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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.

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

EDITORIAL

Tourism research continues to shed light on the evolving intersections of technology, sustainability, accessibility, and local development. This issue includes four articles that collectively illustrate how the sector is being reshaped by digital transformation, inclusive practices, and destination-specific strategies. Articles 1 to 3 adopt systematic or comprehensive literature review approaches. The first article examines Tourism 4.0, showing how smart technologies and innovation drive digital transformation while fostering sustainable growth. The second article addresses accessibility, focusing on persons with hidden disabilities and highlighting the need for inclusive tourism practices that reduce barriers and ensure equitable participation. The third article explores destination planning through the perspective of local development, emphasizing how community-based approaches, environmental conservation, and socio-cultural preservation can balance growth with long-term sustainability, supported by European case studies. The fourth article, in contrast, presents an empirical analysis of accommodation facilities in Czech tourism destinations, uncovering significant variations in sustainability practices, from nature conservation in mountain regions to water preservation in urban areas. Taken together, the four articles underscore that the future of tourism depends on digital innovation, inclusive design, collaborative planning, and context-specific sustainability practices, pointing toward a more resilient and responsible industry.

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Tourism 4.0: Unveiling the Digital Transformation and Sustainable Development of the Tourism Industry

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ABSTRACT

This study aims to provide a comprehensive overview of Tourism 4.0, a concept that enhances the value of the tourism industry through innovation, technology, knowledge, and creativity. Using a systematic review approach, the research analyses selected scholarly articles to clarify definitions, explore related digital technologies, and examine the concept's potential to support sustainable tourism development. A total of 26 articles were chosen from an initial pool of 148 based on defined quality criteria. The analysis, supported by NVivo and VOSviewer software, reveals the major themes and drivers behind Tourism 4.0, emphasising its transformative role in the tourism sector. The findings demonstrate that Tourism 4.0 can meaningfully contribute to the sustainable growth of tourism destinations by enabling digital transformation and innovation. The study identifies key research gaps and provides insights to guide future academic efforts and policymaking. By synthesising existing literature, this research offers a solid foundation for understanding Tourism 4.0 and supports informed decision-making in shaping the future of tourism through digital advancements.

KEYWORDS

Tourism 4.0, Digital Transformation, Sustainable Tourism Development, Smart Technologies, Fourth Industrial Revolution, Systematic Review.

ARTICLE HISTORY

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1. Introduction

The tourism industry, closely linked with social development and technological advancements, has gained significant attention in the digital age, attracting approximately 3.1 billion global travelers annually (Peceny et al., 2019). Recognized for its pivotal role in national economies, the tourism sector generates substantial foreign exchange earnings and government revenues, emphasising the importance of technological integration (Tasya & Usman, 2019). The rapid evolution of tourism markets underscores the critical role of innovation in establishing a sustainable competitive edge (Lim et al., 2021).

As we enter the fourth industrial revolution, the emergence of Industry 4.0, driven by global competition and mass customisation, reshapes various sectors, including tourism (Korže, 2019; Oztemel & Gursev, 2020). Industry 4.0 technologies promise to create sustainable value across economic, environmental, and social dimensions, garnering extensive study by international associations, industry communities, and universities (Sima et al., 2020; Ghobakhloo et al., 2021). The integration of these technologies within tourism aligns with several Sustainable Development Goals (SDGs), such as fostering innovation, promoting decent work, reducing inequalities, and ensuring responsible consumption (United Nations, 2015; Urosevic et al., 2018; Boluk et al., 2019). This alignment underscores the tourism industry's commitment to global sustainability efforts while embracing technology-driven innovation. Sustainability is essential for the success of smart tourism destinations (El Archi et al., 2023), highlighting the need for a comprehensive approach to developing smart and sustainable tourism strategies.

This technological revolution has led to the emergence of Tourism 4.0, characterized as a value ecosystem within the tourism sector that operates on a technology-driven service generation paradigm (Korže, 2019; Pencarelli, 2020). As the integration of technology progresses, the implementation of Industry 4.0 represents a significant stage in enhancing tourism products and services sustainably (Harish & Thomas, 2023). Tourism 4.0 fosters environmental sustainability through eco-friendly innovations, supports community engagement and contributes to economic sustainability by creating new business models and improving service delivery (Femenia-Serra et al., 2019; Peceny et al., 2019; Shafiee et al., 2022). It also aligns with SDGs related to innovation and inclusive growth by optimizing resource use, reducing environmental impacts, and ensuring that technological advancements benefit all stakeholders, including local communities (Buhalis & Amaranggana, 2015; Urosevic et al., 2018; Pencarelli, 2020; El Archi et al., 2023).

Tourism 4.0 introduces disruptive technologies that revolutionize operations within the industry, embracing digitization and the exponential growth of data to enhance destination competitiveness. Leveraging Industry 4.0 technologies such as the Internet of Things (IoT), big data, blockchain, Artificial Intelligence (AI), Virtual Reality (VR), and Augmented Reality (AR), it aims to drive service excellence in an evolving technological landscape. This movement towards increased customisation and improved service delivery, driven by advances in AI and robotics, is set to redefine the trajectory of the tourism industry (Peceny et al., 2019; Dhoundiyal & Mohanty, 2022).

Moreover, Tourism 4.0 supports the development of smart urban destinations by integrating digital tools to manage tourist flows and mitigate negative impacts like overcrowding and pollution (Buhalis & Amaranggana, 2013; Coca-Stefaniak & Seisdedos, 2020). Urban tourism, characterized by dense populations and cultural significance, stands to benefit from the advanced infrastructure promoted by Tourism 4.0. The application of these technologies can revolutionize urban tourist experiences through smart city solutions, enhanced data analytics, and interactive platforms. For instance, smart technologies such as IoT, AR, and AI can offer personalized, real-time services to visitors, contributing to efficient crowd management, improved transportation systems, and seamless interactions between tourists and city infrastructure (Zhang & He, 2020; Matušíková & Šambronská, 2023; Pranita, 2023).

Despite significant advancements, understanding the broad scope of Tourism 4.0 remains a challenge (Gomes et al., 2023). Recent studies have explored the implementation of various Industry 4.0 technologies in tourism (Balasubramanian & Ragavan, 2019; Osei, Ragavan, & Mensah, 2020b), evaluating the advantages and challenges of AI, robots, and service automation (Alexis, 2017; Ivanov & Webster, 2017; Murphy et al., 2017), as well as the impact of big data (Miah et al., 2017; Xiang & Fesenmaier, 2017). The critical components of the fourth industrial revolution and their opportunities in tourism highlight technology's importance in revitalizing the industry during crises (Gretzel et al., 2020; Lau, 2020; Zeng et al., 2020).

While existing literature has shed light on various aspects of Tourism 4.0, further exploration is needed (Korže, 2019; Stankov & Gretzel, 2020). This research aims to address this gap by examining key concepts, components, and drivers of sustainable development within the framework of Tourism 4.0. Although previous studies have explored technology integration and innovation (Stankov et al., 2020),), there is a lack of systematic analysis focusing specifically on the distinct characteristics of Tourism 4.0.

The development of Tourism 4.0 has seen a growing number of articles, particularly a surge in 2020, indicating that research on this topic is in its formative phase. However, a more detailed analysis is needed to track its evolution and identify key milestones. While literature acknowledges the technological, organizational, and environmental determinants of digital transformation (Kindzule-Millere & Zeverte-Rivza, 2022; Bekele & Raj, 2024), a comprehensive assessment of these challenges is warranted. This includes understanding the complexities of technology integration, resource allocation, and the influence of environmental factors on sustainability objectives (Pencarelli, 2020; Ramos & Brito, 2020).

The primary contributions of Tourism 4.0 lie in its potential to transform the industry through new-generation technologies and innovative business models, encompassing growth in tourism demand, sustainable practices, and the impact of technology during crises, such as the COVID-19 pandemic (Trunfio & Pasquinelli, 2021; Kurniati & Suryanto, 2023). However, further exploration is necessary to fully understand these contributions and their implications.

The novelty of this research lies in its exploration of Tourism 4.0 as a distinct paradigm within the digital evolution of tourism. While much attention has focused on smart tourism, this study specifically examines the broader and more integrated concept of Tourism 4.0. By investigating its key components, drivers for sustainable development, and its capacity to create immersive, interconnected experiences, this study fills a critical gap in the literature.

We will conduct a systematic review following PRISMA guidelines, employing NVivo software for data organization and analysis. The systematic review will include a comprehensive literature search, data evaluation using Sandelowski and Barroso's model (2006), and synthesis of findings to ensure a robust research process. The selection of the PRISMA protocol underscores our commitment to rigor in article filtration and data synthesis.

This study aims to address the following research questions:

- What are the key concepts of Tourism 4.0, and how does digital evolution impact the industry?
- What are the constructive components of Tourism 4.0?
- What are the drivers for sustainable development in Tourism 4.0, and how can these drivers be effectively integrated to achieve sustainable outcomes?

By addressing these questions, this study will provide an overview of the existing knowledge on Tourism 4.0, enabling a comprehensive assessment of its implications and potential for the tourism industry.

The first part introduces the problem statement and research questions. The second part presents the methodology and systematic review process employed. The third part provides an overview of the research results, followed by a detailed discussion in the fourth section. The fifth section presents conclusions and discusses the implications of the work, while the sixth section addresses the study's limitations and suggests future research directions.

2. Methodology

The rapid growth of academic research across various disciplines has made it difficult for scholars to stay current with the latest developments. In response, systematic approaches like meta-studies have become popular for synthesizing and analyzing previous research on specific topics. When conducted qualitatively, a meta-study is known as a meta-synthesis, which integrates findings from various studies (Zimmer, 2006). Meta-synthesis is a qualitative method used to systematically review and combine results from both qualitative and quantitative studies, continuing until information saturation is achieved (Thorne et al., 2004). This study follows a systematic review approach, guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, ensuring a structured and transparent process for identifying, selecting, and synthesizing relevant literature. PRISMA is widely used in social sciences

and business to enhance the reliability and reproducibility of systematic reviews (Shamseer et al., 2015; Alsharif et al., 2022).

In addition, the Sandelowski and Barroso model was applied, which provides a methodological framework that involves six phases: problem formulation, literature search, data evaluation, data analysis, interpretation, and presentation (Sandelowski et al., 2006). This model offers a rigorous and transparent structure for conducting qualitative meta-synthesis and supports the credibility of the study.

By using PRISMA and the Sandelowski and Barroso model as foundational frameworks, this study ensures the systematic collection and analysis of literature, providing a robust basis for synthesizing key findings.

2.1 First Step – Research Question

The first step in the meta-synthesis process is formulating the research question (Finfgeld-Connett, 2018), addressing the what, who, when, and how aspects to guide the study (Bondas & Hall, 2007; Paul & Barari, 2022).

- What: This involves identifying key concepts, technologies, and drivers of Tourism 4.0 development by exploring emerging technologies and the forces shaping the evolution of Tourism 4.0.
- Who: The study's population includes all research on Tourism 4.0 and Industry 4.0's impact on the tourism sector, based on reputable scientific articles and studies. This ensures a broad sample, offering insights into the intersection of these fields.
- When: Given that the field is relatively new, only studies from 2016 to 2022 are considered, ensuring the review focuses on recent, relevant contributions to the field.
- How: The meta-synthesis utilises existing studies as secondary data, analyzing all research on Tourism 4.0 and Industry 4.0's influence on the tourism sector to build a strong foundation for the synthesis.

2.2 Second Step – Systematically Review the Literature

This step involves systematically identifying and reviewing literature relevant to the research questions. Articles were selected using specific keywords, with English-language articles from chosen scientific databases serving as the primary information source. The selected articles underwent a comprehensive evaluation process, excluding those that did not meet the specified criteria.

Initially, articles were assessed based on how well their titles aligned with the research subject, question, objective, and approach. The criteria established in the first step facilitated an efficient review within the systematic literature review framework (Swift & Wampold, 2018). The authors conducted a thorough review, screening titles, abstracts, and full texts to determine eligibility and eliminate duplicates.

After comparing assessments, the authors reached a 90% agreement on eligible studies, ultimately achieving 100% consensus on the selected articles through discussion. To ensure a systematic review, specific criteria outlined in Table 1 were applied to review and select articles, addressing any potential overlap, especially for articles retrieved from Google Scholar.

Table 1. Article Review Criteria

Parameters	Inclusion Criteria	Exclusion Criteria
Paper's language	English-language studies	The excluded articles are those with titles, abstracts, and keywords in English but do not have the full text written in English.
Paper presentation time	Papers published between 2016 to 2022	No articles were found in this field before 2016
Research subjects	Articles that exhibit a strong semantic connection to the research domain and incorporate relevant keywords	An article in the field of "FIR" whose content is not related to tourism and its subcategories
Categories of research studies	Research papers that have been published in peer-reviewed journals, international conferences, and book chapters	Non-academic articles, such as editorial materials, conference reviews, content summaries, or forewords

Research information status	Papers that provide transparent research methodologies and present clear research findings	articles without evidence of a serious concern involving tourism and industry 4.0

Source: Own Elaboration

The information sources for this study comprised English-language articles from scientific databases such as Science Direct, Emerald, Taylor & Francis, Springer, and Google Scholar. While other databases exist, these were prioritized due to their extensive coverage of scholarly publications relevant to the research question. The selection of these databases was strategic. Science Direct offers a vast repository of scientific articles, providing rich material pertinent to the study (Tober, 2011; Samadzadeh et al., 2013). Springer, Emerald, and Taylor & Francis were included for their comprehensive coverage across multidisciplinary domains closely aligned with our investigation. Google Scholar, known for its inclusivity of diverse scholarly literature (Tober, 2011; Giustini & Boulos, 2013), was essential for broadening our literature search. We excluded Scopus and Web of Science due to access limitations and subscription availability.

To address potential overlap in articles retrieved from Google Scholar and other databases, a meticulous screening process was implemented to identify and remove duplicates. Additionally, we prioritized conference proceedings, book sections, and journal articles to ensure credible, relevant, and up-to-date scholarly content (Webster & Watson, 2002). These sources are known for their rigorous peer-review processes, contributing to the scholarly integrity and quality of our analysis.

2.3 Third Step – Search and Select Relevant Articles

The texts and articles evaluated in this study included all studies pertinent to the research purpose, categorized by their qualities and research methods. Following the identification of the information sources, relevant articles were selected using specific keywords such as “Industry 4.0,” “Industry 4.0 Revolution,” “tourism,” “Tourism 4.0,” and “smart tourism”. Articles were screened based on these keywords and the criteria outlined in Table 1, focusing on the title, abstract, content, and conclusion. The retrieved papers were filtered to identify and remove duplicates, and articles unrelated to the research subjects were excluded. This rigorous process resulted in the final selection of 26 articles, which were reviewed according to the designated keywords.

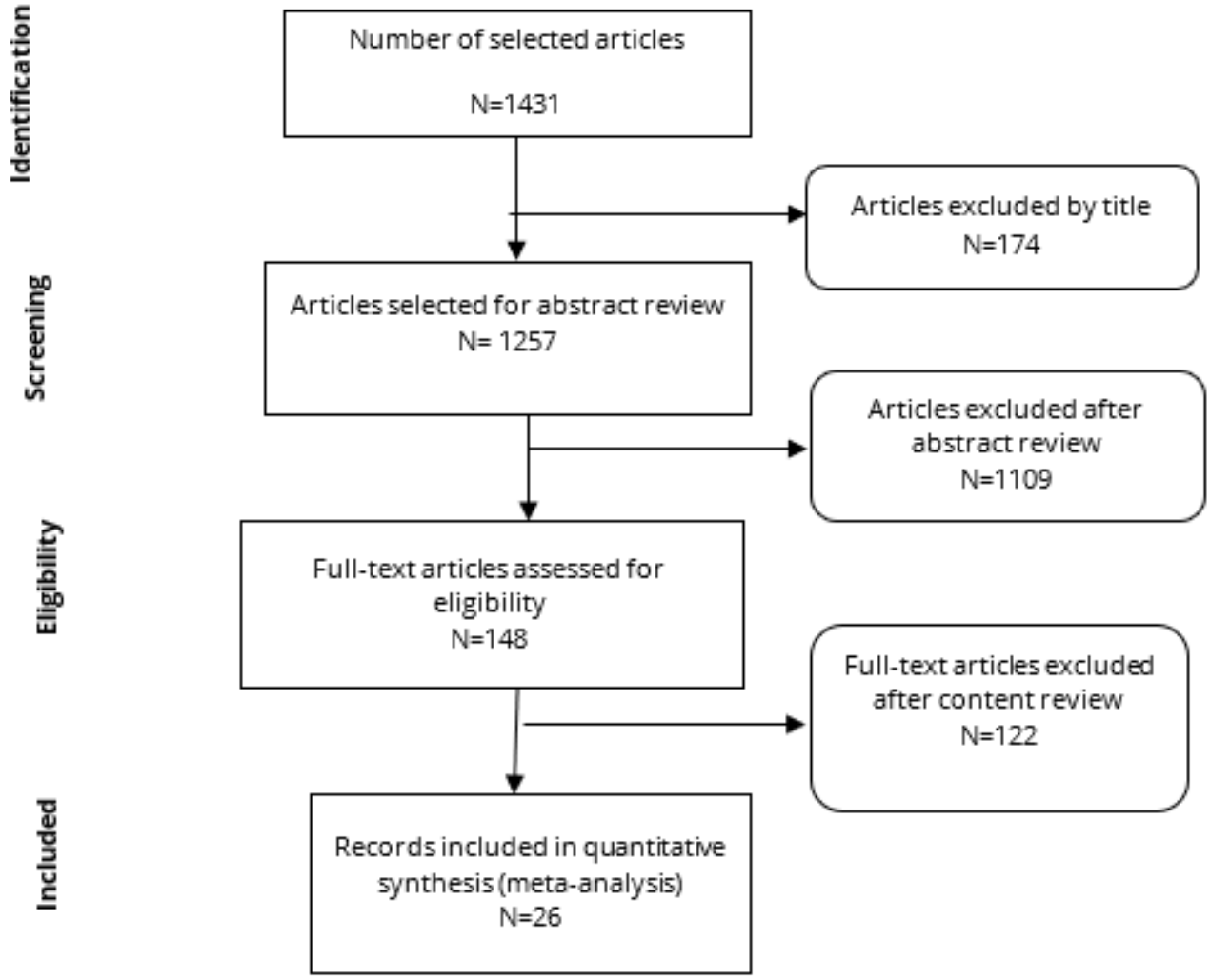
Table 2. Articles Reviewed In Databases

Databases	Number of articles	Articles removed in the first step	Articles removed in the Second step	Final articles
Science Direct	473	381	91	1
Springer	75	64	6	5
Emerald	451	429	18	4
Taylor & Francis	139	132	6	1
Google Scholar	293	251	27	15
Sum	1431	1257	148	26

Source: Own Elaboration

The results of the article filtration process are presented in Table 2. Additionally, Figure 1 illustrates the PRISMA diagram, detailing the systematic literature review process (Shamseer et al., 2015), including the selection criteria covering the search period from 2016 to 2022. The flowchart visually represents the systematic approach to identifying, screening, and selecting relevant articles based on the specified criteria.

Figure 1. Flowchart of Selection Criteria (Search Period: 2016-2022)



Source: Developed based on PRISMA guidelines, Own Elaboration

2.4 Fourth Step – Extract Article Information

To ensure the reliability and credibility of our study, we implemented several supplementary measures, including inter-rater reliability checks among the researchers involved in data collection and analysis. Kappa statistics were utilised to assess agreement levels and ensure consistency in our results (Lampe et al., 2017). Data validation techniques, including standardized methods, were employed to confirm the accuracy of our findings. Quality control measures were rigorously implemented throughout the research process, emphasising our commitment to high standards of research integrity. Ethical considerations were also meticulously documented to reinforce the credibility and trustworthiness of our study (Davison et al., 2000; Levy & Ellis, 2006).

During this stage, the selected articles were systematically examined for analysis. Information was extracted from the 26 chosen articles and categorized based on their main topics. Given the substantial volume of qualitative data, we used Nvivo software, which is optimal for analyzing qualitative data across various disciplines (Berg, 2004; Silverman, 2006). Nvivo facilitated the coding and categorizing of article information, including details such as year, type, publisher, and journal name, thereby organizing the data efficiently. Additionally, the final articles were imported into VOSviewer software, a tool specifically designed for visualizing bibliometric networks, allowing for an in-depth understanding of the evolution of scientific disciplines (Madzík et al., 2023). VOSviewer's specialized algorithms and user-friendly interface made it suitable for exploring term co-occurrence and creating word clouds to identify key themes within the dataset (Van Eck & Waltman, 2010; Kirby, 2023). Although the use of R-tool software was considered, we opted for VOSviewer due to its efficiency and ease of use, aligning with our focus on qualitative analysis.

After a thorough review and the removal of duplicates, a final list of 26 articles was confirmed. These articles were then inputted into Nvivo for further analysis, including extracting specific details. VOSviewer was employed to visualize bibliometric networks, determining the co-occurrence of terms and generating word clouds to highlight relevant themes.

2.5 Fifth Step – Analysis and Synthesize Findings

In this phase, the data extracted from the selected articles underwent a systematic synthesis and analysis to effectively address the research questions. A comprehensive search strategy was employed to ensure the inclusion of relevant documents published between 2016 and 2022. This strategy involved querying selected academic databases with predefined search terms and filters. Additionally, manual searches of relevant journals, conference proceedings, and book chapters were conducted to minimize the risk of overlooking significant publications (Chapman et al., 2010). Upon retrieving the initial set of documents, a rigorous screening process was implemented to select articles that met the established inclusion criteria. This process involved reviewing titles, abstracts, and full texts as necessary to ensure relevance to the research objectives while excluding irrelevant or outdated sources. Any discrepancies in the selection process were resolved through consensus among the research team.

Data extraction commenced systematically once the final set of documents was identified. Each selected article was thoroughly scrutinized, with pertinent information extracted and synthesized to address the research questions effectively. The extracted data included key insights, findings, methodologies, and other relevant information. The culmination of this step was the presentation of research findings that encapsulated the responses to the specific inquiries posed. Data synthesis began by treating all extracted content as distinct codes. These codes were categorized based on their thematic content and contextual relevance, constructing research concepts and categories by amalgamating related codes into a coherent analytical framework. To facilitate this process, a comprehensive codebook was meticulously crafted using NVivo software, following the guidelines of Miles Matthew et al. (2014). The codebook contained a detailed list of thematic nodes and their descriptive explanations, ensuring precision and alignment with the research objectives (Oliveira et al., 2013).

As phrases and segments from the articles were extracted, new codes were generated to capture the essence of the data in alignment with the research questions. The codes recorded in the codebook underwent rigorous scrutiny (Bandara et al., 2015), with discrepancies promptly identified and resolved through consensus before proceeding to code the entire repository of studies. This iterative process involved continuous refinement and organization of codes until reaching saturation, indicating that no new codes were emerging. Each article underwent an in-depth analysis, with pertinent sections assigned appropriate codes based on the criteria delineated in the codebook. This involved aligning text segments from the articles with predefined codes and making necessary adjustments for accurate data representation. Throughout the coding phase, detailed notes and memos were maintained to capture insights, patterns, and emerging themes, enriching the analysis process. To address challenges encountered during coding, a team approach was adopted to enhance the reliability and validity of the findings (Cascio et al., 2019). Two researchers independently coded a subset of articles, resolving any discrepancies through collaborative discussions and consensus-building.

Through the synthesis and analysis of the coded data, key themes and patterns emerged, providing a robust basis for addressing the research questions and yielding meaningful insights into the subject matter under investigation. This meticulous approach ensured a comprehensive analysis of the dataset, fostering transparency and credibility in the research findings.

Table 3. Final Code Extracted

Category	Final Code Extracted	References
Influence of the digital revolution on the tourism sector	-The emergence of tourism 4.0 -Development of digital transformation strategies -Create innovation -Sustainable development -Create smart travel strategies -Development of ICT infrastructure -Increasing the competitiveness of tourism destinations	(Bilsen Bilgili & Koc, 2021; B Bilgili & Özkul, 2019; Dalkiran, 2022; Kononova et al., 2020; Korže, 2019; Nugraheni et al., 2021; Pencarelli, 2020; Ramos et al., 2020; Singh & Bashar, 2021; Suryawardani et al., 2021; Thoi, 2021; Tuncalı Yaman & Başeğmez, 2022; Urbančič et al., 2020; Zeqiri et al., 2020)
Constructive components of Tourism 4.0	-Virtual Reality -Augmented Reality -Big Data -Artificial Intelligence -Internet of Things -Cloud Computing -Blockchain	(Abdurakhmanova et al., 2022; Gajdošík & Orelová, 2020; Hsu & Tseng, 2022; Korže, 2019; Melike & Kudret, 2018; Osei, Ragavan, Kandappan, & Mensah, 2020a; Osei et al., 2020b; Ozturk, 2021; Stankov et al., 2020; Tasya et al., 2019; Urbančič et al., 2020; Zeqiri et al., 2020)
Tourism 4.0 sustainability drivers	-Economic Advantages -Social Advantages -Environmental Advantages	(Dewi, 2020; Fakhimi et al., 2022; Peceny et al., 2019; Tasya et al., 2019; Thoi, 2021; Tuncalı Yaman et al., 2022; Urbančič et al., 2020; Zeqiri et al., 2020)

Source: Own Elaboration

2.6 Sixth Step – Comprehensive Quality Control

In this study, a comprehensive framework for qualitative assessment was adopted, grounded in expert judgment and predefined quality criteria. The framework was informed by a diverse body of literature encompassing qualitative, quantitative, and mixed-method designs. To ensure rigor, a panel of five experts—each with experience in conducting systematic reviews—was engaged to provide independent and continuous feedback throughout the evaluation process.

We used the Critical Appraisal Skills Program (CASP) as the primary tool for quality assessment due to its validated 10-item checklist and widespread use in systematic reviews (Casp, 2018; Long et al., 2020). CASP criteria covered essential aspects such as research objectives, methodology, design, recruitment strategies, data collection, researcher-participant relationships, data analysis, findings, significance, and ethical considerations. A customized checklist based on CASP was developed, and each article was scored accordingly. Articles were independently assessed by both the authors and a panel of five academic experts. A team-based approach was adopted to facilitate discussion, minimize bias, and ensure a more balanced and consistent evaluation. Prior to the assessment, a briefing session was conducted to standardize the evaluation process across reviewers. The total score for each article ranged from 31 to 46, categorizing them as very good (31–40) and excellent (41–50) in quality, based on the scoring system derived from the CASP framework. To assess the consistency of evaluations, Cohen's Kappa was used as a robust measure of inter-rater agreement (Viera & Garrett, 2005; Pérez et al., 2020). The process involved independent coding of the selected articles by the expert team, followed by comparison with the primary researcher's coding. The Kappa statistic compares observed agreement (Po) with expected agreement (Pe) using the formula:

$$kappa = \frac{po - pe}{1 - pe}$$

The analysis was conducted using SPSS software, resulting in a Kappa index of 0.692, which falls within the 0.61–0.80 range, indicating substantial agreement. This confirmed the reliability and consistency of article selection and coding throughout the meta-synthesis process.

Table 4. Testing the Coding Agreement between the Primary Researcher and the Team of Experts

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Measure of Agreement	Kappa	0.692	0.140	3.573	0.000
No. of Valid Cases		26			

Source: Own elaboration based on coding results

2.7 Seventh Step – Present Findings

In this step, the findings from the previous phases were presented. Based on the analysis of the coded meanings, the data were categorized into related concepts. This categorization facilitated the identification of overarching themes and patterns, providing a clear framework for understanding the insights derived from the systematic review.

3. Results

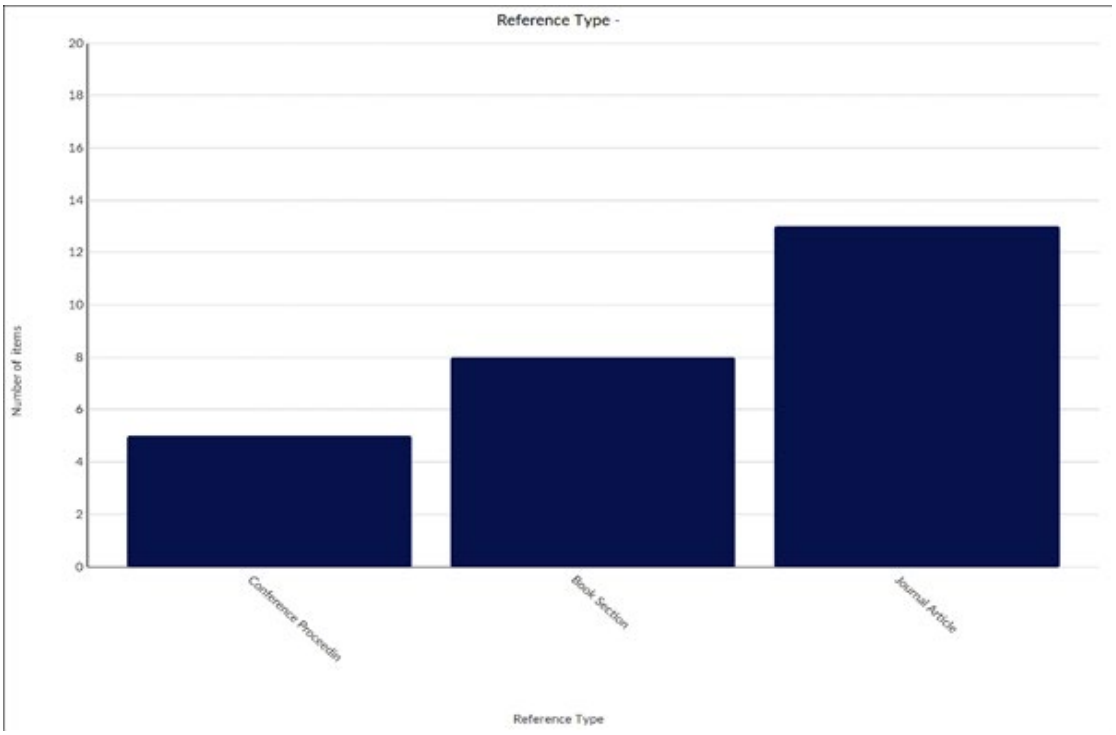
3.1 Addressing Articles' Features

The term "Tourism 4.0" was introduced in Portugal in 2016, following Germany's earlier introduction of "Industry 4.0" in 2011 (Ramos et al., 2020). Notably, these concepts emerged from public sector entities, such as governmental institutes and policymakers, rather than academic institutions. Despite this, researchers have begun to prioritize Industry 4.0 as a significant research agenda. In tourism studies, the focus has largely been on smart cities, smart destinations, and smart tourism, rather than the specific concept of Tourism 4.0 (Korže, 2019).

The analysis of the descriptive features of the articles reveals several interesting insights. Figure 3 illustrates that the first selected articles on Tourism 4.0 were published in 2018, indicating that this area of research is still in its early stages. However, there is a notable upward trend in the number of publications each year, with the volume nearly doubling annually. The significant number of articles published in 2020 reflects a growing interest in Tourism 4.0.

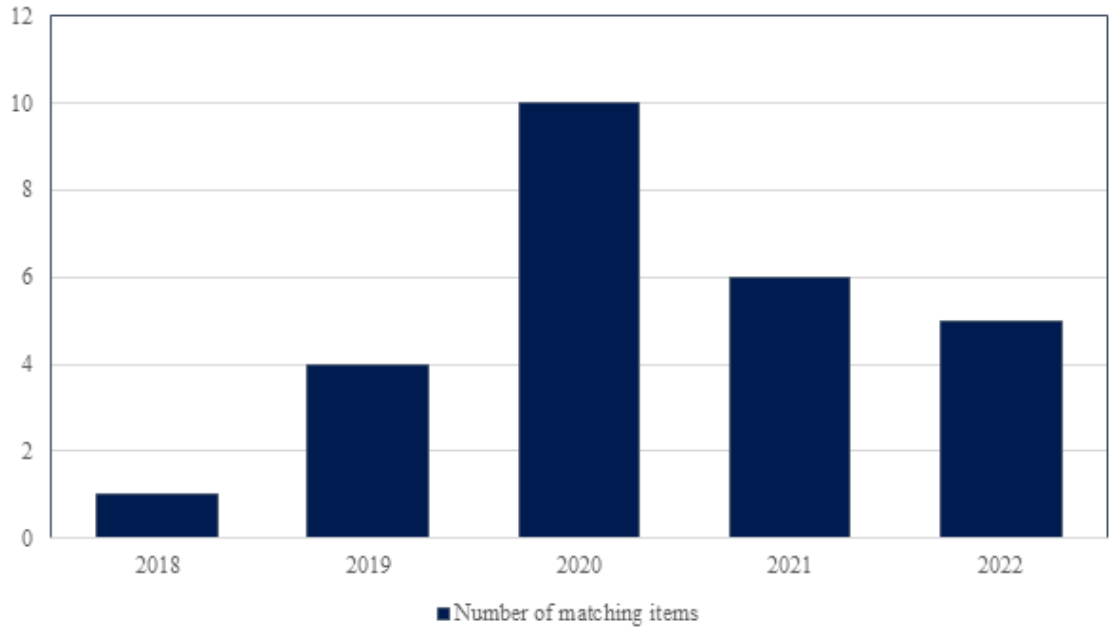
Most of the reviewed articles were published in academic journals, as depicted in Figure 2. To ensure comprehensive coverage of all relevant literature, a supplementary review was conducted using Google Scholar. Figure 3 shows that the majority of articles in the studied time interval were published in 2020. Additionally, most of the papers included in this study were sourced from the Springer and Emerald databases (see Figure 4).

Figure 2. Type of Resources



Source: Own Elaboration

Figure 3. Time Table of Distribution of Articles

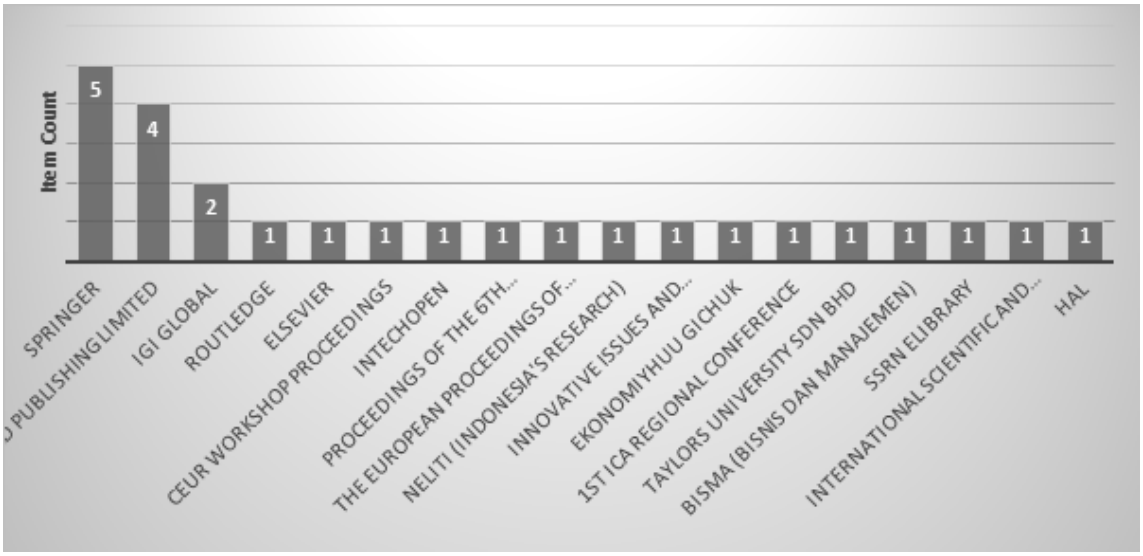


Source: Own Elaboration

Our systematic review included 26 articles representing diverse geographical contexts and sectoral focuses within Tourism 4.0. Geographically, the studies spanned Asia (e.g., Indonesia, Vietnam, Turkey), Europe (e.g., Slovenia, Portugal, Slovakia), as well as review articles with a global scope that were not limited to a specific region. Of these, 61.5% (16/26) adopted a conceptual or review-based approach to examine Tourism 4.0 frameworks and theoretical foundations, while 38.5% (10/26) presented empirical case studies. Sectorally, the articles addressed various domains, including hospitality and hotel management

(34.6%), destination management (19.2%), digital technology applications (30.8%), and business strategy development (15.4%). This distribution reflects a growing global interest in Tourism 4.0, although representation remains uneven across regions and industry segments. Notably, areas such as transportation tourism and emerging markets in Africa and Latin America were underrepresented, highlighting opportunities for future research to address these gap.

Figure 4. The Number of Articles by Publishers



Source: Own Elaboration

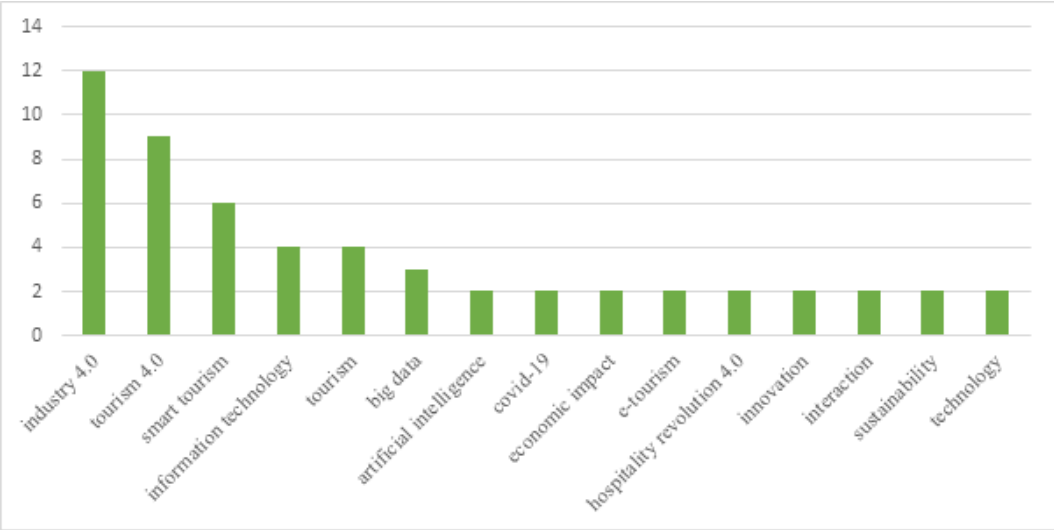
Table 5. Publication Statistics

Journals / Book Chapters / International Conferences	Number of items	Journals / Book Chapters / International Conferences	Number of items
Proceedings of the 6th International Conference on Future Networks & Distributed Systems	1	Journal of Hospitality and Tourism Technology	2
Emerging Transformations in Tourism and Hospitality	1	Research Anthology on Cross-Industry Challenges of Industry 4.0	1
The European Proceedings of Social Behavioral Sciences	1	Consumer behaviour and marketing	1
Logistics 4.0 and Future of Supply Chains	1	Information Technology & Tourism	2
International Research Journal of Management, IT and Social Sciences	1	The Emerald Handbook of ICT in Tourism and Hospitality	1
Smart Cities Policies and Financing	1	International Hospitality Review	1
Computer Science On-line Conference	1	BISMA (Bisnis dan Manajemen)	1
Smart Systems Integration (SSI)	1	Information Technology, Promotion Strategy, Accessibility on Tourist Intention to Visit a Destination	1
Innovative issues and approaches in social sciences	1	International Scientific and Practical Conference on Sustainable Development of Regional Infrastructure	1
Ekonomiyhuu Gichuk	1	Intelligent Systems in Digital Transformation: Theory and Applications	1
Proceedings of the 1st ICA Regional Conference	1	Intelligent Systems in Digital Transformation: Theory and Applications	1
Asia-Pacific Journal of Innovation in Hospitality and Tourism	1	Handbook of Research on Smart Technology Applications in the Tourism Industry	1
Balkan Economic Review	1		

Source: Own Elaboration

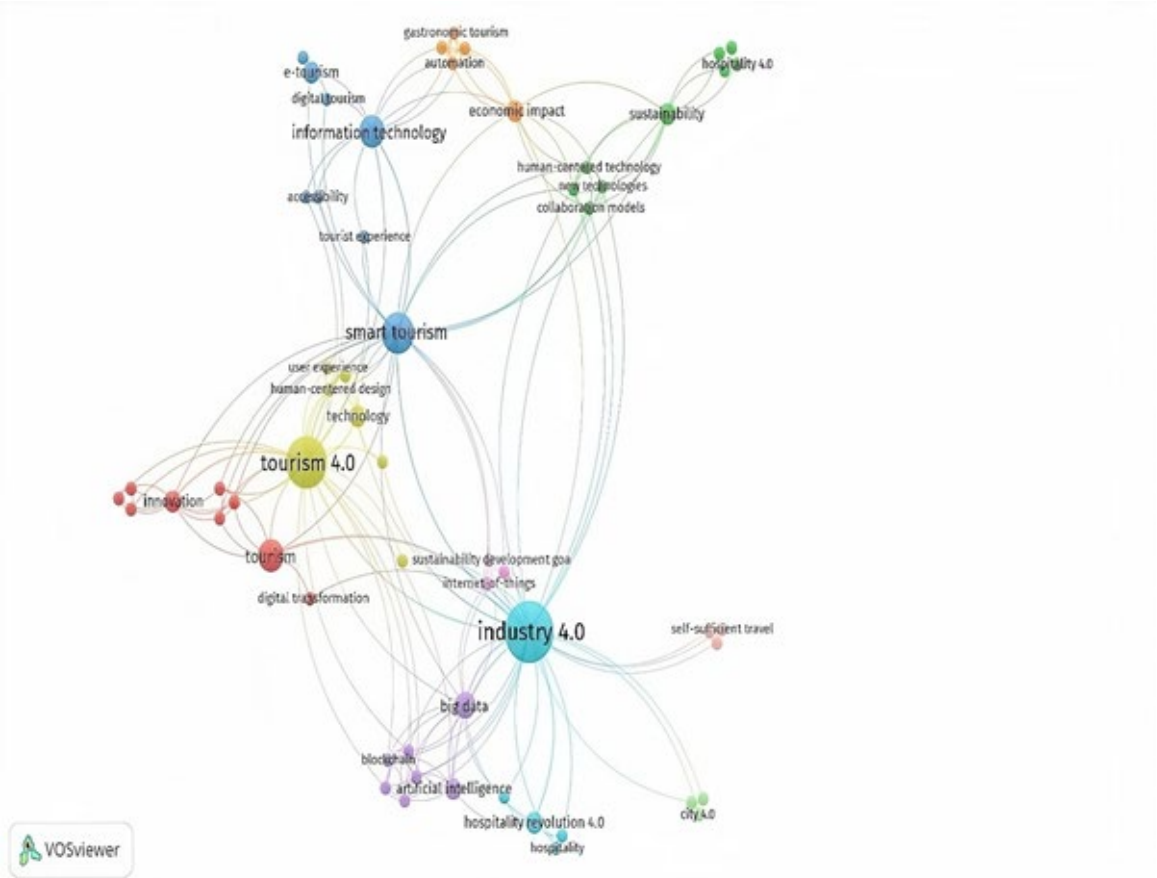
In total, 26 eligible articles contained 69 keywords. Figure 5.a presents the most common keywords found in the abstracts of these articles after applying a noise removal technique. For brevity, only keywords with at least two occurrences were included. As expected, "Industry 4.0" had the highest frequency, followed by related terms such as Tourism 4.0 and smart tourism.

Figure 5.a. Occurance of the Most Common Keywords



Source: Own Elaboration

Figure 5.b. Occurrence of Keywords in Article Abstract (Co-Occurance=3)



Source: Own Elaboration

In this research, clustering analysis was performed on the keywords, and the results are displayed in Figure 5.b, showing the co-occurrence mapping of keywords. In the figure, nodes represent keywords, with node size indicating keyword frequency and connecting lines revealing co-occurrence relationships. The closer the nodes, the higher the co-occurrence frequency. The strength of the relationship between two nodes is conveyed through the distance separating them; a smaller distance indicates a stronger connection (Van Eck et al., 2010). Keywords are differentiated by color and can be classified into six topics (excluding small clusters).

Upon analyzing the information, it is evident that researchers primarily focus on the following areas in their publications: Industry 4.0, Tourism 4.0, smart tourism, tourism, sustainability, and big data. These words are shown in Figure 5-a as the most common keywords.

The blue cluster in Figure 5-b is mainly centered around the keyword "smart tourism." The other main keywords in this cluster refer to information technology, e-tourism, digital tourism, accessibility, and tourist experience. The green cluster includes five main keywords: hospitality 4.0, sustainability, human-centered technology, new technologies, and collaboration models. The most frequent keyword in this cluster is "sustainability," followed by "hospitality 4.0." The cyan cluster consists of the keyword Industry 4.0, which has the highest frequency among all the keywords. The other main keywords in this cluster are revolution 4.0 and hospitality. The purple cluster is mainly centered around the keyword "big data," with other main keywords including artificial intelligence, blockchain, Internet of Things, and development goals. The olive green cluster consists of keywords such as Tourism 4.0, technology, user experience, and human-centered design. Finally, the red cluster comprises keywords related to tourism, innovation, and digital transformation.

Figure 6. Word Clouds Based on Word Frequency in Analysed Papers

Source: Own Elaboration

The word cloud in Figure 6 illustrates the word frequency in the analysed articles, offering a visual summary of the most frequent terms. Word clouds visually represent the size of each word based on its frequency or importance in the analysed text.

3.2 Tourism 4.0 – Definition and Scope

This study aimed to answer the research question and conceptualize Tourism 4.0 by reviewing relevant articles. According to the analysis, researchers view Tourism 4.0 as a concept stemming from the fourth industrial revolution, Industry 4.0, characterized by cyber-physical systems (CPS) in manufacturing. Industry 4.0 has revolutionized manufacturing processes, enhancing operational productivity and automating production, leading to the creation of high value-added products and services (Kononova et al., 2020).

In the context of Tourism 4.0, similar goals are pursued within the tourism industry. Tourism 4.0 utilises application sensors to gather data on tourists' behaviours, which is then analysed to create tailored travel experiences (Korže, 2019; Dewi, 2020). This approach allows tourist destinations to implement effective policies that promote efficient, safe, and personalized travel experiences through digital and automation processes (Kononova et al., 2020). Tourism 4.0 is described as a tourism ecosystem built around advanced technology, embracing the fundamental principles of Industry 4.0, including interoperability, virtualization, decentralization, real-time data analysis, and data collection. This approach has transformed production and work methods (Nugraheni et al., 2021).

Scholars often distinguish Tourism 4.0 as a distinct stage in the evolution of tourism, setting it apart from previous concepts such as e-tourism and mobile tourism (Tasya et al., 2019). Some scholars define Tourism 4.0 or Industry 4.0 as the implementation of smart tourism within the tourism sector (Ozturk, 2021). While some define Tourism 4.0 and Industry 4.0 as implementations of smart tourism, others emphasize that both concepts originate from the fourth industrial revolution and are based on smart technologies such as IoT, AR, VR, and AI. However, Tourism 4.0 primarily focuses on the advanced hardware and software components of these technologies, while smart tourism integrates technological, human, and social resources to enhance the quality of life for visitors (Pencarelli, 2020).

Tourism 4.0 fosters collaboration among all participants in the smart tourism ecosystem, leveraging Industry 4.0 technologies to deliver enhanced experiences. Its primary objective is to establish a shared, locally-centered tourism ecosystem that facilitates data-driven strategic planning, seamless communication, and information exchange among all stakeholders. This collaborative platform enables data collection, sharing, and analysis for various strategic activities, aiming to enhance tourists' experiences while minimizing adverse impacts on the local environment (Urbančič et al., 2020).

Industry 4.0-based Tourism 4.0 helps tourism destinations by enabling effective policies through digitalization and automation processes (Kononova et al., 2020). The procedures of the fourth industrial revolution have multiple effects on the tourism industry, aiming to maximize the opportunities presented by Industry 4.0 (Melike et al., 2018). The goal of Industry 4.0 is to offer sustainable and accessible products and services within the tourism sector, promoting seamless integration between tourists and destinations, enhancing the quality of experiences, and delivering personalized offerings. By embracing innovative collaboration and leveraging Industry 4.0 technologies, the perception of tourism and the associated commercial sector is being reshaped (Tasya et al., 2019).

3.3 Mapping Key Digital Themes In Tourism 4.0

In the context of the systematic literature review, thematic clustering was employed to categorize the key concepts shaping the digital transformation of the travel and tourism sector. Figure 5-b presents the semantic structure derived from the analysis, highlighting six major clusters: Tourism and Innovation (red), Big Data, Artificial Intelligence, and Blockchain (purple), Smart Tourism and User Experience (blue), Industry 4.0 and the Hospitality Revolution (cyan), Technological Design in Tourism 4.0 (olive green), and Sustainability and Human-Centered Technologies (green). Together, these clusters provide a comprehensive framework for understanding how the digital revolution is influencing and reshaping the future of tourism.

3.3.1 Red Cluster – Tourism, Innovation, and Digital Transformation

The red cluster revolves around the interconnected themes of tourism, innovation, and digital transformation. Innovation in tourism extends beyond service improvements and encompasses the redefinition of business models through digital technologies. Tourism stakeholders increasingly leverage emerging tech-

nologies such as AI, blockchain, IoT and big data analytics to enhance operational efficiency, optimize resource management, and deliver personalized experiences (Urbančič et al., 2020; Bilsen Bilgili et al., 2021).

Digital transformation within the tourism sector signifies the fundamental change in how destinations, businesses, and tourists interact. It encompasses the integration of online booking platforms, smart services, virtual and augmented reality applications, and mobile-based interactions, all aiming to create seamless and hyper-personalized travel experiences (Pencarelli, 2020; Urbančič et al., 2020; Dalkiran, 2022). This technological evolution also plays a crucial role in advancing sustainable tourism. Smart mobility solutions, IoT-based resource management systems, and VR alternatives to physical travel are examples of how digital innovation contributes to environmental conservation and cultural preservation (Peceny et al., 2019; Urbančič et al., 2020).

Despite these advancements, the process of digital transformation in tourism is not without challenges. Issues such as cybersecurity risks, data privacy concerns, technological inequalities, and the digital divide present ongoing obstacles that need to be addressed for inclusive and resilient sectoral growth (Fakhimi et al., 2022). The red cluster thus emphasizes the inseparable relationship between tourism, innovation, and digital transformation, reflecting how the digital revolution continuously redefines the industry's structure and operational logic, ultimately shaping the future of Tourism 4.0.

3.3.2 Purple Cluster: Big Data, AI, Blockchain and IoT for Smart Decision-Making

The purple cluster focuses on the integration of big data, AI, Blockchain and IoT within the tourism sector. These technologies form the strategic backbone of data-driven decision-making, which is pivotal in shaping the future of Tourism 4.0. The adoption of these innovations enhances operational efficiency, enriches customer experiences, and enables smart, data-driven solutions for tourism businesses and stakeholders.

Artificial Intelligence: Personalization and Predictive Analytics

Artificial Intelligence plays a crucial role in personalizing the tourist experience. AI technologies, such as machine learning algorithms and predictive analytics, enable businesses to anticipate customer needs and preferences, thereby offering tailored recommendations and services. AI-powered tools, such as chatbots and virtual assistants, facilitate real-time customer support, enhancing customer satisfaction and streamlining operations (Osei et al., 2020b; Urbančič et al., 2020; Zeqiri et al., 2020; Bilsen Bilgili et al., 2021). For instance, AI is used to predict customer behaviour, allowing for tailored marketing strategies, personalized services, and resource planning. It also helps businesses design investment plans and formulate tourism policies (Urbančič et al., 2020). Hilton Hotels, for example, have implemented AI for personalized concierge services and automated check-ins, significantly improving guest experience and operational efficiency (Korže, 2019; Ozturk, 2021).

Big Data and Smart Systems

Big data has transformed the way tourism stakeholders understand visitor behaviour. It replaces traditional survey methods by offering a broader and more accurate view of tourist patterns and preferences (Zeqiri et al., 2020). In this context, smart systems, such as smart hotels, integrate big data with other technologies like IoT and robotics to deliver location-aware, personalized services and streamline internal operations (Ramos et al., 2020). These systems use sensors to adapt room settings, automate services, and manage guest interactions dynamically, enhancing the overall visitor experience. By analyzing data from travel platforms and social media, destinations like Barcelona optimize visitor flows, develop targeted promotions, and reduce overcrowding at peak sites (Ozturk, 2021; Dalkiran, 2022). Tourism providers use big data to determine optimal travel times, routes, and destination preferences, helping formulate more effective business strategies (Korže, 2019; Bilsen Bilgili et al., 2021).

Blockchain and Secure Digital Infrastructure

Blockchain provides a secure, transparent infrastructure for transactions and data management. Blockchain technology ensures secure transactions, data privacy, and transparent management of tourism-related operations. blockchain is effective in reservations, digital payments, identity verification, and

inventory control (Gajdošík et al., 2020; Urbančič et al., 2020). Additionally, the use of NFTs and smart contracts supports new forms of value exchange within the tourism industry, such as loyalty programs and digital ownership of travel-related assets (Peceny et al., 2019).

Blockchain can streamline tourism operations by ensuring secure data storage and reducing reliance on intermediaries. It facilitates encrypted transactions, loyalty programs, and physical asset representation through NFTs. In the context of tourism, blockchain allowing travel agencies to securely book flights and accommodations while sharing customer data with other stakeholders (Peceny et al., 2019; Urbančič et al., 2020). By improving transparency, blockchain fosters trust among stakeholders in international trade (Gajdošík et al., 2020; Fakhimi et al., 2022). Blockchain true power lies in its ability to construct adaptable, trustworthy, and durable systems, offering substantial benefits across the tourism ecosystem (Urbančič et al., 2020).

Real-world implementations further highlight the practical relevance of these technologies. Estonia's national digital ID system and platforms like Winding Tree demonstrate how blockchain can support decentralized bookings without traditional intermediaries. Additionally, tourism-related companies are experimenting with NFTs for event tickets and digital tourism assets, improving traceability, ownership, and customer engagement.

IoT and Cloud Computing

While playing a supportive role compared to AI and big data, IoT significantly enhances Tourism 4.0 by enabling service personalization, improving customer relationship management, and facilitating predictive maintenance. It utilises data from sensors to monitor and minimize tourism's environmental impact by tracking energy and water usage as well as waste production (Osei et al., 2020b; Urbančič et al., 2020). Additionally, IoT supports real-time engagement with tourists through location-based services, offering valuable insights into visitor behavior and preferences (Ramos et al., 2020). The Internet of Services (IoS) complements this by introducing a decentralized framework that enables tourists to access a wide range of online services and engage in digital exchanges. It supports the delivery of software-as-a-service, including development tools, storage, and communication platforms (Pencarelli, 2020; Fakhimi et al., 2022).

Cloud computing, as another pillar of digital infrastructure, simplifies service delivery while reducing IT-related costs. It enables seamless interaction with travel platforms, real-time access to travel content, and the sharing of experiences. By analyzing customer data, cloud platforms allow agencies to offer tailored services that enhance customer satisfaction and improve efficiency, competitiveness, and sustainability in tourism (Zeqiri et al., 2020; Bilsen Bilgili et al., 2021).

These technologies are already being adopted in several smart tourism initiatives. For instance, cities like Singapore use IoT-based sensors for crowd control, environmental monitoring, and location-based marketing. Likewise, cloud-based booking platforms such as Booking.com enable real-time availability updates and seamless communication between service providers and travelers. Together, big data, AI, Blockchain, and IoT form the technological foundation of smart decision-making in Tourism 4.0, enabling more personalized, efficient, and sustainable tourism services.

3.3.3 Blue Cluster: Smart Tourism, Immersive Experiences, and Accessibility

The blue cluster centers on smart tourism, where digital technologies are leveraged to enhance user experience and improve accessibility. Smart tourism is a progressive approach that integrates ICT to create personalized, data-driven travel experiences. It utilises real-time data, sensors, and digital platforms to optimize travel services, making them more efficient and tailored to the needs of individual tourists. This results in a seamless, highly interactive travel experience (Urbančič et al., 2020; Bilsen Bilgili et al., 2021).

Immersive experiences through technologies like VR and AR have significantly transformed how tourists interact with destinations. These technologies allow travelers to engage with destinations in novel ways. For example, VR can simulate visits to remote or inaccessible places, offering an alternative to traditional tourism. This is especially beneficial for cultural and heritage sites that may be too far or fragile for regular tourism, providing educational and sustainable alternatives (Peceny et al., 2019; Urbančič et al., 2020). AR enhances the physical environment by overlaying digital information on real-world objects. For instance, visitors in museums or heritage sites can use AR applications to access detailed information

about artifacts, historical events, and surrounding locations. In cities, AR apps can assist tourists in navigation by providing real-time location-based information, enhancing the overall visitor experience (Ozturk, 2021). Beyond enhancing visitor engagement through immersive technologies, smart tourism also leverages real-time data and connected infrastructures to optimize resource management and destination efficiency.

In addition to enhancing the tourist experience, smart tourism contributes to better resource management in tourism destinations. With the help of IoT-based systems, cities and tourism providers can monitor and optimize resource use, including managing crowd flows, traffic, and even environmental factors such as air quality (Urbančič et al., 2020). For example, cities like Singapore have integrated IoT devices into their urban infrastructure to monitor traffic, crowd control, and air quality, creating a more seamless and efficient travel environment. Similarly, Marriott hotels use smart room technology to adjust lighting, temperature, and entertainment options based on guest preferences, ensuring a personalized and comfortable stay (Korže, 2019; Dalkiran, 2022).

Furthermore, accessibility is a key aspect of smart tourism. Technologies such as mobile apps and wearable devices enable tourists with disabilities or special needs to navigate and engage with destinations more easily. These innovations ensure that tourism is inclusive, offering personalized services to cater to a broader range of visitors (Korže, 2019; Gajdošík et al., 2020).

Overall, smart tourism, powered by immersive technologies like AR and VR, is not just about enhancing tourist experiences, but also about improving efficiency and sustainability, ensuring that tourism grows in a way that meets the needs of the digital age while remaining inclusive and accessible to all.

3.3.4 Cyan Cluster: Industry 4.0 and Hospitality Revolution

The cyan cluster emphasizes the integration of Industry 4.0 technologies in tourism and hospitality. These technologies, including automation, robotics, and cyber-physical systems, are revolutionizing the sector by improving operational efficiency and enhancing guest experiences (Korže, 2019; Zeqiri et al., 2020; Bilsen Bilgili et al., 2021).

Several practical implementations demonstrate how Industry 4.0 technologies are transforming the hospitality sector by enhancing personalization, operational efficiency, and automation. For instance, Marriott Hotels use IoT-based smart room technologies that allow guests to control lighting, temperature, and entertainment settings via mobile applications, ensuring a highly personalized and energy-efficient experience (Korže, 2019; Dalkiran, 2022). Similarly, Alibaba's FlyZoo Hotel employs facial recognition for check-ins and robots for room service, offering guests a fully automated and seamless stay experience. Additionally, AI is being integrated through chatbots like Connie at Hilton Hotels, helping guests with real-time information and personalized recommendations. Data analytics is also playing a significant role in optimizing hotel operations, enabling businesses to adjust pricing dynamically and forecast demand more accurately (Korže, 2019; Urbančič et al., 2020; Bilsen Bilgili et al., 2021).

Industry 4.0 is reshaping tourism and hospitality by enabling smarter, more efficient, personalized, and sustainable services, driving both operational excellence and enhanced guest satisfaction (Nugraheni et al., 2021; Thoi, 2021).

3.3.5 Olive Green Cluster: Tourism 4.0, Technological Design, and User Experience

The olive green cluster focuses on the intersection of Tourism 4.0, technological design, and user experience. It highlights how digital technologies are being integrated into the tourism industry to enhance the overall experience for users, offering a seamless, personalized, and efficient travel journey (Stankov et al., 2020; Zeqiri et al., 2020).

Technological design in tourism involves creating user-friendly, intuitive digital interfaces that improve engagement and accessibility. Smart tourism apps, interactive digital maps, and personalized guides are examples of how technology is used to enhance the user experience (Ramos et al., 2020; Thoi, 2021). These technologies allow tourists to access real-time information, book services, and navigate destinations more efficiently, improving both convenience and satisfaction (Bilsen Bilgili et al., 2019).

Human-centered design also plays a critical role in shaping the tourist experience. By focusing on the needs and preferences of travelers, tourism businesses can create tailored services that make travel more

enjoyable and accessible. For example, personalized mobile apps that suggest activities or restaurants based on individual preferences provide a highly customized experience, increasing satisfaction and encouraging repeat visits (Stankov et al., 2020). Building on these human-centered approaches, emerging technologies like IoT further enhance the connected tourism experience. Moreover, IoT-based systems are used to connect various services and devices in smart cities and accommodations, providing tourists with seamless experiences. For instance, smart hotels enable guests to control their room settings (such as lighting, temperature, and entertainment) through a mobile app, offering convenience and a personalized (Urbančič et al., 2020; Zeqiri et al., 2020).

Thus, the olive green cluster demonstrates how technological and user-centered innovations are reshaping Tourism 4.0 toward greater personalization, efficiency, and accessibility.

3.3.6 Green Cluster: Sustainability and Human-Centered Innovation

This cluster underscores the social, environmental, and economic dimensions of sustainable tourism. Sustainable growth in tourism is essential for mitigating the risks associated with the sharp rise in international travel over the past two decades. Tourism 4.0 presents considerable opportunities to advance sustainable development goals (Ramos et al., 2020), ligning with the United Nations' vision for transformative change within the industry (Peceny et al., 2019). Drawing on a review of the relevant literature, sustainability in the context of Tourism 4.0 is framed around three key dimensions: social, economic, and environmental. These dimensions give rise to three main categories of sustainability drivers: economic benefits, social benefits, and environmental.

A. Economic Advantages

The rapid evolution of Tourism 4.0 brings significant economic advantages by enhancing service accessibility, increasing destination competitiveness, and optimizing operational processes. The integration of AI and robotics helps address seasonal employment fluctuations and workforce turnover, leading to higher operational efficiency, improved customer service, streamlined supply chains, and expanded digital capabilities. This also creates new employment opportunities (Osei et al., 2020b).

While mass tourism continues to challenge environmental sustainability, stakeholders are turning to smart technologies and digitalization to create innovative, cost-effective, and time-efficient service models (Go & Kang, 2023). Virtual technologies, for instance, offer immersive experiences—such as simulations of historical events and cultural landmarks—while reducing costs and elevating service quality (Thoi, 2021).

Sensors, RFID chips, cyber-physical systems, and IoT play a central role in revolutionizing supply chain processes. IoT enables smarter and more efficient operations, exemplified by the widespread adoption of smart self-service technologies in hotels. These innovations respond to the pressures of mass tourism by enabling experiences that are both economically viable and sustainable. Integrating renewable energy sources into accommodation facilities also supports energy efficiency and the transition to circular economy models, contributing to long-term economic sustainability (Zeqiri et al., 2020).

Categorization of Economic Benefits:

Increased Competitiveness: Advanced technologies attract more tourists and strengthen local economies (Gajdošík et al., 2020; Osei et al., 2020b; Thoi, 2021).

Improved Employment and Workforce Efficiency: AI and robotics mitigate seasonal employment issues and improve workforce productivity (Osei et al., 2020a; Osei et al., 2020b; Bilsen Bilgili et al., 2021).

Enhanced Customer Services: Virtual technologies elevate service standards and offer immersive, interactive experiences (Osei et al., 2020a; Bilsen Bilgili et al., 2021).

Cost Reduction and Higher Revenue: Digital technologies enable more efficient service delivery and maximize revenue.

Efficient Supply Chain Management: IoT optimizes logistics and resource use across the tourism sector (Osei et al., 2020b; Zeqiri et al., 2020; Dalkiran, 2022).

Sustainable Operations: Smart systems and renewable energy integration improve energy efficiency and support circular business models (Pencarelli, 2020; Ramos et al., 2020).

Beyond economic benefits, Tourism 4.0 is also driving profound social transformations in the sector.

B. Social Advantages

The emergence of Tourism 4.0 marks a transformative shift in the tourism sector, offering a wide range of social benefits. One of the most prominent is the personalization of services, which not only reduces costs but also significantly improves the customer experience. Digital technologies enable interactive communication and the exchange of creativity between producers and consumers, thereby fostering social and cultural connectedness across regions and countries in the era of the Fourth Industrial Revolution.

Advancements in IoT, smart cities, big data, and cloud computing have enhanced personalization and customer relationship management. For example, hotel rooms are now equipped with tablets or smart TVs that allow guests to customize their environment and receive real-time updates such as flight changes. These technologies also streamline operational tasks and enable predictive maintenance notifications (Urbančič et al., 2020).

Applications of Industry 4.0 simplify travel planning, from room selection to food and beverage preferences, while enabling users to explore destinations virtually (Ramos et al., 2020). Smart robots enhance the travel experience by providing multilingual services via kiosks, mobile devices, social media platforms, and AI-powered tools (Dalkiran, 2022).

Moreover, digital transformation has improved working conditions and created new job opportunities. The demand for digitally skilled professionals is increasing, fostering better livelihoods and promoting social inclusion and cohesion between residents and tourists (Pencarelli, 2020).

Categorization of Social Benefits:

Personalization: Tailored services improve efficiency and enhance customer satisfaction (Osei et al., 2020b; Pencarelli, 2020).

Connectivity: Digital technologies and smart devices facilitate creative and cultural exchange (Gajdošík et al., 2020; Pencarelli, 2020).

Improved Customer Experience: Technologies improve tourism experiences through real-time updates, automation, and predictive services (Bilsen Bilgili et al., 2021; Ozturk, 2021).

Job Opportunities: The tourism sector generates demand for skilled digital labor, improving employment conditions (Urbančič et al., 2020).

Social Cohesion: Tourism 4.0 strengthens community relationships and enhances overall quality of life (Pencarelli, 2020; Fakhimi et al., 2022).

These social dimensions underline the broader human-centered potential of Tourism 4.0, highlighting how advanced technologies can not only serve tourists but also empower communities, improve accessibility, and foster inclusive growth.

In addition to economic and social progress, Tourism 4.0 significantly advances environmental sustainability through technological innovation.

C. Environmental Advantages

Tourism 4.0, through the application of Industry 4.0 technologies, presents significant opportunities for advancing environmental sustainability in the tourism sector. Digital tools enhance resource efficiency, reduce energy consumption, and enable better environmental management at both operational and destination levels (Zeqiri et al., 2020).

One key advancement lies in the integration of renewable energy sources into tourism infrastructure, particularly in energy distribution and smart building systems. These systems—supported by smart metering, data analysis, and automation—help reduce carbon emissions and operational costs while maintaining service quality (Pencarelli, 2020). The use of smart energy networks further contributes to optimizing energy distribution and monitoring consumption patterns across tourism facilities (Fakhimi et al., 2022).

Smart buildings utilise intelligent systems such as automated lighting, climate control, smart showers, and energy-saving appliances to minimize environmental impact. For example, smart hotels employ technologies that monitor energy and water use, contributing to conservation efforts and reduced CO_2 emissions (Ramos et al., 2020). Additionally, smart meters in kitchens and restaurants help reduce food waste by analyzing consumption and adjusting inventory (Zeqiri et al., 2020).

Water management also benefits from Tourism 4.0 technologies. IoT devices and smart meters provide real-time data on water use, enabling targeted conservation practices—such as irrigation scheduling and laundry optimization—in accommodation facilities and public spaces. These tools are also valuable in monitoring water quality and ensuring efficient usage across large-scale tourism ecosystems (Urbančič et al., 2020; Zeqiri et al., 2020).

Furthermore, virtual and augmented reality technologies reduce the environmental impact of travel by enabling immersive experiences that minimize physical mobility. Virtual visits to cultural or natural sites not only lower emissions but also preserve sensitive environments.

Smart mobility systems offer another layer of sustainability by optimizing public transportation, navigation, traffic flow, and travel assistance. These systems provide eco-friendly alternatives and reduce congestion in popular destinations through real-time data sharing and route optimization (Fakhimi et al., 2022).

Categorization of Environmental Benefits:

Sustainable Resource Management: Efficient monitoring and control of water, energy, and waste through IoT and smart meters.

Energy Efficiency: Implementation of renewable energy systems and intelligent infrastructure reduces operational costs and emissions.

Smart Buildings and Infrastructure: Environmentally friendly designs support low-energy tourism facilities (Pencarelli, 2020; Bilsen Bilgili et al., 2021; Fakhimi et al., 2022).

Digital Technologies for Sustainable Transportation: Smart mobility and virtual tourism reduce reliance on physical travel and promote eco-conscious behaviour (Bilsen Bilgili et al., 2021; Ozturk, 2021; Thoi, 2021; Fakhimi et al., 2022).

Pollution Control: Smart systems assist in air and water quality monitoring, recycling management, and emission reduction (Fakhimi et al., 2022).

Tourism 4.0 thus contributes holistically to environmental sustainability by embedding smart, clean, and efficient technologies into all facets of the tourism experience—from resource use and infrastructure to visitor behaviour and transportation systems.

This study has focused on identifying and emphasising the major economic, social, and environmental advantages enabled by Tourism 4.0. While acknowledging the challenges, the intent has been to spotlight the transformative potential of smart technologies in tourism. While Tourism 4.0 delivers substantial sustainability benefits, addressing challenges such as cybersecurity, digital inequality, and environmental risks remains critical.

3.4 Challenges and Risks of Tourism 4.0

While many emerging technologies contribute to Tourism 4.0, this study has focused on the most widely implemented and empirically supported innovations to provide a practical and targeted view of their implications. Despite the potential benefits, the literature also highlights several critical challenges and risks associated with the adoption of these technologies in the tourism sector.

Cybersecurity has emerged as a key concern, with increased digital integration exposing tourism systems to potential data breaches and cyberattacks. The vulnerability of centralized data storage and the lack of robust protection mechanisms have been particularly emphasized (Pencarelli, 2020; Hsu et al., 2022). Beyond cybersecurity, ensuring equitable access to digital innovations presents another significant challenge.

Another pressing issue is digital exclusion, which refers to unequal access to digital infrastructure and varying levels of digital literacy across different populations and regions. This digital divide can undermine the inclusive goals envisioned by Tourism 4.0 and potentially widen existing social inequalities (Osei et al., 2020; Pencarelli, 2020; Bilsen Bilgili et al., 2021; Hsu et al., 2022).

Environmental concerns have also been raised. Although Tourism 4.0 technologies can support sustainability, their implementation—particularly the energy consumption and lifecycle of smart devices—poses new environmental challenges. These may conflict with broader sustainability objectives in tourism development (Ramos et al., 2020; Zeqiri et al., 2020) .

Furthermore, the literature identifies the risk of technological dependency, especially for small and medium-sized tourism enterprises. Relying heavily on a limited number of technology providers could

reduce strategic flexibility and create long-term vulnerabilities (Peceny et al., 2019). However, more empirical research is needed to fully understand the extent of these impacts.

To mitigate these risks, scholars have proposed several strategies, including stronger data protection policies, investment in digital literacy and education, and the adoption of sustainable and inclusive technological frameworks. Moreover, supportive public policies are critical to foster an inclusive and sustainable digital transformation in tourism. A balanced approach to the development of Tourism 4.0—one that simultaneously advances innovation while addressing ethical, social, and environmental considerations—is essential for its long-term success (Al-Romeedy, 2024; Rodrigues et al., 2024; Theofanous et al., 2024). Successfully navigating these challenges is essential for realizing the transformative potential of Tourism 4.0.

4. Discussion

The global economy is increasingly shaped by digital transformation driven by the Fourth Industrial Revolution. Although the tourism sector is a part of this shift, its adoption of digitalization has been slower due to uncertainties and structural challenges. The COVID-19 pandemic underscored the urgency of pursuing development strategies aligned with sustainability, particularly within the framework of the United Nations' Sustainable Development Goals. Problems such as overtourism, pollution, and economic vulnerability have highlighted the need for smarter, balanced approaches. In this context, advanced digital technologies such as AI and IoT are projected to reshape tourism by enhancing service efficiency, real-time responsiveness, and environmental management (Dalkiran, 2022; Rodrigues et al., 2023). Stakeholders are therefore encouraged to prioritize the adoption of these tools in order to remain competitive and sustainable (Melike et al., 2018).

This study conducted a systematic review to evaluate the current state of research on Tourism 4.0. A descriptive analysis of 26 articles indicates a surge in academic interest, particularly since 2020, yet the literature remains fragmented regarding its definitions, guiding principles, and sustainability implications.

Several countries—including Portugal, Finland, Italy, Spain, Turkey, Slovenia, Thailand, Bali, and Malaysia—have begun integrating the Tourism 4.0 paradigm into national strategies and government publications. Leading examples such as Portugal and Slovenia showcase how practical implementations, including AI and IoT-based systems, can enhance destination management and support long-term sustainability (Korže, 2019; Urbančič et al., 2020).

This paper bridges theoretical frameworks with practical examples, illustrating how digital tools can improve operational efficiency and advance sustainable development goals (Pencarelli, 2020; Zeqiri et al., 2020). Slovenia's Tourism 4.0 project and Portugal's smart tourism strategy illustrate how digital innovations can regulate visitor flows, reduce environmental pressures, and optimize energy use (Ramos et al., 2020; Fakhimi et al., 2022).

To further contextualize the findings, the core research questions are revisited in light of the empirical results obtained through co-occurrence analysis and thematic clustering. Regarding the first question, what are the key concepts of Tourism 4.0 and how does digital evolution impact the industry? The findings reveal that Tourism 4.0 is characterized by the integration of advanced digital technologies such as artificial intelligence, blockchain, big data, IoT, cloud computing, and immersive tools like virtual and augmented reality. These technologies enable the transformation of tourism production, management, and experience, resulting in more personalized services, greater efficiency, and enhanced competitiveness. Digital evolution is reshaping traditional business models and enabling the creation of new, innovative services that meet the evolving needs of tourists.

In addressing the second question, what are the constructive components of Tourism 4.0? The study identifies six major components that constitute the foundation of Tourism 4.0: Tourism and Innovation, Smart Decision-Making, Smart Tourism, Industry 4.0 Transformation, Technological Design, and Sustainability and Human-Centered Innovation. These components together illustrate the multidimensional impact of digital transformation on the tourism sector, including the shift towards data-driven decision-making, the integration of immersive technologies, and the adoption of human-centered approaches to ensure that technological progress aligns with sustainable and inclusive tourism practices.

Finally, regarding the third question, what are the drivers for sustainable development in Tourism 4.0, and how can these drivers be effectively integrated to achieve sustainable outcomes? Sustainability in Tourism 4.0 is driven by three main factors: economic, social, and environmental. Economic drivers include improving operational efficiency, reducing costs, and generating new employment opportunities through digital technologies. Social drivers focus on enhancing personalization, cultural connectivity, and inclusivity, ensuring that tourism benefits all stakeholders. Environmental drivers involve smart resource management, energy-efficient technologies, and the promotion of digital alternatives like virtual tourism to minimize the environmental footprint. To achieve sustainable outcomes, these drivers must be effectively integrated through supportive policies, collaborative frameworks, and the equitable distribution of digital resources to ensure that all stakeholders benefit from the advancements of Tourism 4.0.

Although this study is situated within the Tourism 4.0 framework, the identified emphasis on personalization, social inclusion, and empowerment highlights the relevance of the Tourism 5.0 perspective, which may provide a promising direction for future research focused on the integration of human-centric values and digital innovation in tourism.

The findings are supported by multiple empirical studies. For instance, Osei et al. (2020a), (2020b), Ozturk (2021), Bilsen Bilgili et al. (2021) examined the effects of smart technologies on tourism demand and customer experience. Others, including Pencarelli (2020) and Fakhimi et al. (2022), explored the potential of digital innovations to mitigate environmental impacts and improve sustainability during crises such as COVID-19.

This study further identifies technological, organizational, and environmental enablers as crucial to the successful digital transformation of tourism—contrasting with earlier fragmented approaches that analysed these drivers in isolation (Urbančič et al., 2020). Digital tools such as AR, VR, AI, IoT, cloud computing, and blockchain are shown to contribute meaningfully to competitiveness, service personalization, and operational resilience (Gajdošík et al., 2020; Thoi, 2021).

Despite these opportunities, gaps persist in the literature regarding real-world applications and the long-term societal and environmental effects of Tourism 4.0. Many theoretical claims lack empirical validation or fail to address implementation barriers (Thoi, 2021). This study addresses these gaps by examining the practical applications of these technologies.

Future research should focus on the environmental and social impacts of Tourism 4.0, particularly its role in promoting sustainability through digital transformation. Investigating how technologies like AI and blockchain can drive eco-friendly operations and generate socio-economic benefits is essential. Additionally, future studies should explore ethical considerations related to data privacy and the socio-economic effects on local communities, paving the way for innovative, sustainable tourism practices.

Despite the many benefits identified in this study, it is also essential to recognize the accompanying risks and challenges that may hinder the equitable and sustainable implementation of Tourism 4.0. Furthermore, the current study underscores that while the opportunities offered by Tourism 4.0 are vast, they are accompanied by significant challenges. These include cybersecurity threats, ethical concerns regarding data usage, dependence on dominant technology providers, environmental costs of high-tech infrastructure, and issues of digital exclusion—especially in developing regions. Acknowledging these risks is crucial for ensuring that the digital transformation of tourism evolves in an inclusive, ethical, and sustainable manner. Future strategies must therefore balance innovation with digital justice, privacy, and equitable access.

4.1 Theoretical Implications

The term "Tourism 4.0" was introduced in 2016 (Ramos et al., 2020), yet there remains no clear consensus on its definition, criteria, and sustainability principles. This study aims to clarify these aspects by presenting comprehensive theoretical insights. Previous research has identified Tourism 4.0 as a driver of innovation in tourism, fostering entrepreneurial ecosystems and involving tourists, service providers, and government stakeholders (Korže, 2019; Peceny et al., 2019; Ramos et al., 2020).

Tourism 4.0 integrates digital technologies and IT infrastructures to create interactive platforms within the tourism industry (Osei et al., 2020a; Osei et al., 2020b; Peceny et al., 2019). This concept extends beyond digitalizing tourism businesses, focusing on enhancing resource efficiency and promoting environ-

mental sustainability by optimizing energy use and reducing waste (Peceny et al., 2019; Urbančič et al., 2020; Zeqiri et al., 2020; Fakhimi et al., 2022).

Existing literature provides empirical evidence supporting the positive impact of Tourism 4.0 on adopting cleaner production methods and eco-friendly operations. Digitalizing operations in the tourism industry aims to create an integrated digital ecosystem and enhance the productivity and competitiveness of tourism destinations, ultimately contributing to sustainable development (Shafiee et al., 2022). To strengthen the theoretical foundation of Tourism 4.0, future research should draw from innovation management, sustainability studies, and digital transformation theories. Developing clear sustainability criteria, while exploring the role of innovation and entrepreneurship, will be key to understanding how Tourism 4.0 can drive the tourism industry's evolution.

4.2 Practical Implications

The digitization of tourism is a gradual process that involves interrelated technologies such as cloud computing, big data, and IoT, which together enhance personalized services and connectivity with suppliers (Urbančič et al., 2020; Zeqiri et al., 2020; Peceny et al., 2019). Smart buildings, equipped with sensors and IoT, offer enriched user experiences, while robots streamline communication and services (Zeqiri et al., 2020).

Financial capital is crucial for digital advancements, supporting necessary knowledge and expertise in digital transformation (Osei et al., 2020b). Therefore, countries need well-defined strategic plans to handle the complexities of this transformation. Without these plans, Tourism 4.0 cannot achieve its economic, social, and environmental sustainability objectives.

Tourism 4.0 has often been highlighted for its economic benefits, such as increased productivity and job creation (Osei et al., 2020a; Zeqiri et al., 2020; Thoi, 2021). However, its environmental and social impacts are equally significant. Enhanced resource efficiency, waste reduction, and lower carbon emissions contribute to sustainable outcomes. Furthermore, the integration of technologies in Tourism 4.0 fosters smart city development, where AI and IoT improve urban life, ensuring safety, convenience, and environmental monitoring. Aligning tourism with urban strategies promotes resilience and sustainability.

In addition to enhancing urban infrastructure, technologies like smart grids and smart transportation improve energy use and mobility within cities. Digital platforms facilitate better tourist management, reducing overcrowding at popular sites and promoting a balanced visitor distribution.

With global challenges like environmental degradation in mind, Tourism 4.0 can leverage AI and ICT advancements to address natural resource management in the digital age (Balsalobre-Lorente et al., 2023). The convergence of these technologies supports sustainable tourism, empowering communities and contributing to symbiotic tourism destinations (Ozturk, 2021; Thoi, 2021).

The transformative impact of Industry 4.0 technologies on the tourism sector has become increasingly evident, ushering in a new era of digitalization and connectivity. Our systematic review sheds light on current Tourism 4.0 literature, providing important insights into trends, challenges, and potential advantages.

Strategic Emphasis on Communication Technologies: Stakeholders are urged to prioritize communication technology development and integration of new trends. This aligns with the rapid transformations in the industry, emphasising the need for proactive adaptation to these changes.

Global Adoption of Tourism 4.0 Terminology: The review reveals widespread adoption of the term "Tourism 4.0" in publications and initiatives by governments and policymakers globally. Countries such as Portugal, Finland, Italy, Spain, Turkey, Slovenia, Thailand, Bali, and Malaysia have embraced this terminology (Korže, 2019), signaling a global recognition of the importance of Industry 4.0 in tourism.

Focus on Sustainable Tourism Practices: Addressing sustainability is crucial within the Tourism 4.0 framework. Policymakers and industry leaders must align Tourism 4.0 developments with goals that prioritize not only economic growth but also social and environmental sustainability. However, our review highlights a gap in the literature that needs further exploration of this intersection.

Strategic Planning for Digital Transformation: Developing accurate strategic plans is essential for managing the complexities of tourism's digital transformation. Without proper strategies, the potential for achieving economic, social, and environmental sustainability through Tourism 4.0 is limited. As the review suggests, the long-term economic growth driven by Tourism 4.0 could lead to increased job creation and

sustainable tourism ecosystems. Moreover, optimizing energy and resource consumption directly contributes to enhanced efficiency and reduced environmental impact.

Practical Recommendations: It is critical to provide stakeholders in the tourism sector with actionable insights for implementing Tourism 4.0 initiatives (El Archi et al., 2023). Challenges related to infrastructure development, workforce upskilling, and stakeholder collaboration need addressing. Best practices from regions that have successfully embraced Tourism 4.0 principles offer valuable lessons. Strategic planning must encompass economic, social, and environmental facets to ensure a comprehensive digital transformation. Awareness programs should encourage the incorporation of communication technologies to facilitate the effective implementation of Tourism 4.0 initiatives.

4.3 Research Implications

While our systematic review primarily focused on the positive aspects of Tourism 4.0, future research endeavors should delve into the challenges associated with this paradigm shift. Investigating the implications for sustainability, both environmental and social, requires deeper exploration. By addressing these challenges, researchers can contribute to a more comprehensive understanding of the multifaceted impact of Tourism 4.0, thereby informing strategic decision-making and policy development.

Given the dynamic nature of technology, longitudinal studies are essential to track the evolution of Tourism 4.0. Future research should adopt a longitudinal approach to capture the changing landscape, assess sustained impacts, and uncover emerging trends within the tourism industry. This perspective will provide valuable insights into the long-term effects of digital transformation on the tourism sector, enabling stakeholders to adapt and innovate effectively.

Our study hints at the integration of technologies across sectors. Future research can explore the potential benefits and challenges of cross-sector collaboration, offering insights into how different industries can collaborate effectively to enhance overall digital transformation. Understanding the dynamics of cross-sector collaboration in the context of Tourism 4.0 is crucial for fostering synergies and maximizing the potential of interconnected technologies.

A deeper understanding of end-user experiences is crucial for the success of Tourism 4.0 technologies. Future research can delve into user perceptions, preferences, and challenges associated with the adoption of these technologies, ensuring that developments align with the expectations of tourists. By prioritizing user experience studies, researchers can contribute to the creation of more user-centric and effective digital solutions within the tourism industry.

In conclusion, our systematic review not only provides practical insights for industry stakeholders but also highlights critical avenues for future research. By addressing challenges, fostering innovation, and considering sustainability, the tourism sector can maximize the benefits of Industry 4.0 technologies for sustainable and competitive growth. This emphasis on future research directions underscores the importance of continued exploration and adaptation within the evolving landscape of Tourism 4.0.

5. Conclusion

This systematic review has highlighted the impact of the fourth industrial revolution on tourism (Melike et al., 2018; Korže, 2019; Tasya et al., 2019), particularly within the context of Tourism 4.0. By systematically reviewing 148 articles from 2016 to 2022 and employing rigorous selection criteria based on the Critical Appraisal Skills Program (CASP) guidelines, we identified 26 high-quality articles, allowing us to achieve our research goals and extract valuable insights. The findings reveal that Tourism 4.0 represents a paradigm shift driven by the digital transformation of the industry, disrupting traditional business models and giving rise to new ones.

As the industry evolves in the digital age, tourism organisations must intelligently address competitive challenges and adapt to new business models to enhance operational effectiveness and overall output (Osei et al., 2020b; Pencarelli, 2020). Furthermore, the emergence of Tourism 4.0 fosters a new type of collaborative engagement (Korže, 2019; Pencarelli, 2020; Urbančič et al., 2020), involving the active participation of local communities, tourists, tourism service providers, and government entities, ultimately creating a more inclusive and sustainable tourism environment.

Tourism 4.0 aligns with the broader objectives of the United Nations' Sustainable Development Goals (SDGs), including fostering economic growth, promoting innovation, and enhancing sustainability within urban and rural communities. By leveraging digital technologies, Tourism 4.0 contributes to the development of sustainable tourism infrastructures, encourages responsible consumption and production patterns, and reduces environmental impacts through more efficient resource use and eco-friendly practices. Additionally, it promotes inclusive growth by creating job opportunities and empowering local communities, while addressing climate change by reducing carbon footprints and encouraging green initiatives.

For industry practitioners, our findings emphasize the necessity of adapting to digital disruption by embracing new business models and enhancing operational efficiency to remain competitive. Policymakers are encouraged to develop frameworks that facilitate this transition by incentivizing innovation and promoting the integration of emerging technologies in the tourism sector. This will support sustained growth, collaboration, and improved service delivery. For government and non-government organizations, fostering a collaborative ecosystem that includes local communities, tourists, and service providers can lead to a more inclusive and sustainable tourism environment. Researchers can utilise these insights to explore the impact of digital transformation on various aspects of tourism, including operational efficiency and social inclusion, while also addressing challenges such as the digital divide and data security.

The practical implications for society revolve around creating a tourism industry that is more sustainable and inclusive, where community engagement and social well-being play central roles. Tourism 4.0 holds great promise in driving economic growth, environmental sustainability, and social equity through the responsible use of technology. However, despite the quality of the studies conducted, numerous research opportunities remain unexplored. The ongoing evolution of Tourism 4.0 presents immense potential for advancing the tourism industry and fostering sustainable development (Peceny et al., 2019; Fakhimi et al., 2022). Therefore, researchers and practitioners must continue to investigate the various dimensions and implications of Tourism 4.0. By embracing digital transformation and collaborative engagement, countries can create a promising future for their tourism industries in terms of environmental, social, and economic development. By providing the necessary infrastructure and conditions, Tourism 4.0 can achieve even greater growth and development.

In navigating the ever-changing landscape of technology and tourism, it is essential to acknowledge the potential challenges and risks associated with Tourism 4.0. Issues such as data privacy, cybersecurity, and the digital divide must be addressed to ensure that all stakeholders can benefit from the digital revolution. Policymakers and industry leaders must collaborate to establish robust regulations and frameworks that safeguard the interests of individuals, businesses, and communities. In embracing digital transformation and collaborative engagement, countries can create a promising future for their tourism industries regarding environmental, social, and economic development. By providing the necessary infrastructure and conditions, Tourism 4.0 can achieve even greater growth and development.

5.1 Limitations and Future Research Directions

As we chart the future course of research within the dynamic landscape of Tourism 4.0, it is crucial to address existing gaps and propel the field toward new horizons. Future investigations should prioritize specific topics to deepen our understanding of the dynamics and implications of Tourism 4.0. These topics include exploring the socio-economic impacts on local communities, analyzing the transformative potential of emerging technologies such as artificial intelligence and blockchain in reshaping tourism experiences and operational paradigms, and critically examining the ethical dimensions of data collection, privacy, and digital surveillance in digitalized tourism environments.

For researchers, there is a pressing need to develop and test theoretical frameworks that explain how innovation management theories can guide the adoption of Tourism 4.0. Integrating sustainability principles into these frameworks will be key to achieving long-term benefits. Additionally, practical case studies on regions or businesses that have successfully implemented Tourism 4.0 can provide industry practitioners with actionable insights.

Policymakers and industry leaders should focus on strategic planning that addresses not only the economic benefits but also the social and environmental dimensions of Tourism 4.0. Guidelines must balance

the potential growth of digital tourism with ethical concerns, such as data privacy and security, to protect both businesses and individuals.

Theoretical frameworks play a pivotal role in shaping our comprehension of Tourism 4.0 and guiding its implementation. Future research should investigate how innovation management theories influence the adoption and diffusion of Tourism 4.0 practices across diverse industry contexts. Developing robust theoretical frameworks that integrate sustainability principles into the core strategies of Tourism 4.0 will be essential for ensuring that technological advancements contribute to sustainable and inclusive growth.

Moreover, there is a need to examine the role of smart cities in facilitating Tourism 4.0. Research should explore how urban infrastructure and smart city initiatives can support the seamless integration of Tourism 4.0 technologies, enhancing the overall tourist experience while promoting sustainable urban development.

In addition to theoretical explorations, practical insights are indispensable for industry stakeholders navigating the complexities of implementing Tourism 4.0. Future research should prioritize providing practitioners with actionable case studies and best practices from regions or businesses that have successfully embraced Tourism 4.0 principles. This will facilitate knowledge transfer and informed decision-making, enhancing the effectiveness and sustainability of digital transformation efforts within the tourism industry. Emphasising the importance of strategic planning that encompasses economic, social, and environmental dimensions is crucial for ensuring the comprehensive and sustainable evolution of Tourism 4.0.

Finally, it is important to highlight the need for interdisciplinary approaches in future research. Collaboration among technologists, social scientists, urban planners, and industry practitioners will be crucial in addressing the multifaceted challenges and opportunities presented by Tourism 4.0. By fostering such collaborations, we can ensure that the evolution of Tourism 4.0 is guided by a holistic understanding of its impacts and potential.

By embracing these future research directions, scholars and practitioners can collaboratively advance the field of Tourism 4.0, paving the way for innovative strategies and sustainable practices that harness the full potential of digital technologies within the tourism ecosystem.

While this systematic review offers valuable insights into the digital evolution of the Tourism 4.0 industry, certain limitations may have influenced the findings. Future researchers can build upon this study and explore new avenues to comprehensively address these limitations. One limitation lies in the scope of the selected articles, which—despite efforts to include a diverse range—may have inadvertently excluded relevant studies. Future research could expand the scope by considering a broader range of literature, including industry reports, conference proceedings, and gray literature, to provide a more comprehensive analysis. Additionally, reliance on existing literature may have constrained the depth of insights, suggesting the need for primary research methods such as surveys or interviews to uncover practical implementation insights and challenges associated with Tourism 4.0.

Moreover, while this study primarily focused on the impacts and advantages of Tourism 4.0, future research could delve deeper into sustainability practices and strategies, community engagement, and the well-being of both tourists and local residents. Exploring the practical implementation of Tourism 4.0 technologies in real-world settings and conducting bibliometric analyses to supplement systematic reviews could further enrich our understanding of the field's evolution and trends.

Another important limitation relates to the geographical and sectoral scope of the reviewed literature. The geographical distribution of studies was skewed toward Europe and Southeast Asia, with limited representation from Africa, Latin America, and other developing regions. This imbalance may affect the generalizability of the findings and restrict the applicability of Tourism 4.0 frameworks to diverse socio-economic and cultural contexts. Likewise, the sectoral focus leaned heavily toward hospitality and digital technologies, while niche areas such as sustainable tourism logistics, rural tourism innovation, and community-based ecotourism received comparatively less attention. These gaps underscore the importance of future systematic reviews adopting broader inclusion criteria, incorporating diverse regional perspectives, and utilizing interdisciplinary lenses to capture the full spectrum of Tourism 4.0's global development and its implications across varied sectors.

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Accessible and Inclusive Tourism for Persons with Hidden Disabilities: A Systematic Literature Review

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ABSTRACT

Tourism plays a pivotal role in the global economy and significantly contributes to gross domestic product (GDP) and employment. Its swift rebound after the COVID-19 pandemic underscores its resilience and interconnection with various sectors, such as construction, agriculture, and telecommunications, amplifying its economic impact. Tourism has traditionally been concerned with the people who participate. However, studies are increasing with the implementation of accessible tourism programs that aim to reduce barriers, enabling persons with disabilities (PWD) access to more leisure activities and addressing the need for access by PWD, thereby ensuring equitable access. This paper identifies available literature on accessible and inclusive tourism for persons with hidden disabilities (PwHD) to determine processes put in place by the tourism industry to manage PwHD. This conceptual paper used a systematic literature review methodology to identify relevant literature on hidden/invisible disabilities using Google Scholar and an academic university's database. The finding of the paper aims to synthesize the tourism industry and the barriers related to travel for PwHD.

KEYWORDS

Accessible Tourism, Persons with Disabilities (PWD), Persons with Hidden Disabilities (PwHD).

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1. Introduction

Tourism plays a pivotal role in the global economy, significantly contributing to GDP and employment while nurturing connections with sectors such as construction, agriculture, and telecommunications. Its swift rebound after the COVID-19 pandemic underscores its resilience and the role it plays in sustainable economic growth, ensuring that tourism remains a crucial driver of global prosperity (Castro, 2024; UNWTO, n.d.). Tourism is a multi-stakeholder industry that incorporates the government, the business sector, the private sector, and the global society, experiencing exponential growth in recent years (Wijayanti & Damanik, 2019). In 2023, South Africa welcomed four million tourists, marking a 44.5% increase in air travel arrivals in South Africa (George Herald, 2023). However, despite the growth in travel, there remains a significant segment of the population whose travel experiences are often overlooked (Darcy et al., 2020). Have you ever wondered how people with disabilities travel? In 2023, more than 4 million tourists visited South Africa, indicating an increase of 78.2% from 2022 (George Herald, 2023). According to the World Health Organization (WHO, 2023, 2024), disabilities affect a considerable portion of the global population, with approximately 16% of people living with some form of disability (Wiltshire, 2023). Within the African context, it is estimated that about 80 million (20%) people live with some form of disability (Duri & Luke, 2022).

The WHO and the Convention on the Rights of Persons with Disabilities (CRPWD) define a PWD as a person with long-term physical, mental, intellectual, or sensory impairments that hinder social interaction (UN, 2024). This definition can, however, be extended to include persons with hidden disabilities (PwHD), such as medical problems, for example, diabetes and epilepsy, and other less visible conditions, such as ADHD, autism, visual disabilities, and mental disease presenting unique challenges for individuals and parents with children suffering from hidden disabilities (WHO, 2024), thus making participation of such individuals, low in tourism, as they are often neglected from activities as they require more assistance and attention.

The medical and social models of disability present two distinct perspectives on understanding and addressing the challenges faced by PWD. The medical model views disabilities as an individual defect, often leading to an emphasis on treatment and cure. In contrast, the social model identifies societal structures and prejudices, advocating systemic changes to foster inclusion. These models advocate for ongoing dialogue on best supporting and empowering individuals with disabilities (Calitz, 2020).

Accessible tourism ensures inclusivity by applying universal design principles across transport, accommodation, attractions, and services, promoting independence, dignity, and equal opportunities (Kim & Adu-Ampong, 2023). It is increasingly recognized for its ethical and economic benefits, as highlighted by the 2023 International Accessible Tourism Forum in Seoul, which emphasized its role in advancing Sustainable Development Goals (SDGs) and fostering an inclusive tourism industry (Heng, 2023; UNDESA, n.d.-a).

Accessibility is vital for sustainable development, benefiting both persons with disabilities and society at large. However, disability inclusion is often influenced by personal connections, which can lead to inconsistent practices. This lack of practical understanding, particularly among South African tourism professionals, creates challenges in implementing inclusive measures effectively (Makuyana, 2022). This brings to mind Ronald Mace, who faced challenges after contracting at nine. He revolutionized architecture with “universal design,” creating functional, appealing products for diverse abilities (Woodward, n.d.). His work influenced key legislation like the Fair Housing Amendments Act of 1988 and the Americans with Disabilities Act of 1990, safeguarding the rights of people with disabilities (ADA.gov, 2024).

Universal Design (UD) creates accessible products for people with diverse abilities, preferences, and sensory or environmental limitations. It reduces dependence on assistive technology, enhances compatibility with such tools, and improves usability for all, including individuals without disabilities (Center for Excellence in Universal Design.org, 2024). It focuses on creating accessible, practical, and user-friendly products for diverse populations, surpassing traditional accessibility by addressing varying needs and perspectives. Its three main principles include: i) Recognition exclusion (acknowledging biases that unintentionally exclude groups due to disabilities, social barriers, or temporary impairments (Interaction-design.org, n.d.); ii) Learning from diversity (incorporating input from individuals of different ages, abilities, cultures, and socio-economic backgrounds during the design process enhances accessibility and usability

(Interaction-design.org, n.d.); iii) Extention solutions (designing for one group often benefits others, such as, providing an option to listen to content supports visually impaired users and those seeking convenience or relief from screen fatigue (Interaction-design.org, n.d.)).

The study was conducted through a systematic literature review of articles to provide a comprehensive and unbiased overview of existing tourism literature that mentions persons with disabilities, specifically hidden disabilities. It followed a structured methodology to ensure that relevant literature was identified, evaluated, and integrated based on specific keywords.

2. Problem Statement and Objective

Disability includes diverse experiences, with hidden disabilities significantly impacting daily life despite being invisible. Barriers like insufficient wheelchair access and poor infrastructure limit inclusion and accessibility is often neglected for persons with hidden disabilities (PwHD), complicating accessible tourism (Wiltshire, 2023). But what of persons living with a hidden disability? Tourism presents both challenges and opportunities for PwHD as the symptoms are invisible, resulting in misunderstanding and stigmatization. Another is the lack of staff training and awareness, which may lead to communication challenges. While improvements in tourism services and awareness are needed, adaptive experiences, supportive networking, and companion inclusion can greatly enhance travel for PwHD, making destinations more welcoming for all (Kara, 2023; WTM.com, 2023).

South Africa's tourism sector is advancing accessible tourism, but issues like poor signage and communication still hinder PwHD participation. Misunderstanding and neglect of PwHD needs contribute to inequalities in tourism and employment (Duri & Luke, 2022; Schultz, 2023). Despite efforts, barriers continue to challenge PwHD travel experiences, emphasizing the need for inclusive solutions. This paper focuses on the unique challenges and opportunities for PwHD.

This conceptual paper aims to identify available literature on accessible and inclusive tourism for persons with hidden disabilities (PwHD). The systematic review aims to identify barriers, best practices, and gaps in existing literature to ensure an accessible tourism experience for PwHD. This conceptual paper used a systematic literature review methodology to identify relevant literature on hidden/invisible disabilities using Google Scholar, Scopus, Web of Science, and an academic university's database to identify academic and peer-reviewed articles.

3. Methodology

Although there are several significant articles on hidden/invisible disabilities, there appears to be a disconnect between what is written and how the tourism industry addresses the aspects of PwHD. This conceptual paper used a systematic literature review methodology to identify relevant literature on hidden/invisible disabilities using Google Scholar and an academic university's database, and to determine processes put in place by the tourism industry to manage PwHD.

Bibliometric research involves specific steps to ensure a comprehensive literature analysis. The way to identify literature on tourism for PwHD and to determine processes put in place to manage this unique group of tourists. The literature used Google Scholar and an academic university's database, which comprised searches across Scopus, Web of Science, and the Directory of Open Access Journals (DOAJ) using the following main key terms: Invisible disabilities, hidden disabilities, persons with disabilities (PWD) and persons with special needs (PwSN). Aspects outside of these main key terms were excluded. Table 1 provides a summary of the number of searches per category:

Table 1. Number of Searches Per Category

Search term	Persons with disabilities	Persons with special needs	Hidden disabilities	Invisible disabilities
Number of articles	13,990	2,801	384	288

Source: Own Elaboration

The articles in the categories were screened to identify relevant titles linked to tourism and PWD. The abstracts of these articles were further screened to determine relevance to persons with hidden/invisible disabilities and PwSN. The author identified one hundred and forty articles from the abstracts that were relevant to the topic. Table 2 provides an overview of articles referenced in this paper that link tourism search terms with PWD, persons with hidden/invisible disabilities, and persons with special needs.

Table 2. Link to Tourism, Persons with Hidden/Invisible Disabilities, and Persons with Special Needs

Author(s)	Publication date	Article title	Link
Ali, L., Kalic, H. and Ozturen, A., 2023	2023	From disabled tourists to impaired cyborg tourists: What would it take to transform?	Barriers to accessible tourism
Calitz, E. C.	2020	The invisible made visible: Disability Tourism in South Africa – a comparative perspective [dissertation].	The medical and social models of disabilities.
Carneiro, M. J., Alves, J. P., Eusebio, S., Saraiva, L. and Teixeira, L.	2022	The role of social organizations in promoting recreation and tourism activities for people with special needs.	Advocate for better accessibility and provide direct support to PwHD.
Correa, S. C. H. and Gosling, M. S.	2021	Almatourism	Contributes to a collective memory of the place, enriching the person's experience.
Darcy, S., McKercher, B. and Schweinsberg, S.	2020	From tourism and disability to accessible tourism: A perspective article.	From tourism and disability to accessible tourism.
De Pascale, A., Abbate, T. and Meleddu, M.	2021	Exploring the propensity to travel of people with disabilities: a literature review.	Physical obstacles that impede PWD' access to facilities and services.
Duri, B. and Luke, R.	2022	Transport barriers encountered by people with disabilities in Africa: An overview.	Transport barriers are misunderstood and disregarded, leading to inequality in tourism.
Eaton, W. W., Bienvenu, O. J. and Miloyan, B.	2018	Specific phobias	Linked to specific phobias and their implications for accessible tourism of PwHD.
Heng, M.	2023	Accessible tourism solutions to make destinations and traveler experiences more inclusive.	Sustainable Development Goals (SDG) and an equitable tourism industry.
Kara, N.	2023	A systematic literature review on tourist experience of people with disabilities in the hospitality and tourism sector.	Infrastructure can significantly impact the travel experience of PWD.
Kim, S. and Adu-Ampong, E. A.	2023	Disabilities, functioning, and capabilities: The capability approach in accessible tourism.	Accessible tourism to cater to PWD (travelers) to enhance their travel experience.
McIntosh, A. J.	2020	The hidden side of travel: epilepsy and tourism.	Consultation with healthcare providers to develop a travel plan that considers the specific health needs of PwHD.
McKercher, B. and Darcy, S.	2018	Re-conceptualizing barriers to travel by people with disabilities	To understand the nature and effect of travel constraints faced by PWDs.
Makuyana, T., Du Plessis, E. and Chikuta, O.	2022	Literature profiling on tourism, impairment, and disability issues: A future directional guide.	Challenges in effectively integrating inclusive practices in tourism.

Author(s)	Publication date	Article title	Link
Reindrawati, D. Y. Noviyanti, U. D. E. and Young, T.	2022	Tourism experiences of people with disabilities: Voices from Indonesia	The perceptions from other abled tourists stress the importance of a holistic approach to tourism development that prioritizes accessibility and inclusivity.
Rubio-Escuderos, L., Garcia-Andreu, H. and De La Rosa, J. U.	2021	Accessible tourism: origins, state of the art, and future lines of research.	Identify three factors that limit the participation of PwHD in tourist activities and their interaction with the environment in which they travel.
Sarmah, B., Kamboj, S. and Chatterjee, R.	2022	Linking the intrinsic and environmental constraints with tourists with disabilities' behavioral intentions towards a travel destination: mediating the role of learned helplessness.	The influence of individual attributes such as personality traits and communication abilities.
Singh, R., Sibi, P. S., Yost, E. and Mann, D. S.	2021	Tourism and disability.	Improving the quality of life for PWD by providing better travel experiences.
Theofanous, G., Thrassou, A. and Uzumboylu, N.	2024	Digital inclusivity: advancing accessible tourism via sustainable E-commerce and marketing strategies.	Artificial Intelligence (AI) modernizes e-commerce in support of environmentally responsible practices.
Wijayanti, A. and Damanik, J.	2019	Analysis of the tourist experience of management of a heritage tourism product: A case study of the Sultan Palace of Yogyakarta.	Tourism and economic growth.
Wiltshire, D.	2023	Understanding students with disabilities in online higher education courses and their retention.	The broad spectrum of disabilities emphasizes the need for tailored approaches to accommodate the varying needs of PWD.

Source: Own Elaboration

As noted in the articles referenced, there is a gap in terminology where the generic term "persons with disabilities" is used. The term is holistically linked and does not indicate applicability to PwHD.

4. Findings of the Literature Review

The literature surrounding the management of PWD in the tourism industry is rich and varied, reflecting the multifaceted challenges and opportunities inherent in promoting accessibility and inclusivity. This expanded review delves deeper into key themes and insights derived from organisations with PWDs, shedding light on the complex dynamics shaping the experiences of PWD in tourism (UNWTO, n.d.).

The literature on managing persons with disabilities (PWD) in tourism highlights both challenges and opportunities in fostering accessibility and inclusivity. Tourism provides unique sensory experiences, especially for visually impaired individuals, such as tactile connections to nature and history. However, gaps in disability-friendly infrastructure, such as unclear wheelchair paths and remote tourist sites, underscore the need for inclusive design (UNWTO, n.d.; Kara, 2023).

Insights from Surabaya, Indonesia, emphasize a holistic approach to accessible tourism, aligning with UN Sustainable Development Goals (SDGs) to promote equal opportunities for PWD and persons with hidden disabilities (PwHD) (Reindrawati et al., 2022). Addressing these needs ensures tourism is inclusive for all. The 17 global Sustainable Development Goals (SDGs) established by the United Nations in 2015 as part of the 2030 Agenda for Sustainable Development aim to address various global challenges. As a signatory, South Africa is committed to integrating the SDGs into its policies (Castro, 2024; UNDESA, n.d.-a, UNDESA, n.d.-b).

These SDGs present a critical framework for fostering global development, particularly for PwHD. Through the promotion of inclusivity and sustainability, tourism contributed to economic growth and equal opportunities. Where accessible tourism promotes the enjoyment of travel, leisure, and therapeutic

activities, enhancing relaxation and mental health for PwHD, linking to SDG 3, good health and well-being. With the aid of assistive technology (AT) PWD and PwHDs have the chance to take control of their life by improving their well-being and lessening mental problems such as depression (Senjam & Manna, 2024). SDG 4 equips tourism employees with quality education, training, and awareness to manage diverse travelers, thus ensuring inclusive service delivery. AT allows PWD and PwHD to read documents and information on screen readers or Braille software in order to assist travelers with hidden disabilities (Senjam & Manna, 2024).

Robust and adaptable infrastructure forms the backbone of thriving communities, where SDG 9.8. addresses universal access to information and communication technology (UN, n.d.). Numerous smartphone applications on various devices offer innovative features to enhance communication and information access for PWDs, (Theofanous et al., 2024). Technologies such as Optical Character Recognition (OCR), voice recognition, color and contrast enhancement, touch and gesture inputs, and screen magnification are seamlessly integrated into portable devices and applications that allow PWDs to interact with content in formats they can easily understand (Senjam & Manna, 2024).

The incorporation of universal design principles (SDG 11, sustainable cities) ensures inclusive and accessible systems, thus taking cognizance of the unique requirements of PwHD, ensuring that all individuals can use and enjoy facilities equitably and sustainably. Furthermore, partnerships and collaboration (SDG 17) between governments, industries, and small businesses build networks that promote accessible and inclusive tourism practices (Castro, 2024; UN, n.d.; United Nations Tourism (UNT), n.d.).

Integrating SGDs in tourism leads to the development of accessible and inclusive tourism practices. It fosters economic opportunities (SDG8), allows technology to promote accessible tourism (SDG 9), reduces social inequalities (SDG 10), ensures welcoming, inclusive urban communities (SDG 11), and promotes health and well-being (SDG 3) through engaging leisure and therapeutic experiences (UN, n.d).

4.1 Understanding the Spectrum of Disabilities

Central to the discourse on accessible tourism is recognizing the diverse nature of disabilities. As highlighted by Wiltshire (2023), disabilities encompass a broad spectrum, ranging from physical impairments to hidden disabilities such as mental, cognitive, and intellectual challenges. This multifaceted nature of disabilities underscores the need for a tailored approach to accommodate the varying needs and preferences of PwHD in tourism settings.

Several studies have underscored the importance of recognizing and addressing hidden disabilities, which may not be immediately apparent but can significantly impact an individual's travel experience. For instance, Reindrawati et al. (2022) emphasizes the challenges faced by persons with sensory impairments, such as blindness or deafness, in navigating tourism environments as they encounter difficulties in accessing information, communicating with service providers, and engaging in leisure activities, highlighting the need for enhanced support.

4.2 Hidden Disabilities

Hidden disabilities significantly impact travel experiences in the tourism industry despite being invisible. They include conditions such as cognitive dysfunctions, chronic pain, mental disorders, hearing and vision impairments, anxiety, depression, ADHD, autism spectrum disorder (ASD), and dyslexia. These can affect individuals' ability to handle stress, adapt to new environments, engage socially, or process information (Invisible Disabilities Association, 2023; Kara, 2023).

As stated by Dos Santos et al., 2025), there are various types of disabilities, of which hidden disabilities are particularly noteworthy. These invisible conditions include traits that are not immediately apparent, such as mental health issues, autoimmune disorders, neurological conditions, or chronic pain (CDC, Center for Disease Control and Prevention, 2023). Hidden disabilities also encompass developmental disorders, which impact cognitive processes and are classified as hidden due to their lack of physical manifestations that make them easily identifiable (Couzens et al., 2015). Examples include autism spectrum disorder (ASD), intellectual disabilities, multiple sclerosis, lupus, epilepsy, fibromyalgia, arthritis, attention deficit hyperactivity disorder (ADHD), and hearing impairments or deafness (CDC, 2025).

Epilepsy is a neurological disorder causing recurrent seizures that vary in severity and frequency and presents unique challenges for individuals when traveling, particularly concerning safety and accessibility. Research by McIntosh (2020) highlights the concerns of individuals with epilepsy regarding access to emergency medical services and the availability of accommodations to manage their condition while traveling. Issues such as access to medication, seizure response training for tourism staff, and awareness of seizure triggers are crucial considerations for individuals with epilepsy when planning and participating in tourism activities (McIntosh, 2020).

Diabetes is a hidden disability that can pose challenges for individuals traveling. Managing blood glucose levels, medication administration, and dietary considerations are essential aspects of diabetes self-care that travel could complicate. Individuals with diabetes often face difficulties accessing appropriate food options, monitoring blood sugar levels, and obtaining necessary medical supplies while traveling. Furthermore, concerns about language barriers, cultural differences, and unfamiliar healthcare systems can exacerbate the challenges faced by individuals with diabetes when navigating tourism environments (Diabetes.org, n.d.).

Mental disorders such as major depressive disorder, generalized anxiety disorder, schizophrenia, and dementia have their own challenges. Jiang et al. (2025) highlight the importance of tailored approaches to address the unique needs of tourists with mental disorders. The complexity of these conditions is evident in research into the travel experiences of individuals with pervasive developmental disorders (e.g., autism spectrum disorders) and degenerative disorders (e.g., dementia) (Jiang et al. 2025).

Specific phobias, such as fear of heights (acrophobia) or enclosed spaces (claustrophobia), are common hidden disabilities that can impact an individual's ability to participate in certain tourism activities. For individuals with specific phobias, the fear of encountering triggering stimuli can severely limit their options for leisure and recreational activities while traveling. Research by Eaton et al. (2018) highlights the impact of specific phobias on individuals' travel experiences, including agoraphobia, avoidance behaviors, heightened anxiety, and reduced enjoyment of tourism activities. Strategies for managing specific phobias in tourism settings may include providing alternative activities, offering exposure therapy in a controlled environment, and ensuring clear communication and support from tourism staff.

Globally, over 2.2 billion people face visual challenges, with 1 billion cases preventable or requiring attention (World Health Organization, 2023). Visually impaired tourists often travel with family or in groups, strengthening bonds and enhancing safety through companion support, including descriptions of scenery (Qiao et al., 2023; Shaw & Coles, 2004; Su et al., 2020; Small et al., 2012). Group tours are organized by participants, non-profits, or travel agencies (Su et al., 2021). While most prefer traveling with companions, some opt for solo trips using guide dogs despite challenges (Qiao et al., 2023).

Visually impaired individuals enrich their travel experiences through senses like hearing, touch, and smell, aided by sensory replacement technologies such as Sensory Substitution Devices (SSDs) and electronic travel aids (Rombaux et al., 2010; Lloyd-Esenkaya et al., 2020; Qiao et al., 2023). While aesthetic perception is central to tourism, visual impairments do not exclude individuals from appreciating beauty. Their perception of the world, shaped by other senses, challenges traditional notions of "completeness" and emphasizes emotional rather than visual experiences (Mills et al., 2008; Xie & Fan, 2017; Xie et al., 2023; Qiao et al., 2023; Kirillova, 2023).

These hidden disabilities can affect the daily life of a tourist, impacting their focus and behavior. They may struggle to pick up on social cues or have difficulty following verbal commands and directions. They may even find it difficult to express themselves verbally. Recognizing and addressing the needs of individuals with hidden disabilities is essential for promoting accessible tourism and ensuring the full participation of all travelers.

4.3 Accessible Tourism

The literature underscores the importance of addressing the diverse needs of PWD. Darcy et al. (2020) advocate programs to reduce barriers and enhance the participation of PWD in leisure activities. Similarly, Wiltshire (2023) highlights the broad spectrum of disabilities, emphasizing the need for tailored approaches to accommodate the varying needs of PWD. Furthermore, Reindrawati et al., (2022) underscore the challenges faced by PwHD, particularly sensory impairments, in navigating tourism environments.

These studies emphasize the need for comprehensive strategies to enhance accessibility and inclusivity within the tourism industry, highlighting the importance of including PwHD. It examines the importance of accessibility and inclusion of travel for all travelers, focusing on understanding the factors that enable or hinder PwHD travel experiences, aiming to create a more inclusive sector. While PWD share the same travel aspirations as others, there is a need for more profound research on how disability is perceived and addressed in tourism. Such efforts could improve the quality of life for PWD by enhancing their travel experiences, reducing isolation, and alleviating stress (Singh et al., 2021).

Accessible tourism represents a shift in perspective, recognizing the importance of inclusivity in travel experiences. It extends beyond the focus of disabilities, embracing a broader understanding that caters to all individuals, regardless of their physical or cognitive conditions. The evolution in the tourism industry reflects a growing awareness and commitment to ensuring that leisure and travel are enjoyable and feasible for everyone, aligning with "tourism for all" principle, fostering a more welcoming and diverse tourism environment (Kim & Adu-Ampong, 2023). The transition to accessible tourism reflects a growing awareness and commitment to inclusivity in the travel industry. Regions like Catalunya, Singapore, Flanders, and Cairns are leading the way by upgrading their facilities and services to accommodate travelers with disabilities. This not only fosters a more inclusive environment but recognizes the economic contributions of this unique market segment, enriching the entire tourism ecosystem with diversity and opportunity (Darcy et al., 2020).

Qiao et al. (2023) state that accessible tourism for visually impaired travelers is a crucial factor to consider, including accessing dependable information and transportation (Zhao et al., 2023). The availability of accessible infrastructure and supportive companions, such as family, friends, or guide dogs, plays a vital role in enabling tourism participation, where guide dogs help overcome access barriers, fostering independence and self-confidence (Rickly, 2022). Additionally, they improve mobility and encourage social interaction while traveling (Audrestch et al., 2015; Merinero-Rodríguez & Pulido-Fernández, 2016).

Kim and Adu-Ampong (2023) describe the capability approach in tourism as a valuable conceptual framework for accessible tourism, emphasizing the importance of individual agency and choice. It shifts the focus from merely providing access to ensuring that PWDs have the freedom to pursue a life they find fulfilling. Concentrating on removing barriers and enhancing personal capabilities leads to more inclusive and empowering tourism experiences. Kim and Adu-Ampong (2023) focus on three areas of tourism that could benefit PWD, emphasizing the importance of non-market resources and socio-economic factors in travel opportunities. It underscores the significance of personal choice in the tourism experience, advocating for a deeper understanding of how these elements affect travel opportunities for PwHD and their overall well-being. Furthermore, it prompts scholars to critically assess policies and initiatives, fostering interdisciplinary collaboration to tackle social inequality and ultimately to recognize and accommodate the diverse needs of travelers.

To develop accessible tourism, destinations must move beyond temporary solutions and embrace universal design principles, ensuring that all individuals, regardless of their physical or cognitive abilities, can use and enjoy amenities fairly and sustainably (UN, n.d.). Furthermore, the Global North (countries in places such as Europe, North America, and parts of Asia) has recognized accessible tourism as a key strategy for post-COVID-19 recovery. Researchers like Darcy et al. (2020) have highlighted the shift from viewing disability tourism as a niche market to recognizing it as a mature and accessible market. Improving accessibility supports PwHD and benefits all members of society by fostering inclusivity and participation across demographics.

4.4 Social Organizations

Social organizations are crucial in supporting PwHD by reducing barriers and facilitating their participation in tourism activities. Non-governmental organizations, charities, and cooperatives provide essential services that enable PwHD to engage in tourism activities (Carneiro et al., 2022). They are vital in promoting inclusive tourism by advocating for better accessibility and providing direct support to PwHD. Despite their importance, limited research exists on the role of social organizations in accessible tourism, where most studies examine the needs and behaviors (Carneiro et al., 2022).

The medical and social models of disability present two distinct perspectives on understanding and addressing the challenges faced by PWD. The medical model views disabilities as an individual defect, often leading to an emphasis on treatment and cure. In contrast, the social model identifies societal structures and prejudices, advocating systemic changes to foster inclusion. These models advocate for ongoing dialogue on best supporting and empowering individuals with disabilities (Calitz, 2020).

The evolution of thought in accessible tourism reflects a significant shift from viewing disability through a medical lens to a more inclusive social perspective. The medical model emphasizes personal limitations and medical interventions and has given way to the social model that recognizes disability as a result of societal barriers. This paradigm shift underscores the importance of designing inclusive environments that accommodate all individuals rather than expecting people with disabilities to adapt. The growing body of research advocating for the social model highlights a collective move towards a more equitable and accessible world for everyone (Kim & Adu-Ampong, 2023).

The social model highlights the significant role societal structures play in PWD's lives. It emphasizes that it's not the individual's condition but the environmental, attitudinal, and structural barriers that create disadvantages. For instance, these barriers can manifest as discriminatory attitudes from service providers and the general public, as well as physical and cognitive obstacles that impede access to facilities and services (De Pascale et al., 2021). Hidden disabilities such as anxiety disorders, depression, attention deficit hyperactivity disorder (ADHD), autism spectrum disorder (ASD), and learning disabilities like dyslexia affect tourism participation, underscoring the need for inclusivity and awareness (Invisible Disabilities Association, 2023).

4.5 Barriers to Accessibility

Barriers to accessibility persist in the tourism industry, limiting the participation of PWD, especially PwHD. Physical barriers, such as inadequate wheelchair access and poorly designed infrastructure, limit the mobility and participation of leisure activities in tourism. As previously mentioned, stigmatization and stereotyping are significant due to societal misconceptions, which may lead to social isolation. Moreover, hidden disabilities, including mental, cognitive, and intellectual impairments, often go unrecognized, further exacerbating these challenges with aspects such as communication barriers and limited comprehension of signage, further complicating navigating tourism environments. Communication barriers are another challenge due to the hidden nature of deafness that leads to misunderstanding (CDC, 2025). These barriers restrict access to leisure activities and contribute to feelings of exclusion and marginalization among PwHD. Darcy et al. (2020) highlight the importance of addressing physical barriers through the implementation of accessible tourism programs and the adoption of universal design principles in tourism infrastructure. Where this is often still absent, PwHD are deterred from traveling, resulting in their under-representation in tourism.

Travelers with disabilities, often accompanied by companions, represent a unique market with notable spending power. Current research on tourism and disability primarily focuses on environmental barriers through the social model of disability. In addition, exploring the intrinsic barriers from the medical model of disability is essential for gaining a comprehensive understanding of the limitations faced by PWD. Identifying and researching unexplored topics within this field is crucial for developing a more inclusive and equitable tourism sector.

Research shows tourists with cognitive disorders often face challenges such as social withdrawal and barriers to certain locations or participating in specific tourism activities (Sedgley et al., 2017; Connell & Page, 2019). Travel stressors may exacerbate existing conditions, cause mood fluctuations, or even lead to new mental health issues (Felkai et al., 2020; Cooper & Buckley, 2022). Prejudice, discriminatory practices, and restricted access further degrade their travel experiences (Sedgley et al., 2017; Gillovic et al., 2024). Tourism has been recognized as an effective method for improving the well-being and quality of life for PWD and PwHD (Wen et al., 2023). Encouraging active participation in tourism promotes inclusivity and advances in accessible tourism practices, aligning with broader sustainability and equity goals in the industry (Jiang et al. 2025). With detailed travel planning, caregiver assistance, medical guidance, and assistive technologies, safe, enjoyable travel is possible for PwHD (Ali et al., 2023; Wen et al., 2023).

Accessible tourism is a progressive approach that ensures travel and tourism experiences are enjoyable and feasible for everyone, including PwHD. It promotes universal design, creating products and environments that are usable to PWD without needing adaptation or specialized design through smart tourism to enhance the overall quality of the tourist experience (Theofanous et al., 2024). Smart Tourism Destinations are at the forefront of revolutionizing the travel experience by harnessing the power of Information and Communication Technologies (ICT), creating interconnecting hubs that enhance the tourism journey. This interaction between technology and tradition makes the visit more efficient, enjoyable, and personalized, enriching the travel experience (Correa & Gosling, 2021).

Research indicates that South Africa still has infrastructure that is not readily accessible to PWD, such as inadequately designed public spaces and challenging transportation. Often, when confronted by tourists about a facility's lack of accessibility, people in charge have a very negative attitude. The solution is accessible accommodation, other infrastructure, and well-trained and well-informed staff in the hospitality and tourism industry.

Ralph Smith first noted the concept of accessibility tourism in his paper entitled "Leisure of the disabled tourist: barriers to participation" (Smith, 1987), which previewed the concept of three different factors limiting PWD participation in tourist activities, namely: (1) Intrinsic factors related to a person's level of cognitive, physical, and psychological performance; (2) environmental factors of limitations placed upon PWD by their environment; and (3) interactive factors involving the interaction between the PWD and the travel environment (Rubio-Escuderos et al., 2021). Several challenges hinder effective disability inclusion in the South African tourism context: i) Misunderstanding of disability inclusion: Tourism stakeholders often struggle to accommodate the needs of guests with disabilities due to a lack of understanding; ii) Policy gaps: Mainstream tourism policies and legislative frameworks often lack provisions for disability inclusion, offering guidance on physical and visible disabilities, and no guidance on hidden disabilities; iii) Discriminative attitudes: Tourists with disabilities frequently encounter systemic discrimination when engaging with tourism products and services; iv) Unmet market needs: The market for accessible tourism remains underdeveloped, with the needs and expectations of tourists with disabilities often unmet; v) Intuitive management: Tourism educators and industry professionals often rely on intuition rather than formal training, leading to approaches that can be either apathetic or overly sympathetic, which may not be effective (Makuyana, 2022).

Further research suggests barriers themselves may not solely hinder the travel experience for PwHD; instead, learned helplessness influences travel constraints, intentions, and expectations. The theory posits that repeated exposure to uncontrollable events can lead to a sense of helplessness, reducing motivation. Intrinsic constraints such as personality traits and communication abilities further shape this relationship by connecting travel limitations with an individual's willingness to travel and engage fully in travel activities (Sarmah et al., 2022).

4.6 Future of Tourism for an Aging Population, PwHD

Universal design is increasingly becoming the norm in the hospitality industry, ensuring that facilities are accessible to all guests. Key features include amenities such as (1) Adjustable-height furniture, (2) Tactile room markers, and (3) Induction loop systems for guests with hearing aids. Notable examples include Scandic Hotels, which offers rooms with adjustable beds and accessible bathrooms featuring sliding doors and grab rails. Walt Disney World Resorts also prioritizes accessibility, providing rooms with roll-in showers and attractions designed for various disabilities (Red Sea Global, 2024).

Advocacy plays a vital role in promoting accessible tourism, including key initiatives such as The European Union's Accessibility Act, mandating accessibility standards across various sectors, including tourism. Australia's Disability Discrimination Act ensures equal access to public accommodations. Additionally, advocacy from UN Tourism pushes for global accessibility standards (Red Sea Global, 2024). In South Africa, the Tourism Act No. 72 of 1993 and the Tourism Act No. 3 of 2014 promote tourism and regulate the tourism industry. While these Acts aim to improve tourism, they do not address the issues of disabilities, leaving a crucial gap in South African legislation (SAGov.za, 1993; SAGov.za, 2014).

Awareness and training are essential for improving accessibility, and the tourism industry should increase its focus on staff training related to the needs of PWD. Furthermore, advances in assistive tech-

nologies are rapidly evolving, offering more options for travelers with disabilities, such as advanced mobility aids and AI-powered assistance devices that enhance independence. Cities like Tokyo showcased these technologies during the 2020 Paralympics, while Helsinki uses adaptive audio technologies in public transport to assist visually impaired passengers (Red Sea Global, 2024).

Inclusive tourism development aims to engage people with disabilities. However, PWD face limited access to the labor market and lack accessible workplaces. There is minimal research evidence of their engagement in tourism, with most studies focusing on their employment in the hospitality sector, particularly in hotels. These studies examine barriers, challenges, benefits, and human resource practices related to employing people with disabilities. Guest and consumer perspectives are less studied. While the focus has been on the hospitality sector, similar studies could be conducted in the broader tourism sector. One major challenge is encouraging responsible tourism production by existing businesses. Social barriers and industry attitudes continue to hinder the engagement of PWD as tourism producers. Greater attention is needed to involve them in these roles (Gillovic & McIntosh, 2020).

Virtual technologies and virtual tourism democratize travel by enabling individuals with diverse impairments to virtually visit landmarks and sites that may be difficult to access physically, motivating individuals to overcome travel barriers. Research by Ye et al. (2022) shows that high-quality virtual tourism experiences significantly promote travel intentions, aiding governments and tourism companies in policy development and recognizing virtual tourism as a positive force. Ali et al. (2023) explore the transformation from tourists with mobility disabilities to "cyborg tourists" using assistive devices and technological implants, highlighting the benefits and challenges of these technologies. Tourism 4.0 and smart tourism focus on making tourism accessible to the masses. Leading this field, Industry 5.0 technologies and virtual reality have made tourism more attractive and sustainable, easing travel decision-making and enhancing accessibility through virtual tours, increasing destination competitiveness and brand awareness (Rodrigues et al., 2024).

The future of tourism will be shaped by advancements in technology, with increased investments in 5G bridging the digital divide and creating equitable access for extended tourist experiences. This technology will also bring transparency and openness to businesses. Future tourists will be more informed and ready to experience tours in various formats, using every tour as a business opportunity through sharing on virtual platforms. As such virtual tourism will appeal to those who avoid physical travel due to constraints, minimizing risks and enhancing motivation for actual travel. Technological advancements will influence tourists' investigative abilities, leading them to become the most credible sellers in the market. These future technologies will not be disruptive but create jobs and expand market reach. Industry 5.0 will positively impact tourism, benefiting developed and developing nations to help revive the tourism sector in developing countries facing security challenges, allowing them to compete globally (Chaudhary & Islam, 2023).

5. Discussion

This article aimed to identify the literature gaps to offer a comprehensive understanding of PwHD. As most studies relate to the generic terminology of PWD, addressing the physical disabilities only, focusing on travel eligibility, constraints, and accessibility of PwHD. Thus, previous studies have failed to address the interdisciplinary nature of tourism for PwHD and lack direction, resulting in a disconnected research landscape.

Despite the persistent challenges, there is growing recognition of the importance of promoting accessibility and inclusivity in the tourism industry regarding PwHD. Scholars and practitioners have highlighted various initiatives and best practices to enhance travel experiences for PWD, with no specific mention of PwHD. These interventions require addressing various barriers that PwHD face, such as (1) informational challenges in finding reliable travel details; (2) architectural obstacles in transportation and public spaces; (3) political barriers; (4) cultural barriers; (5) relational barriers; (6) technological barriers; and (7) entrepreneurial myopia. These barriers arise from a lack of accessible information on travel options, accommodation, and activities essential for making informed decisions. Therefore, the emerging development of accessible tourism standards and guidelines is a promising strategy for promoting uniformity and consistency when providing accessible services and facilities across tourism destinations (Stankov et al., 2024).

The gap in research on accessible tourism for persons with disabilities is indeed a critical oversight. Training and education programs for tourism professionals should be identified as essential in raising awareness and understanding of disability issues. By equipping service providers with the knowledge and skills necessary to interact effectively with PWD and PwHD, these programs can help foster a culture of inclusivity and sensitivity within the tourism industry.

Recent academic interest in tourism and mental disorders is growing (Wen et al., 2022; Ali et al., 2023; Jiang et al., 2025), yet this research remains underdeveloped due to fragmented literature (Wen et al., 2023; Zheng et al., 2023). The diversity of mental disorders and their unique challenges spanning across the interdisciplinary field of tourism, public health, psychology, and social work, creating a disconnected research landscape, requiring additional research, where each domain bringing its own methodologies, further contributing to fragmentation (Sedgley et al., 2017; Sadlon et al., 2021; Buckley, 2023; Hu et al., 2025).

Prior studies have explored specific aspects, like travel eligibility, constraints, caregiving for children with ASD, airport service, website accessibility, and dementia-friendly destinations (Dattolo et al., 2016; Sedgley et al., 2017; Connell & Page, 2019; Chiscano, 2021; Hu et al., 2024; Park et al., 2024). Understanding the perspectives of PwD and PwHD is essential for inclusive tourism. While many studies focus on their roles and experiences, their needs and challenges are often neglected in tourism planning. Addressing these unique requirements enhances accessibility and improves the travel experience, promoting well-being and fostering equity and diversity in the tourism industry (Jiang et al., 2025). Although Jepson et al. (2024) reviewed neurodiversity in tourism, a comprehensive synthesis of research on tourists with various mental disorders is lacking. Regardless, the gap in literature persists despite calls for a holistic approach to support vulnerable tourists (McKercher & Darcy, 2018; Zhao et al., 2023; Park et al., 2024).

Furthermore, incorporating universal design principles in tourism infrastructure has gained traction to create environments accessible to all individuals, regardless of their abilities or disabilities. Universal designs emphasize the importance of designing products and environments usable by the broadest range of people without needing adaptation or specialized features. Beyond these initiatives, there is a growing emphasis on promoting awareness and advocacy for disability rights within the tourism sector. To ensure true transformation, it is imperative to implement robust policies specifically focusing on the needs of PwHDs, as current initiatives fall short of addressing these unique needs. Comprehensive policies should be mandated across the tourism spectrum, ensuring PwHD are recognized and accommodated.

Seven goals can be used universally throughout the tourism chain to ensure globally accessible tourism and could be explored in further research studies, namely: (1) tourism destination management; (2) tourism information and advertising; (3) urban and architectural environments; (4) modes of transport; (5) food services, accommodation, and conference facilities; (6) cultural activities; and (7) other tourism activities, (UNWTO, 2013). By engaging in dialogue with policymakers and industry leaders and embedding these requirements into legislation, the tourism industry would create a tangible impact that ensures equal access for all travellers.

6. Conclusion

Accessible and inclusive tourism for persons with hidden disabilities requires concerted efforts to address the multifaceted barriers that hinder their participation. While progress has been made in promoting accessible tourism, much remains to be done to achieve true accessibility and inclusivity for all PWD, including PwHD. By prioritizing accessibility, fostering awareness, and implementing inclusive policies, future tourism initiatives should focus on integrating advanced technologies, innovative design, and sustainable practices to improve the travel experience for PwHD. This will also promote social inclusion and ensure that future tourism is indisputably accessible to everyone.

The literature on managing persons with disabilities in the tourism industry highlights the complex interplay of factors shaping the travel experiences of PwHD. Future tourism must evolve and integrate cutting-edge artificial intelligence technologies to create innovative tourism solutions, enhance accessibility, and provide real-time assistance. Additionally, trends such as personalized travel experiences and virtual reality tours would cater to the unique needs of PwHD. This forward-thinking approach paves the

way for the future tourism industry to fully embrace diversity and promote travel equity to ensure that all travellers, regardless of their abilities, enjoy an enriching and barrier-free travel experience.

6.1 Recommendations

Based on the findings of the literature review, several recommendations are proposed to enhance accessibility and inclusivity for PwHD in the tourism industry: i) Improving infrastructure: Invest in upgrading infrastructure to ensure accessible transportation and barrier-free environments; ii) Enhancing communication: Provide accessible information and signage to facilitate navigation and communication for PwHD; iii) Promoting awareness: Increase awareness and understanding of disability issues among tourism stakeholders through training and education initiatives related to PwHD; iv) Implementing inclusive policies: Develop and implement inclusive policies and standards to ensure equal access to tourism experiences for PwHD; v) Technological advancement: The potential to enhance accessibility through the use of virtual reality devices and artificial intelligence (AI); vi) Policy initiatives: Inclusivity in the regulatory frameworks supporting accessible tourism for PwHD; vii) Social awareness: Paradigm shifts in public attitudes towards disability stigmatization.

Tourists with hidden disabilities often face anxiety and stress due to delays, cancellations, and other factors beyond their control, even with thorough planning (Chiscano, 2021; Zhao et al., 2023). Although airports and airlines offer informative materials such as videos and booklets explaining the travel process, these resources only partially meet the needs of PWD, whose primary challenges occur in person during the journey (Van Holstein et al., 2024). Stress caused by unpredictable procedures can be alleviated through prior communication by travel agencies with PWD (Hamed, 2013; Van Holstein et al., 2020). Some studies have emphasized the importance of priority access at check-in, security, and boarding to help mitigate the stress induced by noisy environments, long lines, and unfamiliar contexts (Chiscano, 2021; Zhao et al., 2023; Tata et al., 2024; Dos Santos et al., 2024). In addition, creating mitigating sensory stimuli in public environments for individuals with cognitive or sensory disabilities by reducing noise. As would introducing clear, visible, and readable signage, visual guides on floors, and improved lighting, especially natural lighting, to aid users with location difficulties (Bosch & Gharaveis, 2017; Yeung, 2021; Biglieri, 2021; Small et al., 2023). Clear textual and symbolic signage, including large, standardized letters, color contrast, and proper lighting is crucial to reduce cognitive stress, particularly for individuals with sensory or intellectual disabilities (Hunter-Zaworski & Hron, 1999; O'Reilly & Shepherd, 2016; Symonds, 2017; Dos Santos et al., 2024).

Complementary strategies such as tactile, auditory, or vibrational cues and accessible online maps also support spatial orientation. Quiet waiting areas, like sensory rooms in high-traffic zones, benefit those with sensory or cognitive disabilities. These spaces often feature calming elements such as appropriate lighting, silence, and trained staff to assist passengers and companions (Chiscano, 2021). Additionally, providing tranquil spaces in common areas is recommended as a more inclusive alternative, especially for individuals with ASD (Peterson et al., 2022; Dos Santos et al., 2024).

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Innovating Destination Planning: The Role of Local Development in Sustainable Tourism

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ABSTRACT

As tourism continues to grow worldwide, traditional destination planning models have faced criticism for neglecting environmental sustainability, socio-cultural preservation, and equitable economic distribution. This article examines how sustainable local development can be integrated into destination planning, offering a more balanced approach that benefits both local communities and the tourism industry. Through a comprehensive literature review of studies published from 2014 onwards, the article explores key concepts such as community-based tourism, environmental conservation, and socio-cultural preservation. Case studies from the European Union, including Slovenia, the Azores, and the Balearic Islands, are used to illustrate successful applications of sustainable destination planning. The article also highlights the challenges faced in balancing growth and sustainability and provides policy recommendations for stakeholder collaboration, responsible tourism, and long-term development strategies. By rethinking destination planning through the lens of sustainable local development, this article offers insights for policymakers, researchers, and industry practitioners seeking to promote responsible and resilient tourism.

KEYWORDS

Sustainable Tourism, Destination Planning, Local Development, Community-Based Tourism, Environmental Conservation, Stakeholder Collaboration.

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1. Introduction

Tourism is one of the most dynamic and rapidly growing sectors worldwide, contributing significantly to economic development. However, the impact of conventional destination planning on local communities, the environment, and cultural heritage has sparked global debates about the need for a shift toward more sustainable practices. Traditionally, destination planning has prioritized short-term economic gains, often overlooking long-term sustainability. This has led to challenges such as environmental degradation, loss of cultural identity, and social inequality. As tourism evolves, it is crucial to rethink destination planning with a focus on sustainable local development.

Therefore, this study aims to address the following research question: How can sustainable local development principles be effectively integrated into destination planning models to promote socio-cultural preservation, environmental conservation, and equitable economic benefits? Accordingly, the following research objectives are proposed. First, to examine theoretical links between local development and sustainable tourism. Second, to analyse practical applications in EU case studies. And third, to propose policy strategies for sustainable destination planning.

This study tries to addresses a significant gap by focusing on the integration of local development frameworks into traditional tourism planning—a topic that is underexplored in both academic literature and policy design. Although the tourism literature acknowledges the importance of sustainability, there is a notable gap in how sustainable tourism goals are operationalised within actual planning frameworks. Most existing studies focus either on top-down strategic plans or isolated community-based initiatives, without connecting these scales. This article tries to addresses that gap by offering a governance-focused analysis of how local development principles can be embedded across the planning spectrum—from policy design to implementation. It also introduces a comparative analytical framework that can be adapted across contexts, contributing both to academic debates and to policy learning.

Sustainable development seeks to balance economic growth, environmental protection, and social well-being, ensuring that the needs of the present are met without compromising the ability of future generations to meet their own. It has become a guiding principle across multiple sectors, promoting long-term resilience and equity as key pillars of progress (Achim et al., 2022; Deng & Zhou, 2022). Corporate governance plays a crucial role in fostering sustainable development by encouraging responsible business practices, transparency, and ethical decision-making, which are essential for achieving sustainability goals in tourism (Abbas et al., 2023; Bhuiyan & Darda, 2023). The need for sustainable development in tourism has never been more pressing (Lampropoulos et al., 2024). As global tourism continues to grow, destinations face increasing pressure on their natural ecosystems, cultural heritage, and social structures (Cohen, 2019).

The massive expansion of tourism can lead to the depletion of local resources, the erosion of cultural identity, and growing disparities between local populations and visiting tourists. Mass tourism models have been criticized for contributing to environmental degradation, the commodification of local cultures, and inequitable economic distribution. Sustainable tourism, which aims to balance environmental conservation, socio-cultural preservation, and economic equity, offers a path forward. By embedding sustainability into the core of tourism planning, destinations can protect their unique cultural and natural assets, ensuring that they remain viable for future generations while delivering tangible benefits to local communities today (Drosos & Skordoulis, 2018; Thapa et al., 2024).

This article argues for the integration of sustainable local development into destination planning as a holistic approach that balances economic growth with environmental preservation, cultural integrity, and social equity. Sustainable local development emphasizes community engagement, environmental stewardship, and the equitable distribution of tourism benefits. By aligning tourism activities with the needs of local populations and protecting natural and cultural assets, this model can offer long-term, resilient solutions to the complex issues facing the tourism industry today (Khalid et al., 2019).

The importance of this paper lies in its comprehensive exploration of how sustainable local development can be incorporated into destination planning to create a more balanced and responsible tourism sector. Through an in-depth literature review and analysis of case studies from the European Union, including Slovenia, the Azores, and the Balearic Islands, the paper provides both theoretical insights and

practical examples of successful applications. These examples demonstrate how community-based tourism, environmental conservation, and socio-cultural preservation can be harmonized to achieve sustainable outcomes.

Moreover, this paper makes a significant contribution by addressing the gap between traditional tourism development models and the growing demand for sustainability in tourism practices. It provides actionable policy recommendations and strategic frameworks for stakeholders—policymakers, industry practitioners, and researchers—who are seeking to promote responsible tourism that benefits both travellers and local communities. By rethinking destination planning through the lens of sustainability, this work not only advances academic discourse but also offers practical solutions for destinations aiming to balance growth with long-term sustainability.

In this context, the article highlights the necessity of reimagining tourism's role in local development, where tourism is not merely an economic driver but a tool for socio-cultural and environmental resilience.

2. Literature Review: Governing Tourism through a Local Development Lens

A major shift in recent tourism studies has been the move from narrowly defined sustainability metrics to more holistic questions of governance. Early sustainability debates focused primarily on ecological impacts, visitor management, and destination carrying capacity. In contrast, contemporary literature increasingly views sustainability as a governance issue, centred on institutional capacity, coordination, and equity. Authors such as Hall (2019) and Bramwell and Lane (2023) emphasise that sustainability is not just about outcomes, but about the means by which decisions are made, who is involved, and how accountability is ensured. Polycentric governance models—defined by multi-level decision-making, horizontal partnerships, and shared norms—are widely advocated as better suited to complex tourism systems than traditional state-centric approaches. These models offer a promising framework for integrating diverse stakeholders and objectives, particularly when sustainability goals span environmental, socio-cultural, and economic domains (Martínez et al., 2021).

Despite these advances, recent governance studies often remain disconnected from debates in local development theory. There is a limited body of work that systematically explores how polycentric governance structures can support the principles of endogenous development. This article aims to bridge that gap by linking tourism governance models with the local development literature, particularly the emphasis on place-based planning, social capital, and community agency.

Another important strand in the literature focuses on community-based tourism (CBT), which seeks to empower local communities to participate actively in the planning, ownership, and benefits of tourism. CBT models are increasingly presented not simply as ethical alternatives but as structurally different governance configurations. Scheyvens and Biddulph (2024) argue that CBT should be understood as a form of institutional redesign, rather than a niche product category. Their work challenges the notion that participation can be added onto conventional planning processes; rather, they call for governance systems where communities are embedded as equal actors from the outset. Similarly, Giampiccoli and Mtapuri (2020) adopt a perspective, contending that CBT must resist co-optation by state agencies or donor agendas and instead be anchored in local epistemologies and power relations. Endogenous development theory reinforces these arguments by prioritising internal resources, social cohesion, and bottom-up planning. As Marsden, Lamine and Schneider (2021) note, endogenous models reject development that is externally imposed or capital-driven, favouring locally led strategies that align with cultural identity and long-term community well-being. While many studies present CBT and endogenous development as aspirational, their integration into formal destination planning systems remains rare, especially in the European context.

A third strand in the literature interrogates the contradictions of growth-centric planning models. Scholars such as Fletcher et al. (2019) and Higgins-Desbiolles (2021) offer powerful critiques of "green growth," arguing that sustainability is often instrumentalised to maintain business-as-usual under a veneer of reform. This has led to the emergence of degrowth and post-growth paradigms in tourism studies, which reject economic expansion as the primary objective. Weng and Seraphin (2025) frame degrowth tourism as a strategic response to the overreach of global mobility systems, suggesting that meaningful sustain-

ability requires reduced consumption, slower travel, and the reorientation of tourism toward community resilience. These perspectives resonate strongly with resilience theory, which views systemic change—not just recovery—as the key to long-term adaptation. Cheer and Lew (2018) argue that resilience must go beyond technical capacity and include political transformation, especially in destinations that have become structurally dependent on volatile tourism economies. The degrowth and resilience literature offers both a critique and an alternative to mainstream planning narratives. However, as Saarinen (2020) notes, there remains a gap in translating these critical theories into practical governance frameworks. This article engages directly with this challenge by evaluating how growth logics are reinforced or resisted in the three case studies under review.

In synthesising these themes, it becomes clear that the intersection between tourism planning and local development is rich but under-theorised. Much of the existing literature remains fragmented, with governance studies often disconnected from community-based models, and technological debates divorced from socio-political realities. Moreover, there is a persistent tendency in applied tourism research to prioritise performance metrics and certification frameworks (e.g., Green Destinations, EarthCheck) without examining the institutional structures that determine whether such frameworks are inclusive, enforceable, or scalable. This review has sought to move beyond such managerial framings by foregrounding power, participation, and place as central analytical categories.

This article tries to explore most recent theoretical debates in tourism studies. At the same time, it offers a concrete analytical framework to assess how these ideas are enacted across three European case studies. In doing so, it contributes both to theory-building and to the practical design of more sustainable and inclusive planning systems.

3. Methodology

To examine how sustainable local development principles are operationalised in tourism planning, this study adopts a qualitative methodology combining thematic literature analysis and comparative case study evaluation. This approach is well-aligned with the complex and context-dependent nature of sustainable tourism, which requires a deep understanding of social, cultural, and environmental dynamics (Butler, 1998; Sharpley, 2009). Thematic analysis is particularly effective for synthesizing key patterns in literature and policy discourse, enabling researchers to trace how sustainability narratives evolve and are implemented (Braun & Clarke, 2006; Nguyen et al., 2024). Comparative case study evaluation, in turn, offers analytical leverage by examining variation across local contexts, shedding light on how governance structures and community engagement shape the practical uptake of sustainability principles (Murphy, 2014; Maxim, 2016). Together, these qualitative strategies provide a robust framework for exploring both conceptual and operational dimensions of sustainable local development in tourism planning. This approach allows for both theoretical exploration and empirical grounding in diverse governance contexts. It also enables cross-case comparison while remaining sensitive to local institutional variation.

The study is structured in two main phases. The first phase involves a systematic review of academic literature and policy documents published between 2014 and 2025. The second phase applies a comparative case study approach to three selected European destinations—Slovenia, the Azores, and the Balearic Islands—which were chosen based on their diversity in institutional frameworks, geographic scale, and maturity in sustainable tourism planning.

3.1 Literature Selection and Thematic Coding

The literature review was conducted using academic databases such as Scopus, Web of Science, and Google Scholar. Search terms included “sustainable tourism,” “destination planning,” “community-based tourism,” “local development,” and “governance.” Only peer-reviewed journal articles published in English between 2014 and 2025 were considered. These articles were selected based on thematic relevance, recency, and contribution to debates on sustainable destination planning.

The analysis followed an inductive coding approach, where articles were read carefully, and notes were made to capture recurring themes and concepts. Initial open coding was used to identify relevant sus-

tainability-related categories—such as environmental protection, cultural preservation, economic equity, and stakeholder engagement. Thematic interpretations were refined through multiple readings and compared across the literature to ensure consistency. Codes and categories were analysed and linked to the research questions. Following this process in a clear and organized way, the study became more accurate and easier to follow.

3.2 Case Selection Criteria

The three case studies were selected through purposive sampling to capture variation in governance context, tourism development trajectory, and institutional innovation. The final selection included Slovenia, which represents a nationally coordinated sustainability strategy with strong municipal engagement; the Azores, which highlight community-based marine conservation and regional autonomy; and the Balearic Islands, which illustrate the use of fiscal tools and regulatory reform to mitigate overtourism. These cases were chosen for their diversity of scale (small island vs. national systems), institutional architecture (centralised vs. decentralised), and planning mechanisms (certification, taxation, zoning, co-management). Each case also had available documentation in English, which ensured consistent access to planning reports, sustainability assessments, and evaluation metrics.

3.3 Data Sources and Analysis

Primary sources included official tourism plans, policy evaluation reports, sustainability certifications (e.g., EarthCheck, GSTC), and documentation from government and non-governmental organisations. Secondary sources included peer-reviewed studies, news reports on policy implementation, and literature from tourism think tanks and international bodies such as the European Commission and UNWTO.

For each case, the analysis focused on identifying how sustainability was defined, embedded, and monitored within destination planning. Specific attention was given to governance structures, planning instruments, stakeholder roles, and links to local development objectives. The data was analysed using a common analytical framework derived from the literature review. This framework assessed planning practices against five dimensions: environmental sustainability, socio-cultural integrity, economic equity, governance design, and institutional challenges. To strengthen analytical consistency, the findings from each case were recorded in a standardised template that allowed for the construction of a comparative matrix, which is presented in the next section.

3.4 Ethical Considerations and Limitations

Since the study relies entirely on secondary data, there were no direct human subjects involved and thus no ethical clearance was required. However, the study acknowledges the limitations of document-based research. While policy texts provide valuable insight into official planning intentions, they may not fully capture informal practices, power asymmetries, or the lived experiences of local stakeholders. Future research using mixed methods—such as interviews, focus groups, and participant observation—would complement the findings presented here and allow for greater depth of analysis.

This methodological approach, while qualitative and exploratory, provides a robust foundation for comparative insight across diverse contexts. It also enables a critical reflection on how planning systems incorporate or fail to incorporate local development principles, offering lessons for both academic theory and policy practice.

4. Findings and Comparative Analysis

4.1 Sustainable Development Principles

The concept of sustainable development is rooted in the idea that current generations should meet their needs without compromising the ability of future generations to meet theirs (UNWTO, 2016). In the con-

text of tourism, this translates to developing tourism activities that minimize negative environmental impacts, preserve cultural heritage, and promote long-term economic benefits for local communities.

Tourism sustainability encompasses five key dimensions Environmental sustainability, Socio-cultural sustainability, Economic sustainability, Governance and Institutional challenges. Environmental sustainability requires that tourism operates within the limits of natural ecosystems by reducing pollution, conserving biodiversity, and managing resources responsibly (Scott et al., 2016; Saarinen, 2020). Socio-cultural sustainability involves preserving and respecting the socio-cultural authenticity of host communities, promoting cross-cultural understanding, and preventing the commodification of local traditions (Ruhanen et al., 2019). Economic sustainability ensures that tourism contributes to the economic prosperity of local communities by providing jobs, supporting local businesses, and ensuring that profits are reinvested locally (García et al., 2023). Governance models in sustainable tourism vary and include polycentric systems with national-local coordination and certification tools, co-management arrangements involving NGOs, regional authorities engaging through participatory committees, smart governance enabled by digital platforms, and Indigenous or community-led models grounded in customary law (Rangus et al., 2018; Guerreiro, 2019; Serra-Cantallops et al., 2021). However, there are also several Institutional challenges, such as uneven municipal engagement, reliance on voluntary certification schemes, difficulties in managing visitor influx while maintaining community control, gaps in implementation, political resistance from tourism lobbies, limited digital capacity in peripheral areas, and systemic barriers encountered by Indigenous or community-led governance efforts (Rangus et al., 2018; Mariani et al., 2020; Castanho et al., 2023).

4.2 Destination Planning Models

Traditional destination planning often follows a top-down approach, with external investors and tourism developers leading decision-making. This model tends to emphasize mass tourism, which relies on large-scale infrastructure development, attracting high numbers of tourists, and focusing on popular tourist spots. While this model can generate significant economic returns, it often comes at the cost of local communities and the environment (Fletcher et al., 2020).

To overcome the limitations of traditional models, scholars and practitioners have advocated for community-based tourism planning that prioritizes local stakeholders' involvement in decision-making processes. This bottom-up approach helps ensure that tourism development aligns with local interests and capacities (Stoffelen & Vanneste, 2015).

Table 1. Key Differences Between Traditional and Community-Based Destination Planning Models

Aspect	Traditional Model	Community-Based Model
Decision-Making Approach	Top-down	Bottom-up
Key Players	External investors, tourism developers	Local stakeholders
Focus	Economic returns, mass tourism	Sustainability, cultural preservation
Infrastructure	Large-scale, high-impact	Small-scale, environmentally friendly
Community Involvement	Minimal	Central role
Environmental Impact	Often negative	Focus on conservation

Sources: Fletcher et al. (2020); Stoffelen & Vanneste (2015)

Following in this section findings from the comparative analysis of three European destinations—Slovenia, the Azores, and the Balearic Islands—that have adopted distinct models for integrating sustainable local development into destination planning are presented. The analysis is structured thematically around the three sustainability pillars (environmental, socio-cultural, economic) and includes governance mechanisms and institutional practices as cross-cutting dimensions**.** A comparative framework is provided to distil key insights.

4.3 Slovenia: Integrated Certification and Municipal Engagement

Slovenia has emerged as a European leader in sustainable destination planning through its Green Scheme of Slovenian Tourism (GSST). This national certification framework, aligned with Global Sustainable Tourism Council (GSTC) criteria, promotes sustainability across local destinations by providing structured assessments and capacity-building (Rangus et al., 2018). Over 100 municipalities have joined the scheme, integrating green mobility, cultural heritage protection, and environmental monitoring into local planning.

One of the strengths of Slovenia's model lies in its polycentric governance structure, where local and national agencies coordinate planning through regular consultation and funding mechanisms. Municipalities such as Ljubljana and Maribor have developed tourism strategies that prioritise walkability, green public space, and community participation (Grah et al., 2020). Additionally, EU cohesion funds are linked to Green Scheme of Slovenian Tourism (GSST) participation, creating financial incentives for long-term commitment.

Despite these strengths, challenges remain. There are disparities in uptake between resource-rich urban municipalities and smaller rural ones, leading to uneven implementation. Furthermore, some critics argue that the GSST, while procedurally robust, still relies on market-oriented metrics (e.g., tourism revenue, occupancy rates), which may dilute its transformative potential (Hojnik et al., 2020).

4.4 The Azores: Community-Based Governance and Marine Conservation

The Azores archipelago represents a unique model of regionally coordinated, community-embedded tourism planning. With extensive marine biodiversity, the region has prioritised eco-tourism and environmental protection through participatory marine spatial planning (MSP). Community organisations, marine scientists, and tourism cooperatives collaborate in zoning areas for conservation, eco-activities, and artisanal fishing (Castanho et al., 2023).

The regional government has formalised this collaboration through co-management frameworks that involve local councils, NGOs, and small businesses in decision-making. Revenue from eco-tourism is often reinvested in waste management infrastructure, environmental education, and professional training for local guides. The Azores has achieved EarthCheck Gold Certification, and the region was awarded the title of "Global Sustainable Destination" in 2022 (EarthCheck, 2019).

This case reflects strong alignment with endogenous development principles, combining local stewardship with science-based policy. However, increased international recognition has led to pressure from tour operators to expand capacity. Stakeholders report concerns about overcrowding during peak months, especially on São Miguel Island, and the potential erosion of community control (Baixinho et al., 2023).

4.5 Balearic Islands: Fiscal Policy and Tourism Regulation

In response to decades of mass tourism and associated environmental degradation, the Balearic Islands implemented one of Europe's most ambitious destination-level tax schemes—the Sustainable Tourism Tax (ITS)—in 2016. The tax, levied on overnight visitors, generates annual revenue exceeding €120 million, which is reinvested in conservation, rural development, and cultural programming (Serra-Cantallops et al., 2021).

The revenue is allocated by a participatory committee, including government officials, academics, civil society, and tourism business representatives. Projects supported by the tax include dune regeneration, aquifer restoration, conversion of rural estates into heritage lodges, and expansion of cycling infrastructure. The government has also introduced short-term rental regulations to address housing affordability and restrict overtourism in Palma and Ibiza (Mariani et al., 2020).

What sets the Balearics apart is the integration of fiscal tools with long-term regional planning, positioning taxation as a steering mechanism rather than just a funding source. However, political instability and lobbying from tourism stakeholders have occasionally stalled reform. Critics argue that despite progressive policies, the region still lacks a strong institutional mechanism to enforce zoning, control cruise tourism, or monitor cumulative impacts (OECD, 2023).

4.6 Cross-Case Comparison: Synthesis of Models

To synthesise findings across the three destinations, Table 1 presents a comparative analysis along five key dimensions derived from the literature: environmental protection, socio-cultural integration, economic resilience, governance structure, and institutional challenges.

Table 2. Comparative Sustainability Dimensions Across Case Studies

Dimension	Slovenia	Azores	Balearic Islands	Key Authors / References
Environmental	Green Scheme certification, urban green plans, EU-aligned targets	Marine spatial planning, biodiversity monitoring, eco-tourism zoning	Eco-tax funded conservation, aquifer recovery, dune restoration	Rangus et al. (2018); Grah et al. (2020); Castanho et al. (2023); Serra-Cantallops et al. (2021)
Socio-cultural	Local heritage festivals, municipal co-planning, cultural branding	Community-led eco-lodges, cultural cooperatives, education programs	Tax-supported arts, rural heritage restoration, rental regulation	Grah et al. (2020); Guerreiro (2019); Castanho et al. (2023); Mariani et al. (2020)
Economic	SME support linked to certification, agritourism	Revenue redistribution via cooperatives, skills development, inclusive supply chains	Tax redistribution for rural infrastructure and off-season incentives	Grah et al. (2020); Castanho et al. (2023); Serra-Cantallops et al. (2021)
Governance	Polycentric (national-local integration), certification as governance tool	Co-management model with NGOs, hybrid institutional platforms	Regional authority-led with participatory allocation committee	Rangus et al. (2018); Guerreiro (2019); Serra-Cantallops et al. (2021)
Institutional Challenges	Uneven municipal engagement, reliance on voluntary certification	Managing visitor influx without undermining community control	Implementation gaps, political pushback from tourism lobbies	Rangus et al. (2018); Castanho et al. (2023); Mariani et al. (2020)

Source: Own Elaboration

4.7 Theoretical Implications

These case studies illustrate that sustainability is not embedded by adopting one specific tool (e.g., taxes, certification), but by the coherence of governance arrangements, institutional flexibility, and community integration. Each model demonstrates strengths in one area but reveals vulnerabilities elsewhere, suggesting the need for context-sensitive hybrid models.

Slovenia demonstrates how nationally coordinated certification schemes can support bottom-up planning, but also highlights the risks of uneven uptake and institutional overload. The Azores offers a compelling case for community-driven governance, yet it faces rising tensions as tourism demand grows. The Balearics show the potential of fiscal tools in redistribution and environmental recovery but underscore the need for regulatory enforcement and political continuity.

These cases support the growing body of literature calling for a move beyond symbolic sustainability towards structurally embedded governance reforms (Bramwell & Lane, 2023; Scheyvens & Biddulph, 2024). They also suggest that effective integration of local development principles into tourism planning requires sustained institutional investment, participatory legitimacy, and a capacity for policy learning.

5. Policy Recommendations: Advancing Integrated, Participatory Tourism Planning

The findings of this study point to the urgent need for institutional strategies that can translate sustainability principles into operational planning systems. While each case analysed demonstrates distinct approaches, they all reveal that sustainable outcomes depend less on individual instruments—such as taxes or certification—and more on governance arrangements, stakeholder legitimacy, and adaptive policy design. This section outlines stakeholder-specific recommendations in a discursive format, moving beyond checklists to provide strategic direction grounded in empirical evidence.

5.1 Governments and Policymakers

Governments at national and regional levels play a pivotal role in creating and enabling environments for sustainable destination planning. The Slovenian case demonstrates how vertically integrated certification schemes, when linked to funding and planning requirements, can incentivise local uptake of sustainability criteria (Rangus et al., 2018). Policymakers should institutionalise sustainability goals within long-term spatial planning laws, land-use regulations, and inter-ministerial coordination frameworks. This means not merely creating tourism strategies, but embedding tourism within wider development agendas, including transport, housing, and climate policy.

Additionally, governments must ensure regulatory consistency and policy stability. As seen in the Balearic Islands, even ambitious sustainability taxes risk being undermined by political turnover or industry pushback (Serra-Cantallops et al., 2021). Planning legislation should include accountability clauses, performance audits, and adaptive review mechanisms. Institutional coherence across tourism, environmental, and economic ministries is essential to avoid policy silos and implementation fatigue.

5.2 Local Communities and Municipal Authorities

For sustainability to be meaningful, local communities must be positioned as co-producers of policy, not just beneficiaries or consultees. In both Slovenia and the Azores, the involvement of municipalities and community-based organisations in tourism planning has led to more context-sensitive and culturally embedded outcomes (Castanho et al., 2023). Local governments should establish formal mechanisms for participatory planning, such as tourism councils, neighbourhood advisory groups, or community audit panels.

However, participatory structures must be adequately resourced. Capacity-building programmes, especially in smaller municipalities, are essential to ensure local actors can engage effectively. This includes training in sustainable tourism governance, legal literacy, and digital planning tools. Importantly, communities must have access not only to consultation processes but also to decision-making power, including control over certain funding streams or co-ownership of tourism infrastructure (Grah et al., 2020).

5.3 Tourism Businesses and Industry Associations

Private-sector actors have a dual role—as both beneficiaries of sustainable destinations and potential disruptors of planning reforms. Therefore, their active engagement in sustainability efforts is critical. Businesses should be incentivised to adopt sustainability certifications that go beyond marketing, integrating social and environmental goals into core operations (Jones et al., 2017). Financial mechanisms such as tax credits, public procurement preferences, and innovation grants can support this transition.

Industry associations should act as intermediaries, providing training, coordinating collective action, and fostering peer-to-peer knowledge exchange. They are well-placed to develop voluntary standards, self-assessment tools, and sustainability learning hubs. Moreover, small- and medium-sized enterprises (SMEs) require special attention. Public–private partnerships should be designed to lower entry barriers for SMEs through simplified reporting, co-marketing platforms, and mentorship programmes (Muresan et al., 2016).

5.4 Tourists as Governance Participants

Tourists are no longer passive consumers but active participants in the co-creation of destination experiences. Their behaviours shape local sustainability dynamics, and as such, their decisions must be informed by transparent, credible, and locally relevant information. Destination Management Organisations (DMOs) should develop interactive platforms that communicate sustainability indicators, local values, and responsible travel guidelines (Gössling et al., 2019).

Behavioural interventions—such as off-season discounts, nudges toward low-impact activities, or sustainability loyalty programmes—can realign visitor flows with destination carrying capacity. Additionally, smart tourism tools can provide real-time feedback to tourists about their environmental footprint or encourage engagement with community-led initiatives (Buhalis & Amaranggana, 2015).

Beyond marketing, destinations should cultivate ethical narratives that invite tourists into a shared stewardship role. The aim is not only to shape consumption patterns but to foster understanding, accountability, and long-term loyalty.

5.5 Civil Society Organisations, NGOs, and Academia

Non-governmental organizations are essential in facilitating dialogue, holding institutions accountable, and building bridges between communities and policymakers. In the Azores, for example, NGOs have played a crucial role in co-managing marine areas and mediating conflicts between tourism and conservation goals (Guerreiro, 2019). These organisations should be formally recognised in planning processes and provided with stable funding to fulfil their monitoring, advocacy, and capacity-building functions.

Academic institutions, meanwhile, have a responsibility to move beyond critique and contribute to co-creating knowledge. This includes partnering with local governments on applied research, co-developing participatory planning tools, and offering technical support for data collection and impact analysis. Researchers should also ensure that their findings are communicated in accessible, multilingual formats, and where possible, embed local actors in the research design process (Hall, 2019).

The all-encompassing message is that tourism sustainability cannot be achieved through top-down mandates or isolated community efforts alone. What is needed is an institutional architecture that enables multi-scalar collaboration, redistributes planning power, and aligns short-term tourism goals with long-term development visions. The five stakeholder groups outlined here all have a critical role to play—but only if the governance framework makes space for meaningful participation, accountability, and innovation.

6. Conclusion

This study has explored how sustainable local development principles can be integrated into tourism planning through an institutional and governance-focused lens. Drawing on a thematically structured literature review and three comparative EU case studies—Slovenia, the Azores, and the Balearic Islands—it has demonstrated that successful integration depends not only on adopting tools like certification or taxes but on the underlying institutional architecture that supports participatory, adaptive, and inclusive governance.

In response to the gap described in the literature, this article examined the disconnection between sustainability goals and how they were applied in tourism planning frameworks. It addressed the lack of integration between local development principles and traditional top-down planning models. By focusing on governance, it linked policy design with on-the-ground implementation. The study also proposed a comparative framework to support both academic inquiry and policy innovation.

The article's contribution lies in its synthesis of five governance dimensions—environmental, socio-cultural, economic, institutional, and political—into a comparative planning framework. This model not only reveals the strengths and weaknesses of each destination but also offers a transferable structure for policy learning across contexts. By embedding tourism within broader local development agendas, and by centring institutional design in sustainability discourse, the study reorients the conversation away from performance metrics and toward governance capabilities.

Nonetheless, the study has several limitations. It relies exclusively on secondary data—planning documents, academic literature, and evaluations—which, while rich in content, cannot fully capture local lived experiences or informal planning dynamics. Future research would benefit from primary data collection through interviews, focus groups, and ethnographic observation, particularly in under-represented rural or indigenous tourism settings.

There is also scope to deepen the analysis of digital governance, especially regarding smart tourism platforms and their integration with participatory tools. The role of technology in either enabling or constraining inclusive planning remains a critical question for future exploration. Similarly, the interplay between tourism resilience and degrowth strategies, particularly in the face of climate disruptions, pandemics, or geopolitical instability, demands further empirical testing and conceptual refinement.

In conclusion, this article contributes to both scholarly debates and practical governance reforms by demonstrating that the future of sustainable tourism lies not in isolated interventions, but in the integration of local development logics into robust, inclusive, and learning-oriented planning systems. It calls for a shift in how we define planning success: not through growth indicators or green labels, but through the long-term empowerment of communities to shape the future of their destinations.

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Sustainability Practices in Accommodation Facilities Across Czech Tourism Destinations

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ABSTRACT

This study aims to investigate the existence of statistically significant variations in sustainability practices among accommodation facilities in different tourism destinations in the Czech Republic. Data was collected from 429 collective facilities listed on Booking.com, selected in proportion to the most frequently visited regions. The analysis involved Chi-square tests and one-way ANOVA. The research revealed notable variations in sustainability practices among different tourism destinations, with mountainous areas prioritising nature conservation and urban settings focusing more on water preservation. The findings contribute to understanding the destination-specific sustainability approaches and the importance of considering environmental and cultural resources in developing tourism destinations.

KEYWORDS

Tourism Destination, Sustainability, Sustainability Practices, Sustainable Tourism Services, Destination Sustainability.

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1. Introduction

A tourism destination refers to a distinct geographical area that draws visitors owing to its distinctive characteristics, attractions, and amenities. For an area to qualify as a tourism destination, it must possess four key features: a clearly defined geographical boundary, attract and be visited by tourists, offer diverse tourism products and services, and engage multiple stakeholders with varying interests and requirements (Kadi et al., 2014).

As per the available research, tourism is crucial in fostering economic growth and prosperity within various regions. Numerous studies have indicated that it has the potential to contribute to long-term economic development by promoting competition among local businesses and those in other international tourist destinations (Dritsakis, 2004). However, it is essential to note that tourism can also result in a surge in CO2 emissions, thereby exerting a detrimental impact on the environment (Paramati et al., 2016). Implementing sustainable tourism policies is imperative to mitigate these adverse effects. The issue of sustainability in tourism destinations is multifaceted, encompassing economic, environmental, and social dimensions. It is paramount to consider all these facets, as they collectively influence the overall prosperity of the region.

The paper aims to investigate the existence of statistically significant variations in sustainability practices among accommodation facilities in different tourism destinations. The hospitality sector, being a pivotal industry in tourism, is likely to exhibit distinct sustainability needs. Several authors have pointed out differences in sustainability strategies across tourism destinations. Assaf and Josiassen (2012) underscored the significance of prominent destinations in pursuing preservation for future generations and exploring sustainable development strategies, thereby highlighting the necessity for destination-specific sustainability approaches. Cucculelli and Goffi (2016) deliberated on transforming mass tourism into more sustainable forms, suggesting that diverse destination types may necessitate unique approaches to achieve sustainability. González-Reverté (2019) stressed the importance of understanding the influence of destination type on sustainability initiatives. Khan et al. (2021) emphasised the fundamental role of environmental and cultural resources in the evolution of a tourism destination, suggesting that different destination types may require specific sustainable tourism policies and management approaches. These authors collectively identified the research gap on the examination of differentiation in sustainability strategies across diverse tourism destinations, which this paper endeavours to bridge.

This paper provides a comprehensive literature review of sustainable tourism in various destinations, accompanied by a detailed description of the conceptual framework and methodologies employed. The study culminates with the elucidation of findings and conclusions.

2. Literature Review

The literature extensively examines the sustainability of tourist destinations, including the sustainable practices adopted by individual lodging establishments. It also delves into the correlation between sustainability, competitiveness, and a tourist destination's prosperity. Accommodation certification, tourist behaviour, and business performance are often depicted as integral components of an interconnected ecosystem, where each factor influences and interacts with the others.

The sustainability of a destination is a pivotal factor in its development. According to a study conducted by Cucculelli and Goffi (2016), destination competitiveness is heavily reliant on sustainability. Their research has underscored the significance of sustainability as a determining factor of competitiveness. They involved principal component analysis to reduce a large set of independent variables to a more manageable size. This reduction facilitated the subsequent ordinary least squares regression analysis. In another study by Falatoonitoosi et al. (2022), sustainability was identified as a significant predictor of certain aspects of prosperity, particularly in environmental quality and socio-cultural enhancement. The data was collected from 171 participants representing five different stakeholder groups within the tourism sector. This approach gave a comprehensive understanding of how sustainable tourism development impacts destination prosperity. The researchers employed statistical analysis to quantify the relationships between sustainability and key prosperity dimensions, such as environmental quality and sociocultural empowerment, thereby providing actionable insights for destination managers.

Parte and Alberca (2021) delved into the impact of sustainable practices, such as investments in environmental protection, on business performance. Similarly, Segarra-Oña et al. (2012) investigated the relationship between business performance and certification, particularly regarding ecological sustainability and its influence on business viability.

Another salient area of examination is the intersection of certification and sustainability. Celik and Cevirgen (2021) and Costa et al. (2019) underscored the significance of environmental certification in steering consumers toward environmentally friendly products and services. Moreover, certification is intricately linked to tourist behaviour, a subject explored by Artal-Tur et al. (2017).

This scholarly article delves into the sustainability practices implemented in tourist destinations and their correlation with location. Parte and Alberca (2021) posit that investigating the connection between hotel location and sustainability practices poses an intriguing research question. In the study, the data collection involved gathering microdata from Spanish firms, allowing for a comprehensive evaluation of efficiency across different tourism models. Reid et al. (2017) conducted a study on sustainability practices in hotels situated in urban, coastal, and other settings. The research revealed varying levels of sustainable practices across different settings, with urban hotels exhibiting the highest levels of sustainability practices.

Numerous studies have been carried out to evaluate the sustainability of tourism destinations, focusing on specific types of destinations or comparative analyses between them. For instance, Firoiu et al. (2019) delved into the sustainable development practices of mountain hotels in Romania. They conducted their research through a structured questionnaire distributed to 77 hotels in Romania's mountain regions. The study employed statistical analysis to identify correlations between the use of communication strategies related to sustainable development and occupancy rates, as well as between the implementation of international management standards and profitability increases. The research scrutinised the influence of communication strategies on occupancy rates and the impact of adhering to international management standards on profitability. The findings revealed a positive association between the implementation of sustainable communication strategies and occupancy rates, as well as between the adoption of international management standards and enhanced profitability.

Wu et al. (2022) explored the intersection of sustainability and competitiveness in urban tourism within China's Yangtze River Delta. They employed data envelopment analysis as the primary method to evaluate the sustainability and competitiveness of tourism destinations. They collected data from various tourism destinations, focusing on inputs and outputs related to sustainability metrics, such as environmental impact, economic performance, and social equity. The data was gathered through a combination of secondary sources, including tourism statistics and sustainability reports, ensuring a comprehensive assessment of each destination's performance. The research revealed that conventional efficiency assessments may inflate the perceived sustainability of urban tourism locales by disregarding adverse environmental effects. This underscores the urgency of implementing sustainable resource management in urban tourism, particularly in light of intensifying competition. Furthermore, the study emphasises the significance of factoring in carbon emissions to advance global carbon neutrality objectives.

Gomis-López and González-Reverté (2020) analysed the interplay between urban renewal, sustainable development, and smart tourism in well-established beach destinations in Spain. Their findings unveiled discrepancies in the application of smart tourism for urban revitalisation based on sustainability strategies. In a similar vein, Coccossis and Koutsopoulou (2020) presented a proposed framework for the assessment and monitoring of sustainability in coastal tourist destinations within the Mediterranean region at the local level. This framework adopts a three-tier system of indicators to accommodate diverse tourism activities and destination characteristics. The authors underscored the importance of involving local stakeholders in formulating the framework and deliberated on the encountered challenges.

Lozano et al. (2012) underscore the global importance of sustainable tourism and present a method for developing composite indicators using goal programming to assess sustainable tourism. They demonstrate this method through case studies of cultural tourism destinations in Andalusia, Spain. According to Artal-Tur et al. (2017), cultural tourism has notably increased in recent years. Understanding the behaviour of cultural tourists is crucial for enhancing the sustainability of destinations. The authors seek to identify the characteristics of cultural tourists and analyse their spending patterns and trip satisfaction

using econometric modelling. They emphasise cultural tourism's role in shaping a destination's sustainable development. Jurigová and Lencsésová (2015) have introduced a monitoring system for sustainable development in cultural and mountain destinations to address their susceptibility to the adverse impacts of tourism. They have established specific indicators for measuring sustainability in such destinations.

Based on a study carried out by Parte and Alberca (2021), geographical location has a substantial influence on the effectiveness of sustainable tourism models, particularly in the realms of cultural and rural tourism. By analysing microeconomic data from Spanish enterprises, the researchers discovered that rural tourism sites generally exhibit higher levels of efficiency in comparison to cultural tourism destinations. Furthermore, the study revealed a positive link between the success of rural tourism and sustainable practices, particularly the environmental initiatives undertaken by the regions during the period under review.

3. Methodology

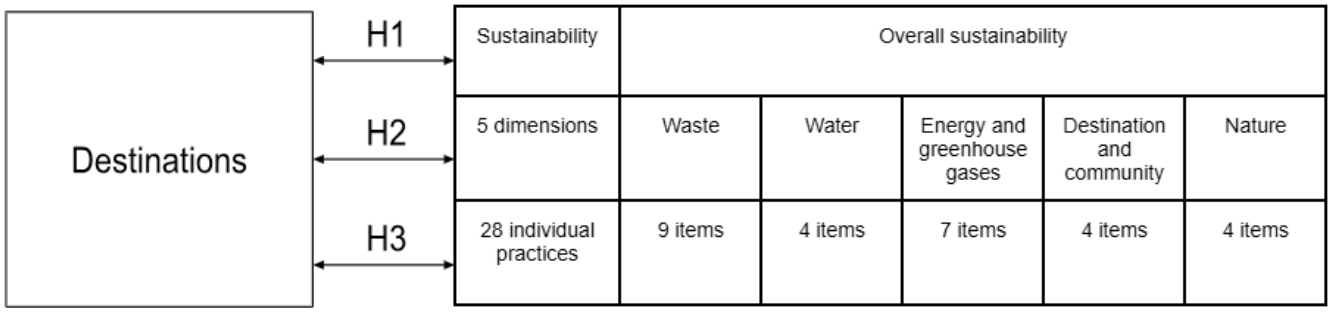
Following an extensive review of the literature, it is clear that there is a significant lack of research concentrating on the diverse approaches to integrating sustainable practices in various tourism destinations. Recognising this research gap, a research question and three associated hypotheses have been formulated to address this issue.

Research Question: Are there any statistically significant differences in adopting sustainability practices across different travel destinations?

H1. There are no significant differences in the overall level of sustainability practices adopted across various destinations.
H2. There are no significant differences in the different dimensions of sustainability practices adopted across various destinations.
H3. There are no significant differences in applying individual sustainability practices across different travel destinations.

Figure 1 illustrates the research's conceptual model. The model encompasses the Czech Republic's top tourist destinations, which are thoroughly listed and characterised in Table 3. The "overall sustainability" section outlines the dimensions and specific practices identified from the study's main data source, Booking.com data.

Figure 1. Conceptual Framework



Source: Own Elaboration

An analytical, descriptive, and deductive methodology is employed to achieve the research goals. The primary data source for the study was Booking.com (2023), a prominent online travel agency for booking accommodation. Up to 2024, Booking.com consistently documented a comprehensive list of 28 sustaina-

ble practices for each accommodation, which were classified into five key dimensions: waste, water, energy and greenhouse gases, destination and community, and nature. A summary of these specific practices is presented in Table 1.

Table 1. Sustainable Practices Defined by Booking.com

Waste	Single-use plastic miniature shampoo, conditioner, and body wash bottles are not used Water cooler/dispenser Recycling bins are available to guests, and waste is recycled Single-use plastic stirrers are not used Single-use plastic straws are not used Single-use plastic water bottles are not used Single-use plastic beverage bottles are not used Single-use plastic cups are not used Single-use plastic cutlery/plates not used
Water	Water-efficient toilets Water-efficient showers Option to opt out of daily room cleaning Option to reuse towels
Energy and greenhouse gases	Most lighting throughout the property uses energy-efficient LED bulbs All windows are double-glazed Most food provided at the property is locally sourced Electric car charging station Key card or motion-controlled electricity 100% renewable electricity is used throughout The property makes efforts to reduce its food waste
Destination and community	Tours and activities organised by local guides and businesses offered Provides guests with information regarding local ecosystems, heritage, and culture, as well as visitor etiquette Invests a percentage of revenue back into community projects or sustainability projects Local artists are offered a platform to display their talents
Nature	Wild (non-domesticated) animals are not displayed/interacted with while captive on the property or harvested, consumed, or sold. Green spaces such as gardens/rooftop gardens on the property Offsets a portion of their carbon footprint Most food provided is organic

Source: Own elaboration based on Booking.com (2023).

The data was manually recorded from the profiles of the accommodation facilities on Booking.com. This approach enabled an assessment of sustainability practices as reported by individual accommodations. In 2024, Booking.com replaced these individual sustainable practices with a third-party sustainability certification.

In the study, data were collected on the most visited tourism destinations in the Czech Republic from March to June 2023. The stratified random sampling method was employed to ensure the sample's representativeness. Specifically, 10% of collective accommodation establishments are situated in the country's most frequented areas, which are certified by Czech Tourism as regional destinations. Notably, Prague, the capital city, was excluded due to its distinct tourism characteristics, which are reflected in both demand (visitors) and supply (accommodation establishments).

Our data collection process entailed utilising random sampling within the selected areas, focusing exclusively on establishments listed on Booking.com that were identified as "travel sustainable property". Consequently, the frequencies presented in the findings pertain exclusively to establishments that have implemented sustainable practices.

The study sample (Table 2) comprised 429 collective accommodation facilities strategically located in the most frequented regions of the Czech Republic. The largest concentration of facilities was observed in the Giant Mountains area (22.4%), followed by the Jizera Mountains (11%) and Karlovy Vary (10.7%). Regarding the accommodation types, the three categories were fairly represented, with apartments constituting 32.2%, guesthouses 32.4%, and hotels 35.4%.

Table 2. Sample Characteristics

	Accommodation facilities		
	Total	**Sample (10 %)**	**Share in sample (in %)**
Karlovy Vary Region	463	46	10.72
Central Moravia	217	22	5.13
Pálava and the Lednice-Valtice Complex	413	41	9.56
Brno and Environs	262	26	6.06
Jeseníky Mountains - West	403	40	9.32
Zlín-Luhačovice Region	204	20	4.66
Jizera Mountains	467	47	10.96
Giant Mountains	956	96	22.38
Lipno Region	220	22	5.13
Třeboň Region	188	19	4.43
Moravian Slovakia	254	25	5.83
Beskid Mountains	248	25	5.83
Total in selected regions	4295	429	100.00

Source: Own Elaboration

In the study, the extracted data were evaluated using IBM SPSS software. Initially, the dataset underwent analysis employing descriptive statistical methods, including constructing frequency tables, calculating means, and determining standard deviations. Following the initial analysis, subsequent data examination encompassed hypothesis testing to better understand the dataset's relationships. Given the sample size and after visual inspection of the histogram, one-way analysis of variance (ANOVA) was utilised to assess disparities in means (H1: across multiple groups and overall level of sustainability across destinations and H2: achieved total sustainability level within the dimensions across destinations). Chi-square tests were employed to investigate the relationships among categorical variables (H3: application of 28 individual sustainability practices across destinations). The condition for minimum expected frequencies was met for all chi-square tests. All tests were conducted with a significance level set at 0.05.

4. Results

The section begins by delineating the characteristics of the selected tourism destinations. It then presents the results comprehensively derived from hypothesis testing, accompanied by their subsequent implications.

Table 3 illustrates the characteristics and focus of each tourism destination in the study. The study identifies four primary focuses of tourism destinations: cultural tourism, active tourism, MICE (Meetings, Incentives, Conferences and Exhibitions), and spa tourism, as outlined in the Strategy of CzechTourism, the national tourism organisation (CzechTourism, 2024). Cultural tourism centres on a destination's cultural and historical attractions, encompassing monuments, museums, festivals, and artistic events, catering to travellers interested in exploring the area's cultural traditions, arts, and history. Active tourism emphasises outdoor activities and adventures, including mountaineering, hiking, cycling, water sports, and adrenaline experiences, appealing to travellers seeking physical activity and adventure during their holidays. MICE tourism focuses on hosting business meetings, incentive events, conferences, and exhibitions, offering facilities and services for corporate events and professional gatherings. Spa tourism centres on wellness and relaxation services such as spa treatments, massages, thermal baths, and therapeutic procedures.

Table 3. Characteristics of the Tourism Destinations in the Czech Republic

Tourism Destination	Main Focus	Characteristics	The Region´s Geography
Beskid Mountains	Cultural tourism, active tourism	The Beskydy-Wallachia Tourist Area comprises 67 villages within the municipalities of Frýdek-Místek, Frýdlant nad Ostravicí, Nový Jičín, Frenštát pod Radhoštěm, Kopřivnice, and partially Ostrava. This area, situated in the Beskydy and Wallachia regions, provides a picturesque natural setting for various sports activities, leisure pursuits, and educational experiences. Tourists often engage in activities such as hiking, cycling, and horse riding. Furthermore, the area's rich local folklore, folk architecture, and historical significance contribute significantly to its appeal. The Beskydy region is renowned for its vibrant tradition and cultural heritage (Destinační management turistické oblasti Beskydy-Valašsko o.p.s., 2024).	Mountain
Brno and Environs	Cultural tourism, MICE	The regional tourist destination of Brno and its surroundings encompasses the sub-regions of Brno, Tišnov, Zastávka-Rosice-Oslavany, Ivančice-Kounice, Židlochovicko, Slavkovsko, Vyškovsko, Kuřimsko, and Ořechovsko. Brno is a culturally significant city and serves as the gateway to this tourist region, boasting a well-developed gastrotourism sector and a notable café culture. Visitors to the Brno area can partake in hiking, cycling, and wine tours, while the city itself holds significance as a major congress and conference destination (Brněnsko destinační společnost, 2021).	Urban
Central Moravia	Cultural tourism, MICE, spa	The Central Moravia Tourist Region is situated in the southern and central part of the Olomouc Region. It is administratively divided into the districts of Olomouc, Prostějov, Přerov and part of the district of Šumperk. The region is further divided into tourist localities, of which there are 12 in total: Hranicko, Konicko, Lipensko, Litovelsko, Mohelnicko, Olomouc, Olomoucko, Prostějovsko, Přerovsko, Střední Haná, Šternbersko, Uničovsko. The region offers visitors sightseeing tourism, active tourism, congress and incentive tourism, spa tourism and gastronomy. The region's natural centre is Olomouc's town with the second largest monument reserve in the Czech Republic and a UNESCO monument (the Holy Trinity Column). (Sdružení cestovního ruchu Střední Morava, 2022)	Rural
Giant Mountains	Active tourism	The tourist area of the Giant Mountains spans over 80,000 hectares. It is situated in the Hradec Králové and Liberec Regions, extending from Kořenov in the west to Žacléř in the east. This area attracts millions of tourists from the Czech Republic and beyond annually, making it a notable destination for winter sports and skiing, as well as alpine hiking and cycling during the summer months. The Giant Mountains stand out as the highest, most visited, and the only ones with an alpine character in the region. Notably, Sněžka, the highest mountain in the Czech Republic, is a prominent attraction in this area (Krkonoše - svazek měst a obcí, 2024).	Mountain
Jeseníky Mountains - West	Active tourism, spa	The Jeseníky West region encompasses the sub-regions of Javornicko and Žulovsko, Zlatohorsko, Jesenicko, Hanušovicko and Dolní Morava, Šumpersko and Zábřežsko, and is recognised as a prominent tourist destination. This mountainous area boasts a wealth of natural, historical, and technical marvels, making it an appealing destination for tourists. During the winter months, the Jeseníky Mountains serve as a significant ski resort, while in the summer, they become a sought-after location for hiking and cycling enthusiasts. Additionally, due to its distinctive climate, the region is renowned as a popular spa destination. Notable tourist attractions within the area include the paper factory in Velké Losiny, Praděd Mountain, the largest Moravian peat bog, Rejvíz, and more (Jeseníky Sdružení cestovního ruchu, 2024).	Mountain
Jizera Mountains	Active tourism	The Jizera Mountains, situated on the border of northern Bohemia and southern Poland, derive their name from the Jizera River, which originates on the slope of Mount Smrk, the highest point in the Czech part of the mountain range. The highest peak in the range is Vysoká Kopa, known as Wysoka Kopa in Poland. The Jizera Mountains attract numerous tourists seeking an active winter holiday or a peaceful retreat amidst the mountain peaks. In the summer, visitors explore the dams, castles, and lookout towers spread across the picturesque surroundings (Jizerskehory.cz, 2024).	Mountain
Karlovy Vary Region	Cultural tourism, active tourism, spa, MICE	The Karlovy Vary Region is renowned for its stunning natural landscapes, numerous historical landmarks, and well-known spa facilities. Within this relatively small region, three of the most celebrated Czech spa towns—Karlovy Vary, Mariánské Lázně, and Františkovy Lázně—are situated, collectively forming the West Bohemian Spa Triangle. Additionally, the region is home to the spas of Kynžvart and Jáchymov. The Ore Mountains have a rich mining history, with miners extracting precious minerals for over eight centuries, resulting in a significant mining heritage. Notably, in 2019, the Ore Mountains/Erzgebirge mining landscape was added to the UNESCO World Heritage List (Destinační agentura pro Karlovarský kraj, z.s., 2024).	Urban

Lipno Region	Active tourism	The Lipno micro-region encompasses the area surrounding the Lipno dam and the upper reaches of the Vltava along the border with Austria and Bavaria. Often referred to as the "Bohemian Sea," the Lipno River is situated amidst the captivating Sumava countryside. Visitors to this region partake in activities such as hiking, cycling, and skiing during the winter season. The prominent natural landmark in the area is the Sumava National Park. However, Lipno also boasts significant historical and cultural heritage sites. Notable among these are the Rožmberk Castle, an architectural gem situated on the Vltava River, the Cistercian monastery in Vyšší Brod, renowned for its unique library, and the Záviš Cross, with a value comparable to that of the crown jewels, which enthrals visitors from around the globe (Turistický spolek Lipenska, 2024).	Rural
Moravian Slovakia	Cultural tourism, active tourism	Moravian Slovakia is a micro-region where traditions and folklore are of great importance. Feasts are an integral part of folklore life in Moravian Slovakia. From spring to autumn, villages come alive with singing and dancing, and people wear their carefully ironed costumes in festive processions. Folklore fans also come to Moravian Slovakia for numerous folklore festivals. A rarity is undoubtedly the men's verbuňk dance, which is listed as a UNESCO Intangible World Heritage Site, as well as the Ride of the Kings and the Blueprint. Proof of traditional life is the open-air museums in Strážnice or Rochus in Uherské Hradiště, and equally important are the regional museums in Uherský Brod, Hodonín, Kyjov and the Moravian Slovakia Museum. Moravian Slovakia is also a very important wine-growing region. The region also offers numerous cycling trails, and the historical water canal built by Jan Antonín Bata is unique. (Region Slovácko sdružení pro rozvoj cestovního ruchu, 2024)	Rural
Pálava and the Lednice-Valtice Complex	Cultural tourism, active tourism	The Pálava and the Lednice-Valtice Complex region harmoniously combine natural scenery with picturesque villages and towns around Pálava. Twenty-seven of them are connected by centuries of history, a long wine-growing tradition and a wealth of relaxation, active recreation and sports activities. The cultural highlight of the region is the annual Pálava Wine Festival, a traditional celebration of wine. Tourists discover the archaeological treasures of Dolní Věstonice, Milovice and Pavlov. These sites have already given several unique testimonies about the life of the local inhabitants in the Stone Age. The most famous find is a ceramic statue of the Venus of Věstonice. The exceptional importance of the area is evidenced by its status as a Protected Landscape Area, which it has held for more than forty years, and by the UNESCO Biosphere Reserve title, awarded more than thirty years ago. (Mikulovsko - destinační společnost, z.s.p.o., 2024)	Rural
Třeboň Region	Cultural tourism, active tourism	The Třeboň region is a place of great interest due to its remarkable architecture, rich history, and captivating natural beauty. The exceptional natural values of this region led to its inclusion in the UNESCO network of biosphere reserves in 1977 and the designation of the Třeboňsko Protected Landscape Area in 1979. Visitors to the area, including hikers, fishermen, cyclists, boaters, and spa guests, are drawn to the region's picturesque landscape, characterised by the silvery surfaces of ponds resembling pearls strung along the blue ribbons of streams and rivers. The Třeboň region boasts several significant tourist attractions, such as the Třeboň Protected Landscape Area, the Třeboň Spa, the Soběslav-Vesel bogs, the Lužnice River offering boating and camping opportunities, the Třeboň pond system, cycling and nature trails, rural tourism, castles, sand pits, towns, religious monuments, the Schwarzenberg Tomb, and the Bohemia Regent Brewery (Turistická oblast Třeboňsko, z.s., 2024).	Rural
Zlín-Luhačovice Region	Cultural tourism, spa	The Zlín and Luhačovice region, situated in the eastern part of the Czech Republic, embodies a rich tapestry of unparalleled contrasts. On the one hand, the distinctive functionalist architecture of the city of Zlín and Jurkovič's Luhačovice coexist. At the same time, on the other hand, the region boasts Wallachian wooden houses, mountains, hills, and southern Wallachia. Luhačovice, a spa town, has long been a traditional wellness tourism destination. The town's unique genius loci is underscored by receiving the prestigious EDEN (European Destination of Excellence) award in 2019. Zlín is renowned for its association with the entrepreneur Tomas Bata, the founder of the Bata factories. Notable sites for visitors include the Bata Villa and the Bata Memorial. Owing to its diverse landscape, the Zlín-Luhačovicko region offers abundant opportunities for a variety of outdoor activities, including hiking, cycling, and skiing during the winter months (Luhačovské Zálesí, o.p.s., 2024).	Rural

Source: Own Elaboration

The sustainability score of each accommodation facility was determined based on the number of sustainable practices adopted across various dimensions, such as waste management, water conservation, energy efficiency, and preservation of the destination and nature. We calculated the total number of

adopted sustainable practices for each dimension and facility. These counts were then averaged across all facilities within a given destination, resulting in an average sustainability score for each dimension at the destination level. In Table 4, the average sustainable score for each facility across all dimensions and individual dimension scores is presented. Due to the varying number of practices across dimensions (ranging from 4 to 9), comparing destination averages across dimensions is not feasible. However, within each dimension, destination averages can be compared. The values are colour-coded to represent their distribution in terms of range.

Table 4. Achieved Average Sustainability Score Per Facility

Destinations	Waste	Water	Energy and greenhouse gases	Destination and community	Nature	Total score
Number of sustainable practices within the dimension	9	4	7	4	4	28
Zlín-Luhačovice Region	6.55	3.50	3.45	2.05	2.10	17.65
Central Moravia	6.77	3.45	3.64	1.86	1.73	17.45
Pálava and the Lednice-Valtice Complex	6.41	3.39	3.46	1.83	1.93	17.02
Beskid Mountains	6.16	3.44	3.24	2.12	1.96	16.92
Jeseníky Mountains - West	6.50	2.93	2.98	1.85	1.98	16.23
Třeboň Region	7.16	3.11	2.89	1.53	1.32	16.00
Brno and Environs	6.50	3.50	3.31	1.50	1.31	15.92
Jizera Mountains	6.51	3.02	3.15	1.68	1.55	15.91
Karlovy Vary Region	6.61	2.96	3.07	1.80	1.46	15.89
Moravian Slovakia	6.16	3.24	3.32	1.48	1.60	15.80
Lipno Region	7.50	2.91	2.59	1.45	1.18	15.64
Giant Mountains	6.21	2.89	2.98	1.56	1.85	15.49
Total (N)	6.50	3.12	3.14	1.71	1.70	16.15
Range	6.16 - 7.50	2.89 - 3.50	2.59 - 3.64	1.45 - 2.12	1.18 - 2.10	15.49 - 17.65

Notes:
White background fields = low values (the lowest one-third of the range)
Light grey marked fields = middle values (second one-third of the range)
Dark grey marked fields = high values (the highest one-third of the range)
Source: Own Elaboration

The destinations situated in the Moravian region of Czechia, including the Zlín-Luhačovice Region (17.65), Central Moravia (17.45), Pálava and the Lednice-Valtice Complex (17.02), and the Beskid Mountains (16.92), exhibited the highest average sustainability scores per facility. Conversely, facilities located in the Czech (western) part of Czechia, such as the Giant Mountains or Lipno Region, demonstrated the lowest average sustainability scores. These facilities scored below average in all dimensions, except one.

It may be argued that the facilities in Moravian destinations exhibit greater sustainability due to the implementation of more sustainable practices. A comprehensive statistical analysis was carried out to ascertain the statistical significance of these differences in overall sustainability, with the results presented in Tables 5 and 6.

H1. There are no significant differences in the overall level of sustainability practices adopted across various destinations.

Table 5. H1. Descriptives (Sustainability Level and Destination)

Destinations	N	Mean	Std. Deviation	Share of the applied sustainable practices
Zlín-Luhačovice Region	20	17.65	4.771	63.00%
Central Moravia	22	17.45	4.295	62.30%
Pálava and the Lednice-Valtice Complex	41	17.02	4.464	60.80%
Beskid Mountains	25	16.92	3.904	60.40%
Jeseníky Mountains - West	40	16.23	4.865	57.90%
Třeboň Region	19	16.00	3.350	57.10%
Brno and Environs	26	15.92	3.939	56.90%
Jizera Mountains	47	15.91	3.775	56.80%
Karlovy Vary Region	46	15.89	4.132	56.80%
Moravian Slovakia	25	15.80	4.000	56.40%
Lipno Region	22	15.64	2.718	55.80%
Giant Mountains	96	15.49	5.574	55.30%
Total	429	16.15	4.482	57.70%

Source: Own Elaboration

Table 6. H1. One-way ANOVA (Sustainability Level and Destination)

	Sum of Squares	df	Mean Square	F	Significance level
Between Groups	187.008	11	17.001	0.843	0.597
Within Groups	8410.838	417	20.170		
Total	8597.846	428			

Source: Own Elaboration

Based on the findings of the One-way ANOVA test conducted at a significance level of 0.05, it was determined that there are no statistically significant differences in sustainability practices across the destinations (Sig. = 0.597, 0.843). Nonetheless, an interesting observation emerged, indicating that facilities in Moravia, the eastern region of Czechia, show a tendency to prioritise the application of sustainable practices. Specifically, the Zlín-Luhačovice Region exhibited a 63% adoption rate, Central Moravia 62%, Pálava and the Lednice-Valtice Complex 61%, and the Beskid Mountains 60%. To gain a more comprehensive understanding of sustainability in the selected destinations, a further investigation was conducted to determine whether specific sustainable practices varied across destinations within each dimension.

H2. There are no significant differences in the different dimensions of sustainability practices adopted across various destinations.

To verify H2, a one-way ANOVA was conducted. The outcomes for the sustainable dimensions are presented in Table 7, providing insights into the proportion of sustainable practices adopted in each dimension by facilities in the selected destinations. For instance, accommodation facilities in the Beskid Mountains demonstrated the adoption of 68% sustainable practices within the waste dimension, 86% within the water dimension, and so on. The final two lines of the table present a summary of the one-way ANOVA results, showcasing the F-value and the significance level.

Table 7. Dimensions of Sustainable Practices Across Destinations (Share of Sustainable Practices Applied)

Destinations	Waste	Water	Energy	Destination and community	Nature
Beskid Mountains	68%	86%	46%	53%	49%
Brno and Environs	72%	88%	47%	38%	33%
Central Moravia	75%	86%	52%	47%	43%
Giant Mountains	69%	72%	43%	39%	46%
Jeseníky Mountains - West	72%	73%	43%	46%	49%
Jizera Mountains	72%	76%	45%	42%	39%
Karlovy Vary Region	73%	74%	44%	45%	36%
Lipno Region	83%	73%	37%	36%	30%
Moravian Slovakia	68%	81%	47%	37%	40%
Pálava and the Lednice-Valtice Complex	71%	85%	50%	46%	48%
Třeboň Region	80%	78%	41%	38%	33%
Zlín-Luhačovice Region	73%	88%	49%	51%	53%
Total	72%	78%	45%	43%	43%
F-value	0.927	2.319	1.243	0.810	2.270
Significance level	0.514	0.009	0.256	0.631	0.011

Source: Own Elaboration

In the realm of sustainable practices in various destinations, it is evident that most facilities prioritise water and waste dimensions, while energy, destination and community, and nature dimensions receive less attention. Furthermore, a comparative analysis reveals statistically significant differences (at the 0.05 significance level) in the realms of water and nature across selected destinations.

In the context of the water dimension, the study found that sustainable practices are predominantly applied in Brno and Environs (88%), Zlín-Luhačovice Region (88%), and Central Moravia (86%). Conversely, facilities in the Giant Mountains (72%), Lipno Region (73%), and Jeseníky Mountains - West (73%) demonstrate less frequent application of these practices.

In various tourist destinations, a study revealed varying degrees of implementation of sustainable practices within the nature dimension. The findings indicated that the percentage of facilities applying sustainable practices in the nature dimension ranged from 30% to 53%. Notably, the highest percentages of sustainable practices were observed in the Zlín-Luhačovice Region (53%), Jeseníky Mountains - West (49%), Beskid Mountains (49%), Pálava, and the Lednice-Valtice Complex (48%). Conversely, the facilities in Lipno Region (30%), Brno and Environs (33%), and Třeboň Region (33%) exhibited the lowest percentage of sustainable practices in the nature dimension.

Our subsequent procedure involved undertaking a comprehensive analysis of sustainable practices to assess potential variations in their implementation across different locations.

H3. There are no significant differences in the application of individual sustainability practices across different travel destinations.

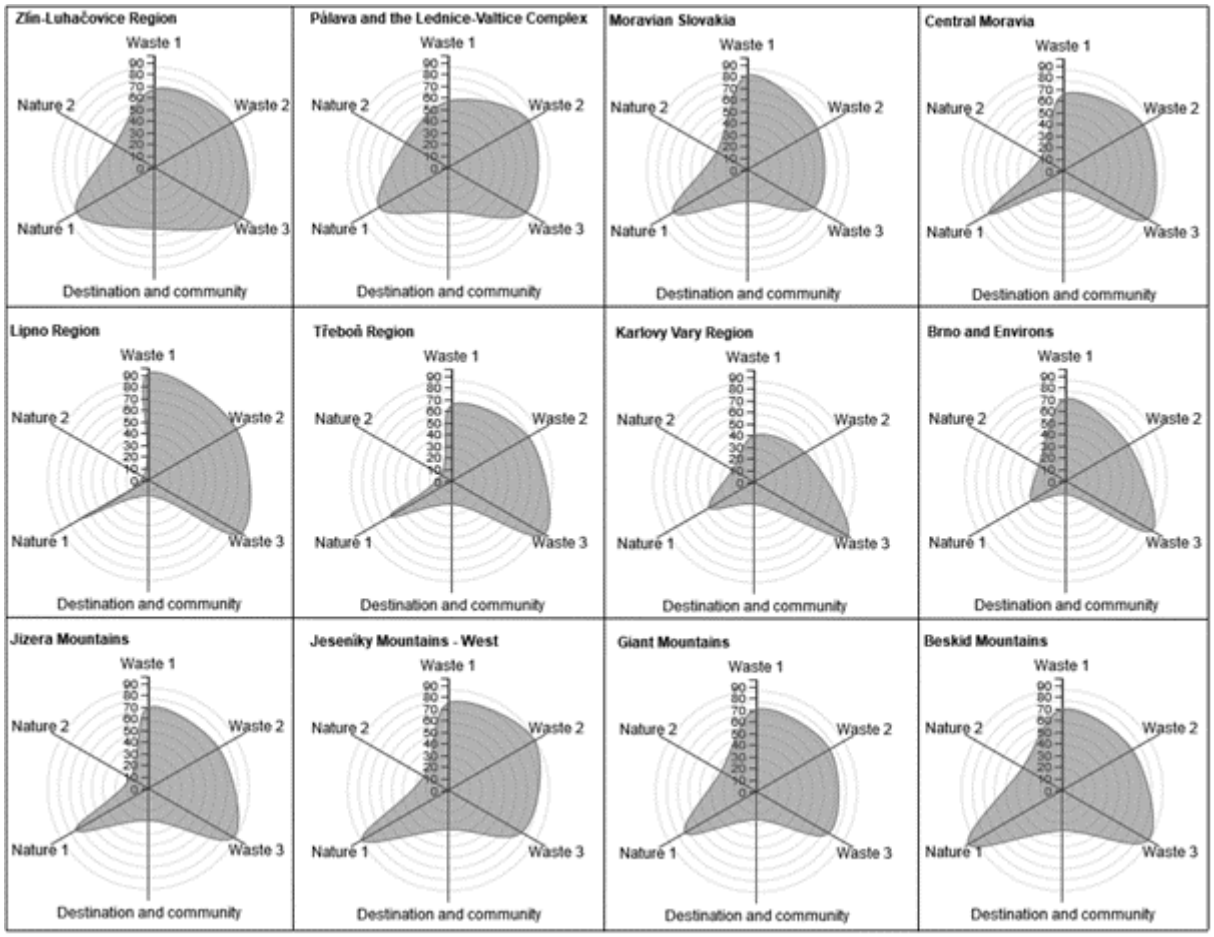
The Pearson Chi-square test was employed to assess the significance of the observed differences. The outcomes have been visually depicted in Figure 2 for comparative purposes. Each destination is represented by individual spider graphs, with significant sustainability practices indicated on the axes: Waste 1 = Avoidance of disposable plastic miniature bottles for shampoo, conditioner, and body lotion, Waste 2 = Provision of recycling bins for guests and recycling of waste, Waste 3 = Elimination of disposable plastic straws, Destination and Community = Allocation of a percentage of revenue towards community or sustainability projects, Nature 1 = Incorporation of green areas such as gardens or roof gardens on the

property, and Nature 2 = Emphasis on organic food provision. The graph exclusively encapsulates the noteworthy sustainable practices identified at a 0.05 significance level.

Detailed results for the third hypothesis are available in a supplementary table accompanying this paper. The table exclusively summarises the sustainable practices that demonstrated significance at the 0.05 significance level. Notably, all other sustainable practices did not exhibit statistical significance (with their significance levels exceeding 0.05). The table presents the distribution of facilities utilising sustainable practices within each region. Additionally, the final two lines show the data of the Chi-square test, including Pearson's Chi-square and the associated significance level.

Although the Chi-square test was performed on frequency data (individual practices were coded as binary variables, yes or no), Figure 2 and the supplementary table present the proportions of facilities utilising sustainable practices within each region for enhanced clarity and inter-regional comparison.

Figure 2. Share of Facilities within the Destination that Apply the Practice in which Differences were Proven to be Significant (in %)



Notes:
Waste 1 = single-use plastic miniature shampoo, conditioner, and body wash bottles not used
Waste 2 = recycling bins available to guests, and waste is recycled
Waste 3 = single-use plastic straws not used
Destination and community = Invests a % of revenue back into community projects or sustainability projects
Nature 1 = green spaces such as gardens/ rooftop gardens on the property
Nature 2 = most food provided is organic
Source: Own Elaboration

In this study, it was observed that waste reduction practices varied significantly across different locations. Notable differences were identified, including the following:

- Facilities in the Lipno Region, Moravian Slovakia, and Jeseniky Mountain - west were the most likely to avoid using single-use plastic miniature shampoo, conditioner, and body wash bottles (Sig. <0.001).

- Facilities in the Lipno Region, Jeseníky-Mountain West, and the Pálava and the Lednice-Valtice complex were more likely to provide recycling bins to guests and recycle waste (Sig. 0.018).
- Facilities in the Karlovy Vary Region, Lipno Region, and the Zlín-Luhačovice region were more likely to avoid using single-use plastic straws (Sig. 0.014).

The study revealed significant variations in the implementation of the "Invests a percentage of revenue back into community projects or sustainability projects" practice across different regions, with the Zlín-Luhačovice Region, the Pálava, and the Lednice-Valtice Complex showing the most notable application (Sig. 0.033).

Regarding the nature dimension, two statistically significant items were identified. The presence of "Green spaces such as gardens/rooftop gardens on the property" (Sig. < 0.001) was predominantly observed in facilities located in the Beskid Mountains, Jeseníky Mountains-West, and the Zlín-Luhačovce Region. Similarly, the implementation of "Most of the food provided is organic" (Sig. 0.014) was most prevalent in facilities situated in the Pálava and the Lednice-Valtice Complex, the Beskid Mountains, and the Zlín-Luhačovice Region.

5. Discussion

The most sustainable tourism destinations in the Czech Republic, in terms of sustainability of lodging facilities, are located in the Moravian part of the country (such as Zlín-Luhačovice Region, Central Moravia or Pálava and Lednice-Valtice Complex). All these destinations are characterised by active tourism and diverse landscapes, and smaller urban centres. These destinations are also known for their spa and enotourism offerings. The lodging facilities in these areas prioritise water conservation and waste management practices, as well as investments in local communities. In contrast, mountainous regions tend to focus more on nature protection, while cultural tourism destinations do not prioritise nature conservation.

According to Reid et al. (2017), urban hotels report the highest levels of sustainability. However, this study's findings differ from this perspective. Although the most sustainable destinations are partly urban, cultural and urban tourism are not typical for these areas. The results also differ from those of Artal-Tur et al. (2017), who emphasise cultural tourism as a key factor influencing sustainability.

The findings align more closely with those of Parte and Alberca (2021), who reported that rural tourism destinations in Spain generally exhibit higher levels of sustainability. The most sustainable destinations are partly focused on rural tourism (the mentioned Moravian part of the country).

The research emphasises the significance of incorporating sustainability principles into the design and operation of lodging facilities specific to each tourism destination. It is observed that facilities located nearby share similar sustainability priorities. Assessing sustainability levels across various types of tourism destinations is crucial for advocating responsible tourism practices, safeguarding natural and cultural heritage, and enhancing the overall competitiveness and appeal of diverse tourism destinations. Nonetheless, it is imperative to recognise the potential conflict between environmental sustainability and the tourism economy. While tourism can stimulate regional economies, it may also yield adverse environmental effects. Therefore, in addition to promoting destinations and increasing tourist inflows, tangible sustainability measures must be enforced to alleviate these negative impacts.

6. Conclusion

The paper presented three hypotheses about the extent of sustainability practices implemented across diverse travel destinations in the Czech Republic. The first hypothesis postulated that there were no statistically significant disparities in the overall level of sustainability practices among different destinations. This hypothesis was substantiated by a One-way ANOVA test at a significance level of 0.05. The Czech Republic's most sustainable locations feature active tourism and varied landscapes, along with smaller urban areas. Additionally, these places are recognised for their spa services and enotourism activities.

The second hypothesis suggested that there were no notable differences in the various dimensions of sustainability practices adopted across different destinations. However, a one-way ANOVA analysis

confirmed statistically significant differences (at the 0.05 significance level) within the water and nature dimensions across the selected destinations. Facilities in destinations primarily focused on cultural tourism tended to prioritise water dimension practices, while facilities in mountain destinations exhibited less frequent application of water dimension practices. Additional variations were observed within the nature dimension, with the highest percentage of nature sustainability practices identified in Zlín-Luhačovice Region, Jeseníky Mountains - West, Beskid Mountains, Pálava, and the Lednice-Valtice Complex. These destinations are distinguished by their natural diversity and treasures. However, the authors did not discern any distinct common characteristic that definitively confirmed the prioritisation of nature sustainability practices in destinations with natural heritage. In general, nature sustainability practices tend to be less visible in urban areas.

The third hypothesis posited that there were no significant differences in applying individual sustainability practices across different travel destinations. However, this hypothesis was not confirmed, and statistically significant differences were found in the dimensions of waste reduction practices, destination and community, and nature protection. Specifically, significant differences were found in the usage of single-use plastic miniature shampoo, conditioner, and body wash bottles in hotel rooms, in the availability of recycling bins, in the usage of single-use plastic straws, investments into community or sustainability projects, green spaces such as gardens or rooftop gardens on the property, and the organic origin of most food provided. The statement "Most food provided is organic" was identified as the least popular practice.

The findings of this study have significant theoretical and practical implications for understanding and managing sustainability practices in various travel destinations in the Central European context. The theoretical contributions lie in the research's unique conceptual model. Up to this point, no similar analysis of different sustainability practices in tourism destinations has been performed before.

Practically, these findings highlight the need for destination-specific sustainability strategies tailored to the unique characteristics and priorities of each location. Destination managers and policymakers can leverage this information to develop targeted intervention programs aimed at addressing identified gaps and disparities in sustainability implementation. Additionally, collaborative efforts among stakeholders within and across destinations are essential for sharing best practices and advancing sustainability agendas collectively.

This study has certain limitations that should be acknowledged. First, the research focuses exclusively on travel destinations in the Czech Republic, which may limit the generalizability of the findings to other regions. Furthermore, the study relies on data from the Booking.com platform, which is self-reported by accommodation providers, potentially introducing a degree of reporting bias. Lastly, as a cross-sectional analysis, this study does not capture long-term developments in sustainability practices over time. Future research should address these limitations by expanding the geographical scope, incorporating data over a longer time horizon, and integrating additional qualitative insights to achieve a more comprehensive understanding of sustainability practices in tourism destinations.

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ANNEX

Significant sustainability practices across destinations: share of facilities within the destination that apply the practice (in %)

	Waste [Single-use plastic miniature shampoo, conditioner, and body wash bottles not used]	**Waste** [Recycling bins are available to guests, and waste is recycled]	**Waste** [Single-use plastic straws not used]	**Destination and community** [Invests a % of revenue back into community projects or sustainability projects]	**Nature** [Green spaces such as gardens/ rooftop gardens on the property]	**Nature** [Most food provided is organic]
Beskid Mountains	72	72	88	36	96	40
Brno and Environs	73	65	88	12	35	27
Central Moravia	68	82	86	18	77	23
Giant Mountains	73	75	74	25	73	36
Jeseníky Mountains - West	78	88	75	35	88	25
Jizera Mountains	72	72	87	28	74	19
Karlovy Vary Region	41	52	96	20	46	22
Lipno Region	95	91	95	14	68	5
Moravian Slovakia	84	72	68	28	76	32
Pálava and the Lednice-Valtice Complex	59	83	80	39	71	44
Třeboň Region	68	79	95	21	63	11
Zlín-Luhačovice Region	70	80	90	55	80	40
Pearson Chi-Square	31.331	23.015	23.726	21.004	45.926	23.624
Significance level	< 0.001	0.018	0.014	0.033	< 0.001	0.014

Notes:
Light grey = the three highest values
Dark grey = the three lowest values
Source: Own Elaboration