








# Population Dynamics and Economic Strategies for Enhancing Industrial Heritage: A Bibliometric Overview



Elaine Scalabrini , Francisco Alves , Reginaldo Neto ,  
Felipe L. Teixeira , Joaquín García, Roberto Ivo Vaz ,  
João Paulo Teixeira , and Paula Odete Fernandes 

## 1 Introduction

The sustainable preservation of cultural heritage has emerged as an increasingly vital sector, reflecting a global commitment to safeguarding and valorising cultural assets. The rehabilitation of heritage buildings is essential for cultural sustainability, as it ensures the maintenance of historical material and the intrinsic values of the community, significantly fostering active societal participation [1]. Efforts in preserving cultural heritage aim to conserve and revitalise traditional craft practices, operationalised through comprehensive strategies that include meticulous documentation, the recreation of authentic designs, the promotion of community education, and close collaboration with cultural institutions.

Industrial heritage is a vital component of cultural heritage, encompassing historical, cultural, and social dimensions of significant importance. Its preservation and revitalisation, particularly in rural areas, primarily aim to transform industrial sites into attractions for cultural engagement. This process includes spatial

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E. Scalabrini (✉) · F. Alves · R. Neto · F. L. Teixeira · R. I. Vaz · P. O. Fernandes  
CeDRI, SusTEC, Instituto Politécnico de Bragança, Bragança, Portugal  
e-mail: [elaine@ipb.pt](mailto:elaine@ipb.pt); [a44544@alunos.ipb.pt](mailto:a44544@alunos.ipb.pt); [a61482@alunos.ipb.pt](mailto:a61482@alunos.ipb.pt); [felipe.lage@ipb.pt](mailto:felipe.lage@ipb.pt);  
[robertovaz@ipb.pt](mailto:robertovaz@ipb.pt); [pof@ipb.pt](mailto:pof@ipb.pt)

J. García  
Fundación Santa María la Real, Palencia, Spain  
e-mail: [j.garcia@santamarialareal.org](mailto:j.garcia@santamarialareal.org)

J. P. Teixeira  
Research Centre in Digitalization and Intelligent Robotics (CeDRI), Associate Laboratory for Sustainability and Technology (SusTEC), Instituto Politécnico de Bragança, Bragança, Portugal  
e-mail: [joaopt@ipb.pt](mailto:joaopt@ipb.pt)

optimisation, architectural restoration, environmental enhancement, and ecological recovery [2].

Heritage buildings play a crucial role in cultural heritage and safeguard communities' history, culture, and identity. These structures serve as tangible representations of high symbolic value, preserving collective memories and cultural values. They allow present and future generations to comprehend and appreciate the historical contexts that have shaped contemporary society [3].

Industrial tourism is an initiative that enhances historic industrial landscapes, contributing to urban development, revitalising communities, and preserving cultural and historical heritage. It involves repurposing tangible elements of industrial history—such as factories, mines, transport infrastructure, and other sites linked to industrial production and development—transforming these elements into museums, cultural centres, and other facilities designed to foster public engagement and encourage sustainable development [4]. This form of tourism has established itself as a sector with significant economic, cultural, and social value, offering unique experiences that enable visitors to access historic industrial sites and, in many cases, observe companies in operation [5]. Industrial tourism repurposes former mining-related sites and infrastructures for cultural and tourist purposes, converting previously inactive industrial sites into museums and cultural centres [6].

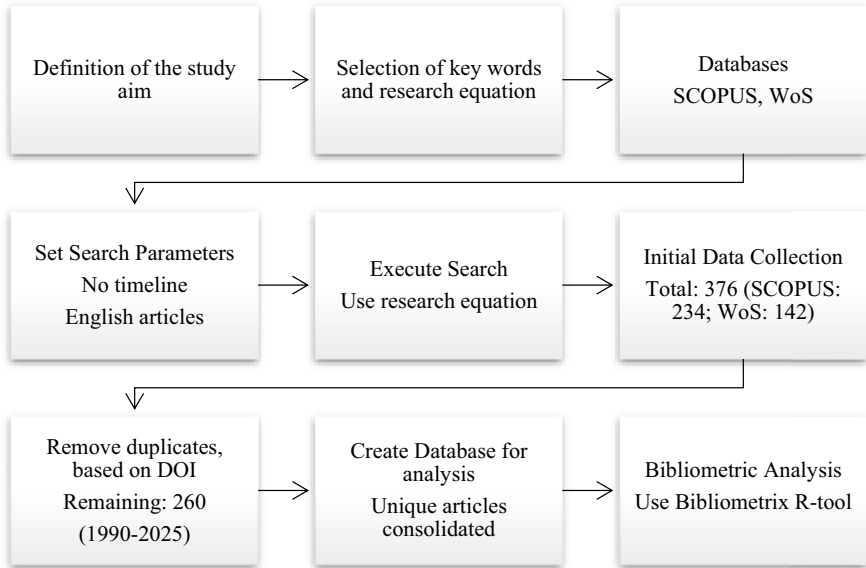
In this context, it is essential to understand the relationship between industrial heritage and tourism and how this can influence population dynamics and economic strategies. To this end, a bibliometric analysis was undertaken, a technique allowing an understanding of research dynamics. The study analyses articles published between 1990 and 2025 in English, using the Web of Science and Scopus databases, to explore the different currents and trajectories of research related to the interaction between Industrial Tourism, Industrial Heritage, economic growth and sustainable development, the investigation aims to examine the evolution of thematic emphases in research, assess the extent of contributions.

To achieve the study aim, this paper is divided into four sections. After the introduction, the methodology chapter is presented, followed by the results and discussions and ending with the final considerations.

## 2 Methods

This study utilised a methodology based on bibliometric analysis, employing the Bibliometrix R-tool software to enhance data visualisation throughout the research process. This approach was selected for its effectiveness in categorising bibliometric data and creating representative summaries. It is particularly valuable for evaluating the performance of journals, institutions, and authors and examining specific research fields' characteristics [7, 8].

The data collection process consisted of several stages. Initially, the keywords included in the research equation were carefully considered to ensure a comprehensive search. It was then determined that data should be sourced from the SCOPUS



**Fig. 1** Bibliometric analysis fluxogram. Source: Own elaboration

and Web of Science (WoS) databases to obtain a representative sample of publications relevant to the topic under investigation. No temporal restrictions were placed on the analysis to provide a thorough overview of the field. The selected document types consisted of articles written in English. As a result, the research equation (“*Heritage preservation*” OR “*Industrial heritage preservation*” OR “*industrial tourism*”) AND (“*Demographic challenges*” OR “*Sustainable development*” OR “*Economic strategies*”) was utilised to construct the dataset for analysis in November 2024.

In the first step, 376 papers were identified, comprising 234 from SCOPUS and 142 from WoS. In the subsequent step, a database was established, removing 116 duplicate publications based on their Digital Object Identifier (DOI). This process resulted in 260 articles being deemed suitable for bibliometric analysis, all published between 1990 and 2025. Notably, most of the duplicated articles were sourced from WoS. A representative diagram of the following method is presented (Fig. 1).

### 3 Results

The compiled data encompassed 260 documents and 129 sources. It involves contributions from 549 authors, including 32 who authored single-authored documents, with a percentage of 15.38 international co-authorship. Additionally, the documents have an average age of 3.2 years and an average citation count of 12.47 per document. The annual evolution of the publication articles is shown in Fig. 2. Although

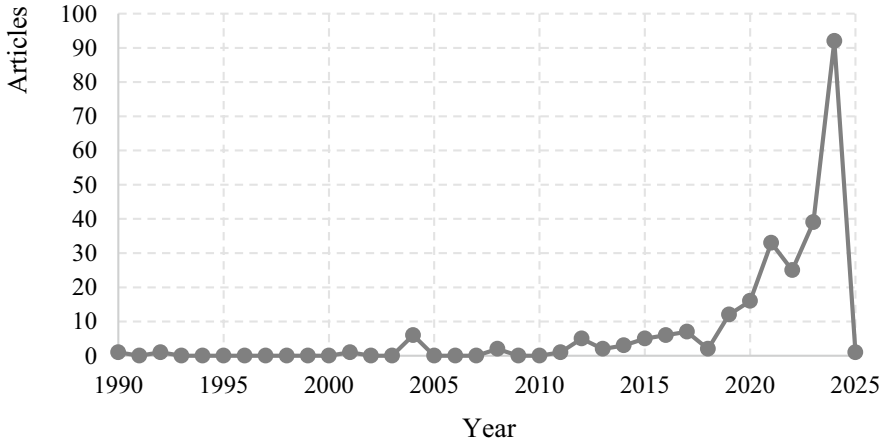


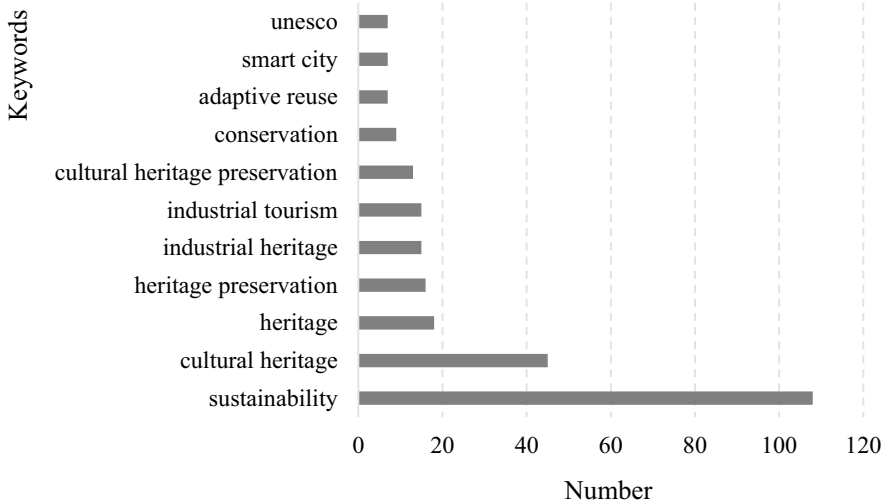
Fig. 2 Evolution of publications. Source: Own elaboration



Fig. 3 Publications per year. Source: Own elaboration

the first article was published in 1990, it can be seen that in subsequent years, there have been few or no publications. This scenario changed in 2019 when 12 articles were published, and 2024 was the peak with 92 articles published. One explanation may be the increased research on the subject in recent years.

The leading contributors to research on the subject are presented in Fig. 3. The top 10 sources have collectively published 103 articles, accounting for about 14.2% of all articles in this area. The remaining percentage of publications is between different journals. One or two articles are published per newspaper. Notably, the journal “Sustainability” emerges as the foremost contributor, significantly outpacing the



**Fig. 4** Publications per journal. Source: Own elaboration

other journals in the number of publications on this subject. This journal has been prominent in the publication of papers related to tourism. Other bibliometric analyses have also identified Sustainability as a publication leader. A bibliometric analysis focusing on sustainable sports entrepreneurship and innovation reveals that “Sustainability” is the leading journal with the most published articles [9]. Other bibliometric analyses indicating this journal were performed to comprehend the sustainability reporting practices [10].

Related to the affiliation, the analysis of the scientific output reveals affiliations spanning 50 countries. Notably, the top six countries contributing the highest number of publications are China (28.8%), Italy (11.9%), the United States (7.3%), the United Kingdom (5.8%), and Malaysia and Poland with 3.8% each one (8.6%), collectively accounting for 65.1% of the total output. Among the leading institutions, the Shanghai University (China) stands out with six publications, followed by the Anhui University (China) with five publications, demonstrating the importance of this country in developing research on this subject.

Analysing the most frequently used authors’ keywords (Fig. 4), sustainability was the most common, followed by heritage, preservation, and conservation terms. Related to the subject under study, it is clear that the use of these words is related to a concern in studies to develop strategies that contribute to preserving heritage and that this is done sustainably and used in other activities such as tourism.

Concerning themes that contribute to advancing the field of knowledge under investigation, the thematic map illustrated in Fig. 5 was created, revealing 11 key clusters. Upon analysis, it becomes evident that four of these clusters are central themes of crucial importance to the development of this research domain, encompassing the following themes: (C1) “climate change” and “stakeholder”; (C2) “economics” and “economic development”; (C3) “historic preservation”, “cultural

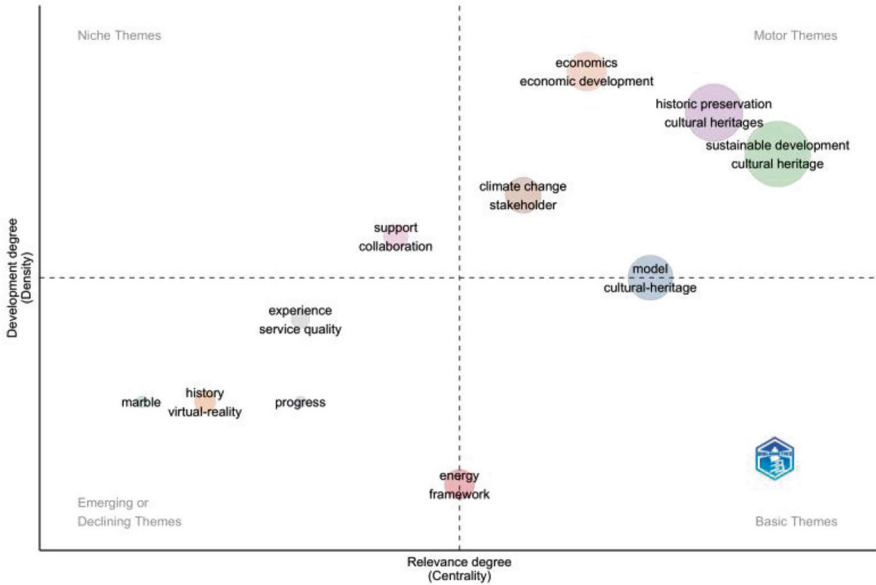


Fig. 5 Thematic map. Source: Bibliometrix R-tool

heritage”, and “cultural heritage preservation”; and (C4) “sustainable development” and “cultural heritage”. One cluster is positioned precisely between the motor themes and the basic themes, and it is connected to (C5) “model” and “cultural heritage”. Another cluster is located between the basic themes and emerging or declining themes (C6), “energy” and “framework”. Also, 4 clusters are positioned in the quadrant of emerging or declined themes, namely (C7) “progress”, (C8) “experience” and “service quality”,; (C9) “history”, and “virtual-reality” and (C10) “marble”. The last cluster in the upper-left quadrant represents well-developed themes, although being very specialised: (C11) “support” and “collaboration”.

Analysing the co-occurrence of the author’s keywords among different authors, in Fig. 6, two main clusters exist related to sustainable development. The blue cluster associates sustainability with historical preservation, heritage preservation and other related terms. The red cluster predominates terms related to cultural identity, climate change, tourism and rural development, sustainable development goals and others. Additionally, terms like conservation, model, design, and cultural heritage appear individually. Through this, it is possible to perceive some emerging themes related to the study subject, and once again, sustainability is an important aspect related to these studies.

Examining the evolution of perspectives on industrial heritage and industrial tourism reflects socio-economic and cultural transformations over time. From an initial interest in the physical preservation of structures, the field has expanded to explore the connection between historical memory, sustainability and economic growth, allowing for a richer and more diverse understanding of this topic.



Keyword analysis reveals that ‘sustainability’ ‘cultural heritage’ ‘heritage preservation’ ‘industrial heritage’ ‘industrial tourism’ and ‘conservation’ are central themes in the research which could help researchers develop future studies related to this practice.

The analysis suggests the need for greater interdisciplinary collaboration to deepen research into the complex relationship between population dynamics, economic development and the preservation of industrial heritage. The concern and need for studies that focus on sustainability is therefore evident.

The theoretical implications of this paper pertain to its contributions to the scientific community regarding the relationship between population dynamism and sustainable economic strategies. In terms of practical contributions, the findings of this study may enhance awareness of these themes and support the development of public policies focused on the sustainable preservation of industrial heritage.

This study has some limitations. The research is limited to articles published in English, which may exclude relevant research conducted in other languages. This restriction may result in an incomplete view of the global panorama of research. Another limitation to consider is the use and absence of content analysis. Bibliometric analysis focuses on quantitative indicators such as the number of publications, citations and keywords. The study needs to carry out an in-depth analysis of the content of the articles, which limits the understanding of the nuances and complexities of the subject. To deepen the analysis, future studies suggest analysing the articles’ content to investigate the authors’ perspectives and approaches.

It is essential to consider these limitations when interpreting the study results. Future research that addresses these gaps could contribute to a more complete understanding of the relationship between population dynamics, economic strategies and the valorisation of industrial heritage.

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