(6), 423-432. <https://doi.org/10.1016/j.jtrangeo.2009.05.005>
- Dobruszkes, F. (2013). The geography of European low-cost airline networks: a contemporary analysis. *Journal of Transport Geography*, 28, 75-88. <https://doi.org/10.1016/j.jtrangeo.2012.10.012>
- Doganis, R. (2006). *The Airline business in the twenty-first century* (2nd ed.). Routledge.
- European Commission. (2020). *The Atlas of the Sky*. https://ec.europa.eu/transport/modes/air/aos/aos_public.html
- Francis, G., Fidato, A., & Humphreys, I. (2003). Airport–airline interaction: the impact of low-cost carriers on two European airports. *Journal of Air Transport Management*, 9(4), 267-273. [https://doi.org/10.1016/S0969-6997\(03\)00004-8](https://doi.org/10.1016/S0969-6997(03)00004-8)
- Fly4free (2018). *Ryanair i Wizz Air mogą otwierać nowe trasy z Poznania. Samorzędy sygną milionami!* <https://www.fly4free.pl/nowe-trasy-ryanair-wizzair-z-poznania/>
- Gabor, D. (2010). Low-cost Airlines in Europe: Network Structures after the Enlargement of the European Union. *Geographica Pannonica*, 14(2), 49-58. <https://scindeks-clanci.ceon.rs/data/pdf/0354-8724/2010/0354-87241002049D.pdf>
- Gross, S., & Schröder, A. (2007). *Handbook of Low-Cost Airlines: Strategies, Business Processes and Market Environment*. Erich Schmidt Verlag GmbH & Co KG.
- Huderek-Glapska S. (2013). The employment and income benefits of airport operation on the country in transition. *LogForum*, 9(1), 27-34. https://www.researchgate.net/publication/279181127_The_employment_and_income_benefits_of_airport_operation_on_the_country_in_transition
- ICAO (2013). *Enhancement of air transport connectivity and facilitation*. Working materials. ICAO. https://www.icao.int/Meetings/atconf6/Documents/WorkingPapers/ATConf6-wp020_en.pdf
- IHGL (2019). *Aviation Benefits Report 2019*. International Civil Aviation Organization and the Industry High-Level Group (IHLG). <https://www.icao.int/sustainability/Documents/AVIATION-BENEFITS-2019-web.pdf>
- Książek, S., & Suszczewicz, M. (2017). City profile: Wrocław. *Cities*, 65, 51-65. <https://doi.org/10.1016/j.cities.2017.03.001>
- Lange, A., & Bier, T. (2019). Airline business models and their network structures. *Logistics Research*, 12(6), 1-14. https://doi.org/10.23773/2019_6
- Lassen, C., Smink, C., & Smitt-Jensen, S. (2015). *The City in the Experience Economy: Role and Transformation*. Routledge.
- Magdalena, A., & Bouzaima, M. (2021). An empirical investigation of European airline business models: Classification and hybridization. *Journal of Air Transport Management*, 93, Article 102059. <https://doi.org/10.1016/j.jairtraman.2021.102059>
- Malighetti, P., Palesi, S., & Redondi, R. (2016). Base abandonments by low-cost carriers. *Journal of Air Transport Management*, 55, 234-244. <https://doi.org/10.1016/j.jairtraman.2016.06.008>
- Mandic, A., & Petric, L. (2017). The impact of the LCC presence on airport performance: evidence from Croatia. *Tourism and Hospitality Management*, 23(1), 17-34. <https://doi.org/10.20867/thm.23.1.4>
- Migracje.gov.pl (2020). *Mapy i dane statystyczne imigrantów i służb migracyjnych Polski [Maps and statistical data of migrants and migrant services]*. Polish Immigration Service Portal. <https://migracje.gov.pl/>
- Olipra, Ł. (2011). Tanie linie lotnicze – nowa „jakość” w przewozach lotniczych w Unii Europejskiej [Low-cost airlines – new „quality” of air transportation in the EU]. *EKONOMIA*, 4(16), 368-376.
- Olipra, Ł. (2016). Wpływ portu lotniczego Wrocław na gospodarkę miasta i regionu - szacowanie i analiza wydatków pasażerów [Impact of Wrocław airport on city and regional economy - estimating and analyzing passenger expenses]. *Studia Oeconomica Posnaniensia*, 4(7), 171-193. DOI: 10.18559/SOEP.2016.7.9.
- Pancer-Cybulska, E., Szostak, E., & Olipra, Ł. (2011). *The impact of the migration processes on the low-cost airlines' routes between EU countries and Poland after its accession to the EU, and on the territorial cohesion of Polish regions*. ERSA conference papers.
- Pancer-Cybulska, E., Cybulski, L., & Olipra, Ł. (2014). Bezpośredni wpływ portów lotniczych na regionalne rynki pracy w Polsce [Direct impact of airports on regional labor markets in Poland]. *Ekonomia XXI Wieku*, 1(1), 74-94. DOI: 10.15611/e21.2014.1.05.
- Pijet-Migoń, E. (2012). Zmiany rynku lotniczych przewozów pasażerskich w Polsce po akcesji do Unii Europejskiej [Changes in the air passenger transport market in Poland after accession to the European Union]. *Rozprawy Naukowe Instytutu Geografii i Rozwoju Regionalnego*, 25, 224.
- Let's Fly (2019, 2021). *The Magazine of Poznań Airport*. <https://poznanairport.pl/lets-fly/>
- Rejestr.io (2020). *Database (Airports financial reports)*. <https://rejestr.io/>

- Rekowski, M. (2012). *Regionalne Porty Lotnicze w Polsce [Regional airports in Poland]*. Wydawnictwo Uniwersytetu Ekonomicznego w Poznaniu.
- Rey, B., Myro, R. L., & Galera, A. (2011). Effect of low-cost airlines on tourism in Spain. A dynamic panel data model. *Journal of Air Transport Management*, 17(3), 163–167. DOI: 10.1016/j.jairtraman.2010.12.004.
- Ryanair (2017). *New Poznan base announced*. <https://corporate.ryanair.com/news/170316-new-poznan-base-announced/>
- SIP (2019). *Raport Lotniczy [Airport report] 2018. Poznań – Ławica*. Stowarzyszenie Inwestycje dla Poznania. <http://idp.org.pl/wp-content/uploads/2019/02/Raport-Lotniczy-za-2018.pdf>
- Stan turystyki (2016). *Stan turystyki w Metropolii Poznań w latach 2013-2015 [The state of tourism in the Poznań Metropolis in 2013-2015]. Raport*. Poznańska Lokalna Organizacja Turystyczna. https://poznan.travel/uploaded/File/barometr/RaportPLOT_2015_v14www.pdf
- Trzepacz, P. (2007). Spatial Aspects of Air Transportation Liberalization – Changes in European Airport Hierarchy. *Bulletin of Geography (Socio-Economic Series)*, 8, 163–177. <https://apcz.umk.pl/BGSS/article/download/2438/2425/8808>
- Trzepacz, P. (Ed.) et al. (2014). *Polish airports in transition 2004-2013*. Institute of Urban Development.
- Wenerowska, A. (2016). Kierunki zmian na rynku niskokosztowych linii lotniczych [Directions of changes in the low-cost airlines market]. *Prace naukowe Uniwersytetu Ekonomicznego we Wrocławiu*, 450, 616–625. DOI: 10.15611/pn.2016.450.53
- Wizz Air (2018). *Wizz Air celebrates the 10th anniversary of its Poznan base*. <https://wizzair.com/en-gb/information-and-services/about-us/news/2018/01/31/wizz-air-celebrates-10th-anniversary-of-its-poznan-base>
- Wizz Air (2020). *Annual report and accounts 2020*. Wizz Air Holdings Plc. https://wizzair.com/static/docs/default-source/downloadable-documents/corporate-website-transfer-documents/annual-reports/wizz-air-holdings-plc-annual-report-and-accounts-2020_v3_fd38d396.pdf
- Whyte, R., & Lohmann, G. (2016). Airline business models. In L. Budd & S. Ison (Eds.), *Air Transport Management: An international perspective* (pp. 107–121). Routledge.
- HiFly (2015). *The Magazine of Wrocław Airport*. <http://airport.wroclaw.pl/zakladka/hifly/>

ORCID

Andrei Bezruchonak  <https://orcid.org/0000-0001-6554-4234>

Notes on contributors

Andrei Bezruchonak holds a PhD in Geography and is an Associate Professor. Was born in 1986 in a middle-sized town of Barysau (Belarus). Got educated, learned how to travel, explore and understand places at the Faculty of Geography (Minsk, Belarus), and at the University of Algarve (Faro, Portugal) and during numerous student and academic exchange programs and conferences. Enriched personal and professional background during mobility programs (ERASMUS and MOST in Portugal, FULBRIGHT and WEISER in the USA, Kirkland Research in Poland) and internship at the Canadian Parliament. The area of scientific interests covers transportation geography, urban studies, related fields of human geography.

Smart Management of Tourist Coastal Areas in a Reborn Tourism Era: Transitioning from Safe to Sustainable Beaches within the Spanish Sun and Sand Model

Ginesa Martínez del Vas  ¹

Miguel Puig-Cabrera  ²

Maricruz Cádiz-Gómez ³

Asier Amilibia de Diego ⁴

1. Faculty of Economics and Business, Catholic University of Murcia-UCAM, Murcia, Spain

2. Research Centre for Tourism, Sustainability and Well-being (CinTurs), Universidade do Algarve, Faro, Portugal

3. Faculty of Economics and Business, Catholic University of Murcia-UCAM, Murcia, Spain

4. Faculty of Economics and Business, Catholic University of Murcia-UCAM, Murcia, Spain

ABSTRACT

The aim of this work is the reconceptualisation of beaches as internal objects of smart tourist destinations and to offer a means to capitalize pandemic distinctives such as the Safe Tourism Certification (STC) on the physical pressure of the coastal tourist space to contribute to the natural recovery of these settings. The methodology of this work consisted of analyzing the spatial management of tourist coastal areas according to their congestion level before and after the implementation of the STC. The research technique used for data collection was an online survey with a sample of 64 certified Spanish beaches. One of the main findings of this work is that despite Spanish beaches holding several quality distinctives based on international standards, none of these distinctives guaranteed their decongestion with a minimum surface of 5 m² per user in the sample, as literature suggests. Thus, the STC implementation and the efforts related to managing physical pressure on coastal resources show the main existing bottlenecks in the sun and sand destinations to transit from safe to physically and ecologically sustainable tourist coastal areas. Also, practical implications to Destination Management Organisations are shared regarding the transition from traditional to smart sun and sand destinations.

KEYWORDS

Tourism Pressure, Physical Carrying Capacity, Smart Touris Coastal Areas Management, Coastal Vulnerability, Sun and Sand Tourism.

ARTICLE HISTORY

Received 09 October 2023 Accepted 29 February 2024

1. Introduction

Since the 1990's decade, the sun and sand model is not only the most predominant tourism modality in Spain but also one of the main challenges for the sustainability of tourism activity at the national level as well as along the Mediterranean region (Blázquez-Salom et al., 2019).

Overcrowding and saturation on Spanish beaches (Pueyo-Ros et al., 2018; Soto & Clavé, 2018; Nolasco-Cirugeda et al., 2020) seem to be inseparable matter from tourism planning and a priority in the urban political ecology (Perles-Ribes et al., 2021).

Within this framework, beaches become the most seasonally and highly vulnerable spaces (Morales et al., 2018; López-Dóriga et al., 2019; Lukoseviciute & Panagopoulos, 2021) due to the high number of users and services. This discourse has been analysed by the scientific community in a large number of studies (Zacarías et al. 2011; Rodella et al., 2017; Botero et al., 2018; De Sousa, et al., 2018; Wang et al., 2020) that have emphasized the need to assess the physical carrying capacity and control the existing tourism pressure on these spaces. This implies the need for optimal management processes and tools that offer guarantees for contributing to the protection, adaptation, changes of use, mitigation, prevention, control, and/or recovery of the existing natural ecosystems in the touristic coast space.

The outbreak of COVID-19 has drawn scenarios of great diversity that emphasize the need to establish mechanisms that guarantee the safety of users in the process of consuming products or services but also the safety of the coastal tourism space (Kane et al., 2021; Merino et al., 2021). Anthropogenic stressors such as the reduction of noise, odor, litter, user density, and recreational activities during COVID-19 lockdown have been proved to restore natural settings quickly (Soto et al., 2021). This fact put governments on alert to seek mechanisms that would guarantee the safe use of beaches. Thus, the arrival of certificates such as Safe Tourism Certified (STC) in the case of Spain contributed to guarantee the development of safe tourism in the different tourism subsectors (Amaro, 2021; Sanabria-Díaz et al., 2021; Vargas-Sánchez et al., 2021; Villacé-Molinero et al., 2021), including beaches. This document helped town councils by providing them with a roadmap of actions to guarantee social distancing and limitation of physical capacity.

The empirical evidence obtained from the use of management tools such as the STC becomes an opportunity for coastal destinations to transit from safe to sustainable beaches.

The results of this work offer empirical evidence based on the use of STC as a tool to control physical tourism pressure on beaches, in the context of ecological transition and digitalisation. To this end, the aim of this work is the reconceptualisation of beaches as internal objects of smart tourist destinations and to offer a means to capitalize pandemic distinctives such as the STC on the physical pressure of the coastal tourist space to contribute to the natural recovery of these settings. This work also brings some practical tools used on the Spanish coast to combine sustainability and digitalisation as a way of guaranteeing an optimal carrying capacity that assures both a proper coastal sensitivity/vulnerability adaptation strategy, as well as offers a better experience for sun and sand tourists. Thus, a technology-based management of beaches is discussed at the end of the work, based on the results of the analysis.

2. Beaches: The Key Tourism Resource for Sun and Sand Destinations

In the context of the sun and sand tourism model, beaches are not just idyllic landscapes but essential and multifaceted tourism resources (Lukoseviciute & Panagopoulos, 2021).

The relevance of beaches in the sun and sand model is underscored by their pivotal role in attracting tourists. The literature substantiates the significance of beaches as prime destinations (Enríquez & Bujosa, 2020), forming the bedrock of tourism in coastal regions. Their natural beauty, recreational opportunities, and cultural resonance make them key drivers for destination choice. However, the escalating popularity of these coastal havens has precipitated a myriad of physical and social impacts, necessitating an in-depth exploration (de Andrade et al., 2019).

Physically, the unregulated influx of tourists places immense pressure on beach ecosystems. Erosion, a tangible consequence, results from trampling on fragile dune systems and the removal of essential vegetation (Defeo et al., 2021; Pinna et al., 2022). Simultaneously, pollution emerges as a critical issue, with elevated levels of litter, sewage, and chemical pollutants degrading marine ecosystems and compromis-

ing water quality (Lukoseviciute & Panagopoulos, 2021). These physical transformations not only threaten the environmental integrity of beaches but also diminish the quality of the tourist experience.

Socially, the impacts of burgeoning tourism on beaches are equally profound. Overcrowding becomes prevalent, transforming serene landscapes into congested spaces, thereby altering the character of the visitor experience (Murillo et al., 2023). Cultural displacement also becomes a poignant concern, as local communities contend with the erosion of their traditional lifestyles and the commodification of their cultural heritage (Macleod, 2023). The amalgamation of physical and social impacts signals the urgent need for interventions such as STC.

The rationale for STC intervention lies in the imperative to reconcile the economic benefits of tourism with the physical preservation of beach ecosystems and the well-being of local communities, thus, becoming a “sustainable beach”. This could be conceptualized as a coastal area where tourism is managed judiciously to preserve ecological integrity, respect local cultures, and foster mutual benefits for both visitors and host communities. The interventions are multifaceted and extend across ecological conservation, community involvement, and the promotion of economically viable, responsible tourism practices (Mestanza et al., 2019; da Costa et al., 2020).

In conclusion, the complex interplay between the allure of beaches, the adverse impacts of tourism, and the exigency for sustainability through STC become the common factors that need further analysed so that sustainable beach management strategies are provided based on technological solutions.

3. Materials and Methods

The methodology of this work consisted of analyzing the spatial management of tourist coastal areas according to their congestion level before and after the implementation of the STC to assuring safe beaches in Spain. The research technique used for data collection was an online survey with a sample of 64 beaches with an STC distinctive.

3.1 Questionnaire Design

This questionnaire contained a total of 33 items combining multiple-choice, 5-point Likert scale, and open questions.

The survey was divided into two sections: the first one focuses on general information (number of STC certified beaches, dates of certification, beach extension and maximum capacity established before the STC implementation, other distinctives, and reasons why they implemented STC, among others).

The second section deepens on the factors related to the implementation of the STC distinctive regarding some of the main difficulties to implementing the social distance measures in highly congested and ecologically vulnerable spaces like beaches.

3.2 Sampling and Data Collection

The survey was addressed to the Destination Management Organisations (DMO) responsible for tourist coast areas management. The sample of this work contains a total of 160 Spanish beaches holding an STC distinctive. A 40% of obtained responses were validated.

The collected data was analyzed at an aggregate level for DMOs that did not give their consent to be de-anonymised (79%) and a disaggregation has been made for the consenting ones (21%).

The questionnaires were applied between January and June 2021, with the pre-test being sent for validation to experts

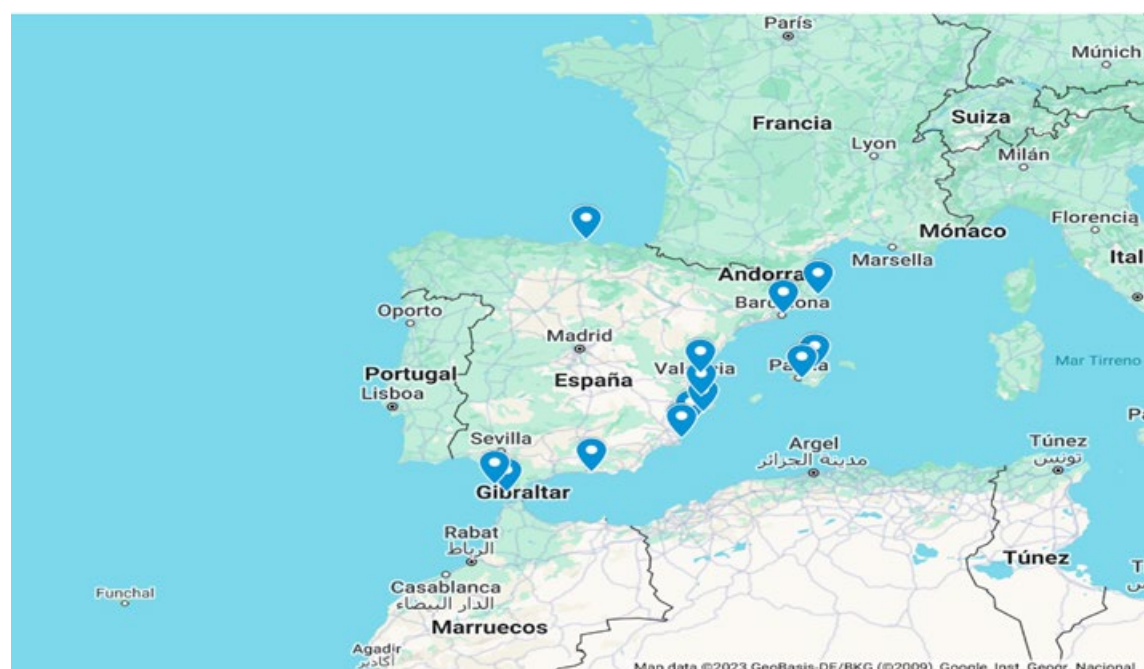
Descriptive analysis was carried out for all the variables. Frequencies and percentages were calculated for categorical variables.

For qualitative variables, minimum and maximum values, median, mean and standard deviation were calculated. For the analysis of the comparison of the different sectors in the common variables, non-parametric tests were carried out due to the small sample size in the beach and museum sectors. Kruskal-Wallis OVA were performed for the comparison of the beaches in quantitative variables and Chi-Square tests for the comparison of categorical variables.

3.3 A Brief Framework of the Area of Study

Sun and sand tourism contributes to a substantial portion of the country's Gross Domestic Product (GDP). In recent years, the tourism sector has accounted for around 12-14% of Spain's GDP, with beach tourism playing a predominant role. Spain consistently ranks among the top three most-visited countries globally (Nurmatov et al., 2021). The change of the Spanish tourist model: From the Sun and Sand to the Security and Sand. *Tourism Economics*, 27(8), 1650-1668. Welcoming over 80 million international tourists annually, and a significant portion of these visitors are drawn to its extensive coastline and pristine beaches. This robust influx of tourists has translated into a substantial economic impact, with tourism-related activities contributing over €150 billion annually to the Spanish economy (INE, 2023). Also, Spain boasts over 8,000 kilometers of coastline (IGN, 2023), and this geographical advantage has led to substantial investments in tourism infrastructure.

Figure 1. Spanish Beaches Included in the Study



Source: Own Elaboration

This is some of the intrinsic factors that are common to the beaches included in the sample (Figure 1).

4. Results

Rodella et al. (2017) carried out a comparison of the carrying capacity for seven beaches in the Emilia-Romagna region (Italy), assessing their geomorphological characteristics in relation to the maximum user threshold, to ensure that the sun and sand model in the region offers a competitive and responsible model in terms of physical-environmental degradation and user satisfaction. Based on the results of this study, it was ruled that the carrying capacity of the beaches of Emilia-Romagna must guarantee, as a minimum, a surface area of 7m²/user.

On the other hand, Zacarías et al. (2011) propose that the usable area per user should be between 5-10 m²/user for the case of the beaches of Faro (Portugal). Based on the assumption that Spanish beaches share similar geomorphology to the beaches of Emilia-Romagna and Faro (Portugal), Table 1 shows the immediate effect that the implementation of the STC had on the maximum permitted capacity on the beaches in the sample that consent to be de-anonymised, based on their respective usable areas:

Table 1. Status of Spanish Beaches Before and After the STC Implementation

Beach	Location	Capacity previous to STC	Capacity after STC	User/m ² Previous to STC	Status previous to STC	User/m ² Post STC	Status after STC
Ensenada del Esparto	San Javier (Region of Murcia)	15,000	13,725	11.20	Decongested	12.24	Decongested
Sotillo-Castell	Gualchos (Andalusia)	12,240	4,153	4.25	Congested	12.52	Decongested
Canet D'En Berenguer	Canet de Berenguer (Valencia)	25,000	5,000	4.00	Congested	20.00	Decongested
Nord	Gandía (Valencia)	140,000	70,009	3.31	Congested	6.63	Decongested
L'Arenal	El Arenal (Balearic Islands)	10,000	4,500	3.20	Congested	7.11	Decongested
Platja Gran	Benidorm (Valencian Community)	7,500	7,000	11.22	Decongested	12.03	Decongested
La Barrosa	Chiclana (Andalusia)	64,200	35,696	4.00	Congested	8.99	Decongested
La Playita	Zahara de los Atunes (Andalusia)	2,500	1,800	1.73	Congested	2.41	Congested
Garbí	Calella (Barcelona)	30,000	14,730	2.14	Congested	4.37	Congested
Trengandín	Trengandín (Cantabria)	70,541	35,270	1.89	Congested	3.79	Congested
Levante	Benidorm (Valencian Community)	30,000	11,300	12.23	Congested	32.46	Decongested
Aiguablava	Begur (Catalonia)	726	182	3.02	Congested	12.03	Decongested
Villananitos	San Pedro del Pinatar (Region of Murcia)	13,104	4,675	1.92	Congested	5.39	Decongested

Source: Own Elaboration

The results show that, in an initial scenario prior to the implementation of the STC, 85.7% of the beaches were in a state of congestion, as they could not guarantee a minimum surface area of 5 m²/user. However, the STC implementation process meant that all the beaches included in the sample were able to optimise and increase the minimum surface area per user: 57.1% of them passed from “congested” to “decongested” status (Sotillo-Castell; Canet D'En Berenguer; Nord; L'Arenal; La Barrosa; Aiguablava; Alcudia; Villananitos beaches). Additionally, 21.4% of the beaches contained in the sample, despite being in a “decongested” situation, achieved better physical capacity management to increase their surface area (Ensenada del Esparto, Platja Gran, and beaches), in some cases even tripling it (Levante beach). Finally, 21.4% of the beaches, despite implementing the STC, were unable to guarantee a minimum threshold of 5m², although the m² /user surface was doubled (La Playita, Platja de Garbí, and Trengandín beaches).

This transition from unhealthy to healthy beaches also made these beaches become more sustainable, as 100% of the beaches decreased their physical pressure, as well as 85.7% transited from congested to descongested status. In the following sections, the findings obtained from the questionnaire are analyzed to identify the main barriers and implications regarding this transition process to environmental sustainability.

4.1 The Implication of the Services Offered on Beaches on Physical Carrying Capacity

The services offered on beaches consist of the provision of facilities or services to beach users, which may be provided by public or private entities and with a variable availability and cost depending on the season. These services may include recreational activities, bars and restaurants, or the use of certain infrastructures such as toilets or showers, among others.

These factors should be analyzed depending on their typology, as this implies the spatial distribution being conditioned by the useful surface area for the joy of users, as well as conditioning the distribution of uses of these beaches per area (Valdemoro & Jiménez, 2006).

Table 2. Elimination or Reduction of Services on Beaches

Services reduced or abolished	%
Recreational áreas	71.4
Sports áreas	57.1
Toilets and/or changing rooms	50.0
Sun lounge/parasol service	50.0
Food and beverage service	35.7
Assistance to people with disabilities	28.6
Showers	14.3
None	7.1

Source: Own Elaboration

According to the data in Table 2, temporary closures and service limitations have been one of the aspects that have considerably conditioned the availability of usable surface area for users to guarantee their safety. In this sense, to optimise the distribution of tourist flows as shown in Table 1, most of the beaches must reduce or remove a large part of the services offered, regarding the level of “spatial dispersion” they currently generate. Specifically, to achieve better physical management of space. This meant a reduction or elimination of sports areas for 57.1% of the beaches, followed by 50% for toilets and changing rooms, as well as for the sun lounge and parasol service. On the other hand, 35.7% of the beaches were forced to eliminate or reduce the food and beverage service, 28.6% the assistance to people with special needs, and 14.3% the shower service. This finding proves one of the main weaknesses regarding the existing management strategies on the studied beaches until the existence of tools such as the STC, as no corrective factors were integrated to meet spatial dispersion generated in terms of tourist pressure with the expected physical carrying capacity to guarantee a minimum of 5m²/user. Thus, fostering a massive sun and sand model within the Spanish beaches.

4.2 The Use of Quality and Sustainability Labels as a Route to Requalification

Spain is one of the countries with the highest number of management system certifications (ISO, 2020), as a means of sustainability and requalification of the sun and sand model. Thus, the majority of managing bodies stated that they hold quality or environmental certificates, or some other recognition prior to the implementation of the STC, as shown in Table 3.

Table 3. Previously Implemented Protocols and Certificates at Beaches

Previous certificates	%
Q for Tourist Quality (based on ISO 13009)	85.7
UNE-ISO 9001 Certificate	42.9
Tourism Quality Commitment (SICTED)	28.6
Blue Flag	21.4
European Environmental Management Association Certificate (EMAS)	14.3
Ecobeaches Flag	7.1

Source: Own Elaboration

The most frequently reported certificate was the Q for Tourism Quality awarded by the Spanish Institute for Tourism Quality (ICTE) and property of the Secretary of State for Tourism (ICTE, 2020), with representativeness of 85.7%. This certificate is obtained after demonstrating compliance with the international standard ISO 13009 Requirements and recommendations for beach management. This is followed by the ISO 9001 Quality Management Systems certificate and then the Tourist Quality Commitment in Destinations (SICTED), which was awarded to 42.9% of the beaches in the sample, prior to the STC label. This was followed by other distinctions such as the Blue Flag, obtained by 21.4% of the beaches, the European Environmental Management Certificate (EMAS), awarded by 14.3%, and the Ecobeaches Flag, awarded by 7.1% of the beaches.

However, none of the certificates included in Table 3 require the definition of a specific beach capacity, although some of these standards, such as the ISO 13009 and ISO 9001 establish a management framework on which to define appropriate measures when, either because of the coronavirus or for other reasons (such as tourist pressure), it becomes appropriate to limit capacity. The STC distinctive, thus, offers a means to fill this gap.

Table 4. Assessment of Motives and Criteria for Implementing a Protocol

Motives	Mean
Ensuring the user's perception of safety	4.43
Preserving the image of the destination	4.39
Caring for the health of workers and users	4.39
Avoiding a source of contagion at the destination	4.35
As a matter of city council policy	4.03
Criteria	
Prestige	4.35
Effectiveness	4.35
Ease of implementation	3.71
Because they are promoted by the Ministry of Industry, Trade and Tourism.	3.57
Cost	3.43
Support from the Autonomous Community	3.00

Source: Own Elaboration

Regarding the reasons for choosing the STC label, based on the certification of the ISO/PAS 5643 specification (Table 4), the most highly valued aspects were the prestige of the brand and the effectiveness of the standard (4.35 out of 5 points), followed by the ease of implementation (3.71 out of 5 points) and the support and promotion at the national level from the Ministry of Industry, Trade and Tourism (3.57 out of 5 points). The aspects least valued when opting for the STC were the support received by the Autonomous Community (3 out of 5 points) and the costs associated with obtaining this certificate (3.4 out of 5 points).

Thus, these results show that a previously recognised brand provides the protocols with the necessary recognition when they are required by the managing bodies to solve the corresponding issues to be solved in tourism destination management, and specifically, control of physical tourism pressure on vulnerable ecosystems.

On the other hand, Table 4 also confirms the need for a tool such as the STC to preserve the image of the destination, as well as to guarantee the safety of users and workers in the sector.

The main criteria that motivated the beach management bodies to implement a protocol focused on COVID-19 safety were, on the one hand, to guarantee the beach user's perception of safety (4.43 out of 5 points), while at the same time preserving the image of the destination (4.39 out of 5 points), protecting the health of workers and users (4.39 out of 5 points) and, lastly, avoiding sources of contagion (4.35 out of 5 points). These criteria obtained average scores above 4.

The results show the importance given by the managing body to regaining the confidence of beach users (whether tourists or residents) through the establishment of biosafety measures appropriate to the context of the pandemic, and as a continuation, therefore, of preserving the image of the destination, a key element for the ecological transition and sustainability of the Spanish sun and sand model. Particularly noteworthy examples include the Balearic Islands and Benidorm, whose level of tourist congestion places these beaches in a situation of overcrowding that requires intervention by the managing bodies, and whose tourism policies in many cases are not adapted to the real need to control this tourist pressure.

4.3 The Delimitation and Management of Capacity: A Pending Issue for the Spanish Sun and Sand Model?

The implementation of the STC on the beaches under study reveals that the delimitation and management of capacity continue to be a pending matter for the management bodies in sun and sand destinations.

Table 5 shows that among the most difficult aspects of implementation and consensus for the STC are the delimitation of the capacity for each space (64.3%) linked to the investment linked to the redistribution of uses and spaces of the beaches (50%), followed by the lack of staff training (14.3%), access control (7.1%), or the difficulty of controlling areas of greater recreation such as those destined for bathing (7.1%).

Table 5. Aspects of the Protocol that are most Difficult to Implement and Reach Consensus on

Aspects that are more difficult to implement	%
Capacities established in each space	64.3
Investment required	50.0
Lack of staff training	14.3
Access control	7.1
Distancing in the bathing area	7.1

Source: Own Elaboration

In short, the Spanish model of sun and sand is going through a challenging stage of congestion that leads to overcrowding of beaches with an aggravated seasonality that exerts serious tourist pressure on coastal resources, endangering the sustainability of the model.

The results of this work prove the relevance of providing local authorities with tools that allow them to define and manage capacity in accordance with optimising tourist pressure on beaches, while offering a user experience that provides sustainability and competitiveness to the destinations, based on tools such as the STC.

5. Discussion

Within the framework of the current process of smart transformation of tourism in Spain, one of the priorities for sun and sand destinations (Dorcic et al., 2019) should be the identification of technological solutions to respond to the challenges posed by the current surpassing of the physical carrying capacity in destinations such as those included in the sample (Femenia-Serra & Ivars-Baidal, 2021). The reconceptualisation of beaches as internal objects of smart tourist destinations together with technology enables not only to better respond to sustainability and ecological challenges but also to build tourism experiences and loyalty (Azis et al., 2020).

Regarding the STC implementation on the Spanish beaches, several methods have been identified combining technology and spatial management of coastal resources. Thus, contributing to the existing body of knowledge on managing sun and sand destinations.

Figure 2. Matrix of Carrying Capacity Management Implemented in Spanish Sun and Sand Destinations

Aggregation degree for smart coastal and tourism management + .	Monitoring the current situation of tourist coastal areas - Coastal drones - Safe management of beaches Apps	Leadership in the management of tourist coastal areas - Cameras with artificial intelligence - Counting and measuring sensors - Data management platform
	Traditional management of tourist coastal areas - Delimitation of access to beaches - Parceling of beaches	Auxiliary predictability on physical pressure of tourist coastal areas - Reservation system
	-	Physical pressure predictability +

Source: Own Elaboration

Figure 2 shows the main technological tools used in Spanish beaches for better spatial management regarding the carrying capacity required to transition from unhealthy to healthy beaches after STC implementation. This matrix divides the corresponding tools according to their potentiality for predicting tourism physical pressure of tourist coastal resources as well as their level of aggregation and interrelationships within smart coastal tourism management.

5.1 Technological Tools for Monitoring of the Current Situation of Tourist Coastal Areas

According to the upper left quadrant of the matrix (Figure 2), these tools are characterized by a high level of aggregation for smart management of tourist coastal areas and a low level of predictability. Their main function is to monitor and evaluate the current situation regarding the physical pressure of coastal resources. Two different tools are included in this quadrant:

On the one hand, coastal drones are used to face the need to control the capacity and behaviour of beach users, such as Conil de la Frontera (Cádiz) and Sagunto (Valencia) have opted for a combination of drones and artificial intelligence, capable of facilitating both the management and the collection of information to determine the state of the beaches (SEGITTUR, 2021). In terms of natural accidents, drones can even transmit information to competent authorities involved in that casual event.

On the other hand, in line with Chen & Teng (2016), physical hazards occurred on beaches can be controlled by mobile apps and websites. According to Fuengirola (Andalusia) and Palma (Balearic Islands) beaches, these apps are based on the Internet of Things (IoT), Artificial Intelligence, and Deep Learning to determine in real-time the occupancy level of a tourist coastal area including 3D optical sensors capable of real-time analysis and differentiation of the different objects as well as monitoring variables such as temperature, humidity, wind speed, air quality or noise levels (Esmartcity, 2020).

5.2 Technological Tools for Leadership in the Management of Tourist Coastal Areas

According to the upper right quadrant of the matrix (Figure 2), these kinds of tools have a high degree of usability to predict physical pressure on tourist coastal areas and also share a high degree of aggregation to feed with the existing smart management systems in destination and contribute to data collection and decision making. In this section, three solutions have been identified:

Firstly, cameras with artificial intelligence are used to establish control over capacity is the installation of sensorised cameras with artificial intelligence. This technology is being already implemented in other governance areas (Sharma et al., 2020) such as civil security or traffic (Sukhadia et al., 2020). In the case of tourism, the information collected by cameras is distributed through a mobile application, which allows the bather to know which beaches are open (green), are beginning to reach the capacity limit (orange), or even are already closed (red).

At Salou beach (Catalonia), a total of 22 smart cameras with Deep Learning technology were installed in bathing areas with Deep Learning technology for the purpose of counting people and offering information about the status of the beach (SEGITTUR, 2021).

Regarding the counting and measuring systems, this is an increasing technology for tourism planning and management (Lisi & Esposito, 2015). In the case of tourist coastal areas, these systems can register the temperature, quality, and cleanliness of the sand, bathymetry, as well as water quality and temperature, and UVA sensors (to measure radiation levels and their variation) based on the pilot initiative of Ciutat Jardín beach (Balearic Islands). It has been determined that if the beach is occupied with a density of less than 8 m²/user, the state of occupation is considered low (green). If the density is between 4-7 m²/user, it is considered medium (orange), and if the density is higher than 4 m²/user, it is considered highly congested (Diario de Ibiza, 2020).

Finally, the data management platform is where the different sources that the destination deploys for subsystems management within a tourism smart transformation process (Buhalis & Amaranggana, 2015). For the case of beach monitoring, this includes indicators such as the inflow data from sensors, the characteristics of the beaches, areas of stay, available services, the state of the sea, the weather, etc.

Santander municipality has installed devices on its beaches based on the use of APIs that are provided by the Smart City platform to send data on people entering and leaving through each one of the regulated accesses. Considering the parameters of each beach, the capacity of the maximum capacity is calculated in real-time, and based on this, the degree of occupancy of the beaches is determined. In addition, the platform integrates information on the services available at the beaches, beach flags, etc. services available on the beaches, lifeguard and lifeguard service flags, jellyfish alerts, weather forecasts, etc. of jellyfish, weather forecasts and the state of the sea, among other information (SEGITTUR, 2021).

In short, these kinds of tools need to be fostered in sun and sand destinations in order to gain smart management leadership and monitor present and future physical pressure on coastal resources.

5.3 Traditional Tools for Management and Auxiliary Predictability Tools for Tourist Coastal Areas

In the lower quadrants of the matrix (Figure 2), three technological tools have been identified to manage physical pressure on beaches.

On the left-hand side, it is contained traditional means to control carrying capacity and widely used until the COVID-19 pandemic:

On the one hand, the control of access to beaches as well as shuttle bus routes from park-and-ride car parks. This system is still used by several beaches such as San Javier (Murcia) and San Sebastian beaches (Basque Country) to assure a limited number of entrance points as well as authorized vehicles (Murcia Government, 2022).

On the other hand, the parceling of beaches consists of delimiting a useful space on the sand per user in areas of 4 by 4 meters. One of the first destinations to apply this technique was Benidorm, which carried out the action on the Levante and Poniente beaches, dividing them into 20 free access sectors with 1,554 plots in Levante and 5,661 plots in Poniente, all of them 16 square meters in size (4x4 meters) in which up to 4 people could be accommodated (SEGITTUR, 2021).

In line with the right-hand side quadrant (Figure 2), the parceling was accompanied by a platform that supported a system of reservations for these plots. The reservation is made 24 hours in advance and implies choosing a date and time with availability on the chosen beach, selection of sectors, filling in the details of the reservation holder and attendees, and finally validating the reservation on the beach access point (Diario La Información, 2021).

Finally, the tools contained in these two quadrants follow a basic strategy that could be useful for Des-

ination Management Organisations in the short term while transitioning to a smarter complex system for monitoring physical pressure.

6. Conclusion

This work brings a rethinking to the management of tourist coastal areas according to their physical vulnerability due to users' pressure within a post-pandemic scenario from a smart paradigm. To do this, the STC implementation process has been analyzed in the Spanish sun and sand model according to their management of the physical carrying capacity.

A key revelation from our study is that, despite Spanish beaches boasting various quality distinctives aligned with international standards, none of these assurances guarantee the decongestion of beaches or the provision of a minimum surface area of 5 square meters per user, as revealed in our sample. Consequently, STC implementation and efforts directed at managing physical pressure on coastal resources emerge as significant challenges within sun and sand destinations, highlighting existing bottlenecks in addressing these issues. Confronted with these barriers, our empirical evidence underscores how a distinctive certification like STC, or a similar framework, ensuring safe spaces, could serve as a catalyst for transitioning from mere safety to the establishment of physically and ecologically sustainable tourist coastal areas.

The practical implications derived from our findings extend to Destination Management Organisations (DMOs), offering insights into the imperative shift from traditional to smart sun and sand destinations. Furthermore, we highlight the emergence of relevant technological solutions in Spain for managing tourist spatial dynamics. This marks a pivotal contribution of our work, as it emphasizes the possibility of a smart transition for beaches, leveraging the analytical prowess of various technological tools. This is one of the main novelties of the work, as smart transition of beaches can be reached based on the analysed technological tools.

Firstly, DMOs are urged to embrace a smart paradigm for coastal destination management, leveraging technology to enhance the visitor experience, optimize resource allocation, and address challenges such as overcrowding. Real-time monitoring, data analytics, and dynamic decision-making can be facilitated through smart solutions to ensure sustainable development.

Additionally, the study emphasizes the relevance of specific technological tools for managing tourist spatial dynamics. DMOs can consider adopting geospatial mapping, crowd monitoring systems, and mobile applications to provide real-time information on beach occupancy and conditions. These tools empower authorities to implement effective crowd control measures, ensuring visitor well-being and sustainable use of coastal resources.

Furthermore, the integration of certification frameworks, such as the Safe Tourism Certification (STC), emerges as a transformative tool for ensuring safe and sustainable coastal tourism. DMOs can proactively collaborate with stakeholders to implement safety protocols, enforce carrying capacities, and leverage certification frameworks to enhance the overall quality and sustainability of sun and sand destinations.

Crucially, stakeholder collaboration and community engagement are highlighted as essential. DMOs should actively involve local communities, businesses, and residents in the decision-making process to foster a sense of shared responsibility for sustainable tourism practices.

Lastly, DMOs are encouraged to advocate for investments in infrastructure and innovation to support the transition to smart destinations. This includes the development of smart infrastructure, such as sensor networks and communication systems, to enhance real-time data collection and analysis. Encouraging innovation in tourism services and experiences contributes to the overall competitiveness and resilience of sun and sand destinations.

As a future research line, factors associated with tourism performance and smart transformation should be analyzed regarding the effects that beach decongestion could have on the quality of life of residents in coastal life as well as both on local and external beach users' perceptions.

Declaration of Interest Statement

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

ACKNOWLEDGEMENTS

This research is funded by National Funds provided by FCT- Foundation for Science and Technology through project UIDP/04020/2020 (DOI: 10.54499/UIDB/04020/2020) and project 101071300 Sustainable Horizons (HORIZON).

REFERENCES

- Amaro, D. (2021). Crisis Management and Resilient Destinations During Covid-19 in the Southern European Countries. In *Pandemics and Travel*. Emerald Publishing Limited. <https://doi.org/10.1108/978-1-80071-070-220211015>
- Azis, N., Amin, M., Chan, S., & Aprilia, C. (2020). How smart tourism technologies affect tourist destination loyalty. *Journal of Hospitality and Tourism Technology*, 11(4). <https://doi.org/10.1108/JHTT-01-2020-0005>
- Blázquez-Salom, M., Blanco-Romero, A., Vera-Rebollo, F., & Ivars-Baidal, J. (2019). Territorial tourism planning in Spain: From boosterism to tourism degrowth?. *Journal of Sustainable Tourism*, 27(12), 1764-1785.
- Botero, C. M., Cervantes, O., & Finkl, C. W. (2018). State-of-the-art innovative beach management tools from the tree of science platform. In *Beach Management Tools-Concepts, Methodologies and Case Studies* (pp. 527-544). Springer, Cham.
- Buhalis, D., & Amaranggana, A. (2015). Smart tourism destinations enhancing tourism experience through personalisation of services. In *Information and communication technologies in tourism 2015* (pp. 377-389). Springer, Cham.
- Chen, C. L., & Teng, N. (2016). Management priorities and carrying capacity at a high-use beach from tourists' perspectives: A way towards sustainable beach tourism. *Marine Policy*, 74, 213-219. <https://doi.org/10.1016/j.marpol.2016.09.030>
- da Costa Cristiano, S., Rockett, G. C., Portz, L. C., & de Souza Filho, J. R. (2020). Beach landscape management as a sustainable tourism resource in Fernando de Noronha Island (Brazil). *Marine Pollution Bulletin*, 150, Article 110621. <https://doi.org/10.1016/j.marpolbul.2019.110621>
- de Andrade, T. S., de Oliveira Sousa, P. H. G., & Siegle, E. (2019). Vulnerability to beach erosion based on a coastal processes approach. *Applied Geography*, 102, 12-19. <https://doi.org/10.1016/j.apgeog.2018.11.003>
- De Sousa, L. B., Loureiro, C., & Ferreira, O. (2018). Morphological and economic impacts of rising sea levels on cliff-backed platform beaches in southern Portugal. *Applied Geography*, 99, 31-43. <https://doi.org/10.1016/j.apgeog.2018.07.023>
- Defeo, O., McLachlan, A., Armitage, D., Elliott, M., & Pittman, J. (2021). Sandy beach social-ecological systems at risk: regime shifts, collapses, and governance challenges. *Frontiers in Ecology and the Environment*, 19(10), 564-573. <https://doi.org/10.1002/fee.2406>
- Diario La Información (2021 1st March). Benidorm vuelve a parcelar sus playas para garantizar la seguridad. *Diario La Información*. <https://www.informacion.es/benidorm/2021/03/01/benidorm-vuelve-parcelar-playas-garantizar-36578703.html>
- Diario de Ibiza (2020 30th July). Así es la tecnología de sensorización de playas para controlar la ocupación. *Diario de Ibiza*. <https://www.diariodeibiza.es/ibiza/2020/07/30/tecnologia-sensorizacion-playas-controlar-ocupacion-29542926.html>
- Dorcic, J., Komsic, J., & Markovic, S. (2019). Mobile technologies and applications towards smart tourism-state of the art. *Tourism Review*, 74(1), 82-103. <https://doi.org/10.1108/TR-07-2017-0121>
- Enríquez, A. R., & Bujosa, A. (2020). Measuring the economic impact of climate-induced environmental changes on sun-and-beach tourism. *Climatic Change*, 160(2), 203-217. <https://doi.org/10.1007/s10584-020-02682-w>
- Esmartcity (2020, 16th of July). Palma de Mallorca lanza una app para conocer el estado de las playas en tiempo real. *Esmartcity*. <https://www.esmartcity.es/2020/07/16/palma-mallorca-lanza-app-conocer-estado-playas-tiempo-real>
- Femenia-Serra, F., & Ivars-Baidal, J. A. (2021). Do smart tourism destinations really work? The case of Benidorm. *Asia Pacific Journal of Tourism Research*, 26(4), 365-384. <https://doi.org/10.1080/10941665.2018.1561478>
- IGN (2023). España: 8000 kilómetros de costa. <https://www.ign.es/recursos-educativos/relieve-costa/index.html>. Instituto Geográfico Nacional (Spain, Madrid).
- INE (2023). Sun and sand tourism in Spain. <https://www.ine.es/DEFIne/es/concepto.htm?c=5335&tf=&op=>. Instituto Nacional de Estadística (Spain, Madrid).
- ISO (2020). *ISO Survey*. <https://www.iso.org/the-iso-survey.html>
- Kane, B., Zajchowski, C. A., Allen, T. R., McLeod, G., & Allen, N. H. (2021). Is it safer at the beach? Spatial and temporal analyses of beachgoer behaviors during the COVID-19 pandemic. *Ocean & Coastal management*, 205, 105533.

- Lisi, F. A., & Esposito, F. (2015, September). An AI application to integrated tourism planning. In *Congress of the Italian Association for Artificial Intelligence* (pp. 246-259). Springer, Cham.
- López-Dóriga, U., Jiménez, J. A., Valdemoro, H. I., & Nicholls, R. J. (2019). Impact of sea-level rise on the tourist-carrying capacity of Catalan beaches. *Ocean & Coastal Management*, 170, 40-50. <https://doi.org/10.1016/j.ocecoaman.2018.12.028>
- Lukoseviciute, G., & Panagopoulos, T. (2021). Management priorities from tourists' perspectives and beach quality assessment as tools to support sustainable coastal tourism. *Ocean & Coastal Management*, 208, Article 105646. <https://doi.org/10.1016/j.ocecoaman.2021.105646>
- Merino, F., Prats, M. A., & Yuste-Abad, V. (2021). Strategies for beach management during the COVID-19 pandemic. *Current Issues in Tourism*, 1-5. <https://doi.org/10.1080/13683500.2021.1995337>
- Mestanza, C., Botero, C. M., Anfuso, G., Chica-Ruiz, J. A., Pranzini, E., & Mooser, A. (2019). Beach litter in Ecuador and the Galapagos islands: A baseline to enhance environmental conservation and sustainable beach tourism. *Marine Pollution Bulletin*, 140, 573-578. <https://doi.org/10.1016/j.marpolbul.2019.02.003>
- Morales, G. G., Arreola-Lizárraga, J. A., & Grano, P. R. (2018). Integrated assessment of recreational quality and carrying capacity of an Urban Beach. *Coastal Management*, 46(4), 316-333. <https://doi.org/10.1080/08920753.2018.1474070>
- Murcia Government (2022). *Ordenación de accesos a las playas del Parque Regional de Calblanque*.
- Murillo, N., Pérez-Cayeyro, M. L., & Del Río, L. (2023). Ecosystem carrying and occupancy capacity on a beach in southwestern Spain. *Ocean & Coastal Management*, 231, Article 106400. <https://doi.org/10.1016/j.ocecoaman.2022.106400>
- Nolasco-Cirugeda, A., Martí, P., & Ponce, G. (2020). Keeping mass tourism destinations sustainable via urban design: The case of Benidorm. *Sustainable Development*, 28(5), 1289-1303. <https://doi.org/10.1002/sd.2084>
- Nurmatov, R., Fernandez, X. L., & Coto Millan, P. P. (2021). The change of the Spanish tourist model: From the Sun and Sand to the Security and Sand. *Tourism Economics*, 27(8), 1650-1668. <https://doi.org/10.1177/1354816620928653>
- Perles-Ribes, J. F., Moreno-Izquierdo, L., Torregrosa, T., & Such-Devesa, M. J. (2021). The relationship between satisfaction and tourism expenditure in 'sun and sand' destinations: a structural equation modelling approach. *Current Issues in Tourism*, 24(18), 2643-2657. <https://doi.org/10.1080/13683500.2020.1849046>
- Pinna, M. S., Cogoni, D., Bacchetta, G., & Fenu, G. (2022). Assessing the potential for restoring Mediterranean coastal dunes under pressure from tourism. *Journal of Coastal Conservation*, 26(3), 15. <https://doi.org/10.1007/s11852-022-00860-9>
- Pueyo-Ros, J., Garcia, X., Ribas, A., & Fraguell, R. M. (2018). Ecological restoration of a coastal wetland at a mass tourism destination. Will the recreational value increase or decrease?. *Ecological Economics*, 148, 1-14. <https://doi.org/10.1016/j.ecolecon.2018.02.002>
- Rodella, I., Corbau, C., Simeoni, U., & Utizi, K. (2017). Assessment of the relationship between geomorphological evolution, carrying capacity and users' perception: Case studies in Emilia-Romagna (Italy). *Tourism Management*, 59, 7-22. <https://doi.org/10.1016/j.tourman.2016.07.009>
- Sanabria-Díaz, J. M., Aguiar-Quintana, T., & Araujo-Cabrera, Y. (2021). Public strategies to rescue the hospitality industry following the impact of COVID-19: A case study of the European Union. *International Journal of Hospitality Management*, 97, Article 102988. <https://doi.org/10.1016/j.ijhm.2021.102988>
- SEGITTUR (2021). *Guía de soluciones en playas y zonas de baño de destinos turísticos de la Red DTI en el contexto del COVID-19*. Sociedad Mercantil Estatal para la Gestión de la Innovación y las Tecnologías Turísticas, SEGITTUR, Spain, Madrid.
- Sharma, G. D., Yadav, A., & Chopra, R. (2020). Artificial intelligence and effective governance: A review, critique and research agenda. *Sustainable Futures*, 2, Article 100004. <https://doi.org/10.1016/j.sfr.2019.100004>
- Soto, M. T. R., & Clavé, S. A. (2018). The role of second homes in a Mediterranean coastal mass tourism destination: An evolutionary perspective. In *The Routledge Handbook of Second Home Tourism and Mobilities* (pp. 27-38). Routledge.
- Soto, E. H., Botero, C. M., Milanés, C. B., Rodríguez-Santiago, A., Palacios-Moreno, M., Díaz-Ferguson, E., Velázquez, Y. R., Abbehusehn, A., Guerra-Castroijn, N., Simoesjkn, M., Muciño-Reyes, J., & Souza Filho, J. R. (2021). How does the beach ecosystem change without tourists during COVID-19 lockdown?. *Biological Conservation*, 255, Article 108972. <https://doi.org/10.1016/j.biocon.2021.108972>
- Sukhadia, A., Upadhyay, K., Gundeti, M., Shah, S., & Shah, M. (2020). Optimization of smart traffic governance system using artificial intelligence. *Augmented Human Research*, 5(1), 1-14. <https://doi.org/10.1007/s41133-020-00035-x>
- Valdemoro, H. I., & Jimenez, J. A. (2006). The influence of shoreline dynamics on the use and exploitation of Mediterranean tourist beaches. *Coastal Management*, 34(4), 405-423. <https://doi.org/10.1080/08920750600860324>
- Vargas-Sánchez, A., & Rodríguez-Toubes, D. (2021). 12 Revisiting tourism crisis management practice: Learning from COVID-19 in Spain. *Organizational Learning in Tourism and Hospitality Crisis Management*, 8, 189.
- Villacé-Molinero, T., Fernández-Muñoz, J. J., Orea-Giner, A., & Fuentes-Moraleda, L. (2021). Understanding the new post-COVID-19 risk scenario: Outlooks and challenges for a new era of tourism. *Tourism Management*, 86, Article 104324. <https://doi.org/10.1016/j.tourman.2021.104324>
- Wang, J., Huang, X., Gong, Z., & Cao, K. (2020). Dynamic assessment of tourism carrying capacity and its impacts on tourism economic growth in urban tourism destinations in China. *Journal of Destination Marketing & Management*, 15, Article 100383. <https://doi.org/10.1016/j.jdmm.2019.100383>

Zacarias, D. A., Williams, A. T., & Newton, A. (2011). Recreation carrying capacity estimations to support beach management at Praia de Faro, Portugal. *Applied Geography*, 31(3), 1075-1. <https://doi.org/10.1016/j.jdmm.2019.100383>

ORCID

Ginesa Martínez del Vas  <https://orcid.org/0000-0002-2713-0636>

Miguel Puig-Cabrera  <https://orcid.org/0000-0003-4524-9830>

Maricruz Cádiz-Gómez

Asier Amilibia de Diego

Notes on contributors

Ginesa Martínez del Vas holds a degree in Geography and History from the University of Murcia and a PhD in Tourism from the University of Alicante. She is Tourism Vicedean at Catholic University of Murcia (UCAM, Spain). Her research line focuses on tourism public governance and smart tourism.

Miguel Puig-Cabrera holds a degree in Tourism and a PhD in Geography from the University of Seville (Spain). He is currently integrated researcher in the Research Centre for Tourism, Sustainability and Well-being (CinTurs), Universidade do Algarve, Portugal. His line of research focuses on smart tourism, sustainability, and governance.

Maricruz Cádiz has been Director of Certification at the Spanish Institute for Tourism Quality (ICTE) since 2005. She has been part of working teams dedicated to tourism product development, quality improvement and destination management with a public-private partnership approach for the Spanish Institute for Tourism Quality (under the Ministry of Energy, Tourism and Digital Agenda of Spain). She is also lecturer at the Catholic University of Murcia (UCAM, Spain).

Asier Amilibia De Diego is PhD candidate at the Catholic University of Murcia (UCAM, Spain). His research line focuses on smart tourism and quality of life.

Ten Sustainable Planning Principles for Second Home Areas

Anne-Mette Hjalager  ¹

1. University of Southern Denmark, Odense, Denmark

ABSTRACT

Enhancing sustainable tourism destinations is a crucial endeavor. Sustainability improvement measures are needed not only in newly built environments but also in physical capacities that are already established and that have been in operation for an extended period. This contribution addresses second home areas in Denmark which are generally characterized by a persistent and notable planning deficit. The challenge lies in redirecting the trajectory of these areas through meticulous planning and instilling a recognition of their sustainability potential with policy makers, DMOs, second-home owners, and tourists. Drawing upon in-depth case studies in selected second home areas and general inquiries into planning practices, this contribution presents ten distinctive approaches to planning: 1): Optimizing land resource utilization. 2): Planning for second homes beyond the immediate coastal zone. 3): Enhancing accessibility. 4): Decreasing energy consumption. 5): Ensuring flooding protection. 6): Mitigating insufficient wastewater treatment. 7): Facilitating solid waste treatment. 8): Reducing the carbon footprint from the construction. 9): Enhancing biodiversity. 10): Involving the owners and tourists. The article contributes with substance to the tourism planning discussion and points to some of the challenges encountered in the pursuit of the objectives.

KEYWORDS

Planning Policy, Climate Change, Involvement, Tourism Built Capacity, Biodiversity.

ARTICLE HISTORY

Received 08 November 2023 Accepted 19 February 2024

1. Introduction

The purpose of this article is to identify and systematize the main environmental challenges and the associated planning principles for second home areas. Second homes play a crucial role in Denmark's tourism and recreation industry, predominantly serving as the primary form of accommodation in coastal and natural regions. Second homes provide the context for a range of recreational activities. They possess substantial amenity qualities and hold social significance for individuals. Danish citizens highly value second homes as a flexible resource, both as owners and through access granted by their networks of relatives and friends. Additionally, the second home sector accommodates for a considerable number of tourists, who rent them on the commercial rental platforms. The second home sector encompasses around 220,000 housing units and accounts for 37% of the total number of commercial touristic bed-nights in 2022.

The COVID-19 pandemic brought turmoil to second homes and their owners, and through that period the value of second homes as an adaptable recreational resource was truly demonstrated. Danes altered their holiday habits, and second homes obtained a new meaning (Slätmo, Vestergård, & Lidmo, 2020). While the use of second-home areas has intensified during the COVID-19 period, this trend builds upon a longer trajectory characterized by extended seasons, increased rental numbers, and more diverse patterns of occupancy. The heightened usage, which varies across the country, places greater pressure on sustainability. Challenges include the degradation of recreational water resources, traffic congestion, overdevelopment of land sites, and waste handling problems.

Given the comprehensive impact of climate and environmental agendas, such as those represented by the UN Sustainable Development Goals, it is imperative to integrate second homes into the green transition alongside other property types. However, Denmark's focus on sustainability in relation to second homes has emerged relatively late. With the dominant presence of second homes already established and being actively used, it becomes crucial to strive for the integration of sustainability into the existing spaces and building structures. In doing so, owners and users can contribute to reducing the negative environmental footprint of their second homes.

Both national and local tourism stakeholders seek to maintain second homes as a fundamental resource for tourism development in Denmark. There is also a strong agenda for growth, expressed clearly by policy makers at national and local levels. This growth may be obtained by extended use of the second homes during the colder seasons in the autumn, spring, and winter, or by increasing the number of second homes that are offered for rent on the renting platforms. While some municipalities also plan for minor capacity increases, they must adhere to the limitations imposed by the governmental planning agency. In recent years, various aspects of the space and place development, as it has taken place previously, have been questioned critically, including the growth agenda. Controversies about the future directions for second homes have emerged, placing locals, tourists, and policy makers in complex and paradoxical discussions surrounding the most sustainable futures for second home areas.

This article addresses the situation in Denmark, utilizing research and data from the national context. Nonetheless, it is evident that similar discussions about planning and sustainability occur in other countries with significant second home sectors (Ericsson, Øian, Selvaag, Lurfald, & Breiby, 2022; Adie & Hall, 2023). Thus, there are overlapping concerns, issues, and potential measures among Denmark and these countries. The evidence from Denmark's national scene, in terms of planning for sustainable futures, contributes to the ongoing applied theory building in the field.

2. Literature Review

Second homes play a significant role as holiday resources in many countries. Extensive research has examined aspects about the prevalence of second homes, including attraction values, demographic patterns, gentrification, local impacts, and seasonality (Paris, 2009; Hall, 2015; Hall & Müller, 2018; Müller, 2021; Alonsoperez, Brida & Rojas, 2022). While second homes can be found in urban areas, they are, in Denmark and the Nordic countries, predominantly located in rural and coastal environments. These second homes are highly valued for their pleasant and serene surroundings, as well as the opportunity

to embrace simple lifestyles (Bærenholdt, Haldrup, & Urry, 2017; Gallent & Tewdwr-Jones, 2020; Björk, Prebensen, Räikkönen, & Sundbo, 2021).

Second homes occupy significant land space, as they constitute an ingredient in building sprawl in rural areas. Swedish second homes are often converted derelict farm sites (Back, 2022), and the contribution to otherwise economically challenged regions by tourism is regarded as essential and an argument for the enhancements and improvement of the capacity. In Denmark, the majority of the 220,000 second homes are located in specific second home areas with dedicated planning regulations, and for that reason the second homes are concentrated and less dispersed. Still, however, the total and accumulated land use is of noteworthy size as a result of, on average, large land sites for each second home (Hjalager, Staunstrup, Sørensen, & Steffansen, 2022b).

The second home sector is affected by various societal trends. The Covid-19 pandemic, as previously mentioned, has notably impacted the perception and utilization of second homes as a holiday place and in terms of property ownership (Gallent, Stirling & Hamiduddin, 2023). The popularity of second homes relies on the availability of infrastructure and the owners' access to the lucrative renting market. Advancements in platforms and arrangements such as home-swaps have facilitated the commercialization of these accommodations, contributing to the observed growth trends and generating income for the second-home owners (Gyimóthy, Pérez, Meged, & Wilson, 2020; Wijburg, Aalbers, Conte, & Stoffelen, 2023).

The environmental impacts of second homes have for some time been a subject of extensive examination and discussion in tourism academia. The international research literature primarily focuses on aspects such as mobility, carbon footprint, water consumption, climate effects, and biodiversity. Of these aspects, mobility implications receive the most attention (Hiltunen, 2007; Hiltunen, Pitkänen, & Halseth, 2016; Steffansen, Xue, Stefansdottir, & Næss, 2022; Ismail, Hoogendoorn, & Müller, 2023). The combination of long distances and short and frequent stays in second homes contributes to negative CO₂ effects. Moreover, inadequate public transport connective urban hubs with rural second home districts intensify the disproportionate impact. Other implications related to second homes use, such as water consumption and wastewater disposal, have also gained attention (Gill, Williams, & Thompson, 2010; Staunstrup, Hjalager, Steffansen, & Sørensen, 2023). Scholars argue that insufficient planning of relevant infrastructure and inadequate capacity to handle polluted wastewater and solid waste exacerbate these issues.

The use of energy for the second homes and the carbon footprint resulting from construction processes and the recurring visits have become prominent research topics. This is driven by owners' inclination to modernize, renovate, and in other ways add quality and comfort to their second homes. However, these activities often contradict the imperative to reduce CO₂ emissions, although insulation can have a positive effect (Stefansdottir, Xue, Steffansen, Næss, & Richardson, 2023; Hjalager & Pihi, 2024). Planning efforts and owner guidance focus on energy-saving strategies through more efficient building technology and user behaviors.

Similar to other tourism facilities, second homes have an impact on the environment and climate. Conversely, climate change may have severe adverse effects on the second home areas. Factors such as flooding, storms, and rising sea levels are increasingly addressed in the academic literature and play a significant role in land use planning (Czarnecki, Dacko, & Dacko, 2024). Coastal second homes, lacking adequate protection, require planning and adaptive measures to mitigate the risks. However, such protective measures often necessitate substantial investments, potentially exceeding the accumulated economic value of the second homes (Hjalager, Sørensen, Steffansen, & Staunstrup, 2023).

The concept of sustainability encompasses other relevant aspects in the context of second homes. Biodiversity is one of them. Managing invasive species and preserving native flora and fauna have become planning priorities in tourism agendas. As noticed by Novoa, Canavan, & Canava, (2022) the awareness among owners regarding these issues is not always well-developed, and effective management remains complex (Barros, Shackleton, Rew, Pizarro, & Pauchard, 2022).

This article particularly focusses on land use planning and infrastructure planning as it pertains to second homes. Planning is an extensively studied discipline in tourism in general, encompassing the need for controlled land and building utilization, functional design, and the implementation of sustainability measures (Inskeep, 1991; Hall, 2008). Compared to other touristic places, second home areas often face planning needs and deficits (Hall, 2015; Slätmo et al., 2020). To conclude, the environmental implications

of second homes remain underexplored. Müller (2021) emphasizes the instrumental role of planning in achieving sustainability.

The emergence of planning issues pertaining to second homes in academic research has been a gradual process over the years, albeit at a relatively low level. The pressing climate crisis has prompted new studies and approaches in this field. Consequently, planning, as a method and discipline, is poised to assume a more prominent role after a long period characterized by distinct neoliberal regimes within this domain (Tjørve, Tjørve, & Owusu, 2022). This particular study focuses on identifying and delineating the challenges associated with planning for second homes. Additionally, it proffers potential solutions to address these challenges and difficulties. Notably, it examines novel approaches that have surfaced in Danish second home areas, while acknowledging the need for consolidation and supplementation of knowledge on planning for second-home tourism, both within Denmark and beyond its borders.

Table 1. Key Characteristics of the Danish Second-Home Sector

Total number of second homes, 2023	222,066
Proportion of second home covered by a local plan, 2021	47.4 %
Average size of all second homes, 2020	79.9 m ²
Average size of second homes built between 2011 and 2020	109.1 m ²
Proportion of second homes on the registered renting market, 2022	17.4 %
Proportion of second homes without connection to public sewage systems, 2021	54.1 %
Total CO ₂ emission from second homes' electricity consumption, 2022	96,938 tons

Sources: Statistikbanken.dk and Hjalager et al., 2022b.

3. Research Approach and Methods

The research approach employed in this study draws on empirical evidence and concepts obtained from two major research projects focusing on second homes and UN Sustainable Development Goals (Hjalager, Steffansen, Sørensen, & Staunstrup, 2022a). A mixed methods approach was utilized, combining quantitative data acquisition from comprehensive data banks with qualitative elements such as interviews, field visits, and desk research. The qualitative components served to test and develop the quantitative findings. This contribution has the nature of syntheses, where the data are amalgamated into the ten planning principles.

The project entailed comprehensive quantitative studies of the spatial, physical, and planning characteristics of the total of 220,000 second homes. The study relied on data obtained from public building data registers specifically Statistics Denmark and The Building and Housing Register. Second homes have a well-defined categorization within the building register, enabling the acquisition of precise data spanning several years. The study produced high-quality data pertaining to the environmental situation of the second home sector. This included information on land use, such as building coverage and house size, which is crucial for assessing densification opportunities. The age of buildings was also considered to understand the energy consumption, as older second homes may lack insulation for winter use. Detailed records were maintained regarding wastewater and sewage handling systems, allowing for the identification of potential deficiencies in this area. Each second home is classified according to whether it is connected to sewage handling plants or relies on individual septic tanks, which are generally less sustainable. The planning status and the intensity of planning in existing second home areas were documented with accurate details, offering valuable insights into the incentives available for selecting sustainable building solutions. Furthermore, by using utility registers, the study examined electricity consumption in all 220,000 second homes in Denmark, providing seasonal details, which aided in identifying critical issues of the CO₂ emissions from the second home sector. The quantitative data represented complete coverage and very high accuracy, thus eliminating any sampling concerns. These data serve as crucial indicators of the environmental challenges and issues facing the second home sector. Geo-coding of each second

home allowed for multiple spatial analysis. All of the aforementioned quantitative data formed the foundation of the study and further details are reported in other publications (Hjalager et al., 2022a).

The interpretation and the handling of sustainability problems exhibits variations across the Danish geography. These variations result from topographical issues, with some second homes located in or near vulnerable nature areas, such as dunes or wetlands. Furthermore, variations in the demand structure exist, with some areas experiencing year-round usage, while other areas are primarily used for summer recreation. Such differences might determine the level and nature of environmental stress attributable to second homes. Additionally, the composition and planning of second homes areas are subject to policy choices by municipalities, leading to differences in the attention given to sustainability concerns. To gain deeper understanding of the prospects for transitioning towards more sustainable futures for second homes, qualitative inquiries were conducted in collaboration with eight (out of a total of 98) municipalities. These inquiries involved extensive desk reviews of planning documents with a focus on identifying elements in the planning situation that could impede or enhance development. Joint field studies were conducted, involving researchers and municipal officers, to discuss the potential of planning measures and identify potential barriers within specific contexts. These field visits were meticulously prepared and proved highly productive, with photographs and notes serving as valuable material for subsequent report writing and analysis. Additionally, consultative planning progression sessions and meetings with policy-makers were conducted to consolidate interpretations and to assess the level of awareness and preparedness for action in relation to climate and environmental agendas. While the eight municipalities played a key role in the qualitative studies, planning officials from other municipalities contributed, thereby enriching the process with additional insights and perspectives.

In summary, the combined quantitative and qualitative approach employed in this research has yielded substantial and novel evidence within the Danish context. Due to the focus of this article on planning principles, it is not feasible to bring in the myriad of underlying data and evidence. This article brings a conceptual summation based on enquiries spanning over three years. The process involved approximately 40 planning professionals, who engaged in formal interviews, workshops, and provided responses and comments on written report drafts. As a result, the following ten principles were developed and consolidated through collaboration with municipalities and were supported by both data and qualitative evidence. Although the sustainability profiles of municipalities and their second homes vary to some extent due to geographical differences, these principles were found to be highly generalizable across Denmark. They represent the significant issues that municipalities as planning authorities agree upon as being important and challenging, although prioritization and the speed of action and implementation may differ.

The study has been contextualized within a broader framework of existing literature, particularly in the field of international and Nordic second home research which has, in recent years, increasingly included issues about sustainability (Müller & Hall, 2018; Næss et al., 2019; Ericsson et al., 2022).

4. Planning in Denmark – An Overview

Denmark possesses a multi-level and hierarchical land use planning system, characterized by the involvement of various planning entities, namely the national planning agency and the 98 municipalities (Galland & Enemark, 2015). The principal responsibility of the national planning agency is to establish comprehensive directions and guidelines for the spatial development. On the other hand, municipalities play a crucial role in land-use planning. They engage in extensive strategic planning for their respected territories. In doing so, they prepare detailed municipal plans that determine the utilization and development of areas, including second home areas. These plans also designate specific locations for urban and recreational development as well as building activities, unless being overridden by national planning directives. Local plans are the lowest levels of planning, and they are devised to provide detailed guidance on land use.

Central to the planning process are key considerations about the potential achievement of good urban and infrastructural functionality that align with the objectives of economic growth, societal wellbeing and welfare, and the preservation of the natural and built environment, including heritage values. Given Denmark's relatively small size and high population density, the appropriate allocation and utilization of limited land resources is a fundamental concern. To address this, second homes are, as a principle in the

Planning Act, located within dedicated zones. Since the 1960s, there has been a steadfast commitment to minimize the sprawl of single second-homes into nature and landscapes. Increasingly, the integration of sustainability as both a concept and a guiding principle in national and municipal planning has gained traction, primarily through coordination with sectoral plans. These plan include the Water Resources Plans, the Transport Plan, the Climate Plan, and the Natura 2000 plan.

The Planning Act empowers municipalities with an array of planning tools to facilitate detailed planning within well-defined territories. Any new development endeavor invariably necessitates the formulation of a local plan, but these plans can also be employed for the management of existing areas. It is worth noticing, however, that not all territories are covered by local plans. In such instances, building practices are regulated by general directives outlined in the municipal plans. Astonishingly, only approximately half of the existing Danish second homes are situated in areas that are covered by a local plan. Some of these local plans must even be considered as outdated. There is a call for improved planning from by many second-home owners. As illustrated below in the sustainability principles, planning plays an indispensable role in the implementation of sustainable measures in second home areas.

To ensure transparency throughout the planning process, the Planning Act stipulates procedures for involving landowners and neighbors in the planning. This instrument serves as a means to foster openness and inclusivity in decision-making and land administration.

5. Sustainability Principle 1: Optimizing Land Resource Utilization

EU has introduced the “No net land-take” initiative to discourage unnecessary development of agricultural land and nature areas for human use, including tourism (Science for Environment Policy, 2016). In Danish second home areas the average building percentage is just under 5%, and existing planning regulations allow for a considerably greater housing capacity in existing second home areas (Hjalager et al., 2022b). Consequently, measures have been implemented to encourage owners to expand their houses and, in some cases, divide their land sites to create additional construction opportunities. Municipalities often support higher utilization by, in local plans, permitting taller buildings, closer proximity to neighboring properties and roads, thereby maximizing land use in available land sites.

These measures may align with the owners’ desire for more space. Since 2017, when planning regulations were liberalized, there has been a surge in the demolition of existing houses and the construction of very large second homes (300-400 m²). These larger second homes have gained popularity in the renting market due to their ability to accommodate for family events, enterprise team building activities, parties, and other social gatherings.

Despite the perceived benefit of conserving land resources and utilizing existing capacity, this densification may conflict with the perceived amenity values, particularly in the case of these large houses, often referred to as “party houses” or “mini-hotels”. This development has triggered significant resistance and protests against speculative elements, changes of the use, increased noise, traffic inconveniences, excessive waste generation, and mounting pressure on nature resources. To address these concerns, several municipalities have chosen to enforce the planning regulations through renewed local plans that determine the most optimal utilization of sites while balancing them against the existing spatial characteristics of a second home area. Recent planning approaches aim to separate the problematic large houses from the traditional capacity of smaller and family-owned second homes.

Furthermore, second-home areas may include pockets of land with limited or abandoned use, for example derelict school summer camps, commons, empty retail space, etc. Investors are screening for such underutilized capacity in existing second home zones. Careful planning can facilitate the transformation of this capacity into additional second homes, as well as the ensuring necessary infrastructures, such as waste management facilities and parking, as described in the following planning principles.

6. Sustainability Principle 2: Planning for Second Homes Beyond the Immediate Coastal Zone

According to Danish planning legislation, the coastal zone (3 kilometers wide) is regarded as an area that necessitates special attention with regards to new development. The objective is to safeguard the outstanding natural values against uncontrolled construction activities and tourism influx that exceeds the carrying capacity. The principle is also implemented to preserve amenity values and guarantee access to the coastal areas for all Danes and tourists. The Danish principle where nature is not privatized is highly valued by foreign tourists visiting from Germany in particular.

There is a (slowly) growing demand for new second homes, and municipalities and destination management organizations (DMOs) are keen to expand the capacity, referring to the changing demand dynamics, especially in the aftermath of the Covid-19 pandemic. A planning principle that could be adopted involves a collaborative effort between national and municipal to facilitate new or expanded development opportunities in inland locations, rather than in vulnerable coastal zones. Successful examples have emerged in the vicinity of tourist attractions, such as golf courses, outdoor facilities, and amusement parks, where the economic viability of rental properties is most evident.

However, it is also advisable, and some municipalities have made it part of their broader strategic aim, to integrate second homes in attractively located villages that are otherwise at risk of decline and depopulation. This represents an opportunity that has yet to be fully utilized in Denmark, as planning regulations do not currently provide straightforward support for such endeavors. The main concern is striking a balance between ensuring economic development and resilience for rural areas while avoiding uncontrolled building sprawl.

7. Sustainability Principle 3: Enhancing the Accessibility of the Second Home Areas through Sustainable Modes of Transportation

Second-home areas are predominantly planned for car transportation. The mobility to and from second homes results in the release of CO₂ emissions, although often perceived as less concerning compared to for example air transportation to tourist destinations that are typically situated at longer distances. In Denmark, second homes areas are seldom integrated well with public transport routes such as busses and trains. However, for newly developed sites, there may be greater inclination towards considering such factors.

The means of accessing beaches often entails utilizing narrow roads that lack adequate parking for cars and bicycles. This poses a significant inconvenience for day visitors and nuisances to the owners and users of second homes. Addressing the issue of parking, particularly in conjunction with public transport, is a challenging task for planning. While access to nature and beaches is a priority in Denmark's spatial planning, it becomes increasingly compromised with the rising levels of car ownership and usage.

Upon arrival in the second homes, individuals typically resort to using their cars for activities such as sightseeing, shopping, and exploring the surrounding areas. However, future planning endeavors may encourage municipalities to ensure more convenient access through the development of bicycle and pedestrian paths. Implementing new trails and tracks proves to be a complex endeavor, as it may involve land acquisition or the establishment of rights-of-way permission. Nonetheless, some municipalities have successfully worked with farmers and other landowners to expand access and establish safe passage-ways. This not only ensures the well-being of pedestrians and bicyclists but also enhances the appeal of routes known for their natural beauty.

8. Sustainability Principle 4: Decreasing Energy Consumption and Reducing the Carbon Footprint

Second homes, primarily those constructed between 1970 and 2000, are mainly intended for summer use and lack proper insulation. The deficiency in insulation leads to excessive electricity consumption, particularly for room heating, during prolonged seasons in the spring, autumn and winter. Despite the

implementation of more stringent requirements set by the EU for new houses, there exists a significant energy efficiency gap. Although some second homeowners take measures such as replacing windows and insulating of walls and roofs, there are no provisions within planning regulations to prescribe and enforce better energy standards, as such matters are in the building regulations. However, planning regulations can indirectly incentivize and facilitate the adoption of earth heating systems by owners. Additionally, planning can accommodate the incorporation of solar heating technologies.

The prevailing trend of constructing towards larger and more luxurious houses contradicts some objectives in CO₂ reductions. Second homes with abundant electrical appliances, pools, spas, saunas, and similar amenities exhibit annual electricity consumption that can exceed ten times that of an average second home. When planning new areas, municipalities have the opportunity to disallow the establishment of outdoor pools, hot tubs, and spas to demonstrate a clear commitment to sustainability.

9. Sustainability Principle 5: Ensuring Flooding Protection

Documentation from the studies behind this article demonstrates that a considerable proportion (25%) of Danish second homes are exposed to various flood risks, including storms, flooded waterways, ground water rise, and coastal erosion. Proximity to coastal zones elevates the vulnerability of these properties, as demonstrated by recent floods in 2023 which emphasized the impact of extreme weather events on second homes.

The planning principle encompasses guidelines on dike development and maintenance. The expenses associated with such investments are shared with coastal authorities, but key and multipurpose urban environments and infrastructures are prioritized over second homes when it comes to public funding. Soft protection measures, for example sand nourishment at beaches and the establishment of rainwater lakes, necessitate close cooperation with the second-home owners who bear the accompanying costs. The location of rainwater lakes and water channels is a planning issue.

At a basic level, planning regulations can ensure that newly constructed or renovated second homes are situated at higher elevation levels on the land site, thereby offering some degree of flood protection.

10. Sustainability Principle 6: Mitigating Insufficient Wastewater Treatment to Prevent Pollution

Approximately half of the second homes in the designated areas are not connected to public wastewater treatment facilities. Instead, they rely on individual septic tanks. Although there have been advancements in technology in recent years, these septic tanks are generally found to be inadequate, especially in areas with high groundwater levels. The increased usage of the second homes throughout the year, coupled with higher water consumption, poses a significant threat to the quality of the seawater in the surrounding seas and fjords. The deterioration of seawater quality in Denmark has been alarmingly rapid, leading to criticism from the fishing and angling communities, as well as from visitors who frequent the second homes for water sports and underwater sea experiences.

To address this issue, planning can include the specification of strategies to connect the designated second home areas to water treatment plants through proper piping systems. The planning process should also include regulation to effectively separate and dispose of surface water and, if possible, the grey wastewater within the land sites and the surrounding area. In particularly vulnerable zones, there may be restrictions on pools and other water-intensive installations through planning regulations. However, behavioral measures related to water pricing are the responsibility of the facilities management and fall outside the purview of planning.

11. Sustainability Principle 7: Facilitating Efficient and Convenient Solid Waste Treatment

While the separation of solid waste for reuse, regeneration, and other waste management methods is already integrated into the environmental programs of cities, second-home areas have lagged behind in

their efforts to sort and recycle solid waste. The delays can be attributed with the seasonal usage, which makes achieving economies of scale in waste handling a challenge. Nonetheless, EU-regulations mandate that municipalities improve waste management conditions, necessitating the provision of adequate space and concepts for waste sorting, regardless of the difficulties involved.

Planning measures include designating appropriate space for waste bins each the single land site and providing guidance on concealing the bins in a manner that does not compromise the aesthetic qualities of a second-home area. Alternatively, municipalities can explore the establishment of centralized solid waste stations, which can be more sustainable in terms of transportation, separation quality, and landscape aesthetics. Holidaymakers sometimes possess a relaxed attitude towards waste disposal, making it crucial to change their mindset and behavior, ensuring that they understand the importance of disposing their solid waste at centralized waste disposal stations at a feasible (walking) distance from their house.

12. Sustainability Principle 8: Reducing the Carbon Footprint in Second-Home Construction and Disposal of Materials

Commencing in 2023, the gradual implementation of climate footprint requirements within building regulations was set to take effect. This mandates that all future constructions must undergo a life cycle assessment (LCA), though smaller buildings such as second homes will be subject to this requirement at a later stage compared to larger structures. Additionally, the second-home sector should anticipate forthcoming carbon labeling obligations. While it may be referenced with in planning documents, carbon reduction requirements primarily fall under the jurisdiction of building regulations rather than planning statutes.

Notwithstanding, several indirect planning measures incentivize second-home owners to select superior construction materials, thereby conforming to carbon reduction criteria. Local plans have the authority to designate suitable materials, such as wooden facades, which possess lower carbon footprint compared to alternatives like concrete. Certified materials may be recommended and referenced in planning documents, particularly if municipalities and owners hold a strategic vision for area development based on climate protection principles. However, current Danish planning legislation does not integrate construction materials with explicit sustainability references, instead, offering only loose and guiding measures.

Existing building already contain a substantial amount of CO₂, known a "sunk CO₂". Consequently, safeguarding building heritage aligns with sustainability principles. Rather than constructing new structures that contribute significantly to CO₂ emissions, it is advisable to utilize existing ones. Planning documents can delineate principles and identify specific buildings meriting preservation for their heritage values. Moreover, the renovation of existing buildings instead of demolishing and erecting new ones aligns well with the objective of reducing carbon footprint.

Beyond the immediate measures provided by planning regulations, municipalities and groups of owners can establish initiatives promoting the exchange and reuse of construction materials, fostering their continued usage and extending their lifespan.

13. Sustainability Principle 9: Enhancing Biodiversity

Second-home land possesses the potential to play a more significant role in addressing the biodiversity crises. Municipal investigations have revealed that many second-home areas suffer from a lack of biodiversity. The principle of enhancing biodiversity involves better integrating of the second-home land resources into the surrounding landscapes, and vice versa. Restricting the establishment of solid fencing enables smoother passage for wildlife and fosters the growth of a more diverse flora that harmonizes with the specific region's natural environments. These measures can be included in planning documents, specifying desired plant species and relevant planting principles. The regulation should also highlight the importance of green fencing methods, not only for the fauna but also for maintaining the visual (green) appeal of the second-home areas. Recommended fencing types can be stipulated within planning regulations.

Invasive species, such as rose hips and mountain beacons, are commonly found in Danish second-home areas. Planning regulations can prohibit the planting of invasive species and provide general warnings

against their proliferation. However, if invasive species have already spread, it becomes the responsibility of the owners to suppress the invasion.

14. Sustainability Principle 10: Involving the Owners and Tourists

In order to achieve sustainability in the environment and climate, it is crucial to have commitment, social support, and unity. The journey towards sustainability may be lengthy and arduous without these essential elements. It is imperative to take action, and the responsibility of promoting and expediting development does not solely rest with the municipality and its planning authorities. Second-home owners who are private individuals and families, play a pivotal role in preserving the qualities of their space. As primary owners, they often serve as the primary and sometimes the sole investors in sustainability. It must be mentioned that commercial entities are prohibited from owning second homes in Denmark.

The Danish planning law encompassed a range of participatory measures. All municipal environmental strategies must be made public and undergo a hearing phase. Local plans hold significant tools for the promotion of sustainability in second-home areas and are subjects of public debate. In the event of changes in local plans, property owners and neighbors are specifically invited to contribute towards their development and subsequent political approval.

By instituting participatory and co-innovative principles, it is possible to transcend the confines of planning, provided there is commitment and a collaborative mindset among the second-home owners. Mobilizing owners within and beyond property owner associations can be advantageous, particularly when second-home areas face sustainability challenges like potential flooding. These associations play a critical role in combating invasive species, where the problem-solving requires collaboration and manpower. In the local plans, the municipality can delegate responsibility for tasks such as infrastructure maintenance, greenery and biodiversity, and fencing control to the owners' association.

A significant portion of foreign tourism bednights in Denmark is attributed to the renting of second homes. However, tourists are generally detached from the active participation in promoting sustainability in the second-home areas. It may be necessary to explore new formats of involvement in order to engage not only owners but also visitors.

15. Discussion and Conclusion

This article presents a systematic approach to the planning of sustainability in second home areas through ten principles. The contribution of this study lies in its comprehensive understanding of the sustainability challenges faced by second homes and their owners, particularly in the light of the growing impact of climate change. These principles serve as a foundation for a practice-oriented theory building.

It has been identified that Danish second-home areas, which play a vital role in accommodating tourists in rural and coastal regions, face a significant planning gap. Planning is seen as a means to support and enhance sustainability, and municipalities involved are making increasing efforts to address this gap. The emergence of critical environmental and climate challenges necessitates a range of measures and new approaches. Consequently, planning policies and tools are continually evolving and developing.

The ten principles emphasize the key role of municipalities as the principal planning authorities in these specific locations. Many municipalities, include those actively involved in this research, are prepared to take proactive measures. However, their progress is hindered by the high demand for new local plans, surpassing their capacity to produce them to the required professional standard. Groups of citizens and second-home owners are advocating for accelerated planning processes to address sustainability challenges and prevent potential land use conflicts. The second-home areas are contested territories and are expected to face heightened opposition and value-based discussions. Some areas are organizing groups to undertake semi-professionally tasks in relation to planning, if they tend to find the municipalities slow or inattentive. This may be indicators of a future with stronger oppositions and higher value laden discussions, even "dramas" in contested zones (Hjalager, 2020; Fienitz & Siebert, 2022).

The spatial aspects of tourist development always spark debates about planning. Should there be more planning to facilitate coordinated action and achieve consistent objectives? Or should the govern-

ment relinquish control, allowing second-home owners to individually or collaboratively solve their own problems? The Danish picture is ambiguous. Planning measures can provide direction, but in most cases the second-home owners are not obliged to take action until they initiate a specific construction or rebuilding project. Consequently, rapid progress towards improved environmental performance of second homes may be delayed longer than desired by policy makers and (some) second-home owners. This illustrates the need for relevant incentives, including coordination with instruments from other policy fields, such as more accurate and logical taxation related to energy consumption.

Future research, employing research-based approaches, can examine the progress of planning in second-home areas. It can also explore dynamic interaction, relationship, and identities among actors (Back, 2022). The extensive quantitative and qualitative research underpinning this article reveals that planning is not merely a technical discipline but a complex undertaking in the juxtaposition between space, identity, emotion, and habits. The challenges lie in effectively and swiftly changing these elements to ensure tangible and timely sustainable achievements. The involvement of second-home owners and the processes related to co-creative adaptations should be anticipated in second home areas, although it remains uncertain when, why, and how actors will participate. Future academic inquiries can benefit from action research approaches. Additionally, if second home are developed as new greenfield projects, there may be motivation to construct these areas with higher sustainability ambitions, such as being “carbon neutral”, “biodiverse”, which would warrant further research.

Danish second homes share many similarities with second homes in other regions, particularly in the Nordic area. They also face sustainability challenges related to water and energy consumption, and landscape adaptation (Hiltunen et al., 2016; Alonsoperez et al., 2022; Ericsson et al., 2022). The planning principles outlined in this article could potentially be applied, in whole or in part, to other national and regional contexts. However, it is important to acknowledge that each country faces unique issues. For instance, if second homes are scattered across large rural areas as sprawl, the sustainability measures and planning will need to be tailored differently compared to Denmark, where most second homes are concentrated in dedicated second-home zones. Some countries, particularly those in the Mediterranean area, have a prevalence of second homes embedded within dense urban zones, which would require planning to address overtourism, pressure on infrastructures, and livability for the local residents.

The contribution of the article serves as a starting point for advancing knowledge about planning for second homes. It is hope that future studies will complement this endeavor with cases from other environments and countries.

REFERENCES

- Adie, B. A., & Hall, C. M. (Eds.). (2023). *Second Homes and Climate Change*. Taylor & Francis.
- Alonsopérez, M. J., Brida, J. G., & Rojas, M. L. (2022). Second homes: A bibliometric analysis and systematic literature review. *Journal of Tourism, Heritage & Services Marketing*, 8(1), 16-26.
- Back, A. (2022). Endemic and diverse: Planning perspectives on second-home tourism's heterogeneous impact on Swedish housing markets. *Housing, Theory and Society*, 39(3), 317-340. <https://doi.org/10.1080/14036096.2021.1944906>
- Barros, A., Shackleton, R., Rew, L. J., Pizarro, C., & Pauchard, A. (Eds.). (2022). *Tourism, Recreation and Biological Invasions*. CABI.
- Björk, P., Prebensen, N., Räikkönen, J., & Sundbo, J. (2021). 20 years of Nordic tourism experience research: a review and future research agenda. *Scandinavian Journal of Hospitality and Tourism*, 21(1), 26-36. <https://doi.org/10.1080/15022250.2020.1857302>
- Bærenholdt, J. O., Haldrup, M., & Urry, J. (2017). *Performing Tourist Places*. Taylor & Francis.
- Czarnecki, A., Dacko, A., & Dacko, M. (2024). Extreme weather event risk awareness among second home owners and their economic and non-economic response strategies: Evidence from the Beskids Mountains in Poland. In Adie & Hall (Eds.). *Second Homes and Climate Change* (pp. 101-122). Routledge.
- Ericsson, B., Øian, H., Selvaag, S. K., Lerfald, M., & Breiby, M. A. (2022). Planning of second-home tourism and sustainability in various locations: Same but different? *Norsk Geografisk Tidsskrift-Norwegian Journal of Geography*, 76(4), 209-227. <https://doi.org/10.1080/00291951.2022.2092904>
- Fienitz, M., & Siebert, R. (2022). “It Is a Total Drama”: Land use conflicts in local and use actors’ experience. *Land*, 11(5), 602. <https://doi.org/10.3390/land11050602>

- Galland, D., & Enemark, S. (2015). The Danish national spatial planning framework: Fluctuating capacities of planning policies and institutions. In Knaap, G., Nedovic-Budic, Z., & Carbonell, A. (Eds). *Planning for States and Nation-States in the US and Europe* (pp. 339-375). Lincoln Institute of Land Policy.
- Gallent, N., & Tewdwr-Jones, M. (2020). *Rural Second Homes in Europe: Examining housing supply and planning control*. Routledge.
- Gallent, N., Stirling, P., & Hamiduddin, I. (2023). Pandemic mobility, second homes and housing market change in a rural amenity area during COVID-19—The Brecon Beacons National Park, Wales. *Progress in Planning*, 172, Article 100731. <https://doi.org/10.1016/j.progress.2022.100731>
- Gill, A., Williams, P., & Thompson, S. (2010). Perceived water conservation attitudes and behaviours in second-home island settings. *Tourism and Hospitality Research*, 10(2), 141-151. <https://doi.org/10.1057/thr.2009.35>
- Gyimóthy, S., Pérez, S. M., Meged, J. W., & Wilson, J. (2020). Contested spaces in the sharing economy. *Scandinavian Journal of Hospitality and Tourism*, 20(3), 205-211. <https://doi.org/10.1080/15022250.2020.1789502>
- Hall, C. M. (2008). *Tourism Planning: Policies, Processes and Relationships*. Pearson Education.
- Hall, C. M. (2015). Second homes planning, policy and governance. *Journal of Policy Research in Tourism, Leisure and Events*, 7(1), 1-14. <https://doi.org/10.1080/19407963.2014.964251>
- Hall, C. M., & Müller, D. K. (Eds.). (2018). *The Routledge Handbook of Second Home Tourism and Mobilities*. Routledge.
- Hiltunen, M. J. (2007). Environmental impacts of rural second home tourism – case Lake District in Finland. *Scandinavian Journal of Hospitality and Tourism*, 7(3), 243-265. <https://doi.org/10.1080/15022250701312335>
- Hiltunen, M. J., Pitkänen, K., & Halseth, G. (2016). Environmental perceptions of second home tourism impacts in Finland. *Local Environment*, 21(10), Article 1198-1214. <https://doi.org/10.1080/13549839.2015.1079701>
- Hjalager, A. M. (2020). Land-use conflicts in coastal tourism and the quest for governance innovations. *Land Use Policy*, 94, Article 104566. <https://doi.org/10.1016/j.landusepol.2020.104566>
- Hjalager, A. M., Steffansen, R. N., Sørensen, M. T., & Staunstrup, J. K. (2022a). *Sommerhuse og verdensmål-beskyttelse, benyttelse og planlægning*. SDU, AAU, Realdania.
- Hjalager, A. M., Staunstrup, J. K., Sørensen, M. T., & Steffansen, R. N. (2022b). The densification of second home areas—sustainable practice or speculative land use?. *Land Use Policy*, 118, Article 106143. <https://doi.org/10.1016/j.landusepol.2022.106143>
- Hjalager, A. M., Sørensen, M.T., Steffansen, R. N., & Staunstrup, J. K. (2023). Sales prices, social rigidity and the second home property market. *Journal of Housing and the Built Environment*, 1-20. <https://doi.org/10.1007/s10901-023-10047-9>
- Hjalager, A. M. & Piihl, J. (2024). Are second homes CO₂ saints or sinners? Electricity consumption from a seasonal and geographical perspective. (Under publication in *Scandinavian Journal of Hospitality and Tourism*).
- Inskeep, E. (1991). *Tourism Planning: An Integrated and Sustainable Development Approach*. John Wiley & Sons.
- Ismail, S., Hoogendoorn, G., & Müller, D. K. (2023). Review of the research on second homes and the environment. *Transactions of the Royal Society of South Africa*, 1-10. <https://doi.org/10.1080/0035919X.2023.2214104>
- Müller, D., & Hall, C. M. (2018). The future of second homes. In Hall, C. M. & Müller, D. (Eds). *The Routledge Handbook of Second Home Tourism and Mobilities* (pp. 355-360). Routledge.
- Müller, D. K. (2021). 20 years of Nordic second-home tourism research: a review and future research agenda. *Scandinavian Journal of Hospitality and Tourism*, 21(1), 91-101. <https://doi.org/10.1080/15022250.2020.1823244>
- Paris, C. (2009). Re-positioning second homes within housing studies: household investment, gentrification, multiple residence, mobility and hyper-consumption. *Housing, Theory and Society*, 26(4), 292-310. <https://doi.org/10.1080/14036090802300392>
- Novoa, A., Canavan, K., & Canavan, S. (2022). The Role of Second Homes in Non-native Plant Invasions. In Pizarro, C., Barros, A., Rew, L. J., Shackleton, R., & Pauchard, A. (Eds). *Tourism, Recreation and Biological Invasions* (pp. 79-87). CABI.
- Næss, P., Xue, J., Stefansdottir, H., Steffansen, R., & Richardson, T. (2019). Second home mobility, climate impacts and travel modes: Can sustainability obstacles be overcome? *Journal of Transport Geography*, 79, Article 102468. <https://doi.org/10.1016/j.jtrangeo.2019.102468>
- Science for Environment Policy (2016). *No net land take by 2050? Future Brief 14*. Produced for the European Commission DG Environment by the Science Communication Unit, UWE, Bristol.
- Slätmo, E., Vestergård, L. O., & Lidmo, J. (2020). *Compact Cities Trigger High Use of Second Homes in the Nordic Region*. Nordregio.
- Stefansdottir, H., Xue, J., Steffansen, R. N., Næss, P., & Richardson, T. K. (2023). The potential use patter of second homes in response to climate change. In Adie, B. A., & Hall, C. M. (Eds.). *Second Homes and Climate Change* (pp 140-156). Taylor & Francis.
- Steffansen, R. N., Xue, J., Stefansdottir, H., & Næss, P. (2022). Perceptions and Justifications of Environmental Impacts of Second Home Use: A Norwegian Study. *Environment, Space, Place*, 14(2), Article 104-131. DOI: 10.1353/spc.2022.0011

- Staunstrup, J. K., Hjalager, A. M., Steffansen, R. N., & Sørensen, M. T. (2023). Water footprints and sewage management challenges in second home tourism. *Environment and Planning E: Nature and Space*, 6(1), 113-131. <https://doi.org/10.1177/25148486221101554>
- Tjørve, E., Tjørve, K., & Owusu, K. (2022). Barriers and challenges to sustainable physical planning for mountain destinations and second-home developments in the mountain region of south-eastern Norway: the reign of governments or developers? *European Spatial Research and Policy*, 29(2), 115-129.
- Wijburg, G., Aalbers, M. B., Conte, V., & Stoffelen, A. (2023). Tourism-Led Rentier Capitalism: Extracting Rent and Value from Tourism Property Investment. *Antipode*. <https://doi.org/10.1111/anti.12989>

DATA SOURCES:

Statistics Denmark: www.statistikbanken.dk

The Building and Housing Register: www.bbr.dk

ORCID

Anne-Mette Hjalager  <https://orcid.org/0000-0001-5648-4401>

Notes on contributors

Anne-Mette Hjalager is a Professor at the Department for Business and Sustainability at University of Southern Denmark. She works with innovation, entrepreneurial processes, planning, and management - particularly, but not only, in the tourism sector. She has published extensively in the fields mentioned, and her present focus is on the boundary shifts between public and private sectors, and the related spatial and relationship transformations. She is involved in international research endeavors, and she is editor of *Gastronomy and Tourism*.

Sustainable Tourism Policies and Overtourism Risk in Destination Management: The Case of Alanya

Muhammet Necati Çelik  ¹

Aydın Çevirgen  ²

1. Department of Tourism Management, Alanya Alaaddin Keykubat University, Alanya, Antalya, Türkiye

2. Faculty of Tourism, Alanya Alaaddin Keykubat University, Alanya, Antalya, Türkiye

ABSTRACT

Problems caused by overtourism are currently a major concern in the most visited destinations. Awareness of overtourism and the amount of news about reactions to overtourism has been increasing around the world recently. Overtourism has been frequently discussed by journalists in media, researchers in their research and politicians in their search for solutions. It also causes some negative impacts and reactions against tourism in destinations. Sustainable tourism policies should be developed to minimize the negative impacts and prevent potential reactions before they occur. The research aims to identify these necessary sustainable tourism policies for destinations at risk of, or struggling with, overtourism. The research was carried out in four stages, demonstrating the overtourism risk in Alanya, determining the negative impacts of tourism in the study area, examining international reports, and generating a list of proactive sustainable tourism practices and policies for destinations by document analysis. Long-term planning, involving destination stakeholders in the planning process, and the continuous monitoring of the tourism impacts on the destination are among the main results. Sustainable tourism policies and practices are enriched with concrete examples. The research results are expected to be a guide for decision-makers in the destinations at risk of, or struggling with, overtourism.

KEYWORDS

Sustainable Tourism Policies, Sustainable Practices, Destination Management, Impacts of Tourism, Overtourism, Alanya.

ARTICLE HISTORY

Received 31 October 2023 Accepted 20 February 2024

1. Introduction

Overtourism was defined by Goodwin (2017: 1) as a state of “hosts or guests, locals or visitors, feel that there are too many visitors and that the quality of life in the area or quality of the experience has deteriorated unacceptably”. It is a new phenomenon of intensive negative impacts of tourism perceived by residents or visitors in destinations (Dods & Butler, 2019; Çevirgen & Çelik, 2023). It is also related to perceiving crowdedness and exceeding carrying capacity in a specific area. In fact, overtourism has emerged as a result of rising wealth in communities, increasing leisure time in human life, easier travel and mobility and the desire to explore popular destinations. Of course, increment in the social media usage has also affected the occurrence of overtourism phenomenon (Song & Wondirad, 2023). There is a global trend to share the picture from a popular attraction and that trend prods others to take a photo at the same place. In addition to this, the possibility of having too many visitors at the same place at the same time is enhanced because of increasing global mobility. As a result of this, the carrying capacities of places are exceeded and the physical, social, cultural and economic environments of the destinations are negatively impacted by overtourism.

Of course, tourism contributes economic development of the destinations and improves socio-cultural and environmental aspects of communities but if it cannot be managed in a sustainable manner, it can leave some negative impacts such as cost of living, pollution, or cultural degeneration (Roberts, Renda, & Pinto, 2022). These negative impacts generate dissatisfaction in the visitor experience and decrease residents' quality of life. In addition to these, emerging negative perceptions towards overtourism are also causing conflicts of interest between stakeholders in destinations. For this reason, many destinations faced some concrete reactions from residents in recent years (Rodriguez, 2023; Williams, 2023). For instance, some posters expressing the negative feelings of residents were attached to the walls in the city centre of Barcelona in 2018 (Charlton, 2018). However, there are such destinations that have been affected by these negative impacts but have not been faced with concrete reactions yet. It can be said that those destinations have the risk of overtourism issues in the near future as underlined by Butler in 2018. Therefore, sustainable tourism policies are becoming mandatory for destinations to overcome issues caused by overtourism. Sustainable tourism policies should be evolved with the aim of minimizing the negative impacts and preventing potential reactions before they occur by taking a proactive perspective (Tosun & Çalışkan, 2011).

It is crucial to design management instruments and generate policies for minimizing negative issues and preventing overtourism issues before they occur in a proactive and sustainable manner (Gonzalez-Reverte, 2022). Therefore, Alanya, one of the destinations that may face overtourism issues soon, was chosen as a study area. Alanya is a coastal mass tourism destination in southern Türkiye. It is located on the Mediterranean coast, is also one of the destinations at risk of overtourism and is used as a case destination in the research. Despite the large volume of tourism in the international tourism market, there have not been any serious concrete reactions yet as a result of overtourism in Alanya. However, if it is not properly managed in a sustainable manner and with proactive policies, it is predicted that Alanya may have potential reactions to the negative effects of overtourism (Çevirgen & Çelik, 2023). It emphasized that more destinations can be faced with overtourism issues soon (Butler, 2018). From this point of view, the research aims to develop required sustainable tourism policies and practices for destinations at the risk of, and struggling with, overtourism. In this context, answers to the following research questions were searched by the authors.

RQ 1. Is there any risk of overtourism in Alanya?

RQ 2. What kind of negative impacts of tourism have been determined in Alanya?

RQ 3. Which policies and practices towards managing overtourism and sustainable tourism were developed in the past?

RQ 4. Which policies and practices can be applied for destinations at risk of, or struggling with overtourism?

In the first part of the study, the historical background of overtourism and its negative impacts have been examined. Afterward, the literature on destination management and sustainable tourism policies was provided. In the next part, the research methodology was explained and the risk of overtourism was determined. Thus, the findings and results were given to answer determined research questions. Finally, research implications, some national and international examples of sustainable practices and suggestions for future research were presented.

2. Literature Review

2.1 Overtourism and Its Negative Impacts

Overtourism has been counted as one of the challenges that destinations will face in the near future (Butler, 2018). It is related to excessive tourism growth, negative impacts of tourism and exceeding the carrying capacity in a specific area. In 2001, it was referred by the Sydney Morning Herald for explaining the state of tourism growth related to underfunding and overtourism in the ancient city of Pompei (Milano, Novelli, & Cheer, 2019a). However, the term disappeared for 15 years and it has become a popular term to explain the intensive negative impacts of tourism in overvisited destinations after the report of Andrew Sheivachman from Skift.com in 2016 (Sheivachman, 2016). Thereafter, the term “overtourism” has started to be discussed in detail by academia (Butler, 2018; Gonzalez, 2018; Koens, Postma, & Papp, 2018; Milano, Cheer, & Novelli, 2018). According to the World Tourism Organization (WTO), while the number of international tourist arrivals was 692.6 million in 2001, it reached 1.460 million tourists internationally before the COVID-19 Pandemic in 2019 (WTO, 2002; UNWTO, 2021). On the other hand, intense international mobility and the pressure on the socio-cultural, physical, and economic environment have increased in popular tourist destinations. In addition to this, an increment in the usage of the internet and social media caused to rise in the popularity of attraction in destinations (Song & Wondirad, 2023). All these developments caused the emergence of overtourism awareness and more feelings about the negative impacts of overtourism in destinations (Papadopoulou, Ribeiro, & Prayag, 2022; Çevirgen & Çelik, 2023).

The term overtourism is defined as “the impact of tourism on a destination, or parts thereof, that excessively influences the perceived quality of life of citizens and/or quality of visitors experiences in a negative way” in 2018 (UNWTO et al., 2018: 4). Accordingly, symptoms of negative impacts on residents’ quality of life or visitors’ experience must be seen in a destination facing overtourism. In line with this, the symptoms of overtourism have been revealed in Barcelona, Berlin, Budapest, Ljubljana, Montreal, Munich, and so forth (O’Regan, Salazar, Choe, & Buhalis, 2022). For instance, strong reactions and a group of people against tourism have appeared in Barcelona (Hughes, 2018). Moreover, an event named “Collapse Tourism Day” was organized instead of celebrating “World Tourism Day” in Barcelona on the 27th of September, 2023 (ABDT, 2023). That situation is called tourismphobia and causes a social movement against tourism (Milano, Novelli, & Cheer, 2019b).

In fact, overtourism and its results are due to the negative impacts of tourism. Although some benefits of tourism exist such as economic growth, employment opportunities, and better landscaping, some negative impacts can occur such as pollution, price inflation and social conflicts (Baltacı & Çevirgen, 2020; Çelik & Çevirgen, 2021; Frleta, 2022; Roberts et al., 2022; Buitrago-Esquinas, Foronda-Robles, & Yñiguez-Ovando, 2023). This situation causes conflicts of values between the environmental, economic and socio-cultural resources of the destinations (Çelik & Buhalis, 2022). Ideally, a sustainable development approach, which aims to minimize the negative impacts and maximize the positive impacts, is needed to be implemented while managing the destination with paying regard interests of the destination. A sustainable development approach can be hard to actualize in destinations struggling with overtourism. Because, different stakeholders have diverse interests (Buhalis, 2000). For example, tourism businesses focus on economic benefits and desire more tourists while residents care about their quality of life and want to preserve their socio-cultural structure. Hereby, these destinations face residents’ reactions against tourism. Because, the quality of life of residents is negatively affected by tourism activities in destinations struggling with overtourism (Buitrago & Yñiguez, 2021). The quality of life comprises economy,

health, environment, education, safety and security, and culture and leisure dimensions (Berbekova & Uysal, 2021). For instance, tourism causes an increase in the cost of living which is negatively related to the economic dimension of residents' quality of life (Çevirgen & Kesgin, 2007; Frleta, 2022; Roberts et al., 2022; Çevirgen, 2023). This can be explained by social exchange theory which is a kind of cost-benefit analysis made by residents (Tam, Lei, & Zhai, 2023). In fact, the problems are based on the perception of unfair distribution of resources, benefits and costs between destination stakeholders. In this situation, the negative impacts of tourism are more felt by residents and it is thought that their quality of life is negatively affected by tourism activities (Çevirgen & Çelik, 2023). This is also related to community wellbeing which is one of the policy implications of sustainable tourism agenda expressed by UNEP and UNWTO in 2005. On this occasion, destination decision-makers need to interfere in order to come through existing issues with sustainable tourism policies. Destination Management Organizations (DMOs) play a key role in determining these needed policies, actualizing the sustainable tourism development approach and paying regard interests of the destination.

2.2 Destination Management and Sustainable Tourism Policies

Destination management is crucial to ensure sustainability in destinations. It has become a profession and a significant trend in today's world (Morrison, 2024). It is defined by UNWTO (2019: 10) as "the coordinated management of all the elements that make up a tourism destination (attractions, amenities, access, marketing and pricing)". DMOs manage the destination and one of their functions is strategic planning and policy-making (Çelik & Buhalis, 2022). It cannot be discussed that policy and planning are essential for tourism destination management. More environmental and host-friendly practices in development, planning and policymaking are needed to reduce several issues due to tourism, as well as to overcome overtourism and tourismphobia in tourism destinations (Saarinen, 2006; Milano et al., 2019b). This can only be achieved with sustainable tourism policies. Hereby, the quality of life and well-being of the community should be integrated into tourism policies by decision-makers or DMOs (Berbekova, Uysal, & Assaf, 2024). Ensuring coordination, collaboration and governance between destination stakeholders is among the responsibilities of DMOs (Reinhold, Beritelli, & Grünig, 2019), which is also a necessity for actualizing sustainable destination management.

International and national organizations have also followed the issue closely and have produced different publications to address the issues of overtourism. Several reports published on the sustainability of tourism (Tosun & Çalışkan, 2011; Spilanis, Le Tellier, & Vayanni, 2012) and various policies for overcoming overtourism presented by international organizations, such as spatial and time-based dispersal of visitors, stimulating new visitor itineraries and attractions, reviewing and adapting regulation among others (McKinsey & Company and WTTC, 2017; Peeters et al., 2018; Toposophy & HOTREC, 2018; UNWTO et al., 2018). All these developments show that the overtourism phenomenon is becoming more important by the day, and there is a need to develop sustainable tourism policies and review legal structures for applying regulations and incentives to overcome the problems of overtourism (UNWTO et al., 2018). Following updated regulations and innovative incentives of other destinations and internationally recognized organizations is also crucial and should be considered by destination decision-makers.

Farsari (2012) mentioned that it is important to conceptualize sustainable tourism policies and ensure economic, environmental and socio-cultural sustainability in destinations. In the literature, these three dimensions (economic, environmental and socio-cultural) are called the pillars of sustainability (Mihalic, 2020). It is also emphasized that there is not any unique recipe for sustainability in destination (Farsari, 2012). Therefore, the aim of this research is to determine issues specific to Alanya and develop sustainable tourism policies in order to minimize negative impacts in the destinations at the risk of, or struggling with, overtourism.

3. Methodology

This research aims to identify necessary sustainable tourism policies for destinations at risk of, or struggling with, overtourism. A document analysis technique, a qualitative research method, was used in the

research. Bowen (2009) mentioned that document analysis is a research technique based on a systematic review and evaluation of related documents. It provides a confluence of evidence that breeds credibility and reduces potential biases (Bowen, 2009). Although the document analysis method has limitations like working on limited information and having fewer opportunities to check bias, it also has some strengths like dealing with fewer ethical concerns, conducting an unobtrusive form of research, being a cost-effective method and giving the opportunity to do research that would be hard with other methods (Morgan, 2021). During the document selection process, authenticity, credibility, representativeness and meaning factors were considered as indicated by Kridel in 2015. Selected documents were chosen by considering the suitability of the research purpose to increase representativeness. The reports of internationally recognized organizations and publications of authors studying in the field were used in the research to strengthen authenticity and credibility. The content of the publications was checked by the authors to prevent meaning issues.

The research was carried out in four stages. In the first stage, the risk of overtourism in Alanya has been proved by considering the volume of tourism in Alanya and using scientific criteria in the literature. In the second stage, the negative impacts of intensive tourism development were determined by examining the previous research conducted in Alanya. In the third stage, the relevant reports prepared by internationally recognized organizations related to practices and policies towards managing overtourism and sustainable tourism development were examined by the authors. In the final stage, a list of proactive sustainable practices and policies special to Alanya was presented in order to be a guide for other destinations at risk of, or struggling with, overtourism.

3.1 Overtourism Risk in Alanya

Alanya is one of the most visited destinations in the Mediterranean coastline of Türkiye with 8 million international and domestic visitors annually in 2022 (ACCI, 2023). Sea, sun and sand (3S) tourism-based mass tourism dominates the destination. It has also several historical and natural attractions such as Alanya Castle, Red Tower, Shipyard, Dim River and Cleopatra Beach among others with a surface of 1756 km² (Alanya Municipality, 2023; Governorship of Antalya, 2023). According to ACCI (2023), the population of Alanya was 364.180 and total bed-nights (short-term apartment rentals such as Airbnb excluded) in Alanya were 24.045.515 in 2022.

The phenomenon of overtourism is essentially associated with intensity (bed-nights/ population) and density (bed-nights/km²) in tourism (Peeters et al., 2018; Duignan, Everett, & McCabe, 2022; Pérez Garrido, Sebrek, Semenova, Bal, & Michalkó, 2022). On the other hand, the intensity and density of tourism determine the degree of negative impacts caused by overtourism. Therefore, it is important to calculate the risk of overtourism quantitatively to reveal the magnitude of the potential negative effects of tourism. According to Peeters et al. (2018), tourism intensity (bed-nights/capita) and density (bed-nights/km²) were expressed as the main causes of overtourism. Therefore, these two calculations can be considered for demonstrating overtourism risk in destinations. Percentiles were determined from less risky (1st) to the riskiest (5th) for European destinations (Peeters et al., 2018).

Based upon the study of Peeters et al. (2018), tourism intensity and density values were calculated in Alanya and presented together with the number of visitors, total bed-nights and population in Table 1. Although the total number of tourists and bed-nights in Alanya decreased in 2020 and 2021 due to the COVID-19 Pandemic process, it reached 2019 levels again in 2022 with the rapid recovery of the destination. According to Table 1, it is proved that Alanya has been ranked in the 5th percentile among the riskiest destinations. According to Peeters et al. (2018), tourism density values were between 2278-37290 and tourism intensity values were between 9.58-70.73 in the 5th percentile. Values for tourism density and intensity were found as 13693.35 and 66.03 based on the numbers in 2022 in Alanya. Therefore, overtourism risk in Alanya has been demonstrated by the authors, which was the first stage of the research. (RQ1). The high risk of overtourism in Alanya requires the review of current and future tourism policies and practices within the proactive approach. Because, excluding the COVID-19 pandemic process, Alanya continues to be an attractive destination with an increasing number of tourists and population (Table 1).

This means that the risk tends to increase in Alanya in the future. Although Alanya was not included in the study of Peeters et al. (2018), it is placed among the highest risky destinations in the current situation in terms of tourism density and intensity values together with Prague, Venice and so forth.

Table 1. Calculations of Overtourism Risk in Alanya (2018-2022)

Year	Number of visitors	Total Bed-nights	Population	Tourism Intensity (bed-nights/population)	Tourism Density (bed-nights/km ² *)
2018	5.680.359	20.279.791	312.319	64.93	11548.86
2019	6.693.646	23.066.231	327.503	70.43	13135.67
2020	2.462.735	6.922.211	333.104	20.78	3942.03
2021	5.538.697	16.731.773	350.636	47.72	9528.34
2022	8.080.308	24.045.515	364.180	66.03	13693.35

*Surface area of Alanya: 1756 km²

Source: Own Elaboration based on ACCI, 2020; ACCI, 2022; ACCI, 2023; Çevirgen & Çelik, 2023; Governorship of Antalya, 2023; TSI, 2023.

4. Findings and Results

4.1 Negative Impacts of Tourism in Alanya

The negative impacts of tourism were determined by examining previous studies in Alanya. Nine research consisting of book chapters, journal articles, international reports and conference papers have been found between the years of 2007 and 2023. The negative impacts were divided into three groups, physical, socio-cultural and economic impacts by authors as presented in Table 2.

Rapid construction, decrease in agricultural areas, increasing pollution problems (noise, waste etc.), traffic congestion, environmental concerns, and pressure on the physical environment based on exceeded physical carrying capacities can be counted among the negative physical impacts of tourism in Alanya. Increasing urban population due to uncontrolled migration and visitor numbers, cultural degeneration, decreasing residents' quality of life due to intense workload and tourism activities during the high season, loss of local architecture and rapid urbanization were found as negative socio-cultural impacts of tourism. Finally, the increasing cost of living, high level of regional economic dependence on tourism and specific markets, loss of fertile agricultural lands, rising land and housing prices due to high demand can be given as some examples of negative economic impacts of tourism in the region (Çevirgen & Kesgin, 2007; Tosun & Çalışkan, 2011; Spilanis et al., 2012; Bayrakçı, 2014; Bayrakçı & Zencir, 2018; Baltacı, 2021; Çevirgen, 2023; Çevirgen & Çelik, 2023). By demonstrating Table 2 and presenting all the negative impacts of tourism in Alanya, the second stage of the research has been accomplished by the authors (RQ 2).

Table 2. Previous Studies on the Impacts of Tourism in Alanya

Authors	Publication Type	Method/Research Area	Negative Impacts		
			Physical	Socio-cultural	Economic
Çevirgen (2023): 210, 213-214, 217	Book Chapter	Review study/ Tourism in Alanya	1. Rapid construction (facilities, second homes, etc.) started with mass tourism in the 1980s and continues today. 2. Decrease in agricultural areas and concretion. 3. Pressure on the environment and natural resources due to the increasing population, especially during the summer months 4. Increasing noise pollution and traffic congestion 5. Exceeding physical carrying capacities	1. The ongoing rapid urbanization 2. Increasing urban population due to migration from within and outside of the country	1. Increasing cost of living 2. Regional economic dependence on tourism
Çevirgen & Çelik (2023): 6	Conference Paper	Quantitative/ Residents in Alanya	1. Causing significant pollution problems 2. Generating traffic congestion	1. Increasing crime rates (robbery, violence, etc.) 2. Causing loss of local culture 3. Increasing drug abuse and alcoholism among locals	----
Baltacı, (2021): 226, 230	Journal article	Quantitative/ Residents in Alanya	1. Residents' concerns about environmental sensitivity 2. Numerous large-scale facilities for mass tourism	---	1. Increasing dependence on the tourism sector 2. The contribution of tourism to residents' quality of life is not at the desired level
Çelik & Çevirgen (2021): 188-189	Journal article	Qualitative/ Accommodation Managers in Alanya	1. Wastes 2. Excessive construction 3. Noise pollution 4. Reduction of natural and agricultural lands	1. Excessive immigration	1. Limited product diversity 2. Cheap price policy 3. Low service quality 4. Excessive dependence on tourism 5. Seasonal economic activity
Bayrakçı & Zencir (2018): 60, 63-65	Book Chapter	Review study/ Tourism in Alanya	1. Construction and concretion 2. Conversion of agricultural lands into hotels	1. Changing family and cultural structure of society (Nevertheless, the residents maintain their conservative structure)	1. Decreasing the impact of agriculture on the economy and turning to tourism
Bayrakçı (2014): 919-924	Conference Paper	Oral History Method/Impacts of Tourism in Alanya	1. Construction of hotels and concretion in agricultural lands	1. Uncontrolled migrations 2. Migrants create discrimination by forming associations or groups 3. Changing family and cultural structure, e.g. marriages with foreigners 4. Increasing crime rates 5. Changing consumption habits, e.g. food culture, clothing, shopping, manufactured housing 6. Decreasing social relations of residents working in the tourism sector due to intense workload during the summer period	----
Spilanis et al., (2012): 18, 23, 29-30, 36, 39	International Report	Review study/ Sustainable tourism in the Mediterranean (11 Destinations from 8 Countries)	1. Pressure on natural and other resources due to the intense urbanization process 2. Environmental pressure caused by second homes	1. Social pressure created by second homes 2. Changing demographic structure and increasing population due to migration 3. Intensive urbanization due to tourism 4. Increasing urban population by up to 4 times during the summer months	1. Alanya is a mature international 3S destination and should be prepared for the stagnation stage 2. Tourism is the main sector of the regional economy 3. Presence of very large industrial-scale facilities in the region 4. Highly dependent on international tour operators and specific markets 5. The need to create product diversity and the issue of seasonality 6. Increasing costs for destination management and rejuvenation stage 7. Quality of life issues

Tosun & Çalışkan (2011): 34-36, 45, 47, 58, 61, 72	International Report	Review study/Profile of sustainability in Alanya	1. Visual pollution and the banalization of the scenic caused by unplanned and ugly buildings 2. Occurrence of noise pollution 3. Traffic congestion and insufficient parking areas	1. Many buildings, such as second homes and tourism facilities, are not built in compliance with the local architecture. 2. It is a more crowded city than many larger cities due to the increasing population in the summer months. 3. Intensive migration from within and outside the country 4. Reverse migration from Alanya due to rising real estate prices	1. Over-dependency on the tourism sector 2. Loss of fertile agricultural lands 3. Many summer houses are only used for a few months. 4. Rising land and housing prices with high foreign demand for real estate
Çevirgen & Kesgin (2007): 317, 318	Journal article	Quantitative/ Local authorities and NGOs in Alanya	-----	1. Decreasing quality of life due to intense tourism-based migration 2. Causing rapid and uncontrolled urbanization	1. Increasing the cost of living in the region 2. Tourism is the main driver of the regional economy

Source: Own Elaboration

Table 3. Summary of Negative Impacts of Tourism in Alanya

1	Over-construction and concrection	PHYSICAL IMPACTS
2	Pressure on the environment and natural resources (waste production and water pollution, etc.)	
3	Traffic congestion and insufficient parking areas	
4	Noise pollution	
5	Rapid and unplanned urbanization	SOCIO-CULTURAL IMPACTS
6	Increasing urban population due to internal and external migration	
7	Reverse migration	
8	Increasing crime rates	
9	Degeneration of local culture and architecture	
10	Dissatisfaction due to increased demand for social and cultural services during high season	
11	Weak social relations of tourism workers due to intense workload during high season	ECONOMIC IMPACTS
12	Increasing costs of living in the region	
13	Loss of fertile agricultural lands	
14	Economic dependence on tourism	
15	Seasonal tourism activities and job opportunities	
16	High dependence on tour operators, 3S tourism, specific markets and products	
17	Rising prices of housing and land due to high demand	PHYSICAL, SOCIO-CULTURAL AND ECONOMIC IMPACTS
18	Decreasing the quality of life of residents	

Source: Own Elaboration based on Table 2.

The impacts of tourism gathered from previous research were summarised by the authors in Table 3. They were classified into three categories physical, socio-cultural and economic impacts. Negative impacts were explained in detail in the following paragraphs.

Over-construction and concrection can cause visual pollution and the conversion of agricultural areas to huge accommodation businesses creates *economic dependence on tourism*. This situation started in the 1980s and Alanya has been enlarged from both sides east and west (Çevirgen, 2023: 213). *Inappropriate structures for local architecture* have been built since that time (Tosun & Çalışkan, 2011). Second home demand has been increased by *international and domestic migration* to the region because of the warm climate in Alanya (Çevirgen & Kesgin, 2007). Recent global crises such as the Russia-Ukraine war caused

a mass migration wave to Europe (Başçılar, Karataş & Pak Güre, 2022) as well as Alanya. The population in Alanya is affected by all these developments, and it has a growing tendency. Because of *the rising cost of living* due to the increasing demand for all services and products, *reverse migration* has also existed in Alanya. It may cause *socio-cultural degeneration and pressure on the environment* in the region.

Pressure on the environment and natural resources were expressed among the negative impacts of tourism. It was recorded that Alanya has a very high density in terms of beds per km² when compared with similar Mediterranean 3S mass tourism destinations (Spilanis et al., 2012). This situation leads to some problems such as loss of biodiversity, an increase in solid waste production, pressure on water resources and so forth. It was mentioned that Alanya had 621 accommodation enterprises and approximately 180.000 bed capacity in 2022 (ACCI, 2023). This high capacity also brought rising waste production by large-scale hotels in the region together with increasing inhabitants. Together with the increased population, *traffic congestion and insufficient parking areas* were mentioned in the relevant research (Tosun & Çalışkan, 2011; Çevirgen, 2023). This can be seen as one of the leading problems in destination because of the increasing number of visitors and excessive migration. *Noise pollution* is also among the problems especially in the high season due to the animation activities of hotels and entertainment businesses in the heart of the city. Businesses need to consider current regulations about voice levels and the time of the entertainment activities to prevent potential reactions.

Unplanned urbanization is one of the reasons behind the problem. The increasing urban population due to internal and external migration is another situation in which Alanya needs to struggle. Increasing labour force necessity and second home demand brought seasonal and permanent migration to Alanya (Çevirgen & Kesgin, 2007). Alanya had visitors more than 8 million in 2022 and most of them visited during the high season between April and October. This situation may cause *residents' dissatisfaction with social, cultural and public services* because of insufficient capacity (Tosun & Çalışkan, 2011). Another negative socio-cultural effect is the weakening of the social relations of the residents. Tourism is a labour-intensive sector. Therefore, tourism workers have *weak social relations during the high season* (Bayrakçı, 2014).

Considering the negative economic impacts of tourism, *economic dependence on tourism* and *loss of fertile agricultural lands* are important issues in the region. While agricultural activities were at the forefront in the period between 1950 and 1980, tourism activities gained importance after the 1980s in Alanya (Çevirgen, 2023). *High dependence on tour operators and 3S tourism, seasonal tourism activities and job opportunities, rising housing prices, and increasing living costs* are emphasized as other economic issues in Alanya, which has become a mass tourism destination today. As a result, these negative physical, socio-cultural and economic impacts of tourism *decrease the quality of life* of the residents (Table 3). To minimize all these negative impacts in the region, there is a necessity to generate proactive policies and implement sustainable tourism practices. In line with this, practice and policy suggestions were examined by the authors in the following part.

4.2 Practice and Policy Suggestions

Many empirical or theoretical studies conducted by academics and organizations to generate sustainable tourism practices and policies for sustainability of destinations (Tosun & Çalışkan, 2011; Farsari, 2012; Spilanis et al., 2012; McKinsey & Company and WTTC, 2017; Toposophy & HOTREC, 2018; Peeters et al., 2018; UNWTO et al., 2018; Ruggieri, Calò, & Orthodoxou, 2020). In the first half of the 2010s, studies were focused on sustainable tourism development (Tosun & Çalışkan, 2011; Farsari, 2012; Spilanis et al., 2012). However, studies were started to focus on practices and policies for finding solutions to overtourism issues because of increased mobility and negative impacts of tourism, especially in the most visited destinations after 2017 (McKinsey & Company and WTTC, 2017; Toposophy & HOTREC, 2018; Peeters et al., 2018; UNWTO et al., 2018; Ruggieri et al., 2020). Although suggested practices and policies were similar, the focus of academics and organizations has changed from sustainable tourism development to solutions for overtourism issues. Because of that, practice and policy suggestions were given together by the authors in Table 4. Practices and policies from seven international reports were examined in the third stage of the research (RQ 3). All of them were summarised by the authors and presented as 15 suggestions in Table 5 (RQ 4).

Table 4. Practice and Policy Suggestions Towards Managing Overtourism and Sustainable Tourism Development

Publications	Suggested Practices and Policies
Ruggieri et al. (2020): 99-101	1. Destination management system 2. Intelligent transport system 3. Environment management information system 4. Location-based service 5. Global positioning system 6. Geographical information system
UNWTO et al. (2018): 6	1. Dispersal of visitors within the city and beyond 2. Time-based dispersal of visitors 3. Stimulate new visitor itineraries and attractions 4. Review and adapt regulation 5. Enhance visitors' segmentation 6. Ensure local communities benefit from tourism 7. Create city experiences that benefit both residents and visitors 8. Improve city infrastructure and facilities 9. Communicate with and engage local stakeholders 10. Communicate with and engage visitors 11. Set monitoring and response measures
Toposophy & HOTREC (2018): 4	1. Governing tourism activities accurately 2. Considering sensible threshold practices on visitor capacity 3. Spreading the demand and easing the pressure 4. Educating visitors to become a responsible visitor 5. Setting up a structure to ensure dialogue and consultation among stakeholders
Peeters et al. (2018): 101-102	1. Managing with a holistic and integrated approach 2. Long-term planning 3. Achieving an appropriate pace and rhythm of development 4. Involving all stakeholders 5. Using the best available knowledge 6. Minimising and managing risk 7. Reflecting impacts on costs 8. Setting and respecting limits 9. Undertaking continuous monitoring
McKinsey & Company and WTTC (2017): 9	1. Spreading visitors over time 2. Dispersal of visitors across sites 3. Adjusting prices to balance supply and demand 4. Regulating accommodation supply 5. Limiting access and activities
Spilanis et al. (2012): 50-52	1. Enforcement and implementation of legal instruments and improvement of their effectiveness 2. Development and promotion of market-based instruments and voluntary schemes for tourist companies 3. Raising environmental awareness of tourists, entrepreneurs and employees 4. Encourage investors and tour operators for more responsible behaviour in their activities 5. Product diversification (integration of new and additional products) 6. Decentralization vs. Central Planning: fostering local governance 7. Monitoring system for impacts of tourism
Tosun & Çalışkan (2011): 63-69	1. Product and market diversification strategies 2. Developing a more contemporary planning approach 3. Moving towards a proactive planning approach 4. Adopting a participatory planning approach 5. Decentralizing public administration of tourism development 6. Adopting a societal-oriented destination marketing philosophy 7. Encouraging environmental awareness and protection 8. Widening environmental awareness 9. Developing and empowering environmental laws 10. Using alternative energy sources 11. Saving energy and water 12. Promoting strategies for decreasing economic leakages 13. Promoting consumption of locally made product 14. Training residents for their employment in the tourism sector 15. Encouraging local people to be entrepreneurs

Source: Own Elaboration

Table 5. Summary of Practice and Policy Suggestions for Sustainable Tourism Development

1	Spreading visitors to different places of destination and periods of year to manage density
2	Using smart systems and technological tools in destination management
3	Long-term planning of tourism development in the destination
4	Improving environmental awareness of destination stakeholders and encouraging them to protect the environment
5	Ensuring stakeholder participation in destination management with a holistic approach and establishing a governance mechanism
6	Establishing a system to monitor and measure the impacts of tourism development
7	Improving infrastructure facilities in line with increasing population and visitors
8	Determination and implementation of carrying capacities
9	Product diversification and market re-segmentation
10	Encouraging investments in different sectors to reduce tourism dependence
11	Generating quality-oriented policies instead of quantity-oriented policies in tourism development
12	Focusing on policies enhancing residents' quality of life and visitor satisfaction
13	Supporting scientific research on tourism and benefiting from generated knowledge in planning and management
14	Encouraging businesses to participate in international certification systems
15	Reviewing and adapting regulations

Source: Own Elaboration based on Table 4.

Rapid tourism growth and concentration in space and time make ensuring the sustainability of destinations difficult (Kuščer & Mihalič, 2019). Concentration in a specific place and time is one of the biggest problems in destinations facing overtourism. *Spreading visitors to different places of destination and periods of year for managing density* was a common suggestion for overcoming overcrowding (McKinsey & Company and WTTC, 2017; Toposophy & HOTREC, 2018; UNWTO et al., 2018).

The management style of tourism directly impacts the carrying capacity and overtourism in destinations (Vargas-Sanchez, 2020). Therefore, *determining and implementing carrying capacities* and *improving infrastructure facilities* in parallel with the increasing population and visitors constitute other essential policies for sustainably managing tourism. Another suggestion is the use of technology in destination management. *Smart systems and technological tools* are the smart destination strategy that improves *the quality of life of residents* and *the quality of tourist experience* (Ivars-Baidal, Hernandez, & Mendoza de Miguel, 2019: 126). These knowledge-based applications help the ability to understand and solve problems related to overtourism (Garcia Hernandez, Ivars-Baidal, & Mendoza de Miguel, 2019; Vargas-Sanchez, 2020). However, using technology will not be sufficient to ensure sustainable tourism development without *long-term planning* (Vargas-Sanchez, 2020). Managing overtourism requires the establishment of a *governance mechanism* that will ensure the *stakeholders' participation* in decision-making processes based on trust and cooperation with a *holistic planning approach* (Vargas-Sanchez, 2020; Sebrek, Garrido, & Michalko, 2022). Monitoring and controlling are also important factors for success in destination management. Therefore, *a monitoring system* could be established to monitor and measure the overtourism impacts. This system will provide data to decision-makers in determining practices and policies for sustainable tourism (Blazquez-Salom, Cladera, & Sard, 2021).

Finally, the following other essential practices and policies for sustainable tourism development are suggested: 1. improving environmental awareness of destination stakeholders and encouraging them to protect the environment; 2. product diversification and market re-segmentation; 3. encouraging investments in different sectors to reduce tourism dependence; 4. generating quality-oriented policies instead of quantity-oriented policies in tourism development; 5. supporting scientific research on tourism and benefiting from generated knowledge in planning and management; 6. encouraging businesses to participate in international certification systems; and 7. reviewing and adapting regulations (Table 5).

5. Implications and Conclusion

Destination management is a growing profession that leads and coordinates destination stakeholders for effective destination management (Morrison, 2019; Morrison, 2024). It needs to be in relation with all stakeholders during the management process. Therefore, cooperation with and participation of stakeholders during the planning and policy-making process are essential for successful destination management. *The establishment of a strong governance framework* can make it possible and is a must for actualizing sustainable tourism development.

Tourism affects destination stakeholders directly or indirectly, as well as positively or negatively. Over-tourism exists in the state of feeling negative impacts on residents' well-being or visitor experience (UNWTO et al., 2018). The critical responsibility here is *determining the carrying capacities* and applying appropriate practices and policies for sustainable tourism development in the destination. To achieve success, *a holistic, proactive and participatory management approach* should be applied by decision-makers in the destination. For instance, public authorities should integrate sustainable policies and practices into their public policy to enhance residents' quality of life and improve the visitor experience before the emergence of dissatisfaction. In addition, *the impacts of tourism should be monitored*, and if there is a necessity, remedial or preventive practices and policies should be implemented based on the data obtained in the destinations. However, it can be said that there is no single recipe suitable for all destinations (Vargas-Sanchez, 2020). Each destination may have different problems and the priority of the problems may change. First of all, the problems should be determined systematically by taking into account issues such as the characteristics of the destinations, their development levels, product types, carrying capacities, and supply and demand situations. Appropriate practices and policies should be developed by starting with the top prior problems and considering available resources or opportunities in the destinations. These policies may differ in coastal, rural, urban, or island destinations. Although the research findings about tourism impacts were examined local context and specific to destination Alanya, suggested sustainable policies and practices may be suitable for other destinations.

It is demonstrated that Alanya is a destination at risk of overtourism in terms of tourism density and intensity values. Although concrete reactions from residents or visitors were not seen in Alanya, these reactions may occur soon. Policy-makers should consider the negative impacts of tourism and actualize sustainable tourism practices and policies with a proactive approach. As one of the results of the research, over-construction and concretion has been one of the continual negative physical impacts of tourism in Alanya since the 1980s. This problem has been triggered by intensive migration and growing mass tourism demand. To solve these two triggers, *regulations should be reviewed and a shift from quantity-oriented to qualitative-oriented policies should be actualized by diversification of tourism products and re-segmentation of the market*. On the other hand, because of spatial and time-based concentration, physical carrying capacities may be exceeded especially during the high season. This issue puts pressure on environmental resources and causes massive waste production, noise pollution, and traffic congestion. *Determination and implementation of carrying capacities, improving infrastructure facilities in line with increasing population and visitors, encouraging businesses to participate in international certification systems and improving environmental awareness of destination stakeholders* were suggested by the authors as solutions.

Because of warm climate conditions, Alanya welcomes many visitors and second home owners, as well as migrants caused by crises such as the Russia-Ukraine War. Second home tourism and migration brought rapid and unplanned urbanization together with an increase in urban population. This situation caused cultural degeneration and made protecting local architecture difficult. *Long-term planning and establishing a system to monitor and measure the impacts of tourism development* and migration can be presented as solutions for these issues. In addition, increased demand for social and cultural services caused dissatisfaction among residents during the high season. Also, weak social relations emerged due to the intense workload of tourism workers in Alanya, especially during the high season. *Improving socio-cultural infrastructure facilities and focusing on improving residents' quality of life* were suggested as practical and political solutions.

High dependence on specific markets, products, and the tourism industry occurred together with the transformation of fertile agricultural lands to tourism facilities in Alanya. The lack of product diversifica-

tion (high dependency on 3S tourism) created seasonal tourism and job opportunity problems. *Encouraging investments in different sectors and spreading visitors to different places of destination and periods of year* were suggested for reducing tourism dependence and managing spatial or time-based concentration in the destination. High demand for products and services, and rising real estate prices increased residents' cost of living including tourism workers. A reverse migration started in the destination because of this issue. The main solution for overcoming this issue should be to ensure the supply-demand balance related to these products and services. However, supporting tourism workers by their businesses for their housing needs can be suggested as a short-term solution. Otherwise, it is predicted that some problems may be seen in the personnel procurement of tourism businesses. It can be said that all negative impacts of tourism are related to residents' quality of life, and it is related to all dimensions of tourism impacts. Because, the quality of life includes various dimensions of economy, health, environment, education, safety and security, and culture and leisure (Berbekova & Uysal, 2021). Therefore, in case of implementing all suggestions will contribute to residents' quality of life in the destination.

Finally, *using smart systems and technological tools, ensuring stakeholder participation, establishing a governance mechanism, and benefiting from scientific knowledge* will strengthen destinations for managing overtourism and sustainable tourism development. In addition, the risk of overtourism and the magnitude of tourism impacts on destinations should also be measured and monitored periodically (Blazquez-Salom, et al., 2021; Buitrago & Yñiguez, 2021). Destinations can procure concrete evidence about the impacts of tourism by monitoring economic, socio-cultural and environmental aspects in their region (Çelik & Buhalis, 2022). However, destination stakeholders may also face some barriers during the application process of suggested sustainable policies and practices. For instance, high costs, lack of solidarity and cooperation, and limited interest and awareness can be presented among the barriers faced by accommodation enterprises (Çelik & Çevirgen, 2021). To overcome barriers, it is important to *encourage the destination stakeholders with the actualization of regulations and incentives towards sustainable policies and practices*. Some good examples of actualizing sustainable policies and practices from several destinations are presented in the following paragraph.

As an example of smart systems and technological tools, the tourist card system has been applied to decrease waiting time in the queues at the most visited attractions in Florence (Garcia-Hernandez et al., 2019). In another example, SmartCitizen environmental monitoring sensors have been used to increase the residents' quality of life by monitoring pollution and noise levels in Barcelona (Vargas-Sanchez, 2020). For the establishment of a governance mechanism, a consortium was found to promote tourism in Barcelona together with the City Council, the Official Chamber of Commerce, Industry and Shipping, and the Barcelona Promotion Foundation in 1993 (Barcelona Turisme, 2023). One good example of measuring and monitoring systems is the UNWTO International Network of Sustainable Tourism Observatories (INSTO) which was founded in 2004. Recently, 42 observatories in 18 countries have maintained their measuring and monitoring impacts of tourism. For instance, Algarve Sustainable Tourism Observatory is currently monitoring employment, destination economic benefits, tourism seasonality, energy, water, solid waste and waste water management and development control in their region (UNWTO INSTO, 2023). Finally, the Türkiye Tourism Promotion and Development Agency (TGA) has applied the Sustainable Tourism Program in collaboration with the Global Sustainable Tourism Council (GSTC) since 2022. The program based on the criteria of the GSTC aims to ensure the sustainable development of the tourism industry and it includes all stakeholders with a holistic approach (TGA, 2023).

It is expected that the stages implemented by the authors in this research and all suggested practices and policies will support decision-makers in their planning and management processes in destinations at risk of and struggling with overtourism issues. The results of this research are limited to examined documents by the authors. Bed-nights statistics are based on data obtained from accommodation enterprises. It can be said that if short-term rental bed-nights are added to these statistics, tourism density and intensity values may be higher. In future studies, researchers can use different research methods and techniques such as semi-structured interviews, focus group interviews, or quantitative questionnaires. They can be useful to get in-depth knowledge about the experience of policy-makers and understand the problems during the policy application process. Decision-makers should care about the quality of life and well-being of all destination stakeholders, and it is also crucial for the liveability of destinations

(Berebekova et al., 2024). Therefore, it is suggested that further research should focus on policies and practices about how to enhance the quality of life of residents and improve the quality of visitor experience in the destinations. Another suggestion can be doing more research on integrating technological tools and smart systems into destination management to minimize the negative impacts of tourism and solve overtourism issues.

ACKNOWLEDGEMENTS

This research is based on an abstract presented by the authors at the 7th International West Asia Congress of Tourism Research in 2023.

REFERENCES

- ABDT (Assemblea de Barris pel Decreixement Turístic) [NATD (Neighborhood Assembly for Tourist Decline)] (2023, September 27). 27S: concentra-acció contra la celebració del dia mundial del turisme [27S announcement: celebrating World Tourism Day is celebrating the collapse]. <https://assembleabarris.wordpress.com/2023/09/25/27s-concentra-accio-contra-la-celebracio-del-dia-mundial-del-turisme/>
- ACCI (Alanya Chamber of Commerce and Industry). (2023). *Alanya ekonomik rapor 2022 [Alanya economic report 2022]*. <https://www.altso.org.tr/yayinlarimiz/alanya-ekonomik-rapor/alanya-ekonomik-rapor-2022/>
- ACCI (Alanya Chamber of Commerce and Industry). (2022). *Alanya ekonomik rapor 2021 [Alanya economic report 2021]*. <https://www.altso.org.tr/yayinlarimiz/alanya-ekonomik-rapor/alanya-ekonomik-rapor-2021/>
- ACCI (Alanya Chamber of Commerce and Industry). (2020). *Alanya ekonomik rapor 2019 [Alanya economic report 2019]*. <https://www.altso.org.tr/yayinlarimiz/alanya-ekonomik-rapor/alanya-ekonomik-rapor-2019/>
- Alanya Municipality. (2023). *Official website of Alanya municipality*. <https://www.alanya.bel.tr/Default.aspx?v=en>
- Baltacı, F. (2021). The relationship between the environmental attitude, behavioral role and support of the local resident in sustainable development of tourism: The example of Alanya. *Journal of Economy Culture and Society*, 63, 213-236. <https://doi.org/10.26650/JECS2020-0067>
- Baltacı, F., & Çevirgen, A. (2020). The impacts of second home tourism on socio-cultural and economic life: The residents' perspective. *Journal of the Geographical Institute "Jovan Cvijić" SASA*, 70(3), 273-288. <https://doi.org/10.2298/IJGI2003273B>
- Barcelona Turisme. (2023). *About Us*. https://professional.barcelonaturisme.com/en/corporate/corporate-information/about-us?_gl=1*wwwwhh*_ga*MTk3Mzc2Mjk1Ny4xNzAzNjAzMjE0*_ga_5SN4KC9Q6J*MTcwMzYwMzIxNC4xLjEuMTcw-MzYwNDA5MS4yNS4wLjA
- Başçılar, M., Karataş, M., & Pak Güre, M. D. (2022). The Russia-Ukraine War, forced migration and humanitarian corridors: An assessment in the context of social work. *Gümüşhane University Journal of Health Sciences*, 11(2), 794-805. <https://doi.org/10.37989/gumussagbil.1095252>
- Bayrakçı, S. (2014). Turizmin Alanya'nın sosyo-kültürel gelişimine etkisi [Impacts of tourism on socio-cultural development of Alanya]. In N. Kozak & O. E. Çolakoğlu (Eds.), *III. Disiplinlerarası Turizm Araştırmaları Kongresi Bildiri Kitabı [Proceedings book of III. Interdisciplinary tourism research]* (pp. 914-926). Detay Yayıncılık.
- Bayrakçı, S., & Zencir, E. (2018). Muz bahçelerinden turizm cennetine: Alanya'nın turizm yolculuğu [From banana gardens to tourism paradise: Tourism journey of Alanya]. In N. Kozak (Ed.), *Dünden Bugüne Türkiye'de Turizm: Kurumlar, Kuruluşlar, Turizm Bölgeleri ve Meslekler [Tourism in Türkiye from yesterday to today: Organizations, establishments, tourism regions and jobs]* (pp. 53-71). Nazmi Kozak.
- Berebekova, A., & Uysal, M. (2021). Wellbeing and quality of life in tourism. In J. Wilks, D. Pendergast, P. A. Leggat, & D. Morgan (Eds.), *Tourist Health, Safety and Wellbeing in the New Normal* (pp. 243-268). Springer. https://doi.org/10.1007/978-981-16-5415-2_10
- Berebekova, A., Uysal, M., & Assaf, A. G. (2024). Quality of life and public policy development for tourism destinations. *Cornell Hospitality Quarterly*, 65(1), 34-43. <https://doi.org/10.1177/19389655231182089>
- Blázquez-Salom, M., Cladera, M., & Sard, M. (2021). Identifying the sustainability indicators of overtourism and undertourism in Majorca. *Journal of Sustainable Tourism*, 31(7), 1694-1718. <https://doi.org/10.1080/09669582.2021.1942478>
- Bowen, G. A. (2009). Document analysis as a qualitative research method. *Qualitative Research Journal*, 9(2), 27-40. <https://doi.org/10.3316/QRJ0902027>
- Buhalis, D. (2000). Marketing the competitive destination of the future. *Tourism Management*, 21(1), 97-116. [https://doi.org/10.1016/S0261-5177\(99\)00095-3](https://doi.org/10.1016/S0261-5177(99)00095-3)
- Buitrago E. M., & Yñiguez, R. (2021). Measuring Overtourism: A necessary tool for landscape planning. *Land*, 10(9), 889. <https://doi.org/10.3390/land10090889>

- Buitrago-Esquinas, E. M., Foronda-Robles, C., & Yñiguez-Ovando, R. (2023). A literature review on overtourism to guide the transition to responsible tourism. *Revista de Estudios Andaluces*, 45, 71-90. <https://doi.org/10.12795/rea.2023.i45.04>
- Butler, R. (2018). Challenges and opportunities. *Worldwide Hospitality and Tourism Themes*, 10(6), 635-641. <https://doi.org/10.1108/WHATT-07-2018-0042>
- Çelik, M. N., & Buhalis, D. (2022). Sustainable destination development. In D. Buhalis (Ed.), *Encyclopedia of Tourism Management and Marketing* (pp. 305-309). Edward Elgar Publishing. <https://doi.org/10.4337/9781800377486.sustainable.destination.development>
- Çelik, M. N., & Çevirgen, A. (2021). The role of accommodation enterprises in the development of sustainable tourism. *Journal of Tourism and Services*, 23(12), 181-198. <https://doi.org/10.29036/jots.v12i23.264>
- Çevirgen, A. (2023). Alanya'da Turizm: Dünü, Bugünü ve Geleceği [Tourism in Alanya: Its yesterday, today and future]. In O. Karaoğlu (Ed.), *Alanya: Kadim Medeniyetler Kalesi [Alanya: The castle of ancient civilizations]* (pp. 197-223). Vakıfbank Kültür Yayınları.
- Çevirgen, A., & Çelik, M. N. (2023). Residents' overtourism awareness, subjective wellbeing and their support for tourism development. *19th Contemporary Trends in Tourism and Hospitality, 2022, Creative Culture Capitals, Collection of Papers, e-Book* (pp. 1-11). Novi Sad.
- Çevirgen, A., & Kesgin, M. (2007). Local authorities' and NGOs' perceptions of tourism development and urbanization in Alanya. *Tourism: An International Interdisciplinary Journal*, 55(3), 309-322. <https://hrcak.srce.hr/24651>
- Charlton, C. (2018). 'BALCONING IS FUN' Sick anti-tourist posters mocking Brit balcony plunge deaths spring up around Barcelona encouraging holidaymakers to risk their lives. *The Sun News*. <https://www.thesun.co.uk/news/7013850/sick-anti-tourist-posters-barcelona-balcony-deaths-balconing/>
- Dods, R., & Butler, R. (2019). The phenomena of overtourism: a review. *International Journal of Tourism Cities*, 5(4), 519-528. <https://doi.org/10.1108/IJTC-06-2019-0090>
- Duignan, M. B., Everett, S., & McCabe, S. (2022). Events as catalysts for communal resistance to overtourism. *Annals of Tourism Research*, 96, 1-15. <https://doi.org/10.1016/j.annals.2022.103438>
- Farsari, I. (2012). The development of a conceptual model to support sustainable tourism policy in north mediterranean destinations. *Journal of Hospitality Marketing & Management*, 21(7), 710-738. <https://doi.org/10.1080/19368623.2012.624298>
- Frleta, D. S. (2022). Perceived wellbeing – mature vs. developing tourist destination. *European Journal of Tourism Research*, 32, 1-17. <https://doi.org/10.54055/ejtr.v32i.2623>
- García Hernández, M., Ivars-Baidal, J., & Mendoza de Miguel, S. (2019). Overtourism in urban destinations: The myth of smart solutions. *Boletín de la Asociación de Geógrafos Españoles*, 83. <http://dx.doi.org/10.21138/bage.2830>
- Gonzalez, A. T. (2018). Venice: the problem of overtourism and the impact of cruises. *Journal of Regional Research*, 42, 35-51. <https://investigacionesregionales.org/en/article/venice-the-problem-of-overtourism-and-the-impact-of-cruises/>
- Gonzalez-Reverte, F. (2022). The perception of overtourism in urban destinations. Empirical evidence based on residents' emotional response. *Tourism Planning & Development*, 19(5), 451-477. <https://doi.org/10.1080/21568316.2021.1980094>
- Goodwin, H. (2017). The challenge of overtourism. *Responsible tourism partnership working paper 4*, 1-19. <https://harold-goodwin.info/wp-content/uploads/2020/08/rtpwp4overtourism012017.pdf>
- Governorship of Antalya. (2023). Alanya. <http://www.antalya.gov.tr/alanya>
- Hughes, N. (2018). 'Tourists go home': anti-tourism industry protest in Barcelona. *Social Movement Studies*, 17(4), 471-477. <https://doi.org/10.1080/14742837.2018.1468244>
- Ivars-Baidal, J. A., Hernández, M. G., & Mendoza de Miguel, S. (2019). Integrating overtourism in the smart tourism cities agenda. *E-Review of Tourism Research*, 17(2), 122-139. <https://ertr-ojs-tamu.tdl.org/ertr/article/view/500>
- Koens, K., Postma, A., & Papp, B. (2018). Is overtourism overused? Understanding the impact of tourism in a city context. *Sustainability*, 10(12), 1-15. <https://doi.org/10.3390/su10124384>
- Kridel, C. (2015). The biographical and documentary milieu. In M. F. He, B. D. Schultz, & W. H. Schubert (Eds.), *The Sage Guide to Curriculum in Education* (pp. 311-318). Sage.
- Kuščer, K., & Mihalič, T. (2019). Residents' attitudes towards overtourism from the perspective of tourism impacts and cooperation—The case of Ljubljana. *Sustainability*, 11(6). Article 1823. <https://doi.org/10.3390/su11061823>
- McKinsey & Company and WTTC (World Travel & Tourism Council). (2017). *Coping with success: Managing overcrowding in tourism destinations*. McKinsey & Company and World Travel & Tourism Council. <https://www.mckinsey.com/industries/travel-logistics-and-infrastructure/our-insights/coping-with-success-managing-overcrowding-in-tourism-destinations>
- Mihalic, T. (2020). Conceptualising overtourism: a sustainability approach. *Annals of Tourism Research*, 84, Article 103025. <https://doi.org/10.1016/j.annals.2020.103025>
- Milano, C., Cheer, J. M., & Novelli, M. (2018). Overtourism: a growing global problem. *The Conversation*, 18(1), 1-5. <https://theconversation.com/overtourism-a-growing-global-problem-100029>
- Milano, C., Novelli, M., & Cheer, J. M. (2019a). Overtourism and degrowth: a social movements perspective. *Journal of Sustainable Tourism*, 27(12), 1857-1875. <https://doi.org/10.1080/09669582.2019.1650054>

- Milano, C., Novelli, M., & Cheer, J. M. (2019b). Overtourism and tourismphobia: A journey through four decades of tourism development, planning and local concerns. *Tourism Planning & Development*, 16(4), 353-357. <https://doi.org/10.1080/1568316.2019.1599604>
- Morgan, H. (2021). Conducting a qualitative document analysis. *The Qualitative Report*, 27(1), 64-77. <https://doi.org/10.46743/2160-3715/2022.5044>
- Morrison, A. M. (2024). Professional destination management trends and issues. In A. M. Morrison & D. Buhalis (Eds.), *Routledge Handbook of Trends and Issues in Global Tourism Supply and Demand* (1st Ed., pp. 301-316). Routledge. <https://doi.org/10.4324/9781003260790-31>
- Morrison, A. M. (2019). *Marketing and Managing Tourism Destinations* (2nd Ed.) Routledge.
- O'Regan, M., Salazar, N. B., Choe, J., & Buhalis, D. (2022). Unpacking overtourism as a discursive formation through interdiscursivity. *Tourism Review*, 77(1), 54-71. <https://doi.org/10.1108/TR-12-2020-0594>
- Papadopoulou, N. M., Ribeiro, M. A., & Prayag, G. (2022). Psychological determinants of tourist satisfaction and destination loyalty: The influence of perceived overcrowding and overtourism. *Journal of Travel Research*, 62(3), 1-19. <https://doi.org/10.1177/00472875221089049>
- Peeters, P., Gössling, S., Klijs, J., Milano, C., Novelli, M., Dijkmans, C., Eijgelaar, E., Hartman, S., Heslinga, J., Isaac, R., Mitas, O., Moretti, S., Nawijn, J., Papp, B., & Postma, A. (2018). *Research for TRAN Committee - Overtourism: impact and possible policy responses*. European Parliament, Policy Department for Structural and Cohesion Policies. [https://www.europarl.europa.eu/RegData/etudes/STUD/2018/629184/IPOL_STU\(2018\)629184_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/STUD/2018/629184/IPOL_STU(2018)629184_EN.pdf)
- Pérez Garrido, B., Sebrek, S. S., Semenova, V., Bal, D., & Michalkó, G. (2022). Addressing the phenomenon of overtourism in Budapest from multiple angles using unconventional methodologies and data. *Sustainability*, 14(4), Article 2268. <https://doi.org/10.3390/su14042268>
- Reinhold, S., Beritelli, P., & Grünig, R. (2019). A business model typology for destination management organizations. *Tourism Review*, 74(6), 1135-1152. <https://doi.org/10.1108/TR-03-2017-0065>
- Roberts, T., Renda, A. I., & Pinto, P. (2022). Residents' perceptions on tourism impacts and quality of life: The case of Faro. *Journal of Tourism, Sustainability and Well-being*, 10(1), 39-57. <https://doi.org/10.34623/z1zj-5q27>
- Rodriguez, C. (2023, July 31). Tourists Go Home! Fed up with over-tourism, European hotspots impose bans, fines, taxes. *Forbes*. <https://www.forbes.com/sites/ceciliarodriguez/2023/07/31/tourists-go-home-fed-up-with-over-tourism-european-hotspots-impose-bans-fines-taxes-and-traps/?sh=ac0373465f58>
- Ruggieri, G., Calò, P., & Orthodoxou, K. (2020). Overtourism and undertourism: ICT in island development policy. In *Annual Report on Global Islands 2019* (pp. 85-108). Island Studies Press at the University of Prince Edward Island. <https://island-studies.com/files/2022/08/Annual-Report-on-Global-Islands-2019-Chapter-3-Overtourism-and-undertourism-Giovanini-Ruggieri-Patrizia-Calo-Koulla-Orthodoxou.pdf>
- Saarinén, J. (2006). Traditions of sustainability in tourism studies. *Annals of Tourism Research*, 33(4), 1121-1140. <https://doi.org/10.1016/j.annals.2006.06.007>
- Sebrek, S. S., Garrido, B. P., & Michalkó, G. (2022). Why are unfavorable signs of overtourism ignored by urban politics? An attention-based explanation of no intervention. *Tourism Planning & Development*, 1-9. <https://doi.org/10.1080/21568316.2022.2151503>
- Sheivachman, A. (2016). Iceland and the trials of 21st century tourism. *Skift*. <https://skift.com/iceland-tourism/>
- Song, Q., & Wondirad, A. (2023). Demystifying the nexus between social media usage and overtourism: evidence from Hangzhou, China. *Asia Pacific Journal of Tourism Research*, 28(4), 364-385. <https://doi.org/10.1080/10941665.2023.2230313>
- Spilanis, I., Le Tellier, J., & Vayanni, H. (2012). *Towards an observatory and a "quality label" for sustainable tourism in the Mediterranean*. (Blue Plan Papers 12). Plan Bleu/ UNEP/ MAP Regional Activity Center. https://planbleu.org/wp-content/uploads/2012/06/Cahier12_destinations_EN.pdf
- Tam, P. S., Lei, C. K., & Zhai, T. (2023). Investigating the bidirectionality of the relationship between residents' perceptions of tourism impacts and subjective wellbeing on support for tourism development. *Journal of Sustainable Tourism*, 31(8), 1852-1868. <https://doi.org/10.1080/09669582.2022.2071911>
- TGA (Türkiye Tourism Promotion and Development Agency). (2023). *About the Sustainable Tourism Program*. <https://tga.gov.tr/en/safe-and-sustainable-tourism/sustainable-tourism-program/about-the-sustainable-tourism-program>
- Toposophy & HOTREC (Hospitality Europe). (2018). *HOTREC position paper on overtourism*. HOTREC. https://www.hotrec.eu/en/policies/_overtourism_8211_a_growing_concern_to_be_addressed_in_a_responsible_and_sustainable_manner.html
- Tosun, C., & Çalışkan, C. (2011). *Profile of sustainability in Alanya (Turkey) as a tourist destination. An analysis for achieving a better level of sustainable tourism development at local scale*. Plan Blue/UNEP/MAP Regional Activity Center.
- TSI (Turkish Statistical Institute). (2023). Adrese Dayalı Nüfus Kayıt Sistemi Sonuçları [Address Based Population Registration System Results]. <https://biruni.tuik.gov.tr/medas/?kn=95&locale=tr>
- UNEP & WTO (United Nations Environment Programme & World Tourism Organization). (2005). *Making Tourism more Sustainable: A Guide for Policy Makers*. <https://wedocs.unep.org/20.500.11822/8741>

- UNWTO (United Nations World Tourism Organization). (2019). *UNWTO Guidelines for Institutional Strengthening of Destination Management Organizations (DMOs) – Preparing DMOs for new challenges*. United Nations World Tourism Organization. <https://doi.org/10.18111/9789284420841>
- UNWTO (United Nations World Tourism Organization). (2021). *International Tourism Highlights 2020 Edition*. United Nations World Tourism Organization. <https://www.e-unwto.org/doi/epdf/10.18111/9789284422456>
- UNWTO (United Nations World Tourism Organization); Centre of Expertise Leisure & Hospitality; NHTV Breda University of Applied Sciences; and NHL Stenden University of Applied Sciences. (2018). *'Overtourism'? Understanding and managing urban tourism growth beyond perceptions*. United Nations World Tourism Organization. <https://doi.org/10.18111/9789284420070>
- UNWTO INSTO (World Tourism Organization International Network of Sustainable Tourism Observatories). (2023, December 26). About. <https://www.unwto.org/insto/>
- Vargas-Sánchez, A. (2020). Overtourism and smart cities: present and future. In J. A. Oskam (Ed.), *The Overtourism Debate* (pp. 267-278). Emerald Publishing Limited. <https://doi.org/10.1108/978-1-83867-487-820201017>
- Williams, Z. (2023, August 17). Wish you weren't here! How tourists are ruining the world's greatest destinations. *The Guardian*. <https://www.theguardian.com/travel/2023/aug/17/wish-you-werent-here-how-tourists-are-ruining-the-worlds-greatest-destinations>
- WTO (World Tourism Organization). (2002). *Tourism Highlights 2002*. World Tourism Organization. <https://www.e-unwto.org/doi/pdf/10.18111/9789284406876>

ORCID

Muhammet Necati Çelik  <https://orcid.org/0000-0001-5201-8024>

Aydın Çevirgen  <https://orcid.org/0000-0002-3245-8783>

Notes on contributors

Muhammet Necati Çelik is a Research Assistant and Ph.D. Candidate in the Department of Tourism Management at Alanya Alaaddin Keykubat University. He started to study tourism during his vocational high school period in 2006. He had his bachelor's degree in Tourism Management in 2014 and completed his master's thesis on the sustainability of accommodation enterprises in 2019. He is in the last year of his doctoral degree in tourism and hotel management now. He is conducting his research on tourism planning and policy, sustainable tourism, destination management, digital nomad destinations, stakeholder management, hospitality management, and overtourism issues.

Aydın Çevirgen is an associate professor in the Department of Tourism Management, Faculty of Tourism at the Alanya Alaaddin Keykubat University. His research interests focus on community tourism development, tourism management, sustainable tourism, second home tourism and ecotourism.

The Application of Artificial Intelligence in the Tourism Industry: A Systematic Literature Review Based on Prisma Methodology

Henrique José Gonçalves Henriques  ¹

Cláudia Ribeiro de Almeida  ²

Célia Maria Quitério Ramos  ³

1. Research Centre for Tourism, Sustainability and Well-being (CinTurs); School of Hospitality and Management (ESGHT), Universidade do Algarve, Faro, Portugal

2. Research Centre for Tourism, Sustainability and Well-being (CinTurs); School of Hospitality and Management (ESGHT), Universidade do Algarve, Faro, Portugal

3. Research Centre for Tourism, Sustainability and Well-being (CinTurs); School of Hospitality and Management (ESGHT), Universidade do Algarve, Faro, Portugal

ABSTRACT

Tourism is one of the biggest industries in the world and its contribution to the global economy has continued to grow. Due to the rapid development of technology, tourism has seen some critical changes in how people interact with the industry. By applying artificial intelligence (AI) to different aspects of the tourism business, it is possible to increase efficiency by using resources more effectively. This paper aims to provide insights into how AI technologies can be applied to different aspects of tourism operations and services to improve the customer experience both online and offline and at service providers such as hotels. A literature review is conducted based on the PRISMA methodology by running searches on databases Scopus and Web of Science. This research contributes to providing an overview of how current AI technologies are used in the tourism industry and how they may be used in the future to enhance customers' experiences when interacting with different aspects of tourism. It also examines various concerns that need further investigation before adoption can occur. The review shows that the application of AI technologies can improve numerous facets of tourism operations and services, resulting in numerous advantages.

KEYWORDS

Artificial Intelligence, Hospitality, AI Hospitality Technologies, Robots, Tourism Industry.

ARTICLE HISTORY

Received 30 October 2023 Accepted 23 February 2024

1. Introduction

AI is beginning to widespread in the most basic and common daily tasks. To investigate this, the authors conducted a systematic literature review of AI's potential applications, benefits, and limitations in the tourism industry. It will examine how AI technologies are being used in the industry and the state of the art. Technology has become a crucial component of the hospitality and tourism industry. The widespread adoption of digital tools and platforms transformed the way guests plan, book, and experience their travel (Kansakar et al., 2019). Similarly, technological advances enabled industry professionals to optimize their operations, increase productivity, and improve profitability (Buhalis & Moldavska, 2022). However, the rapid pace of technological change presents several challenges, such as data privacy and security, the digital divide, and the need for digital skills training. Therefore, examining the latest trends, challenges, and opportunities in hospitality and tourism technology is imperative.

Hospitality and tourism should consider a reasonable layout and carry out digital transformation (Cheng et al., 2023). The tourism industry has been growing rapidly, and technology has played a significant role in shaping the sector's growth. AI has been increasingly used in various industries (Huang & Rust, 2018), and tourism is no exception. AI has the potential to revolutionize the tourism industry, providing significant benefits to tourists and businesses.

The hospitality industry needs to pay attention to personalization and pace with the times in the process of using digital technology and needs to use more digital means and decisions that have a high positive impact on the perception and behavior of customers and employees and pay attention to the impact of the policy (Wirtz et al., 2018). Consumer experience is essential to hospitality and tourism.

During digital transformation, using digital technology to interact with consumers and provide services, enterprises should always pay attention to consumer feedback and adjust the digital transformation strategy (Cheng et al., 2023). As per literature review, there's a consensus that AI can help tourism companies deliver personalized and efficient services, enabling them to stand out in an increasingly competitive market.

The adoption of AI can provide businesses with actionable insights, leading to better decision-making, increased revenue, and customer loyalty. However, implementing AI in tourism comes with several challenges, such as ethical concerns, data privacy, and the lack of human touch in service delivery. Therefore, it is essential to review the current state of AI in tourism to identify the techniques used, benefits, challenges, and potential research directions.

The objective of this research is to synthesize the current state of knowledge on this topic, identify research gaps, and provide insights into future research directions and practical implications. This article is subdivided into five sections, without considering the introduction. The first section presents the theoretical foundations of what is AI, highlighting the most common definitions. The second section discusses the research methodology using the PRISMA model. The third section presents the results of a literature review focused AI based solutions in the tourism industry, the evolution, how can it help T&H operational improvement, financial performance, data analysis and other potentialities. The fourth section highlights the discussion, considering theoretical and practical implications. The last section presents the conclusions, limitations, and future research.

2. Theoretical Foundations

AI refers to the simulation of human intelligence in machines that are programmed to think and learn like humans and perform tasks that typically require human intelligence, such as visual perception, speech recognition, decision-making, and language translation (Buhalis et al., 2019); thus, there is no consensus on AI's definition, and there is no generic definition of AI.

In a recent study, Sheikh et al. (2023) characterized AI as "systems that display intelligent behaviour by analysing their environment and taking actions with some degree of autonomy to achieve specific goals". It involves the development of algorithms and computer applications that can process vast amounts of data, recognize patterns, and make predictions or decisions based on that data. For the extraction of knowledge from acquired and preprocessed data, data analysis employs advanced techniques from data

mining methods, information theory, and AI in diverse industries such as tourism, hospitality, etc. (Sharma et al., 2022).

Some popular types of algorithms used in data processing include machine learning, deep learning, and artificial neural networks. Similarly, data can be structured or unstructured, and it can come from various sources such as social media, sensors, or customer databases. AI is typically defined as a collection of problem-solving technologies that mimic human intelligence (Lai & Hung, 2018). Crafts (2021) assumes that AI in the future will become considered a General-Purpose Technology (GPT) like steam or electricity, complementing enabling technologies such as Robots or Voice Assistants.

3. Research Methodology

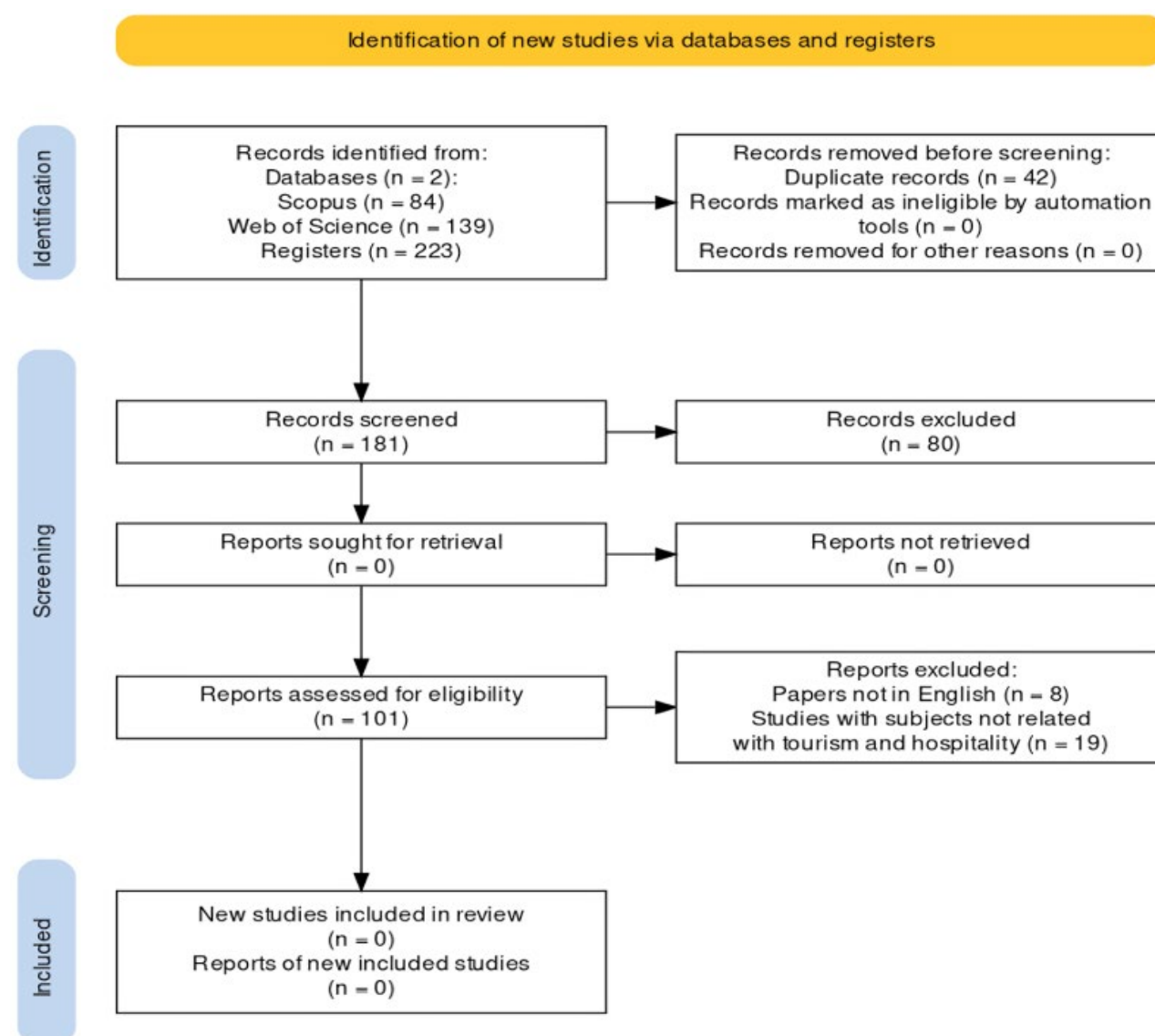
The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) model (Haddaway et al., 2022) was used to conduct a comprehensive search for peer-reviewed articles published between 2013 and 2023. The search was conducted in two electronic databases, Scopus and Web of Science, using relevant keywords such as “artificial intelligence” hospitality” AND OR “artificial intelligence” hospitality service” AND OR “guest experience”.

The inclusion criteria were articles written in English, published in peer-reviewed journals, and focused on hospitality and tourism technology. After screening titles, abstracts, and full texts, 74 articles were selected for inclusion in the review. Below, inclusion and exclusion criteria are explained. Figure 1 shows the Prisma Flow Diagram. Table 1 shows the inclusion and exclusion criteria.

Table 1. Inclusion and Exclusion Criteria

Inclusion criteria	Exclusion criteria
Papers written in the English Language	Studies with subjects not related with tourism and hospitality
Articles published between January 2013 and March 2023	
The source type is a journal (Web of Science and Scopus)	
Search protocol: “artificial intelligence” hospitality” AND OR “artificial intelligence” hospitality service” AND OR “guest experience”.	

Source: Own Elaboration

Figure 1. Prisma Flow Diagram

Source: Own Elaboration

Due to the recent growing importance of this theme for academics and scholars, it is presented in Table 2, a resume of the number of published articles per year, which justifies the choice of our research. The data search was conducted in May '23.

Table 2. Results per Year

Year	Nº of Articles	Percentage %
2018	1	1,35%
2019	3	4,05%
2020	14	18,91%
2021	20	27,02%
2022	31	41,89%
2023	5	6,75%

Source: Own Elaboration

Table 3 presents the results per author and the number of articles published.

Table 3. Results per Author

Author	Nº of Articles
Buhalis, Dimitrios	4
Bai, Billy	4
Webster, Craig	4
Gursoy, Dogan	4
Ivanov, Stanislav	3
Li, Minglong	3
Choi, Youngjoon	3
Yin, Dexiang	3
Qiu, Hailian	3
Sivathanu, Brijesh	2
Wong, Ip Kin Anthony	2
Oh, Munhyang	2
Shi, Si	2
Pillai, Rajasshrie	2
Chi, Oscar Hengxuan	2
Choi, Miju	2
Kim, Seongseop	2
Other	13

Source: Own Elaboration

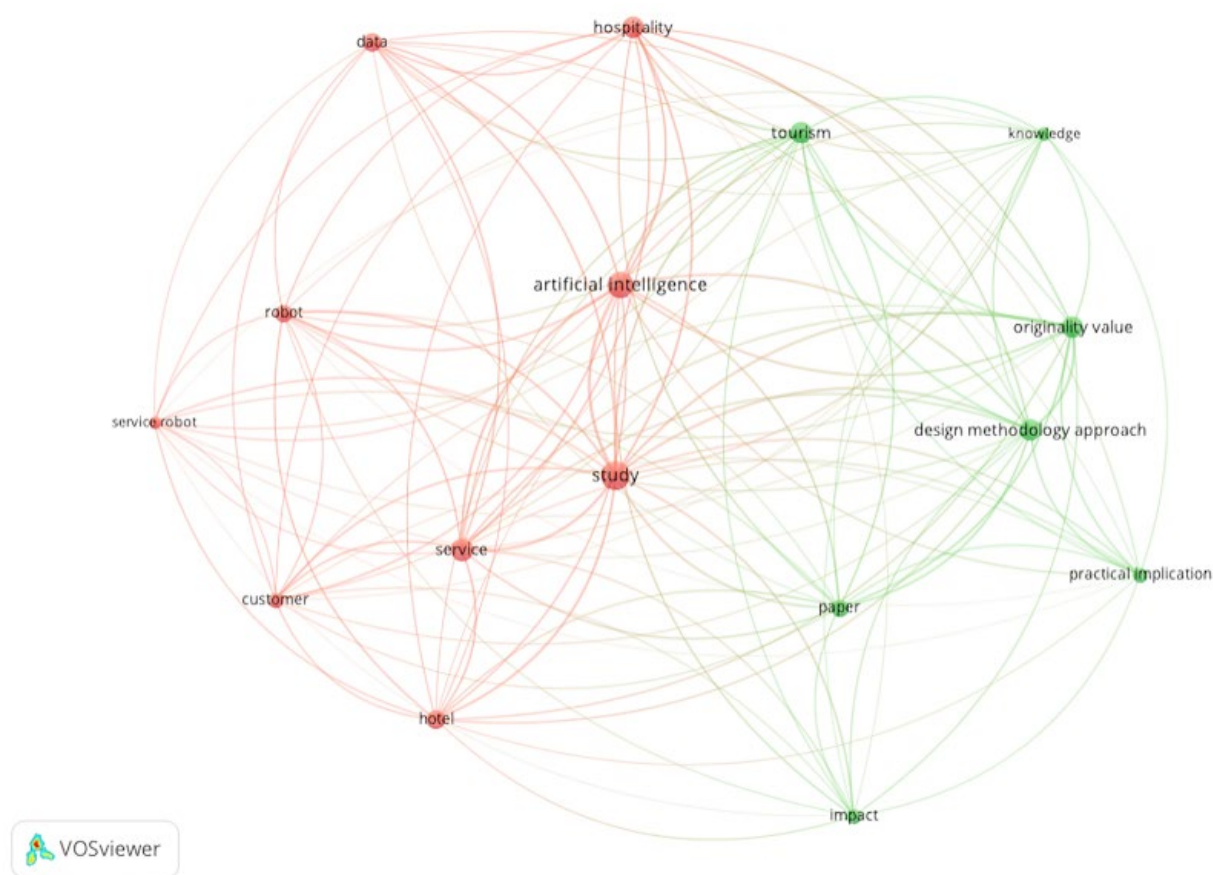
Table 4 aggregates the articles per journal and the SCImago ranking of each journal to validate the article's publication's quality.

Table 4. Results per Journal

Journal	Nº Articles (%)	SJR Ranking
International Journal of Contemporary Hospitality Management	10 (13,51%)	Q1
International Journal of Hospitality Management	9 (12,16%)	Q1
Journal of Hospitality Marketing and Management	5 (6,75%)	Q1
Tourism Review	5 (6,75%)	Q1
Eletronic Markets	4 (1,68%)	Q1
Journal of Hospitality and Tourism Technology	3 (4,05%)	Q1
Technology In Society	3 (4,05%)	Q1
Journal of Tourism Futures	3 (4,05%)	Q1
Worldwide Hospitality and Tourism Themes	2 (2,70%)	Q2
Other Journals	30 (40,54%)	

Source: Own Elaboration

To justify the correlation between the thematic and selected papers, as an aggregation of articles was done in VOSviewer Software (van Eck & Waltman, 2008) to identify the main topics (Figure 2). Artificial Intelligence, hospitality, and tourism were identified and justified our research topic.

Figure 2. VOSviewer Topic Analysis

Source: Own Elaboration

With Rayyan Software (Ouzzani et al., 2016) keyword research based on the selected articles for literature review was conducted to identify the main keywords present and reinforce our research topic selection. Table 5, lists the main keywords found.

Table 5. Articles' main Keywords Researched with Rayyan Software

Keywords	N° Articles
Hospitality	55
Artificial Intelligence	51
Service	46
AI	35
Robots	27
Hotel	27

Source: Own Elaboration

To validate the keyword research with Rayyan Software a Machine Learning Text Mining model was applied in Orange Software (Demšar et al., 2013), using a corpus viewer and creating a bag of words. The result in Figure 3 validates the article selection and reinforces the VOSviewer results.

Figure 3. Orange text mining cloud of words from the selected articles



Source: Own elaboration

4. Results of Literature Review

4.1 AI Technologies in the Tourism Industry

Recent AI applications, such as robotics, Augmented Reality/Virtual Reality (AR/VR), and chatbot/virtual assistants (VAs), appear to be transforming the tourism and hospitality (T&H) sectors (Doborjeh et al., 2022). The susceptibility to AI adoption in the hotel and tourism sectors varies depending on the type of AI. Virtual assistants, chatbots, and search/booking engines place highly on the adoption susceptibility scale (Huang et al., 2022).

Accordingly, Buhalis and Moldavska (2022) analysis indicates that VA is becoming increasingly digital assistants. The use of VA technology improves customer service, expands operational capacity, and reduces expenses for hotels. Robot concierges, delivery robots, chatbots, and information assistants are replacing humans in hospitality areas using a range of devices, such as mobile apps and self-service check-in/check-out machines.

Powered by AI algorithms, big data, mobile Internet, and Internet-of-things technologies, the number of inventions supporting a move to social robotics has increased tremendously recently (Kim et al., 2022). Generating positive buzz about innovative services based on RAISA (Robot, AI, and Service Automation) in the hospitality industry can increase the likelihood of a successful promotion by reducing uncertainty (Kim et al., 2022).

Some customers might be resistant to RAISA-based services, as not all customers are eager adopters. Consumers' technological fear is a major worry; therefore, designers and developers must guarantee that chatbots are easily accessible, have a user-friendly interface, are more human-like, and engage with customers in their local languages (Pillai & Sivathanu, 2020). In addition, hotel management could make AI technology more attractive in terms of look, speech, and touch by offering physical forms to make AI visible and by enhancing its acoustic capabilities.

Interactivity and responsiveness have direct and significant effects on the psychological safety, values,

and service quality of customers. To increase service encounters and outcomes, hospitality company managers should enhance the interaction performance of their AI technology, prioritize prompt responses, and simplify the use of services. For instance, it is crucial to enhance the speech and facial recognition systems of AI to make the associated services more responsive and to personalize immersive encounters based on historical consumption data to attract more clients and provide favorable results (Li et al., 2022).

Due to the growing interest in AI and service robotics within tourism and hospitality, Saydam et al. (2022) research study analyzed 123 articles thematically to identify how AI is defined and which themes are most closely related to the phenomenon. Theoretical and conceptual works on AI and service robotics from the perspective of employees and customers (cluster 1), conceptual understanding and a systematic review of the literature on AI and service robotics in the T&H industry (cluster 2), conceptual understanding and a systematic review of the literature on AI and service robotics in the T&H sector (cluster 3) and anthropomorphism in AI literature (in cluster 4) are the focus of this research.

Cho et al. (2022) show that it is possible to use AI in different areas to improve knowledge in T&H. By employing AI technology, it is possible to reduce time and money when classifying tourism pictures and analyzing tourism destinations images (TDI) in detail, compared to a manual technique that is expensive and has restrictions on in-depth analysis. In addition, the analysis of TDI can provide a sense of what pictures DMOs (Destination Management Organizations) should provide to travelers and how to promote the tourism destination by gaining an appreciation of the region's qualities.

Oh et al. (2022) suggest the use of deep learning methodologies based on expectation-confirmation theory to predict customer satisfaction in hospitality services. If the adoption of AI solutions in tourism and hospitality is a no-return point, according to Bhushan (2021), the worldwide potential of AI is exponential; AI development should be effective. However, globally, there are contradictory perspectives regarding the repercussions of AI. Consequently, the balance between humans and AI, protocols, and a global regulatory system must be established as soon as possible to avoid catastrophic outcomes.

4.2 The Evolution of AI in T&H

The use of AI in the tourism and hospitality industry has evolved significantly from the late 1990s to the present. Initially, AI was used to forecast hotel occupancy and tourism demand (Kirtil & Askun, 2021). With the integration of AI, tourism, and hospitality professionals have been able to personalize tourist experiences and provide technology-enhanced tourist experiences through the use of different AI applications (Parvez, 2021), such as search/booking engines, tourism-demand forecasting, virtual agents/chatbots, robots and autonomous vehicles, service automation, kiosks/self-service screens, augmented reality (AR), and virtual reality (VR) devices (Knani et al., 2022).

Recently, AI has also expanded the use of robotics applications in hotels and restaurants and can help tourists find more relevant information to improve their decision-making. The full potential of AI in the tourism and hospitality sector has not yet been realized, but it has already strongly influenced this field (Knani et al., 2022).

AI plays a significant role in the digital transformation of the tourism and hospitality industry. AI technologies offer advantages such as enhancing productivity, operational efficiency, and creating personalized service experiences. AI is predominantly being used for forecasting, demand analysis, and recommender systems in the travel and tourism industry (Kirtil & Aşkun, 2021). AI solutions such as big data analytics, chatbots, and machine learning are used in different settings like sentiment analysis, augmented reality, digital face recognition, robotics in hospitality and service, and intelligent chatbots to improve personalization and accurate recommendations in tourism (Filiari et al., 2021; Cheng et al., 2023).

Due to AI and IoT, unmanned intelligent hotels are emerging and realizing a non-contact accommodation experience for customers without human waiters (Cheng et al., 2023). Moreover, digital transformation helps companies to recover from the COVID-19 pandemic, which leads to a larger number of visitors, higher turnover, and a better reputation (Cheng et al., 2023).

Organizations need to develop multifaceted engagement with their employees and have an enhanced ability and willingness to adopt new AI methods and applications. However, technology may negatively affect employees' well-being, and businesses should address these issues (Knani et al., 2022).

AI technologies can provide multiple benefits for the digital transformation of the tourism and hospi-

tality industry, improving productivity, and operational efficiency, and enhancing customer experiences. Self-service technologies (SSTs) are technology-based systems that eliminate the need for human interaction to complete a business transaction, providing speed and efficiency (Giousmpasoglou & Hua, 2020). In the UK, including budget hotels, SSTs have been increasingly adopted to enhance customer service and create operational efficiencies. Budget hotels are investing in SSTs to increase controlling and operational efficiency and to engage guests in a more intelligent service design.

4.3 How AI Helps T&H Operational Improvement

The Pandemic COVID-19 period has accelerated the adoption of AI technologies in tourism and hospitality. Several scholars and researchers mention that in the examined papers. However, the pandemic period can only be considered the beginning of a new era in T&H technologies.

Webster and Ivanov (2020), predict that the robonomic society by 2100 will vastly differ from that of today. Robots, AI, and automation technologies, and only a small percentage of humans (probably less than 10 percent) will be employed, raising significant demographic, cultural, political, economic, and ethical issues. In one century, robots have transitioned from an abstract concept in science fiction to something real and have a significant role in the economy.

While robots' capabilities to provide goods and services to consumers have improved, industry, government, and consumers have not yet figured out how to fully integrate them into the economy (Webster & Ivanov, 2020). Numerous research questions posed by the introduction of robots by tourism and hospitality companies must be answered by tourism research and tourism economics. We are entering a brave new world of robonomics, and research in tourism economics should reflect this.

According to Fileri et al. (2021), the travel and tourism industry stands to gain the most from AI, which could transform this sector. European AI start-ups are concentrated in the capitals of major tourist destinations (France, UK, and Spain). Learning, Communication, and Services (i.e., big data, machine learning, and natural language processing) received the most funding from Venture Capitals, indicating a strong interest in AI solutions enabling marketing automation, segmentation, and customisation for pre-trip and post-trip tourism planning, such as big data, data analytics, machine learning, and chatbots.

Sharma et al. (2022), identify ten crucial factors for analyzing the impact of AI on a company's competitiveness. AI-readiness, AI-competent workforce, AI policies and regulations, infrastructure, AI-enabled technologies, tourist satisfaction, digital platforms, productivity, AI innovation, and financial performance are identified factors. Whilst Hsu and Tseng, (2022), look to the ten pillar technology competencies required for hospitality practitioners to face the smart era: basic information and communication technology, integration of Intelligent systems and technology, cloud computing, big data analytics, IoT, robots and chatbots, additive manufacturing, XR and simulation, cybersecurity, and AI. Hsu and Tseng (2022) argue that smartness and Industry 4.0 give clients warmth and personalization.

4.4 The AI and the Financial Performance

Before using AI to increase a company's financial performance (competitiveness), it is necessary to have the proper infrastructure, platforms, and skilled workforce. Li et al. (2021) argue that hospitality and tourism firms can appropriately adopt AI technologies that fit their services and tasks. Jabeen et al. (2022) suggest that human knowledge, services, and robotics applications most influence automation and AI implementation.

Organisations in the hospitality and tourism industries all over the world are using automation and AI to gain a competitive edge. AI type affects hospitality and tourism AI adoption. Search/booking engines, virtual agents, and chatbots are high adoption (Huang et al., 2022). All service businesses use Self-service technologies (SSTs). UK hotels, particularly affordable ones, are using this kind of technology to improve customer service and operations. The hospitality business, especially inexpensive hotels, will include AI, robots, and the IoT (Giousmpasoglou & Hua, 2020). However, Leung (2019), referred to Stakeholders who still prioritize cost savings and were unaware that technology may boost strategic planning and financial returns.

Machine Learning (ML) has provided hotels with innovative tools for evaluating and enhancing perfor-

mance, and current tourism is based on technological advancements beginning with the search for information about a certain trip destination (Parvez, 2021). One of the most common uses of ML is in service robots.

Hotels acknowledge the value of AI and robots, and automation often boosts efficiency (Nam et al., 2021). Data analysis based on ML to find patterns that help better decisions is commonly used in demand forecasting (Pereira & Cerqueira, 2022) or text mining using AI techniques to understand customer satisfaction (Kim et al., 2022; Oh et al., 2022; Sharma et al., 2022).

Ten key factors were identified for analyzing the impact of AI on a firm's competitiveness, including AI readiness, workforce, policies, infrastructure, AI-enabled technologies, productivity, innovation, and financial performance (Sharma et al., 2022). The m-TISM methodology helps understand the hierarchical relationship between these factors and their impact on financial performance. Proper infrastructure, digital platforms, and a skilled workforce are prerequisites before implementing AI. For the authors, the use of AI solutions, when well-integrated in tourism operations, has the potential to increase financial performance.

4.5 AI and Data Analysis in T&H

One of the older and main uses of AI in T&H is data analysis. From forecasting demand to sentiment analysis, through classification and satisfaction, several systems are using ML techniques to better performance decisions. Sentiment analysis algorithms, such as the valence-aware dictionary and sentiment reasoner (VADER) and bidirectional encoder representations from transformers (BERT), can be used to evaluate corpus documents by assigning sentiment values to words and phrases based on pre-compiled sentiment terms used to analyze YouTube streaming data (Kim et al., 2022).

Big data can be utilized in various ways in the tourism and hospitality industry. Due to the digital nature of the industry, big data analytics allows for real-time analysis and a more holistic approach to understanding tourism issues (Lv et al., 2022).

The different types of big data used in this industry can be divided into two categories: structured data and unstructured data. Structured data mainly comes from professional databases, government databases, and enterprise databases and has been used for performance analysis and forecasting by researchers. Unstructured data, on the other hand, includes user-generated content (UGC) and device data, providing valuable insights into travelers' preferences and behaviors (Lv et al., 2022).

For instance, deep learning models can support the analysis of social network service data and identify tourist preferences based on their photos (Cho et al., 2022), or the integration of data and technology in smart restaurants to develop intelligent ambient conditions that appeal to the diners' five senses (Wong et al., 2022).

4.6 Other AI in T&H Potentialities

Several literature reviews have already been developed by scholars and researchers regarding AI in T&H. Gaur et al. (2021) focus their research on the use of AI during the pandemic period. AI and robotics have great potential for enhancing the hospitality industry's response to pandemics like COVID-19.

The adoption of service robots in the industry can help reduce operational costs and improve service delivery by providing a technological shield between guests and employees, thereby, minimizing the risk of infection. Yang and Chew (2021) focus on challenges with the adoption of humanoid robots, identifying several risks: the robots creating more problems than they can solve; the need to integrate AI humanoid robots into the industry and avoid incidents; legal restrictions on AI robots in various countries, labor shortages; and a large amount of consumer data, which may require the use of technologies like big data and intelligent robots to continuously stimulate service innovation.

According to the literature on AI research in tourism and hospitality, several key clusters and networks have been identified. These include motor themes such as artificial neural networks and data mining, basic and transversal themes such as big data, robotics, smart tourism, the internet of things, COVID-19 and AI, specialized and peripheral themes such as forecasting tourism models, augmented reality and virtual reality, and biometrics, and emerging themes such as customer experience with service robotics

and automation (Knani et al., 2022).

Additionally, a bibliometric analysis of research progress and trends in AI and tourism identified leading contributors such as institutions and authors, as well as visualizing the evolution of AI through co-occurrence network analysis (Kirtil & Aşkun, 2021). Regarding future perspectives and avenues of research, AI in tourism and hospitality is an area that requires further exploration and analysis. Some proposed areas of study include the impact of AI on workplaces, privacy concerns, information disclosure related to AI use, smart tourism experiences, and the effects of automation and robotics on tourists' experiences (Knani et al., 2022).

Other future research agendas that need to be addressed include identifying and analyzing the most relevant topics related to AI and robotics in the industry, preparing the hospitality industry to face the changes that are certain to come due to the outbreak of COVID-19, and proposing a theoretical framework for the use of AI and robotics in the hospitality industry (Gaur et al., 2021).

4.7 Technology Challenges, Changes, and Preferences in Hospitality

AI in business, society, and the economy is reshaping experiences and relationships among stakeholders and citizens (Loureiro et al., 2021). The fast development of new technologies regarding AI and ML in the T&H industry has created new challenges for practitioners. Speed changes and the innovation processes adopted by the industry face urgent technology adoption. Some of them are likely preferable to others. Some benefits and advantages of adopting AI and robotic solutions are focused on reducing operational expenses and enhancing productivity (Nam et al., 2021). If the level of complexity involved in implementing this solution is perceived as too complex, it may deter hotels from adopting it.

From the literature review, potential challenges are identified, like (i) *perceived risk*: there is concern regarding the risks associated with AI adoption, such as financial losses, data breaches, and privacy infringement (Huang et al., 2022); (ii) *resistance by employees*: some employees may resist the adoption of new AI technologies due to fear of job loss (Nam et al., 2021); (iii) *ethical, moral, and privacy*: concerns surrounding the integration of robots in the industry, considering specific concepts such as power, discrimination, equality, and justice in the context of service robots (McCartney & McCartney, 2020); (iv) *skilled manpower*: there is a lack of skilled manpower in the AI industry, which can affect the successful implementation of AI solutions (Bhushan, 2021).

While perceiving a relative advantage positively influences the intention to adopt robotic technologies among hotel managers, compatibility and complexity have different effects. Understanding these factors can help managers make informed decisions about adopting robotic technologies in their hotels (Pizam et al., 2022). If, for industry, the impact is huge for customers, the challenges are bigger too.

The impact of AI systems adoption can enhance the travel experience through personalized services that enhance the customer experience (Nam et al., 2021). Service quality and customer satisfaction perceptions can change, where AI-based service encounters have a direct impact. The use of robots may alter how services are delivered (Ivanov & Webster, 2020) the customer's perception of them, and whether they meet their expectations. Within AI-infused service encounters, customers have more access to service value creation, which means that customers may perceive increased value in services provided through AI technologies, which can enhance their overall experience (Li et al., 2021).

4.8 Chatbots and Voice Assistants

Chatbots and Voice Assistants have commonly been adopted in the T&H industry (Klaus & Zaichkowsky, 2020). However, to make this technology more user-friendly, it is important to consider certain factors.

Firstly, the design and interface of the chatbot should be intuitive and easy to navigate, making it user-friendly for individuals with varying levels of technological expertise (Pillai & Sivathanu, 2020). Additionally, chatbots should be programmed to understand and respond to user inquiries accurately and efficiently, providing relevant information and solutions. Implementing natural language processing ca-

pabilities can enhance the chatbot's ability to comprehend and interpret user queries more effectively.

Cai et al. (2022) argue that customer perceptions of AI-enabled voice assistants in hotels are influenced by various factors such as brand, perception level, and hotel scale. Perceived usefulness and ease of use are two important factors that influence customers' intentions to use AI-enabled voice assistants.

According to Buhalis and Moldavska (2022), voice assistants are being used in hospitality to enhance customer service and streamline operations. In hotels, voice assistants, also known as VA-enabled interactions, are implemented in hotel rooms to provide digital assistance to guests. These voice assistants recognize human speech and execute commands given by users. They can perform various tasks such as providing information, setting alarms, controlling room temperature, lights, television, curtains, and even opening doors. Guests can use voice assistants to request in-room services and access personalized amenities.

4.9 Robots

The current trend in the hospitality industry regarding AI and robotics technology is the increasing adoption and implementation of these technologies in various hotel operations. Hotels across the globe are recognizing the importance of AI and robots in improving operational efficiency and enhancing the guest experience (Nam et al., 2021).

Many hotels have already implemented AI and robotics in their operations, such as using robots for the contactless delivery of food and providing information to passengers (Khaliq et al., 2022). These technologies are being used to automate processes, increase productivity, reduce costs, and provide customized and personalized services to guests (Nam et al., 2021).

The rise of service robots in the marketplace is evident, with examples such as restaurants allowing customers to interact with chefs using tabletop tablets or employing robot waiters (van Doorn et al., 2017). This technology will change the nature of customer service experiences, transforming the way customers interact with businesses.

The successful implementation of robots in the hospitality industry requires careful consideration of several important factors. The capability of service robots is crucial for their adoption in hotels. Robots should be equipped with advanced technologies that allow them to effectively communicate with guests and handle exceptional circumstances. This includes the ability to process special requests and provide personalized services (Choi et al., 2020).

Effective leadership and communication are vital during the implementation of service robots. Hotel leaders should provide clear guidelines and training to employees to ensure they understand how to work alongside robots and how their roles may be reconfigured. Including employees in the implementation process can help mitigate resistance and capitalize on the benefits of the technology (Xu et al., 2020).

Finding a balance between human and robotic labor is crucial to catering to different customer groups. Hotel managers should enhance human employees' work performance through robots, rather than replacing them entirely. This approach helps ensure the satisfaction of both high-tech and high-touch customer groups while mitigating operational risks (Ivanov et al., 2018). Accommodation establishments that use robots should emphasize the advantages of using robots in their marketing communications. This includes highlighting the robots' social skills and the unique experiences they can create for guests (Ivanov et al., 2018). Table 6 summarizes the studies and research about robots in T&H.

Table 6. Research Articles about Robots in T&H

Author	Article	Research Focus	Findings
Alma Çallı et al. (2023)	The impact of different types of service robots' usage in hotels on guests' intention to stay	Investigates the impact of service robots on hotel guests' intention to stay. It examines consumer perceptions of using robotic technologies for 12 services using the technology acceptance model (TAM) framework. The study refines the classification of robotic service delivery tasks based on characteristics and perceptions, addressing the need for studies on AI and robot applications in the hospitality sector post-COVID-19.	The findings suggest that perceived ease of use and perceived usefulness significantly influence consumer attitudes towards robotic service delivery tasks in hotels and their intention to stay in robot-staffed hotels
Ayyildiz et al. (2022)	Attitudes of hotel customers towards the use of service robots in hospitality service encounters	Examines hotel customers' attitudes towards service robots in hospitality encounters, examining factors like gender, education, generation, and cultural orientations. It emphasizes the need to explore age and culture's impact on adoption, and considers theoretical and practical perspectives, personality traits, and external factors like the Covid-19 pandemic.	The study indicates that hotel guests have a generally positive attitude towards the use of service robots in hotels. They perceive the service offered by robots at hotels as advantageous and do not see it as a disadvantage. However, they still exhibit a preference for human staff at hotels.
Goel et al. (2022)	Consumers' adoption of AI and robotics in the hospitality and tourism sector: literature review and future research agenda	The literature review studied factors driving and hindering the adoption of AI and robotics (AIR) in the hospitality and tourism sector. It identifies four major barriers: psychological, social, financial, technical, and functional. The integrated antecedent-outcome framework provides insights for academia, practitioners, AI marketers, developers, designers, and policymakers.	The study contributes to the tourism and consumer behavior literature by offering an integrated framework for understanding the adoption of Artificial Intelligence and robots in the hospitality and tourism industry.
Khaliq et al. (2022)	Application of AI and robotics in hospitality sector: A resource gain and resource loss perspective	Observes the relationship between AI and robotics awareness in the hospitality industry and employee turnover intention, influenced by perceived competitive psychological climate and job resources. It presents a theoretical framework for mitigating turnover intentions.	The findings of the study indicate that the awareness of AI and robotics in the hospitality industry leads to increased turnover intention among employees. The adoption of AI and robotics creates a sense of job loss and insecurity for employees, which in turn increases their intention to leave the organization. The study also found that mutual trust and competitive psychological climate play a moderating role in the relationship between AI and robotics awareness and turnover intention.
Kim et al. (2022)	Robots, AI, and service automation (RAISA) in hospitality: sentiment analysis of YouTube streaming data	The research examines customer attitudes towards RAISA applications in the hospitality industry, analyzing YouTube streaming data and identifying factors influencing attitudes. It offers insights on design guidelines for promoting RAISA applications and understanding customer attitudes.	The findings of the research paper reveal that the sentiment of customer responses towards RAISA applications in the hospitality industry is influenced by factors such as the sentiment of video narration and physical interaction.
Samala et al. (2022)	Impact of AI and robotics in the tourism sector: a critical insight	Investigates the impact of AI and robotics in the tourism industry, focusing on technologies like facial recognition, virtual reality, chatbots, robots, and language translators. It highlights the challenges and potential of AI in personalization, tailoring recommendations, and fast response times. AI has transformed the industry into a smart industrial hub, improving customer engagement and enhancing overall customer experience.	The authors argue that while AI enhances tourism experiential services, it cannot completely replace the human touch that is essential in experiential tourism. AI complements the future of tourism by offering automated, customized, and insightful travel services.
Belanche et al. (2021)	Frontline robots in tourism and hospitality: service enhancement or cost reduction?	Examines the impact of service robots on customer-provider relationships in the hospitality and tourism industries. It explores how customers' attributions about firms' motivation impact their intentions to use and recommend technology	Findings suggest that the introduction of service robots should focus on emphasizing the benefits of service improvement rather than cost reduction to enhance customer acceptance and engagement with the technology.
Choi et al. (2021)	Exploring the influence of culture on tourist experiences with robots in service delivery environment	Observes the impact of culture on tourists' experiences with service robots in Japan's robot-staffed hotels. It compares Japanese and non-Japanese online reviews and examines their perceptions of the services. The study emphasizes the significance of cultural perceptions in service robot acceptance.	The study's findings indicate the importance of human-robot interaction in creating a unique experience for tourists in robot-staffed hotels and highlight the role of cultural perceptions in the acceptance and development of service robots in society.

Author	Article	Research Focus	Findings
Gaur et al. (2021)	Role of AI and robotics to foster the touchless travel during a pandemic: a review and research agenda	Explores the adoption of AI and robotics in the hospitality industry as protective measures against the COVID-19 pandemic. It proposes a theoretical framework that extends protection motivation theory to explain guests' intent to adopt these technologies.	The findings of the study highlight the growing importance of AI and robotics in the hospitality industry during the COVID-19 pandemic and suggest that these technologies can play a crucial role in ensuring guest safety and enhancing hotel operations.
Huang et al. (2021)	Customer-robot interactions: Understanding customer experience with service robot	Investigates customer experience with service robots in the hospitality and tourism industries, focusing on sensory, cognitive, affective, and conative aspects. It emphasizes studying real-world settings and user-generated content for a grounded understanding of customer experience and technology acceptance.	The study found that service robots can enhance customer experience and provide new insights on consumer satisfaction and acceptance of the technology. However, the overuse of robots may diminish humanist hospitality and customer experience, potentially impacting customer loyalty and abandonment behavior.
Kim et al. (2021)	Preference for robot service or human service in hotels? Impacts of the COVID-19 pandemic	Examines the impact of robots and AI on hospitality jobs during the COVID-19 pandemic, focusing on travelers' preference for robot-served or human-served hotels.	The findings highlight the importance of human interaction in hotel service provision, such as developing trust, offering personalized service, and creating positive emotions among guests. However, the adoption of technology, specifically robots, is necessary to meet consumers' increased expectations of novel experiences, efficiency, and reduced labor costs.
Luo et al. (2021)	Understanding service attributes of robot hotels: A sentiment analysis of customer online reviews	Studies the service attributes of AI robots in the hospitality industry and their impact on customer satisfaction. It analyzes online reviews and employs multi-criteria decision-making modeling to evaluate service features' importance.	The findings of the study suggest that the service attributes of AI robots in the hospitality industry have a significant impact on customer satisfaction.
Manthiou et al. (2021)	Man vs machine: examining the three themes of service robotics in tourism and hospitality	Consolidates cross-disciplinary literature on service robots and AI in the tourism and hospitality industry, focusing on deployment, acceptance, and ethical considerations. It discusses their impact on tourists, society, wealth distribution, and employment. The study provides guidelines for implementing and developing service-robot-driven technology.	The research paper focus on three fundamental properties of service robots in the tourism and hospitality industry: deployment, acceptance, and ethical considerations. The study provides a general definition of service robots' role in society and establishes their foundational properties.
Mingotto et al. (2021)	Challenges in re-designing operations and jobs to embody AI and robotics in services. Findings from a case in the hospitality industry	Examines the impact of AI-equipped humanoid robots in the hotel reception, focusing on the evolving roles of frontline employees and customers. It examines factors in customer-robot interaction and motivations for AI adoption.	The article suggest that the use of a humanoid robot equipped with AI can act as an augmentation force in the tourism industry.
Nam et al. (2021)	The adoption of AI and robotics in the hotel industry: prospects and challenges	Investigates factors influencing AI and robotics adoption in the hotel industry. In Dubai-based smart cities, case studies reveal potential benefits such as operational efficiency, cost reduction, revenue increase, and employee satisfaction. However, obstacles like lack of data consolidation, technological complexities, cybersecurity risks, modeling difficulties, and process-based interactions hinder their adoption.	The findings provide insights into the determinants impacting the adoption of AI and robotics in the hotel industry and offer implications for easing the adoption process and achieving successful implementation.
Tuomi and Ascensão (2021)	Intelligent automation in hospitality: exploring the relative automatability of frontline food service tasks	Assesses the potential of intelligent automation in frontline food service in hospitality jobs. It examines the foundational mechanisms and how intelligent automation technology impacts them.	The study highlights the importance of developing systems that can navigate the unpredictable and dynamic environments of food service and suggests that successful implementation of intelligent automation in this industry requires a combination of human and machine capabilities.
Yang and Chew (2021)	A Systematic Review for Service Humanoid Robotics Model in Hospitality	Study the application of humanoid robots in the hospitality industry, addressing challenges, opportunities, legal, ethical, and privacy issues. The study proposes transforming traditional hospitality into an intelligence-driven model to improve customer experience and meet personalized needs.	The findings of the systematic review indicate that introducing service humanoid robots in the hospitality industry presents both challenges and opportunities. The study highlights the legal, ethical, and privacy issues that arise with the use of intelligent robots in this context.

Author	Article	Research Focus	Findings
Choi et al. (2020)	Service robots in hotels: understanding the service quality perceptions of human-robot interaction	Investigates service quality perceptions of human-robot interaction in hotels through focus-group interviews and an experiment. It explores factors like interaction quality, physical service environment, and outcome quality. The research aims to understand the impact of human-robot interaction on service quality and provide insights for the potential adoption of service robots in hotels.	The research provides insights into the service quality perceptions of human-robot interaction in hotels, which could inform the use of service robots in the hospitality industry.
Go et al. (2020)	Machine learning of robots in tourism and hospitality: interactive technology acceptance model (iTAM) – cutting edge	Surveys the acceptance of AI robots in the tourism and hospitality industry using an interactive technology acceptance model (iTAM). It emphasizes the importance of examining perceived interactivity for effective models.	The paper discusses the proposed interactive technology acceptance model (iTAM) and the factors that influence consumer perceptions of advanced robots in the tourism and hospitality industry.
Lin et al. (2020)	Antecedents of customers' acceptance of artificially intelligent robotic device use in hospitality services	Examine factors influencing customers' acceptance of artificially intelligent robotic devices in hotels, focusing on social influence, hedonic motivation, anthropomorphism, performance expectancy, and emotions. It validates the AIDUA model and provides implications for the hospitality industry to improve customer attitudes towards AI service robots.	The study suggests that customers' acceptance of AI devices in hotels is influenced by various factors. These factors include social influence, hedonic motivation, anthropomorphism, performance and effort expectancy, and emotions towards the devices.
McCartney and McCartney (2020)	Rise of the machines: towards a conceptual service-robot research framework for the hospitality and tourism industry	Research service robot acceptance in the hospitality and tourism industry, focusing on factors influencing employee and consumer acceptance, policy, compliance, and corporate decision-making processes.	The findings provide insights into the factors that influence the acceptance and experiences of service robots by both employees and consumers in the hospitality and tourism industry. It also highlights the need for considering ethical and privacy issues when implementing service robots.
Reis et al. (2020)	Service robots in the hospitality industry: The case of Henn-na hotel, Japan	Investigate service robots' impact on the hospitality industry, particularly in fully automated hotels. It addresses privacy, security, dehumanization, and social deprivation, and suggests further research and implications for theory and practice.	Findings of the article are based on a systematic literature review and content analysis. The article explores the pros and cons of using service robots in the hospitality industry, specifically focusing on the case of the Henn-na hotel in Japan.
Webster and Ivanov (2020)	Future tourism in a robot-based economy: a perspective article	Examines the impact of robots, AI, and automation technologies on the tourism industry and society. It discusses the positive and negative impacts of robonomics on work, leisure time, politics, international trade, ownership rights, and customer experiences.	The article suggests that the use of robots, artificial intelligence, and automation technologies (RAIA) in the tourism industry will have significant impacts. It is predicted that by 2100, only 10% of the workforce will be human, leading to a major transformation of society and the political economy.
Xu et al. (2020)	How will service robots redefine leadership in hotel management? A Delphi approach	Considers the impact of service robots on hospitality leadership and human resource management, identifying trends and challenges in the next decade. It highlights the need for hospitality leaders to redefine roles and foster a culture of creativity, collaboration, and support for their workforce.	The study provides valuable insights into the impact of service robots on leadership and human resource management in the hospitality industry. The findings highlight the need for hospitality leaders to rethink their role and create a work environment that embraces change and supports the human workforce in a world with service robots.
Ivanov et al. (2018)	Consumers' attitudes towards the introduction of robots in accommodation establishments	Studies consumers' attitudes towards robots in the hospitality industry, examining tasks suitable for robots and those still conducted by humans. Factors influencing attitudes include recognition of advantages, experience, general attitudes, and social skills. Addressing these attitudes is crucial for promoting growth in the tourism and hospitality industries.	The findings highlight the importance of discussing the attitudes of consumers towards robots in the hospitality industry as technology continues to advance.
Wirtz et al. (2018)	Brave new world: service robots in the frontline	Explores the potential impact of service robots on service industries, focusing on customer concerns, ethical considerations, employee interaction, competitive advantage, economics, employment, and societal implications.	The paper suggests that service robots will dominate routine service encounters and tasks with low emotional or social complexity, while tasks requiring emotional and social intelligence will likely be delivered by human beings supported by robots.

Author	Article	Research Focus	Findings
van Doorn et al. (2017)	Domo Arigato Mr. Roboto: Emergence of Automated Social Presence in Organizational Frontlines and Customers' Service Experiences	Technology's impact on service and customer experiences, introducing the concept of automated social presence (ASP) and a typology of human and automated social presence. It presents a conceptual framework and explores how ASP affects service and customer outcomes through social cognition and psychological ownership.	The document does mention that there are different combinations of automated and human social presence in organizational frontlines, and it proposes a conceptual framework that focuses on the relationship between automated social presence (ASP) and key service and customer outcomes, which is mediated by social cognition and perceptions of psychological ownership.

Source: Own Elaboration

4.10 Hospitality Service

4.10.1 Customer's Impact

AI technology can shape customer perceptions of hospitality influencing their overall experience in a service environment. Yin et al. (2023) have shown that AI's ability to create hospitable experiences has generated controversial results, with both positive and negative customer responses to frontline AI.

The use of AI in the servicescape challenges traditional sources and forms of hospitality, as it involves not only hospitality etiquette and appropriate service behaviors but also the service environment, facilities, and other non-interpersonal factors. Rauf et al. (2023) mention the generational impact as an acceptance factor, Millennials' perceptions of AI in hotel service encounters are influenced by their technological proficiency, desire for authentic experiences, preference for efficiency, and price sensitivity.

Abdel-Hamid et al. (2022), emphasize the importance of adopting advanced technologies and optimizing their utilization to enhance customer satisfaction. On the other hand, Prentice et al. (2020), consider the importance of AI preference as a moderating factor for customer engagement and experience.

Mariani and Borghi (2021) suggest that reviewers are generally satisfied with the presence of mechanical AI in the guise of service robots and perceive it as adding value to their hotel experience. Regarding biometrics solutions, Lehto et al. (2021), showed that the customers were not highly supportive of biometrics-based hotel services, did not find such services highly desirable, or believed that they positively influenced their well-being. In luxury restaurants, some negative feedback is also found. Nozawa et al. (2022), describe how consumers evaluated luxury restaurants more negatively when the service was provided by AI compared to humans. The study found that foods cooked by AI in luxury restaurants had a negative impact on evaluations of food, service, and ambiance quality.

4.10.2 Human Resources Impact

AI adoption in tourism jobs raises concerns about job insecurity for employees, as it can enhance efficiency, reduce costs, and improve the customer experience. AI's ability to mimic human thought processes could replace human tasks in large data-driven tasks (Koo et al., 2021).

Morosan and Bowen (2022) suggest that advanced information technology can alleviate the labor shortage crisis in the hospitality industry by automating tasks and processes, improving staff performance, and streamlining operations. Leung et al. (2023), mention that the adoption of robots in the hotel industry offers physical and cognitive advantages, such as assisting with labor-intensive tasks like delivering guests' requests and supporting employees in cognitive tasks like greeting guests and understanding languages.

These advantages increase efficiency, productivity, time, and effort savings, and enable employees to focus on value-creating, personalized tasks, resulting in enhanced customer satisfaction and fulfilling diverse customer needs.

5. Discussion

5.1 Theoretical Implications

This systematic literature review on the application of artificial intelligence in the tourism industry has multiple theoretical ramifications. It provides a comprehensive overview of the current state of research

in this field, emphasizing the various AI technologies currently in use and their potential impact on several tourism operations and services.

The review identifies research gaps in the field of artificial intelligence in tourism and emphasizes the need for additional research on specific topics, such as the ethical implications of artificial intelligence, its impact on the human workforce (Koo et al., 2021), and the challenges of data privacy and security (Chi et al., 2022).

These identified gaps can direct future research efforts and contribute to the theoretical development of AI in tourism. It focuses on the various AI technologies currently in use and their prospective impact on various tourism operations and services (Huang et al., 2021b; Osei & Cheng, 2023).

The purpose of this literature review is to provide a foundation for future scholarly exploration and development of AI in tourism. The review identifies factors that influence hotel managers' decision to adopt robotic technologies, as well as the significance of perceiving a relative advantage and comprehending the compatibility and complexity of AI technologies in the tourism sector.

This knowledge can help hotel administrators make informed decisions regarding the adoption of robotic technologies. The review highlights the impact of AI systems adoption on enhancing the travel experience through personalised services and the direct impact of AI-based service interactions on service quality and consumer perceptions. It also addresses how the use of robotics may affect the delivery of services and the customer's perception of those services. Recognises the challenges posed by the rapid development of new technologies in the tourism and hospitality industry, as well as the need for practitioners to adapt to these changes and address challenges such as privacy concerns, information disclosure, and the effects of automation and robotics on the experiences of tourists.

5.2 Practical Implications

The practical implications of AI in tourism are substantial for industry stakeholders. The review shows that the application of AI technologies can improve numerous facets of tourism operations and services, resulting in numerous advantages. AI can automate and improve repetitive tasks, such as the management of bookings and reservations, customer inquiries, or housekeeping duties. This automation can increase operational efficiency and avoid staff constraints (Hsu & Tseng, 2022; Morosan & Bowen, 2022).

Due to the AI capability of analysing vast quantities of data from various sources, such as customer reviews, social media, and booking patterns, it allows for determining customer trends and behaviour, that can be used to optimise business strategies and make data-driven decisions (Sharma et al., 2022). Robots and other AI technologies can assist with labor-intensive duties such as delivering guest requests and providing translation services, resulting in time and effort savings, enhanced productivity, and ultimately increased consumer satisfaction (Manthiou et al., 2021; Mingotto et al., 2021; Samala et al., 2022).

By automating certain functions, artificial intelligence enables employees to concentrate on value-generating and personalised tasks that require human interaction and creativity. This can result in more satisfying work for employees and enable them to provide superior customer service.

6. Conclusion

As with all literature reviews, this literature review contains limitations. Literature evaluations can be improved in the future by incorporating more database research and articles in additional languages.

This systematic literature review identifies several knowledge gaps and research opportunities. These gaps can guide future researchers and contribute to the theoretical advancement of artificial intelligence in the tourism industry.

Further research is required to comprehend the ethical concerns associated with applying artificial intelligence in the tourism industry, including data privacy, security, dehumanisation, social deprivation, and the influence on the human workforce; How AI technologies improve consumer experiences in the tourism industry; Identifying and addressing the obstacles and difficulties associated with implementing AI in the tourism industry; How the use of AI technologies, such as predictive analytics, can potentially increase operational efficacy in the tourism industry; Research on the interaction between humans and AI

systems and how can help identify methods to incorporate the human touch while reaping the benefits of AI technologies; Or understanding of how AI can assist employees with their duties and improve customer satisfaction, are some research lines.

ACKNOWLEDGEMENTS

This paper is financed by National Funds provided by FCT- Foundation for Science and Technology through project UIDB/04020/2020.

REFERENCES

- Abdel-Hamid, T. A., Ahmed, M. A. el A. S., Zohry, M. A. F., Elshabrawy, G. A., & Elgohary, E. M. (2022). The role of digital transformation in improving customer satisfaction: An empirical study on Egyptian hotels. *The Electronic Journal of Information Systems in Developing Countries*, 88(6). <https://doi.org/10.1002/isd2.12234>
- Alma Çallı, B., Çallı, L., Sarı Çallı, D., & Çallı, F. (2023). The impact of different types of service robots usage in hotels on guests' intention to stay. *Journal of Hospitality and Tourism Technology*, 14(1), 53–68. <https://doi.org/10.1108/JHTT-09-2021-0266>
- Ayyildiz, A. Y., Baykal, M., & Koc, E. (2022). Attitudes of hotel customers towards the use of service robots in hospitality service encounters. *Technology in Society*, 70, Article 101995. <https://doi.org/10.1016/j.techsoc.2022.101995>
- Belanche, D., Casalo, L. V., & Flavian, C. (2021). Frontline robots in tourism and hospitality: service enhancement or cost reduction? *Electronic Markets*, 31(3), 477–492. <https://doi.org/10.1007/s12525-020-00432-5>
- Bhushan, S. (2021). The impact of artificial intelligence and machine learning on the global economy and its implications for the hospitality sector in India. *Worldwide Hospitality and Tourism Themes*, 13(2), 252–259. <https://doi.org/10.1108/WHATT-09-2020-0116>
- Buhalis, D., Harwood, T., Bogicevic, V., Viglia, G., Beldona, S., & Hofacker, C. (2019). Technological disruptions in services: lessons from tourism and hospitality. *Journal of Service Management*, 30(4), 484–506. <https://doi.org/10.1108/JOSM-12-2018-0398>
- Buhalis, D., & Moldavska, I. (2022). Voice assistants in hospitality: using artificial intelligence for customer service. *Journal of Hospitality and Tourism Technology*, 13(3), 386–403. <https://doi.org/10.1108/JHTT-03-2021-0104>
- Cai, R., Cain, L. N., & Jeon, H. (2022). Customers' perceptions of hotel AI-enabled voice assistants: does brand matter? *International Journal of Contemporary Hospitality Management*, 34(8), 2807–2831. <https://doi.org/10.1108/IJCHM-10-2021-1313>
- Cheng, X., Xue, T., Yang, B., & Ma, B. (2023). A digital transformation approach in hospitality and tourism research. *International Journal of Contemporary Hospitality Management*, 35(8), 2944–2967. <https://doi.org/10.1108/IJCHM-06-2022-0679>
- Chi, O. H., Gursoy, D., & Chi, C. G. (2022). Tourists' Attitudes toward the Use of Artificially Intelligent (AI) Devices in Tourism Service Delivery: Moderating Role of Service Value Seeking. *Journal of Travel Research*, 61(1), 170–185. <https://doi.org/10.1177/0047287520971054>
- Cho, N., Kang, Y., Yoon, J., Park, S., & Kim, J. (2022). Classifying Tourists' Photos and Exploring Tourism Destination Image Using a Deep Learning Model. *Journal of Quality Assurance in Hospitality & Tourism*, 23(6), 1480–1508. <https://doi.org/10.1080/1528008X.2021.1995567>
- Choi, Y., Choi, M., Oh, M. (Moon), & Kim, S. (Sam). (2020). Service robots in hotels: understanding the service quality perceptions of human-robot interaction. *Journal of Hospitality Marketing & Management*, 29(6), 613–635. <https://doi.org/10.1080/19368623.2020.1703871>
- Choi, Y., Oh, M., Choi, M., & Kim, S. (2021). Exploring the influence of culture on tourist experiences with robots in service delivery environment. *Current Issues in Tourism*, 24(5), 717–733. <https://doi.org/10.1080/13683500.2020.1735318>
- Crafts, N. (2021). Artificial intelligence as a general-purpose technology: an historical perspective. *Oxford Review of Economic Policy*, 37(3), 521–536. <https://doi.org/10.1093/oxrep/grab012>
- Demšar, J., Curk, T., Erjavec, A., Gorup, C., Hocevar, T., Milutinovic, M., Možina, M., Polajnar, M., Toplak, M., Staric, A., Stajdohar, M., Umek, L., Žagar, L., Žbontar, J., Žitnik, M., & Zupan, B. (2013). Orange: Data Mining Toolbox in Python. *Journal of Machine Learning Research*, 14, 2349–2353.
- Doborjeh, Z., Hemmington, N., Doborjeh, M., & Kasabov, N. (2022). Artificial intelligence: a systematic review of methods and applications in hospitality and tourism. *International Journal of Contemporary Hospitality Management*, 34(3), 1154–1176. <https://doi.org/10.1108/IJCHM-06-2021-0767>
- Filieri, R., D'Amico, E., Destefanis, A., Paolucci, E., & Raguseo, E. (2021). Artificial intelligence (AI) for tourism: an European-based study on successful AI tourism start-ups. *International Journal of Contemporary Hospitality Management*, 33(11), 4099–4125. <https://doi.org/10.1108/IJCHM-02-2021-0220>
- Gaur, L., Afaq, A., Singh, G., & Dwivedi, Y. K. (2021). Role of artificial intelligence and robotics to foster the touchless travel during a pandemic: a review and research agenda. *International Journal of Contemporary Hospitality Management*, 33(11), 4079–4098. <https://doi.org/10.1108/IJCHM-11-2020-1246>

- Giousmpasoglou, C., & Hua, T. T. (2020). The Use of Self-Service Technologies in Budget Hotels: The Case of Bournemouth. *European Journal of Tourism, Hospitality and Recreation*, 10(3), 251–261. <https://doi.org/10.2478/ejthr-2020-0022>
- Go, H., Kang, M., & Suh, S. C. (2020). Machine learning of robots in tourism and hospitality: interactive technology acceptance model (iTAM) – cutting edge. *Tourism Review*, 75(4), 625–636. <https://doi.org/10.1108/TR-02-2019-0062>
- Goel, P., Kaushik, N., Sivathanu, B., Pillai, R., & Vikas, J. (2022). Consumers' adoption of artificial intelligence and robotics in hospitality and tourism sector: literature review and future research agenda. *Tourism Review*, 77(4), 1081–1096. <https://doi.org/10.1108/TR-03-2021-0138>
- Haddaway, N. R., Page, M. J., Pritchard, C. C., & McGuinness, L. A. (2022). PRISMA2020: An R package and Shiny app for producing PRISMA 2020-compliant flow diagrams, with interactivity for optimised digital transparency and Open Synthesis. *Campbell Systematic Reviews*, 18(2), Article e1230. <https://doi.org/10.1002/cl2.1230>
- Hsu, H., & Tseng, K.-F. (2022). Facing the era of smartness: constructing a framework of required technology competencies for hospitality practitioners. *Journal of Hospitality and Tourism Technology*, 13(3), 500–526. <https://doi.org/10.1108/JHTT-04-2021-0120>
- Huang, A., Chao, Y., de la Mora Velasco, E., Bilgihan, A., & Wei, W. (2022). When artificial intelligence meets the hospitality and tourism industry: an assessment framework to inform theory and management. *Journal of Hospitality and Tourism Insights*, 5(5), 1080–1100. <https://doi.org/10.1108/JHTI-01-2021-0021>
- Huang, D., Chen, Q., Huang, J., Kong, S., & Li, Z. (2021). Customer-robot interactions: Understanding customer experience with service robots. *International Journal of Hospitality Management*, 99, Article 103078. <https://doi.org/10.1016/j.ijhm.2021.103078>
- Huang, M.-H., & Rust, R. T. (2018). Artificial Intelligence in Service. *Journal of Service Research*, 21(2), 155–172. <https://doi.org/10.1177/1094670517752459>
- Ivanov, S. H., Webster, C., & Seyyedi, P. (2018). Consumers' attitudes towards the introduction of robots in accommodation establishments. *Tourism*, 63, 302–317. <https://www.researchgate.net/publication/327932977>
- Jabeen, F., Al Zaidi, S., & Al Dhaheri, M. H. (2022). Automation and artificial intelligence in hospitality and tourism. *Tourism Review*, 77(4), 1043–1061. <https://doi.org/10.1108/TR-09-2019-0360>
- Kansakar, P., Munir, A., & Shabani, N. (2019). Technology in the Hospitality Industry: Prospects and Challenges. *IEEE Consumer Electronics Magazine*, 8(3), 60–65. <https://doi.org/10.1109/MCE.2019.2892245>
- Khalik, A., Waqas, A., Nisar, Q. A., Haider, S., & Asghar, Z. (2022). Application of AI and robotics in hospitality sector: A resource gain and resource loss perspective. *Technology in Society*, 68, Article 101807. <https://doi.org/10.1016/j.tech-soc.2021.101807>
- Kim, S., Kim, J., Badu-Baiden, F., Giroux, M., & Choi, Y. (2021). Preference for robot service or human service in hotels? Impacts of the COVID-19 pandemic. *International Journal of Hospitality Management*, 93, Article 102795. <https://doi.org/10.1016/j.ijhm.2020.102795>
- Kim, T., Jo, H., Yhee, Y., & Koo, C. (2022). Robots, artificial intelligence, and service automation (RAISA) in hospitality: sentiment analysis of YouTube streaming data. *Electronic Markets*, 32(1), 259–275. <https://doi.org/10.1007/s12525-021-00514-y>
- Kirtil, İ. G., & Askun, V. (2021). Artificial Intelligence in Tourism: A Review and Bibliometrics Research. *Advances in Hospitality and Tourism Research (AHTR)*, 9(1), 205–233. <https://doi.org/10.30519/ahtr.801690>
- Klaus, P., & Zaichkowsky, J. (2020). AI voice bots: a services marketing research agenda. *Journal of Services Marketing*, 34(3), 389–398. <https://doi.org/10.1108/JSM-01-2019-0043>
- Knani, M., Echchakoui, S., & Ladhari, R. (2022). Artificial intelligence in tourism and hospitality: Bibliometric analysis and research agenda. *International Journal of Hospitality Management*, 107, Article 103317. <https://doi.org/10.1016/j.ijhm.2022.103317>
- Koo, B., Curtis, C., & Ryan, B. (2021). Examining the impact of artificial intelligence on hotel employees through job insecurity perspectives. *International Journal of Hospitality Management*, 95, Article 102763. <https://doi.org/10.1016/j.ijhm.2020.102763>
- Lai, W. C., & Hung, W. H. (2018). A framework of cloud and AI based intelligent hotel. *The 18th International Conference on Electronic Business*, 36–43.
- Lehto, X. Y., Park, S., Mohamed, M. E., & Lehto, M. R. (2023). Traveler Attitudes Toward Biometric Data-Enabled Hotel Services: Can Risk Education Play a Role? *Cornell Hospitality Quarterly*, 64(1), 74–94. <https://doi.org/10.1177/19389655211063204>
- Leung, R. (2019). Smart hospitality: Taiwan hotel stakeholder perspectives. *Tourism Review*, 74(1), 50–62. <https://doi.org/10.1108/TR-09-2017-0149>
- Li, M., Yin, D., Qiu, H., & Bai, B. (2021). A systematic review of AI technology-based service encounters: Implications for hospitality and tourism operations. *International Journal of Hospitality Management*, 95, Article 102930. <https://doi.org/10.1016/j.ijhm.2021.102930>
- Li, M., Yin, D., Qiu, H., & Bai, B. (2022). Examining the effects of AI contactless services on customer psychological safety, perceived value, and hospitality service quality during the COVID-19 pandemic. *Journal of Hospitality Marketing & Management*, 31(1), 24–48. <https://doi.org/10.1080/19368623.2021.1934932>

- Lin, H., Chi, O. H., & Gursoy, D. (2020). Antecedents of customers' acceptance of artificially intelligent robotic device use in hospitality services. *Journal of Hospitality Marketing & Management*, 29(5), 530–549. <https://doi.org/10.1080/19368623.2020.1685053>
- Loureiro, S. M. C., Guerreiro, J., & Tusssyadiah, I. (2021). Artificial intelligence in business: State of the art and future research agenda. *Journal of Business Research*, 129, 911–926. <https://doi.org/10.1016/j.jbusres.2020.11.001>
- Luo, J. M., Vu, H. Q., Li, G., & Law, R. (2021). Understanding service attributes of robot hotels: A sentiment analysis of customer online reviews. *International Journal of Hospitality Management*, 98, Article 103032. <https://doi.org/10.1016/j.ijhm.2021.103032>
- Lv, H., Shi, S., & Gursoy, D. (2022). A look back and a leap forward: a review and synthesis of big data and artificial intelligence literature in hospitality and tourism. *Journal of Hospitality Marketing and Management*, 31(2), 145–175. <https://doi.org/10.1080/19368623.2021.1937434>
- Manthiou, A., Klaus, P., Kuppelwieser, V. G., & Reeves, W. (2021). Man vs machine: examining the three themes of service robotics in tourism and hospitality. *Electronic Markets*, 31(3), 511–527. <https://doi.org/10.1007/s12525-020-00434-3>
- Mariani, M., & Borghi, M. (2021). Customers' evaluation of mechanical artificial intelligence in hospitality services: a study using online reviews analytics. *International Journal of Contemporary Hospitality Management*, 33(11), 3956–3976. <https://doi.org/10.1108/IJCHM-06-2020-0622>
- McCartney, G., & McCartney, A. (2020). Rise of the machines: towards a conceptual service-robot research framework for the hospitality and tourism industry. *International Journal of Contemporary Hospitality Management*, 32(12), 3835–3851. <https://doi.org/10.1108/IJCHM-05-2020-0450>
- Mingotto, E., Montaguti, F., & Tamma, M. (2021). Challenges in re-designing operations and jobs to embody AI and robotics in services. Findings from a case in the hospitality industry. *Electronic Markets*, 31(3), 493–510. <https://doi.org/10.1007/s12525-020-00439-y>
- Morosan, C., & Bowen, J. T. (2022). Labor shortage solution: redefining hospitality through digitization. *International Journal of Contemporary Hospitality Management*, 34(12), 4674–4685. <https://doi.org/10.1108/IJCHM-03-2022-0304>
- Nam, K., Dutt, C. S., Chathoth, P., Daghfous, A., & Khan, M. S. (2021). The adoption of artificial intelligence and robotics in the hotel industry: prospects and challenges. *Electronic Markets*, 31(3), 553–574. <https://doi.org/10.1007/s12525-020-00442-3>
- Nozawa, C., Togawa, T., Velasco, C., & Motoki, K. (2022). Consumer responses to the use of artificial intelligence in luxury and non-luxury restaurants. *Food Quality and Preference*, 96, Article 104436. <https://doi.org/10.1016/j.foodqual.2021.104436>
- Oh, S., Ji, H., Kim, J., Park, E., & del Pobil, A. P. (2022). Deep learning model based on expectation-confirmation theory to predict customer satisfaction in hospitality service. *Information Technology & Tourism*, 24(1), 109–126. <https://doi.org/10.1007/s40558-022-00222-z>
- Osei, B. A., & Cheng, M. (2023). Preferences and challenges towards the adoption of the fourth industrial revolution technologies by hotels: a multilevel concurrent mixed approach. *European Journal of Innovation Management*. <https://doi.org/10.1108/EJIM-09-2022-0529>
- Ouzzani, M., Hammady, H., Fedorowicz, Z., & Elmagarmid, A. (2016). Rayyan—a web and mobile app for systematic reviews. *Systematic Reviews*, 5(1), Article 210. <https://doi.org/10.1186/s13643-016-0384-4>
- Parvez, M. O. (2021). Use of machine learning technology for tourist and organizational services: high-tech innovation in the hospitality industry. *Journal of Tourism Futures*, 7(2), 240–244. <https://doi.org/10.1108/JTF-09-2019-0083>
- Pereira, L. N., & Cerqueira, V. (2022). Forecasting hotel demand for revenue management using machine learning regression methods. *Current Issues in Tourism*, 25(17), 2733–2750. <https://doi.org/10.1080/13683500.2021.1999397>
- Pillai, R., & Sivathanu, B. (2020). Adoption of AI-based chatbots for hospitality and tourism. *International Journal of Contemporary Hospitality Management*, 32(10), 3199–3226. <https://doi.org/10.1108/IJCHM-04-2020-0259>
- Pizam, A., Ozturk, A. B., Balderas-Cejudo, A., Buhalis, D., Fuchs, G., Hara, T., Meira, J., Revilla, M. R. G., Sethi, D., Shen, Y., State, O., Hacikara, A., & Chaulagain, S. (2022). Factors affecting hotel managers' intentions to adopt robotic technologies: A global study. *International Journal of Hospitality Management*, 102, Article 103139. <https://doi.org/10.1016/j.ijhm.2022.103139>
- Prentice, C., Weaven, S., & Wong, I. A. (2020). Linking AI quality performance and customer engagement: The moderating effect of AI preference. *International Journal of Hospitality Management*, 90, Article 102629. <https://doi.org/10.1016/j.ijhm.2020.102629>
- Rauf, A., Zurcher, M., Pantelidis, I., & Winbladh, J. (2022). Millennials' perceptions of artificial intelligence in hotel service encounters. *Consumer Behavior in Tourism and Hospitality*, 17(1), 3–16. <https://doi.org/10.1108/CBTH-04-2021-0104>
- Reis, J., Melão, N., Salvadorinho, J., Soares, B., & Rosete, A. (2020). Service robots in the hospitality industry: The case of Henn-na hotel, Japan. *Technology in Society*, 63, Article 101423. <https://doi.org/10.1016/j.techsoc.2020.101423>
- Samala, N., Katkam, B. S., Bellamkonda, R. S., & Rodriguez, R. V. (2022). Impact of AI and robotics in the tourism sector: a critical insight. *Journal of Tourism Futures*, 8(1), 73–87. <https://doi.org/10.1108/JTF-07-2019-0065>

- Saydam, M. B., Arici, H. E., & Koseoglu, M. A. (2022). How does the tourism and hospitality industry use artificial intelligence? A review of empirical studies and future research agenda. *Journal of Hospitality Marketing & Management*, 31(8), 908–936. <https://doi.org/10.1080/19368623.2022.2118923>
- Sharma, K., Jain, M., & Dhir, S. (2022). Analysing the impact of artificial intelligence on the competitiveness of tourism firms: a modified total interpretive structural modeling (m-TISM) approach. *International Journal of Emerging Markets*, 17(4), 1067–1084. <https://doi.org/10.1108/IJOEM-05-2021-0810>
- Sharma, M. P., Meena, U., & Sharma, G. K. (2022). Intelligent Data Analysis using Optimized Support Vector Machine Based Data Mining Approach for Tourism Industry. *ACM Transactions on Knowledge Discovery from Data*, 16(5), 1–20. <https://doi.org/10.1145/3494566>
- Sheikh, H., Prins, C., & Schrijvers, E. (2023). *Artificial Intelligence: Definition and Background* (pp. 15–41). Springer, Cham. https://doi.org/10.1007/978-3-031-21448-6_2
- van Doorn, J., Mende, M., Noble, S. M., Hulland, J., Ostrom, A. L., Grewal, D., & Petersen, J. A. (2017). Domo Arigato Mr. Roboto. *Journal of Service Research*, 20(1), 43–58. <https://doi.org/10.1177/1094670516679272>
- van Eck, N. J., & Waltman, L. (2008). Bibliometric Mapping of the Computational Intelligence Field. In *ERIM report series research in management Erasmus Research Institute of Management* (Issue ERS-2008-015-LIS). Erasmus Research Institute of Management. <http://hdl.handle.net/1765/11811>
- Webster, C., & Ivanov, S. (2020). Future tourism in a robot-based economy: a perspective article. *Tourism Review*, 75(1), 329–332. <https://doi.org/10.1108/TR-05-2019-0172>
- Wirtz, J., Patterson, P. G., Kunz, W. H., Gruber, T., Lu, V. N., Paluch, S., & Martins, A. (2018). Brave new world: service robots in the frontline. *Journal of Service Management*, 29(5), 907–931. <https://doi.org/10.1108/JOSM-04-2018-0119>
- Wong, I. A., Huang, J., Lin, Z. (CJ), & Jiao, H. (2022). Smart dining, smart restaurant, and smart service quality (SSQ). *International Journal of Contemporary Hospitality Management*, 34(6), 2272–2297. <https://doi.org/10.1108/IJCHM-10-2021-1207>
- Xu, S., Stienmetz, J., & Ashton, M. (2020). How will service robots redefine leadership in hotel management? A Delphi approach. *International Journal of Contemporary Hospitality Management*, 32(6), 2217–2237. <https://doi.org/10.1108/IJCHM-05-2019-0505>
- Yang, J., & Chew, E. (2021). A Systematic Review for Service Humanoid Robotics Model in Hospitality. *International Journal of Social Robotics*, 13(6), 1397–1410. <https://doi.org/10.1007/s12369-020-00724-y>
- Yin, D., Li, M., Qiu, H., Bai, B., & Zhou, L. (2023). When the servicescape becomes intelligent: Conceptualization, assessment, and implications for hospitableness. *Journal of Hospitality and Tourism Management*, 54, 290–299. <https://doi.org/10.1016/j.jhtm.2023.01.001>

ORCID

Henrique José Gonçalves Henriques  <https://orcid.org/0000-0002-5543-766X>

Claudia Ribeiro de Almeida  <https://orcid.org/0000-0002-0790-3152>

Célia Maria Quitério Ramos  <https://orcid.org/0000-0002-3413-4897>

Notes on contributors

Henrique J. G. Henriques is a PhD Tourism student in Tourism on Faculty of Economics, University of Algarve. Holds a Master degree in Hotel Management and Operations from Escola Superior de Turismo e Tecnologia do Mar, Instituto Politécnico de Leiria, and is graduated in Human Resources Management and Strategic Organization from Instituto Superior de Linguas e Administração de Lisboa. He is Professor at School for Management, Hospitality and Tourism, in University of Algarve.

Cláudia Ribeiro de Almeida holds a PhD in Tourism from University of Aveiro, a Master in Total Quality Management from Aberta University, Lisbon. She is an Adjunct Professor at School for Management, Hospitality and Tourism, also in the UALG, where she lectures mainly Tourism and Transports. Current research interests includes: Air transport; Airports; Tourism Trends; Dynamics of Tourism System; Road Tourism; Short-term rentals. She is author of several articles and book chapters, reviewer of several scientific journals. At the level of applied research, she participated in several funded projects. Researcher at the Centre for Tourism, Sustainability and Well-being (CinTurs).

Célia M. Q. Ramos holds a PhD in Quantitative Methods Applied to Economics and Management from Faculty of Economics, University of Algarve, obtained her Master in Electrical and Computers Engineering from the Higher Technical Institute, Lisbon University, and is graduated in Computer Engineering from the University of Coimbra, Portugal. She is Coordinator Professor at School for Management, Hospitality and Tourism, also in the UALG, where she lec-

tures mainly Information Systems. Current research interests include, information systems, data analytics, electronic tourism, business intelligence, digital marketing, panel data models. Has published in the fields of information systems, marketing and tourism. She is reviewer of several scientific journals. At the level of applied research, she has participated in several funded projects. Researcher at the Centre for Tourism, Sustainability and Well-being (CinTurs).