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Review

On the Implementation of Destination Management Systems

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Abstract: This systematic review investigates the structures of Destination Management Systems (DMS) in low-density regions. These regions are known for their unique cultural and natural assets but face challenges due to limited infrastructure and accessibility. With the tourism industry embracing digital transformation, DMS are becoming essential tools for leveraging these unique features to attract tourists. They help address challenges such as promoting lesser-known attractions and overcoming marketing limitations. The review emphasizes the significance of advanced technologies such as Big Data, IoT, AI, and machine learning in revolutionizing DMS. These technologies enable real-time data analysis and adaptive responses to the ever-changing tourism landscapes. By analyzing articles, conference papers, and case studies published between 2013 and 2024, the study explores the balance between scalability, trackability, agility, and maintainability in DMS architectures, which is crucial for destinations with limited resources. The review identifies various approaches to DMS design and implementation, demonstrating their effectiveness in different contexts. The results demonstrate the positive impact of these systems on the competitiveness and appeal of destinations by improving their visibility and accessibility. The analysis stresses the importance of continuous research on the technical aspects of implementing destination management systems and incorporating new technologies. This forward-looking approach is essential for further enhancing destination management and improving the tourist experience in the changing tourism industry, especially in less populated areas where the use of digital tools can greatly influence visibility and engagement.

Keywords: Destination Management Systems (DMS), Low-Density Regions, Destination Management Organizations (DMO), Tourism, Destination

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1. Introduction

The landscape of tourism management has been profoundly transformed by the advent and integration of advanced digital technologies. Destination Management Systems (DMS), at the forefront of this transformation, have emerged as pivotal tools in enhancing the competitiveness and attractiveness of tourist destinations. These systems encompass a broad range of functions, including but not limited to information aggregation, marketing strategies, resource management, and visitor engagement. The advent of DMS has marked a significant shift from traditional destination management approaches, enabling more dynamic, responsive, and data-driven strategies [1].

The importance of DMS becomes particularly pronounced in the context of low-density regions. These regions, often characterized by sparse population, limited infrastructure, and unique cultural and natural assets, present distinct challenges and opportunities for tourism development. The conventional mass tourism models are typically unsuitable for these areas due to their fragile ecosystems, cultural sensitivity, and infrastructural constraints. Therefore, the design and implementation of DMS in such contexts demand careful consideration of sustainability, local community impact, and preservation of natural and cultural heritage.

Technology's role in DMS is multifaceted, ranging from data collection and analytics to visitor experience enhancement. The emergence of Big Data and IoT (Internet of Things) has opened new avenues for capturing real-time data and insights into visitor behavior, preferences, and patterns [2]. Such data are invaluable for tailoring services, predicting trends, and making informed decisions that align with sustainable tourism goals [3]. Moreover, the integration of technologies like AI and machine learning in DMS architectures contributes to the evolution of adaptive and intelligent systems capable of responding to changing scenarios in real-time.

However, the development of effective DMS architectures in low-density regions requires a balance between several critical attributes: scalability, trackability, agility, and maintainability [4]. Scalability ensures that the system can accommodate varying levels of user demand and data influx without compromising performance. Trackability involves the system's ability to monitor and analyze tourism dynamics effectively, providing stakeholders with actionable insights. Agility refers to the system's capacity to adapt swiftly to changing market trends, technological advancements, and policy shifts. Lastly, maintainability is crucial for ensuring the system's long-term viability, facilitating updates, and addressing potential challenges without significant overhauls.

The development of DMS architectures that encompass these attributes is a complex task, necessitating an understanding of not just technological capabilities but also the socio-economic and environmental context of low-density regions [5]. This systematic review, therefore, aims to explore the various architectural approaches undertaken in the development of DMS for low-density regions, examining their effectiveness in addressing these unique requirements and challenges [6].

2. Methodology

2.1. Research Questions

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In guiding this systematic review, the following research questions (RQs) were formulated:

RQ1: What are the prevailing architectural frameworks and technical features in Destination Management Systems that support scalability, trackability, agility, and maintainability in low-density regions? This question aims to explore the various architectural designs and technical elements that are employed in DMS, specifically in the context of low-density areas. It seeks to understand how these systems are built to handle scalability, ensure effective tracking and reporting, maintain agility in operations, and facilitate ongoing maintenance and upgrades.

RQ2: How do existing methodologies in developing DMS address the unique challenges and requirements of low-density regions? This question delves into the methodological approaches used in the creation and implementation of DMS. It focuses on understanding how these methodologies are tailored to meet the specific challenges and needs of low-density regions, such as limited resources, geographical constraints, and distinct user behaviors.

These research questions are designed to direct the review towards a comprehensive understanding of the technical and methodological aspects of DMS development in low-density regions.

2.2. Selection Criteria

The literature review was meticulously executed using the Scopus database. The specific search string employed was: "destination AND management AND system AND (dms OR dmo)". This string was deliberately constructed to refine the search results, which was a necessary step due to the broad and diverse nature of literature in the fields of destination management and systems.

The terms "destination", "management" and "system" on their own are wide-ranging and would yield an overwhelming number of results, many of which may not be directly relevant to the specific focus of this study.

Therefore, the inclusion of acronyms "DMS" (Destination Management Systems) and "DMO" (Destination Management Organizations) was a strategic decision to narrow down the search to more pertinent studies. This flow is depicted in Figure 1.

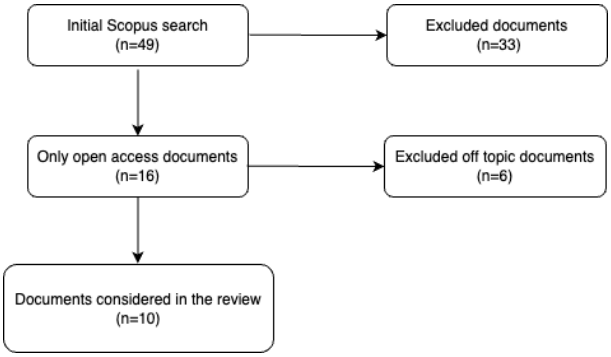


Figure 1. PRISMA flow diagram.

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The selection criteria for the studies included in this systematic review were defined with the objective of ensuring relevance, quality, and applicability to the research topic. The criteria were as follows:

Relevance to Topic: The study must directly address aspects related to Destination Management Systems (DMS) or Destination Management Organizations (DMO), with a particular focus on answering RQ1 and RQ2.

Type of Publication: The review included peer-reviewed journal articles, conference papers, and academic publications. This was to ensure the inclusion of high-quality research with rigorous methodologies and well-substantiated findings.

Timeframe: Only studies published or scheduled for publication between 2013 and 2024 were considered. This range was chosen to capture both the current state and the evolving nature of the research in this field.

Language: Studies published in English were primarily considered, as this allowed for a broader international scope and comparability of findings.

Methodological Rigor: Studies that demonstrated clear and sound research methodologies were favored. This included clear articulation of research objectives, methods of data collection and analysis, and well-supported conclusions.

Accessibility: Preference was given to studies that were accessible in full-text format, ensuring a thorough review and analysis of their content.

3. Results

It is worth noting that the papers we have scrutinized vary in how effectively they address our research questions, denoted once again as **RQ1** and **RQ2**. This variance reflects the diverse nature of the literature we've engaged with. While some papers provide direct and comprehensive answers to our research inquiries, others contribute in more subtle or tangential ways, offering more nuanced but still useful insights.

Furthermore, our graphical representations reveal that there is not a single standout study or article that significantly stands out from all others in terms of impact.

In our quest to identify the most relevant articles, we employed graphical representations, which are visually depicted in Figure 2. Specifically, the plots illustrate the connection between the number of publications considered for analysis each year and the subsequent number of citations received by articles published during that same year.

Broadly speaking, [7] [8] tackle both research questions, with others focusing specifically on either **RQ1** ([9], [10], [11], [12]) or **RQ2 (**[13], [14], [15], [16]) reflecting a sparse approach to understanding Destination Management Systems (DMS) and Destination Management Organizations (DMO).

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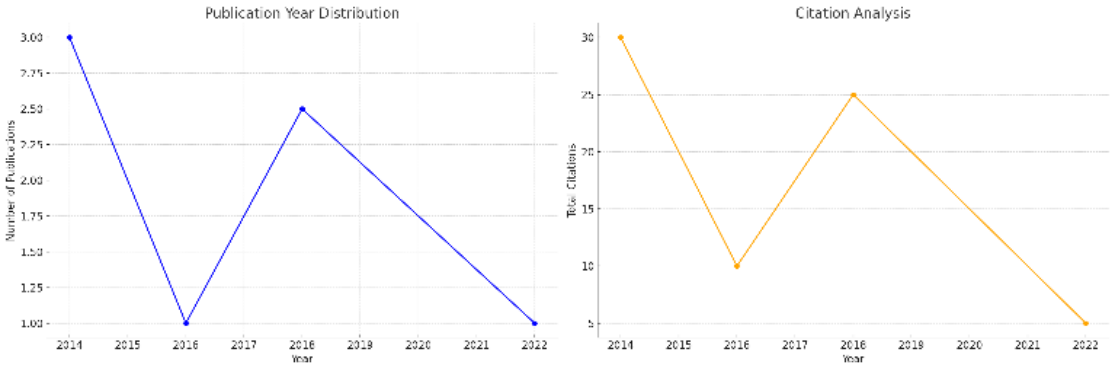


Figure 2. Absolute Number of Articles by Year and Absolute Number of Citations by Year.

Relative to **RQ1**, [9] reveals insights into how the awareness of DMS features, costs, benefits, and operations impacts the intention to implement such systems and the importance of focusing on core use cases to achieve user satisfaction. It is highlighted that the success of a DMS is not solely dependent on its complexity [11] but rather on its ability to meet the specific needs of users and support essential functions beyond just providing information, including transaction capabilities [12] and decision support for DMO agents. The development of models for suggesting optimal tourist destinations based on data analysis also contributes to the discussion on implementing effective DMS [10].

For **RQ2**, the findings in [13] suggest that the success of DMS implementation is correlated with the availability of resources, a well-planned vision, and the competitive landscape of web-based alternatives. The importance of DMS in crisis situations [15], the increasing necessity of digitalization for DMOs, and the positive efficiency gains from using DMS are made salient in [16]. Additionally, the user experience (UX) of the DMS, especially from the perspective of DMO agents and the ability to perform core tasks efficiently, is highlighted [14] as a critical factor for the success of these systems. Concerning both **RQ1** and **RQ2**, [7] suggests that DMS should not only facilitate transactions and provide information on attractions but also contribute to the branding of the destination, enhancing the tourist's perception. The integration of modern technologies such as mobile devices, sensors, IoT, and AI, along with the analysis of big data, is seen as having a positive impact on the success of DMS [8], indicating a move towards more integrated and intelligent systems that can significantly contribute to the management and promotion of destinations.

4. Discussion

The research papers discussed in the previous section undoubtedly offer valuable insights into the realm of DMSs, shedding light on various aspects related to their functionality and effects. These studies provide essential contributions to our understanding of DMSs, elucidating key considerations that impact their success and effectiveness in the tourism industry. However, it's essential to recognize a notable gap in the existing research, which revolves around the absence of in-depth technological discussions concerning the implementation of DMSs.

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The focus of these research papers primarily resides within two pivotal realms: the functionality of DMSs from a high-level perspective and the effects stemming from their implementation. In examining the functional aspects, the studies emphasize the importance of DMSs being informative, capable of handling transactions, and serving as effective platforms for promoting the destination's brand [14]. They show the value of simplicity in design and usability, positioning these factors as critical determinants of user satisfaction and adoption [11] [14]. Moreover, the integration of cutting-edge technologies such as mobile devices, Internet of Things (IoT), and Artificial Intelligence (AI) is identified as a means to augment the capabilities of DMSs and enhance user experiences [8].

On the other hand, when exploring the effects of DMSs, the research highlights their versatility. These systems are recognized for their utility not only during routine operations but also in times of crisis [15]. They are seen as instruments that can significantly enhance the efficiency of DMOs and provide a competitive advantage in the increasingly digital landscape of the tourism industry [16].

However, it's crucial to acknowledge that investment in DMSs is resource-intensive, necessitating careful planning, allocation of resources, and diligent management [13] which can make the implementation of these systems in resource-scarcer environments challenging. Additionally, the presence of web-based competitor systems introduces a competitive challenge that DMOs must address to maximize the impact of their DMS implementations.

While these insights are undoubtedly valuable, they do not extend to the nitty-gritty technical details of DMS implementation, with technical details being limited to a Machine Learning (ML) model that could be employed in a DMS [10], not an architectural detailing of such a system, and is therefore tangential at best to the proposed Research Questions. The research largely refrains from delving into the intricate technological aspects that underpin the development and deployment of DMSs. This absence of comprehensive technical discussions represents an opportunity for future research to bridge this gap.

Future studies can contribute by delving deeper into the technical aspects of DMS development. This could include thorough examinations of the underlying technologies employed, architectural choices made during implementation, data management strategies employed to handle vast amounts of tourism data, security considerations to safeguard user information, and the integration challenges faced when connecting DMSs with other tourism infrastructure and systems. Detailed technological insights would be invaluable in guiding Destination Management Organizations and stakeholders in the practical implementation of effective DMSs, ensuring that these systems are not only functionally robust but also technologically sound and secure.

Furthermore, future research can benefit from a closer examination of the roles played by emerging technologies like mobile devices, sensors, IoT, and AI in the context of DMS implementation.

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5. Conclusion

The examination of Destination Management Systems (DMSs) shows their possible impact in the tourism sector, stressing the importance of being informative, facilitating transactions, and promoting brands. It is suggested to leverage technologies such as mobile devices, IoT, and AI to enhance functionality and user experience, with an emphasis on simplicity for ease of use and adoption. DMSs are also valuable for crisis management, providing efficiency and competitive advantages for Destination Management Organizations (DMOs). However, challenges from online competitors and the need for efficient resource management are acknowledged. While the papers reviewed offer valuable insights, they lack in-depth technical discussions on DMS implementation. Thus, future research should delve into technical architecture, security measures, and integration strategies, as well as explore the impact of emerging technologies to better grasp and advance DMSs to meet the changing needs of the tourism industry.

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References

[1] João Estêvão, M.J.C. and L. Teixeira. 2020. Destination management systems: Key distinctive functionalities aimed at visitors and destination suppliers. Journal of Global Information Technology Management 23 (4): 292–325. https://doi.org/10.1080/1097198X.2020.1822138

[2] Novera, C., Z. Ahmed, R. Kushol, P. Wanke, and M. Azad. 2022. Internet of things (iot) in smart tourism: a literature review. Spanish Journal of Marketing - ESIC 26 (3): 325–344 https://doi.org/10.1108/SJME-03-2022-0035

[3] OECD. 2023. Preparing tourism businesses for the digital future — oecd tourism trends and policies 2020. https://www.oecd-ilibrary.org. Accessed: 2023-11-22.

[4] Martins, C.A., M.J.A. Carneiro, and O.R. Pacheco. 2021. Key factors for implementation and success of destination management systems. empirical evidence from european countries. Industrial Management & Data Systems 121 (6): 1287–1324. https://doi.org/10.1108/IMDS-11-2019-0598

[5] Toste, A.A., D.C. Moura, and L. Aguiar 2022. Smart Cities: How Can Low-Density Territory Populations Be Smart Tourist Destinations? The Case of Guarda, pp. 233–258. IGI Global.

[6] Choe, Y. and D. Fesenmaier. 2021. Designing an advanced system for destination management: a case study of northern indiana. Industrial Management & Data Systems 121 (6): 1167–1190. https://doi.org/10.1108/IMDS-02-2020-0063

© 2024 ITMA. All rights reserved.

[7] Sorokina, E., Y. Wang, A. Fall, P. Lugosi, E. Torres, and T. Jung. 2022, 03. Constructing a smart destination framework: A destination marketing organisation perspective. Journal of Destination Marketing and Management 23: 100688. https://doi.org/10.1016/j.jdmm.2021.100688

[8] Ammirato, S., A.M. Felicetti, M. Della Gala, C. Raso, and M. Cozza. 2018. Smart tourism destinations: Can the destination management organizations exploit benefits of the icts? evidences from a multiple case study. IFIP Advances in Information and Communication Technology 534: 623 – 634. https://doi.org/10.1007/978-3-319-99127-654

[9] Anh, L.T.P., P. Kunasekaran, N.A. Ragavan, T. Subramaniam, and T.K. Thomas. 2022. Stakeholders' participation intention towards a sustainable destination management system. Journal of Sustainability Science and Management 17 (1): 66 – 83. https://doi.org/10.46754/jssm.2022.01.005

[10] Lee, K.W. 2023. An autocratic strategy for multi-attribute group decision making based on neutrosophic triplets: A case study in prioritizing recreation areas in the tourist industries. Studies in Informatics and Control 32 (1): 15 – 24. https://doi.org/10.24846/V32I1Y202302

[11] Inversini, A., L. Cantoni, and M. De Pietro. 2014. Destination online communication: Why less is sometimes more. a study of online communications of english destinations. Journal of Travel and Tourism Marketing 31 (5): 563 – 575. https://doi.org/10.1080/10548408.2014.883949

[12] Estêvão, J.V., M.J. Carneiro, and L. Teixeira. 2014. Destination management systems: Creation of value for visitors of tourism destinations. International Journal of Technology Management 64 (1): 64 – 88. https://doi.org/10.1504/IJTM.2014.059233

[13] Estêvão, J., L. Teixeira, and M.J. Carneiro. 2023. Factors affecting the adoption of destination management systems by stakeholders: Proposal of an explanatory model; [fatores que influenciam a ado¸c˜ao de sistemas de gest˜ao de destinos pelos stakeholders: Proposta de um modelo explicativo]. Revista Portuguesa de Estudos Regionais (65): 101 – 120. https://doi.org/10.59072/rper.vi65.125

[14] Keil, D., W. Höpken, M. Fuchs, and M. Lexhagen. 2017. Optimizing user interface design and interaction paths for a destination management information system. Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics) 10290 LNCS: 473 – 487. https://doi.org/10.1007/978-3-319-58640-3_34

[15] Fedyk, W., M. Soltysik, J. Bagi´nska, M. Ziemba, M. Kolodziej, and J. Borzyszkowski. 2022. Changes in dmo's orientation and tools to support organizations in the era of the covid-19 pandemic. Sustainability (Switzerland) 14 (18). https://doi.org/10.3390/su141811611

[16] Borzyszkowski, J. 2014. Information technologies in the activities of destination management organizations. Tourism and Hospitality Management 20: 61 – 70. https://doi.org/10.20867/thm.20.1.5

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