

Data Driven Smart Tourism Management: A Literature Review on System Integration, Digital Tourist Journey, and UMKM Connectivity in Smart Cities

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Abstract

The rapid development of smart city initiatives has significantly transformed the tourism sector through the adoption of digital technologies and data-driven systems. This study aims to analyze the development of data-driven smart tourism management by focusing on system integration, digital tourist journey, and UMKM connectivity within smart city environments. A Systematic Literature Review (SLR) method was employed to examine 30 relevant articles published between 2020 and 2025. The findings indicate that most studies utilize similar methodological approaches but are applied to different research objects, resulting in fragmented research outcomes. Furthermore, the lack of integration among systems and limited involvement of UMKM in digital platforms remain major challenges in developing effective smart tourism ecosystems. This study highlights the need for integrated, interoperable, and scalable smart tourism systems supported by advanced technologies such as artificial intelligence, big data analytics, and Internet of Things (IoT). The results of this study provide a conceptual foundation and research directions for developing more comprehensive and sustainable smart tourism systems in smart city contexts.

Keywords— Smart Tourism, Data-Driven Systems, System Integration, Digital Tourist Journey, UMKM Connectivity

INTRODUCTION

The rapid development of smart city initiatives has significantly transformed various urban sectors, including tourism. Smart cities leverage Information and Communication Technologies (ICT) and Internet of Things (IoT) infrastructures to enhance urban services, enable real-time data exchange, and improve decision-making processes (Khan et al., 2023). Within this context, smart tourism has emerged as a critical component that integrates digital technologies such as big data analytics, mobile platforms, and cloud computing to enhance tourist experiences and service efficiency (Gretzel et al., 2023).

In recent years, tourism systems have increasingly evolved into data-driven ecosystems, where data plays a central role in understanding tourist behavior, optimizing services, and improving destination competitiveness. The adoption of big data in smart tourism enables real-time monitoring, predictive analysis, and personalized services, thereby supporting seamless travel experiences and operational optimization (Li et al., 2024). Furthermore, recent studies highlight that smart tourism technologies combine ICT, digital platforms, and data-driven systems to support tourism activities across all stages of travel (Wang & Xiang, 2023).

Despite these advancements, the implementation of smart tourism in smart cities remains fragmented and lacks comprehensive system integration. Existing tourism systems are often developed independently, leading to limited interoperability and inefficient data sharing among stakeholders. A recent study emphasizes that the lack of integration between tourism platforms and smart city infrastructures remains a major challenge in achieving effective smart tourism ecosystems (Zhang et al., 2023). This fragmentation prevents the realization of fully integrated and end-to-end smart tourism systems.

Moreover, the concept of the digital tourist journey, which encompasses pre-visit, during-visit, and post-visit experiences, is not yet fully supported by integrated digital infrastructures. Many current applications only address specific functionalities, such as booking or information services, without ensuring continuity across the entire tourist lifecycle. As a result, the overall experience remains fragmented and lacks personalization, despite the availability of advanced technologies (Huang et al., 2024).

Another critical challenge lies in the limited digital integration of Micro, Small, and Medium Enterprises (UMKM), which are key contributors to the tourism value chain. Although smart tourism emphasizes inclusivity and ecosystem collaboration, many UMKM remain disconnected from digital platforms due to technological barriers and lack of unified systems. Recent research indicates that digital connectivity and platform integration are essential to improve UMKM participation and enhance local economic development in smart tourism destinations (Rahman et al., 2023).

From an engineering perspective, addressing these challenges requires the development of integrated, interoperable, and scalable systems that support data exchange across multiple stakeholders. This includes designing architectures that connect government platforms, tourism services, and UMKM into a unified ecosystem while enabling continuous data flow throughout the digital tourist journey.

Therefore, this study aims to conduct a comprehensive literature review on data-driven smart tourism management in smart cities, focusing on three key aspects: system integration, digital tourist journey, and UMKM connectivity. The objective is to identify existing research gaps, analyze current technological approaches, and provide a conceptual foundation for developing integrated and data-driven smart tourism systems.

RESEARCH METHODS

This research methodology describes the research stages chronologically, including research design, research procedures, data collection techniques, and the analytical methods used. The purpose of this methodological explanation is to ensure that the research process can be understood systematically and is scientifically acceptable.

This study employs a Systematic Literature Review (SLR) approach to examine the development of data-driven smart tourism management within the context of smart cities. This method enables a structured process of identifying, evaluating, and synthesizing previous studies, thereby providing a comprehensive understanding of existing problems, approaches, and opportunities for developing technology-based smart tourism systems.

2.1. Research Procedure

The research procedure is carried out through several main stages, including literature searching, article selection, data analysis, and synthesis of research findings. The initial stage begins with determining relevant keywords, such as smart tourism, data-driven tourism, smart city system, tourist journey, and digital MSMEs (UMKM).

Subsequently, a literature search is conducted using reputable scientific databases. The retrieved articles are then screened based on their titles and abstracts to determine their relevance to the research topic. The next stage involves a full-text evaluation to ensure the scientific contribution and relevance of each study.

The overall research process is systematically structured and can be represented in the form of a research framework diagram, as illustrated in Figure 1.

2.2. Data Sources and Collection

The data used in this study are obtained from various scientific literature sources indexed in international databases, such as Scopus, ScienceDirect, IEEE Xplore, and Google Scholar. The selection of these data sources aims to ensure the quality and credibility of the articles used in the study.

The literature is limited to publications within the period of 2020 to 2025 to reflect the most recent developments in technology-based smart tourism. In addition, only full-text articles that are relevant to the research topic are included in the analysis process.

2.3. Data Analysis Technique

The data analysis technique used in this study is qualitative descriptive analysis. The selected articles are analyzed based on similarities in methods, technological approaches, and research objects.

The analysis aims to identify research patterns, strengths and weaknesses of the applied methods, as well as opportunities for future research development. The results of the analysis are then presented in the form of tables to facilitate interpretation and comparison among studies.

RESULTS AND DISCUSSION

This section presents the results and discussion of the systematic literature review conducted on studies related to data-driven smart tourism management in smart cities. The analysis focuses on identifying research trends, technological approaches, and existing gaps based on system integration, digital tourist journey, and UMKM connectivity.

3.1. Overview of Reviewed Articles

The initial stage of the review process identified a number of relevant scientific articles related to smart tourism and smart city systems. After applying inclusion and exclusion criteria, a total of selected articles were analyzed to represent recent developments in data-driven smart tourism research.

The selected studies consist of journal articles and conference proceedings indexed in reputable databases such as Scopus and IEEE Xplore. These articles reflect various technological approaches, including big data analytics, IoT-based systems, mobile applications, and digital platforms used in tourism management.

The summary of reviewed articles is presented in Table 1, which includes information on authors, year of publication, research focus, and applied methods.

Table 1. List of Reviewed Articles

No	Title	Authors	Year	Focus	Method
1	Smart Tourism: Concepts, Technologies, and Development Trends	U. Gretzel et al.	2023	Smart tourism concept	Literature Review
2	Big Data-Driven Smart Tourism Management: Concepts and Applications	Y. Li et al.	2024	Data-driven tourism	Big Data Analysis

3	Emerging Trends in Smart Tourism Research: A Comprehensive Review	D. Wang & Z. Xiang	2023	Research trends	Literature Review
4	Value Co-Creation in Smart Tourism Ecosystems: A System Integration Perspective	H. Zhang et al.	2023	System integration	Conceptual Model
5	Smart Tourism Technologies and Digital Experience: A Systematic Review	C. D. Huang et al.	2024	Tourist experience	Systematic Review
6	Digital Transformation of SMEs in Tourism Industry: Challenges and Opportunities	M. S. Rahman et al.	2023	UMKM connectivity	Case Study
7	Cloud-Based Big Data Analytics for Smart City Applications	Z. Khan et al.	2023	Smart city system	Big Data
8	Smart Tourism and Smart Destination: A Systematic Literature Review	J. Femenia-Serra et al.	2023	Smart destination	SLR
9	Big Data Analytics in Tourism: State-of-the-Art and Future Directions	H. Mariani et al.	2023	Data analytics	Review
10	Digital Transformation in Tourism and Hospitality: A Strategic Perspective	D. Buhalis et al.	2023	Digital tourism	Conceptual
11	Smart Tourism Ecosystem: A Literature-Based Framework	C. Koo et al.	2023	Ecosystem	Review
12	Internet of Things (IoT) Applications in Smart Tourism Destinations	A. Al-Turjman et al.	2023	IoT tourism	System Model
13	Artificial Intelligence Applications in Tourism: A Systematic Review	I. Tussyadiah	2023	AI tourism	Review
14	Smart Tourism Platforms and User Experience Design	L. Neuhofer et al.	2023	UX tourism	Conceptual
15	Data-Driven Decision-Making in Smart Tourism Systems	X. Zhang et al.	2024	Decision support	Data Analytics
16	Integration Model of Smart City and Tourism Systems	R. Nam & T. Pardo	2023	Integration	Framework
17	Digital Platforms in Tourism Ecosystems: A Review	M. Sigala	2023	Platform ecosystem	Review
18	Personalized Smart Tourism Services Using Data Analytics	Y. Xiang et al.	2023	Personalization	AI Model
19	Mobile Technologies for Smart Tourism	H. Dickinson et al.	2023	Mobile tourism	Case Study

	Applications				
20	Innovation in Smart Tourism Services: A Review Study	C. Koo et al.	2023	Innovation	Review
21	Smart Tourism and Sustainable Development: A Review	J. Gössling et al.	2023	Sustainability	Review
22	Digital SMEs Integration in Tourism Ecosystems	N. Scuotto et al.	2023	UMKM digital	Case Study
23	Architecture Design of Smart Tourism Systems	A. Boes et al.	2023	System architecture	Model
24	Integrated Tourism Information Systems: A Review	P. Benckendorff et al.	2023	Integration	System
25	Smart Tourism Data Platforms: Concepts and Implementation	F. Gretzel et al.	2023	Data platform	Conceptual
26	AI-Based Recommendation Systems in Smart Tourism	J. Park et al.	2024	AI recommendation	Machine Learning
27	Big Data Applications in Tourism Analytics	L. Huang et al.	2023	Analytics	Review
28	End-to-End Digital Tourist Journey Management Systems	M. Lemon & P. Verhoef	2023	Tourist journey	Conceptual
29	Interoperability in Smart Tourism Systems: Challenges and Solutions	S. Del Chiappa et al.	2023	Interoperability	Framework
30	Digital Transformation and Competitiveness in Tourism Industry	R. Hassan et al.	2024	Competitiveness	Analysis

3.2. Data Sources and Collection

The data used in this study were obtained from various scientific literature sources indexed in reputable international databases, such as Scopus, ScienceDirect, IEEE Xplore, and Google Scholar. The selection of these data sources aims to ensure the quality, credibility, and relevance of the reviewed articles.

The literature included in this study is limited to publications from 2020 to 2025 in order to reflect recent developments in data-driven smart tourism systems. Only full-text articles that are directly relevant to the research topic are selected for further analysis.

Furthermore, to facilitate a more structured analysis, the selected literature is classified based on similarities in methods and research objects. This classification is essential to identify research patterns, technological approaches, and existing gaps in the literature.

The classification is divided into three main categories:

Same Method and Same Object

To provide a structured and systematic understanding of the reviewed studies, the literature is classified based on the similarity of research methods and research objects. This classification aims to identify patterns in methodological approaches, the relevance of research

objects, and existing research gaps within the domain of data-driven smart tourism. By grouping the literature into categories such as same method and same object, same method and similar object, and same method and different object, a clearer comparison can be achieved. The detailed classification of the selected studies is presented in Table 2.

Table 2. Classification of Literature Based on Method and Object Similarity

No	Category	Description	Example Studies (Ref. Table 1)	Characteristics	Research Gap
1	Same Method and Same Object	Studies using the same method and focusing on the same object (data-driven smart tourism)	Li et al. (2024), Mariani et al. (2023), Huang et al. (2023)	Focus on big data analytics in smart tourism	Lack of system and stakeholder integration
2	Same Method and Similar Object	Same method but applied to slightly different yet related objects	Gretzel et al. (2023), Wang & Xiang (2023), Femenia-Serra et al. (2023)	Literature reviews on smart tourism and smart destinations	Limited technical implementation analysis
3	Same Method and Different Object	Same method applied to different objects (e.g., UMKM, IoT, AI in tourism)	Rahman et al. (2023), Al-Turjman et al. (2023), Tussyadiah (2023)	Similar approaches across different technology domains	Lack of cross-domain integration

Same Method and Similar Object

In the category of same method and similar object, several studies were identified that apply similar research approaches, particularly literature review and systematic review methods, to research objects that are not identical but still closely related within the smart tourism domain. These objects include smart tourism ecosystems, smart destinations, digital platforms, sustainability, and data-driven tourism systems.

The similarity of these research objects lies in their shared characteristics, such as the use of digital technologies, data integration, and user-centered service design within tourism systems. The findings from this group of studies indicate that review-based approaches are effective in providing conceptual understanding and identifying research trends. However, since the objects are not exactly the same, these studies have not fully addressed the challenges of integrated system implementation in smart tourism.

Therefore, this group of literature serves as supporting references to strengthen the generalization of smart tourism concepts and highlights the need for more integrated and implementation-oriented research. The detailed classification of these studies is presented in Table 3.

Table 3. Same Method and Similar Object

No	Article Title	Authors	Year	Method and Object
1	Smart Tourism: Concepts, Technologies, and Development Trends	Gretzel et al.	2023	Literature Review; Smart tourism concept
2	Emerging Trends in Smart Tourism Research: A Comprehensive Review	Wang & Xiang	2023	Literature Review; Research trends
3	Smart Tourism and Smart Destination: A Systematic Literature Review	Femenia-Serra et al.	2023	SLR; Smart destination
4	Digital Platforms in Tourism Ecosystems: A Review	Sigala	2023	Review; Platform ecosystem
5	Smart Tourism and Sustainable Development: A Review	Gössling et al.	2023	Review; Sustainable tourism
6	Smart Tourism Ecosystem: A Literature-Based Framework	Koo et al.	2023	Review; Tourism ecosystem
7	Big Data Analytics in Tourism: State-of-the-Art and Future Directions	Mariani et al.	2023	Review; Data analytics tourism
8	Smart Tourism Technologies and Digital Experience: A Systematic Review	Huang et al.	2024	Systematic Review; Tourist experience
9	Artificial Intelligence Applications in Tourism: A Systematic Review	Tussyadiah	2023	Review; AI in tourism

Same Method and Different Object

In the category of same method and different object, a number of studies were identified that apply similar research methods, particularly data-driven approaches and analytical models, but focus on research objects that are significantly different from smart tourism systems. These objects include smart city infrastructure, cloud computing systems, decision support systems, and digital transformation in various industries.

Although the research objects differ, these studies share methodological similarities in utilizing data analytics, system modeling, and technology-driven frameworks. The findings indicate that these methods are flexible and can be applied across multiple domains beyond tourism. However, since the objects are not directly related to smart tourism, the approaches used in these studies do not specifically address the unique characteristics of tourism ecosystems, such as tourist behavior, experience management, and service integration.

Therefore, this category highlights the general applicability of data-driven methods while also emphasizing the need for adaptation when applied to smart tourism contexts. The differences in research objects suggest that a more specialized and integrated approach is required to effectively support smart tourism system development. The detailed classification of these studies is presented in Table 4.

Table 4. Same Method and Different Object

No	Article Title	Authors	Year	Method and Object
1	Cloud-Based Big Data Analytics for Smart City Applications	Khan et al.	2023	Big Data; Smart city system

2	Integration Model of Smart City and Tourism Systems	Nam & Pardo	2023	Framework; Smart city integration
3	Architecture Design of Smart Tourism Systems	Boes et al.	2023	Model; System architecture
4	AI-Based Recommendation Systems in Smart Tourism	Park et al.	2024	Machine Learning; Recommendation system
5	Mobile Technologies for Smart Tourism Applications	Dickinson et al.	2023	Case Study; Mobile tourism
6	Personalized Smart Tourism Services Using Data Analytics	Xiang et al.	2023	AI Model; Personalization
7	End-to-End Digital Tourist Journey Management Systems	Lemon & Verhoef	2023	Conceptual; Tourist journey
8	Interoperability in Smart Tourism Systems: Challenges and Solutions	Del Chiappa et al.	2023	Framework; Interoperability
9	Digital Transformation and Competitiveness in Tourism Industry	Hassan et al.	2024	Analysis; Digital transformation

Review Analysis Diagram

The review analysis diagram illustrates the distribution of the literature based on the similarity of research methods and research objects. From the 21 classified articles, 3 articles fall into the category of the same method and the same object, while 9 articles each belong to the categories of the same method with similar objects and the same method with different objects.

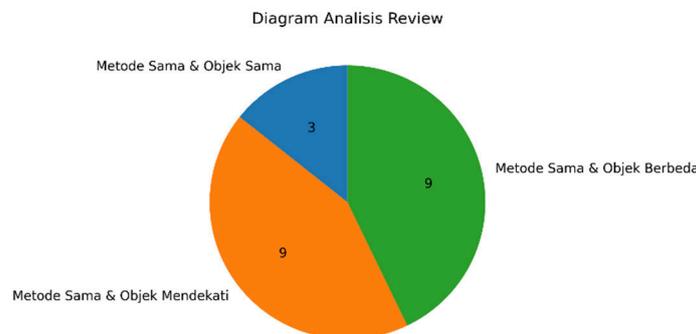


Figure 1. Review Analysis Diagram

These results indicate that most studies employ similar methodological approaches but apply them to different research objects, suggesting the presence of research fragmentation and highlighting opportunities for more comprehensive integration in future studies.

2.3. Data Analysis Technique

The data analysis technique used in this study is qualitative descriptive analysis. The selected articles are analyzed based on similarities in methods, technological approaches, and research objects.

The analysis aims to identify research patterns, strengths and weaknesses of the applied methods, as well as opportunities for future research development. The results of the analysis are then presented in the form of tables and diagrams to facilitate interpretation and comparison among studies.

To provide a clearer understanding of the analysis process, the data analysis framework is presented in Table.

Table 5. Data Analysis Framework

No	Analysis Aspect	Description	Output
1	Method Similarity	Identifying similarities in research methods such as literature review, big data analysis, AI models, and system frameworks	Grouping based on method categories
2	Technological Approach	Analyzing technologies used such as IoT, Big Data, Cloud Computing, AI, and Mobile Applications	Technology classification
3	Research Object	Classifying studies based on objects such as smart tourism, smart city systems, UMKM, and digital platforms	Object-based grouping
4	Strengths Analysis	Evaluating advantages of each method and approach used in previous studies	Identification of best practices
5	Weaknesses Analysis	Identifying limitations such as lack of integration, scalability issues, or limited implementation	Research limitations mapping
6	Research Opportunities	Determining future research directions based on identified gaps	Recommendations for future research

Figure 5. presents the data analysis process applied in this study. The process begins with literature collection and selection, followed by data extraction and classification based on methodological and technological aspects as well as research objects. Subsequently, the analysis focuses on identifying strengths, weaknesses, and research gaps, which serve as the basis for proposing future research directions.

2.4 Future Research Directions

Based on the findings of this study, several opportunities for future research can be identified. Further studies are needed to develop integrated smart tourism systems that connect system integration, digital tourist journeys, and UMKM connectivity into a unified platform. In addition, future research should focus on designing end-to-end architectures that enable seamless data exchange among stakeholders, including government, tourism service providers, and local businesses. The exploration of advanced technologies such as artificial intelligence, big data analytics, and Internet of Things (IoT) is also essential to enhance personalization and real-time decision-making in tourism systems. Moreover, practical implementation and validation through case studies are required to ensure the applicability and scalability of proposed solutions in real-world smart city environments. The summary of future research directions is presented in Table 6.

Table 6. Future Research Directions

No	Research Focus	Description	Expected Outcome
1	System Integration	Development of integrated smart tourism systems connecting multiple platforms and stakeholders	Unified and interoperable tourism system
2	Digital Tourist Journey	Designing end-to-end digital tourist journey from pre-visit to post-visit	Seamless and personalized tourist

			experience
3	UMKM Connectivity	Integration of UMKM into digital tourism platforms	Increased participation of local businesses
4	Advanced Technologies	Implementation of AI, Big Data, and IoT in smart tourism systems	Real-time analytics and decision support
5	System Architecture	Designing scalable and interoperable system architectures	Efficient and flexible system design
6	Practical Implementation	Validation through case studies and real-world implementation	Applicable and scalable smart tourism solutions

This table presents the potential directions for future research based on the identified research gaps, including system integration, digital tourist journey, UMKM connectivity, advanced technologies, system architecture, and practical implementation.

CONCLUSIONS

This study presents a systematic literature review on data-driven smart tourism management in the context of smart cities, focusing on system integration, digital tourist journey, and UMKM connectivity. The results indicate that most studies employ similar methodological approaches but are applied to different research objects, leading to fragmented research outcomes. Only a limited number of studies focus on both similar methods and objects, highlighting a gap in developing comprehensive and integrated solutions.

Furthermore, the findings reveal that current smart tourism systems are not yet fully integrated, particularly in connecting stakeholders and ensuring seamless data flow across the entire tourist journey. The limited involvement of UMKM in digital platforms also remains a significant challenge.

Therefore, future research should focus on developing integrated, scalable, and interoperable smart tourism systems by leveraging advanced technologies such as artificial intelligence, big data, and IoT. These efforts are expected to support more efficient, personalized, and sustainable tourism ecosystems in smart city environments.

SUGGESTIONS

Based on the findings of this study, several practical suggestions can be proposed. First, stakeholders such as government, tourism service providers, and UMKM should enhance collaboration to develop integrated smart tourism platforms. Second, policymakers are encouraged to support digital transformation by providing infrastructure, training, and incentives for UMKM to participate in digital ecosystems. Third, developers and researchers should focus on implementing advanced technologies such as artificial intelligence, big data analytics, and IoT to improve system efficiency and user experience. Finally, future implementations should be tested through real-world case studies to ensure scalability and effectiveness in supporting smart tourism development within smart city environments.

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