

**A BIBLIOMETRIC ANALYSIS OF INDUSTRIAL TOURISM RESEARCH**

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**Abstract**

*The aim of this study was to identify trends in industrial tourism literature in bibliometric terms by analyzing scientific studies carried out in recent decades. According to research findings, were observed that experimental researches on industrial tourism do not hold an important place in the Romanian specialized literature and other international publications.*

*This paper conducts a bibliometric overview of the industrial tourism research on the Web of Science (WOS) platform and it identifies the most frequently used terms with regard to industrial tourism, by means of the VOSviewer software tool.*

**Keywords:** *industrial tourism, bibliometric analysis, VOSviewer.*

**JEL codes:** L83, Z32, M42.

**1. INTRODUCTION**

Industrial tourism is one of the many forms of tourism in the world, which experiencing important development through the increase of tourist education and touristic interest for different attractions represented of industrial heritage.

The most important industrial tourism destinations worldwide are cities and regions with a solid industrial potential. Currently, attention is being paid worldwide to reconvert economically collapsed mono industrial areas (especially mining and metallurgic ones) through industrial tourism Krivoi Rog - Ukraine, Reșița and Petroșani- Romania.

In countries such as China or the USA, researchers have mostly studied topics such as the concept of industrial tourism, industrial heritage, especially aspects related to the inclusion in the tourist circuit of production units. Industrial heritage consists of the remains of industrial culture which are of historical, technological, social, architectural or scientific value.

The bibliometric analysis as a research methodology in economics research that has acquired recognition in the last decade, and moreover its popularity is recognized to be attributed to several arguments (Naveen et al, 2021): (1) the advancement, availability, and accessibility of bibliometric software such as Delphi, Leximancer, VoSviewer, and scientific database such as Scopus and Web of Science, and (2) the cross-disciplinary pollination of the bibliometric methodology from information science to business research. Other authors Javanmardi E. &all (2020) attributes the increasing popularity of this method to its functionality in dealing

with substantial quantities of scientific data, but also to the capability of generating high impact research. We must underline an important parameter of the bibliometric analysis, specifically, the scientific data in question is enormous, with various variables, and an unbiased nature (quantifiable variables: number of citations, number of co-occurrences of words/keywords, etc.).

The usefulness of this research method if identified through different outcomes, namely, to identify trends in the research performance, to sketch research networks both in academic community as well as individuals, to distinguish the influences that appears in a certain domain Verma &Gustafsson (2020).

**2. THEORETICAL BACKGROUND**

If the first visits associated with industrial tourism appeared about 100 years ago, the same cannot be said of the emergence of the concept of industrial tourism. Pioneers in the approach of industrial tourism, as a distinct form of tourism, can be considered the American specialists (Abbey and Solitaire, 1968) who believed that industrial tourism is of particular economic importance, but conflicts with the activity of biodiversity conservation in U.S. national parks by building highways and elements of tourist infrastructure, and the tourist product is considered a commodity of any kind to be sold for mass consumption. Wemhaner (1976) also indicated that Oklahoma's recreational policy is strongly geared toward industrial tourism and that investment would grow more in areas that allow their yield to be maximized

It was only in the early 2000s that the definition of the term crystallized in the international literature. Thus, Frew defines the term industrial tourism as follows: "Industrial tourism involves visits by tourists to operational industrial sites where the core activity of the site is 'non-tourism' oriented" (Frew, 2000, p. 1).

A decade later, on the European continent, industrial tourism is considered a new form of tourism alongside geotourism (Paweł Różycki, 2010), an alternative to mass tourism (Pojić, 2018). Other authors, consider industrial tourism a tourist experience with regard to a product, its functioning, the production process, its historical significance (Mitchell and Orwig, 2002). Industrial tourism is a relatively new branch in the touristic field which promotes sites and events originating from the sphere of industrial production (InduCult 2.0 Project, 2016-2019).

Realizing its huge potential, certain countries of the world are giving increasing credit to the development of industrial tourism by including in the tourist circuit disused production units. In Taiwan, for instance, since 2003, the government has initiated a program through which "traditional factories transform into tourism factories in order to build up industrial tourism, which can act in a multifunctional manner by allowing for both manufacturing and tourism and which, therefore, may successfully promote a given brand, making it stronger and more competitive" (Industrial Technology Research Institute, 2013).

Viewed from an interdisciplinary point of view, industrial tourism is analyzed from the perspective of demand, customers perceptions of the value of a branded tourism factory through the concept of brand equity (Hsueh-wen Chow et al., 2017, pp 70-79).

There are also Romanian authors who highlight the extremely complex industrial potential available to Romania and which could be exploited through industrial tourism (Iancu and Stoica, 2010, pp 62-70), being about: salt mines as industrial destinations (Slănic Prahova, Târgu Ocna, Turda), vineyards or wine-making units of vineyards (Recaș Cellars, Rhein Azuga Wine cellars, Jidvei vineyard, etc.), and mining exploitation (Roșia Montană – Alburnus Maior archaeological site). Another Romanian specialist (Săgeată, 2010) highlights the fact that the chance of economic and cultural development of some deindustrialized areas is the capitalization of the industrial heritage existing on the territory of Romania through integrated industrial tourism.

Regarding the opportunity to develop industrial tourism, some authors believe that this form of tourism can be developed through a public-private partnership (Otgaar, 2010, p. 2), can contribute to the establishment of lasting relationships between companies and the community (Mitchell and Orwig, 2002).

As a main form of manifestation, industrial tourism means visits to various manufacturing companies and capitalization of the industrial heritage that offers visitors a certain experience on products, production processes, economic history.

Associated with the term industrial tourism is that of industrial heritage, respectively the testimonies of industrial culture that have historical, technological, social, architectural and scientific significance (ICTCIH Industrial Heritage Charter 2003). This heritage is represented by buildings, machines and installations, laboratories, mills and factories, mines and sites for processing and refining, warehouses, places where energy is generated, transmitted and used, transport structures and infrastructures, as well as places used for social activities related to industry such as housing, places of worship, buildings for education, etc.).

The first forms of practicing industrial tourism appeared in the post-war period, with the growing concern for the protection and preservation of the past, so that towards the end of the last century it experienced an important expansion. In England alone, for example, there were registered in 1990, 294 industrial tourist attractions representing 6% of English tourist attractions) of which 90% were included in the tourist circuit between 1980 and 1990 (Swarbrooke, 2002).

Over the last few decades, new types of destinations appeared in tourism because of the ever growing competition and economic restructuring of regions. In some cases such places became attractions which were considered ugly and unattractive earlier (Boroş et al., 2013, pp 108-114).

In China, today the world's leading tourist destination, there were 1157 industrial tourist attractions by the end of 2016, attracting 428,000 people. (Wang and Fu, 2019, pp 13-26).

The most obvious industrial tourism destinations are cities and regions with a solid industrial base. For them, industrial tourism is a potential growth sector that matches with their identity: the sector offers opportunities to strengthen their distinctiveness and image, notably by building onto their already existing assets (Otgaar et al., 2010).

In conclusion, it can be appreciated that if various components of industrial heritage attracted visitors a century ago, clarifying the concept and outlining a distinct form of tourism on the tourist market, namely industrial tourism, is much more recent.

### 3. RESEARCH METHODOLOGY

#### 3.1 Aims and scope of the bibliometric analysis

The aim of our study is to present an outline of *industrial tourism research* through its performance and science. As *performance analysis* the study presents the contribution of the research constituents to the *industrial tourism research*, so we investigate the prolific research constituents in terms of types of documents published, authors, universities, countries, and journals / editors. As performance analysis is regarded (Donthu A., &all, 2021), there is a multitude of quantifiable measures, the most conspicuous ones are number of publications of number of citations/per/item, where publication is a variable for productivity and citation is a measure for impact and influence.

In term of *science mapping*, our study investigates the structure of networks as well as different research constituents in terms of research topics, clustering identified for the research topics, the importance of the key issues identified and how they relate in different contexts (clusters).

The study's scope is to analyse the complete information regarding *industrial tourism research* published in the Web of Science Platform.

#### 3.2 Technics for the bibliometric analysis

Secondly, our study follows identifying and choosing the technics to be used, correspondingly, conferring to our study's aim, we choose as most proficient one a mixture of co-word analysis for the identification of networks amongst different research constituents and for future direction of research in terms of research topics, the importance of the key issues identified and how they relate in different contexts (clusters).

#### 3.3 Collecting the data for the bibliometric analysis

We acknowledged as the main objective of our research the presentation of a bibliometric analysis for the published scientific papers regarding *industrial tourism research* using data retrieved from the Web of Science database and to explore the relationships among the most frequently used terms regarding *industrial tourism research* by using relational techniques. In order to be able to recognize the scientific interest in the field of *industrial tourism research* and to be able to ascertain its evolution, a bibliometric analysis was elaborated on the papers published in the above-mentioned field.

The analysis was carried out with the help of information obtained from the query of the existing database in the Web of Science Core Collection (WOSCC), which includes more than 21,894 journals,

books and conference proceedings and it covers over 82 million records, more than 126,000 books and over 226,000 conferences covered. Through all its scientific resources, WOS provides users with a database that can form the basis for designing quantitative analyses on the progress of research in the most diverse fields, including *industrial tourism research*.

The database query available in the WOS platform was performed on November 5th, 2021 and had the following protocol:

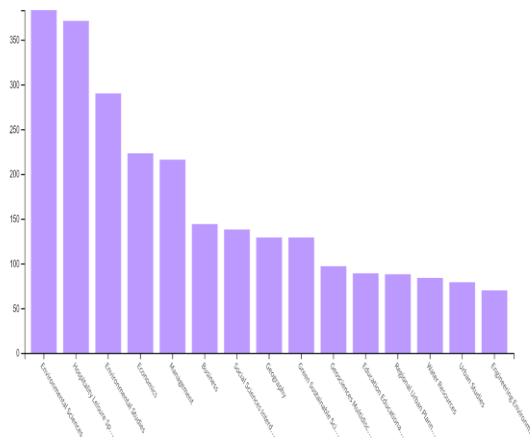
1. Database selected: Web of Science Core Collection.
2. Advanced search on the group of words: "industrial tourism" in Topic.
3. Timespan: All years.

The worldwide information about *industrial tourism research*, published between 1975 to 2021, were scanned in the WOSCC, after interrogating the database, 2200 papers on the topic searched were classified.

#### 3.4 Results and discussion

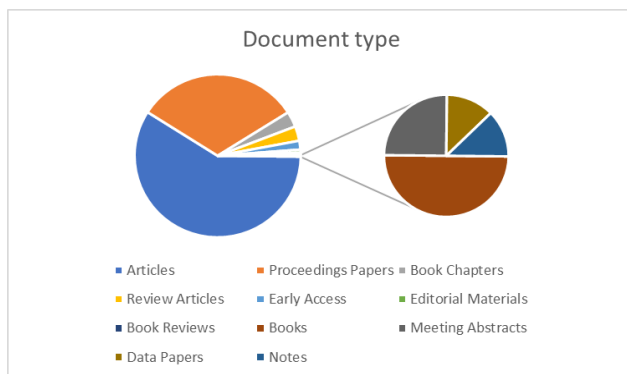
Afterwards, the main results were filtered by the WOSCC research areas, as shown in Fig.1. Publication no/ Research areas. It is quite interesting to relate to the biggest number of publications pertaining to *Environmental Sciences Ecology*, (583-publications) more than one quarter of the total number, of 26,5%. The second biggest represented research area is *Social Sciences and Other Topics*, with a number of 514 publications, counting for 23,8% of total publication number. Thirdly, as main research area in terms of number of publications, we have the *Business Economics* domain, with a number of 453- items, counting for 20,61% of total, lastly we mention the fourth most important research area *Engineering*, with a number of 239 publications, reckoning for 10.8% of total; the following research area are counting individually for least that 10% of total.

The examination found that the main research areas of the published papers were the following, consequently the interdisciplinarity of *industrial tourism research* is manifest, it is however identified a trend as an interdisciplinary idem with three main research area covering in almost the same measure the research for this concept.



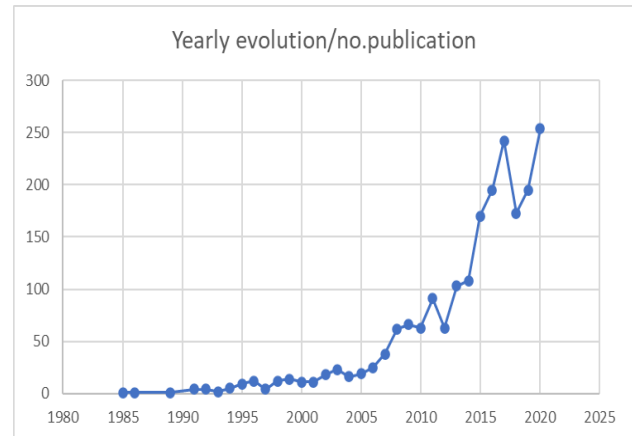
**Fig.1. Publication no/ Research areas**  
Source: own generation

The final results of the query (Fig.2) consist of 1389 articles (62,96%), 757 proceedings papers (34.31%), respectively 73 book chapters (3,31%) and other forms of publications including book review, editorial materials, review articles etc. Consequently, we may assert that the mainstream of research published that includes the topic of *industrial tourism research* are research articles (either as articles or proceedings papers), and just a small part (3,31%) book chapter.



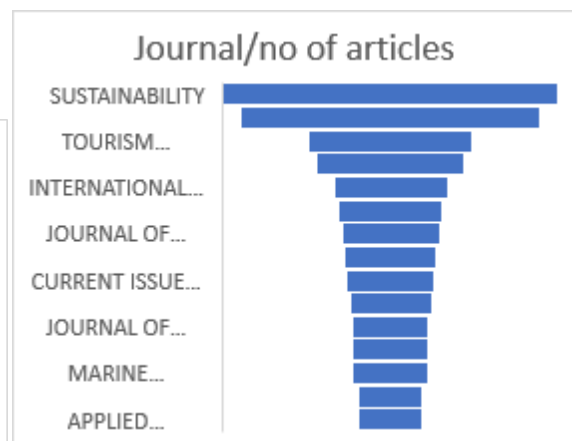
**Figure 2 Result analysis based on document types**  
Source: Own generation

It is noteworthy, to recognise the early on commencement of items for the researched item as 1875. Notably, between the records, the years with most published articles are 2017 (242) and unexpectedly 2020 (254), being a pandemic year (COVID 19), it is a direction for further research among all items pertaining to tourism. Looking at the ascending trend of publications over the last few years, it can be noted that there is a growth of interest in the discussed issues, especially in the last 10 years, as in the decade from 1999-2010 the number of publications (313) represents only 16,41% of the number of publication (1847) from the decade 2011-2021.



**Figure 1 Result analysis based on publication's year**  
Source: Own generation

We recognized of great interest the idea of acknowledging the first fifteen journals (by number of publication) that publishes articles with *industrial tourism research* topic, as it can be shown in the figure no.4, the first two Journals dominates clearly in interest as they cumulate a number of articles that will be reached only by follower five journals.



**Figure no.4. Journal/ number of articles**  
Source: Own generation

Analysis of the journals placed in a geographical system showed that the authors interested in *industrial tourism research* come mostly from the PR of China (631 papers), followed at a large distance by authors with USA affiliation (182 papers), and also at a respectable distance authors based in Australia (76). Additionally, we find it worthy to be mentioned that the mainstream of publications (1983 records, 90%) were written in English, followed by 92 in Spanish (4.2%) and 24 in Chinese (1,09%) the other 14 languages published, represents only sub unitary digits in percentage, consequently not mentioned. We identified also, the most prolific editors of this articles and the top three editor in terms of numbers of papers edited are: Zhang Y.- 35 papers, Zhang H- 21 papers, Zhao R. – 16 papers.



**Figure 5 Result analysis based on countries/regions**

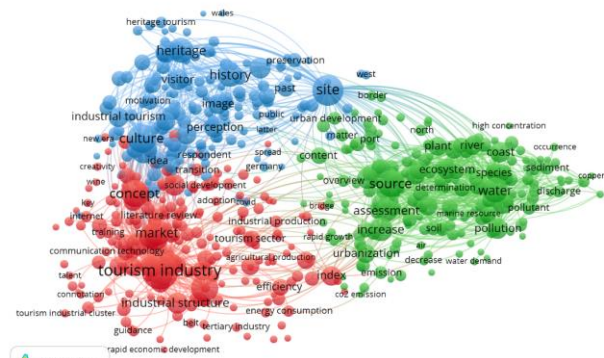
*Source: Own generation*

In relationships to science mapping, we have undertaken a concise analysis of the bibliometric structure and intellectual structure using special technics for science mapping (co-word analysis) and bibliometric analysis enhancement technics (network metrics, clustering, and visualization) using the VOSviewer software.

Hence, to intricate the quantitative analysis of the scientific interest in terms of *industrial tourism research* we have used the VOSviewer software (version 1.16.17), carried out by Nees Jan van Eck and Ludo Waltman. VOSviewer allows the analysis of the keywords in the documents existing in the WOS database, one of the purposes of this analysis being to highlight the links between these keywords. VOSviewer offers the possibility of making a map that graphically represents the links between the words that appear most frequently in the documents for which the query was made in the WOS database. The system used in order to execute the bibliometric analysis was focussed firstly on data retrieval, afterwards on pre-processing, then on network extraction, mapping, analysis and finally visualization (Cobo et al., 2011).

Afterwards, 2200 retrieved records were exported into a plain text format (txt) containing the following information: author, title, source and abstract, in the VOSviewer software for further analysis. By using VOSviewer software we created a co-occurrence map based on the text data exported from the bibliographic database files (WOSCC). We extracted the keywords with minimum 25 occurrences in the titles and abstract fields using full counting method (van Eck & Waltman, 2011).

Out of the 291 publications, the software retrieved 121 terms that met the threshold of at least 10 occurrences. From the 1027 list of terms, only 616, the most relevant 60% terms in our research were enrolled in the final analysis, many terms have been eliminated because they were common words such as article, author, data, model, paper, study, theory, value, year or names of countries.

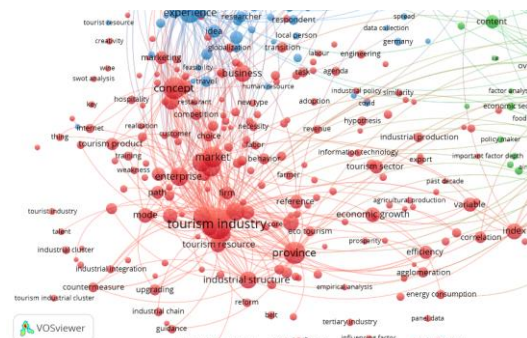


**Figure 6 VOSviewer network visualization map – industrial tourism research Association strength of on WOS platform.**

*Source: Own generation*

In the figure no.6 we have a co-word (keyword co-occurrence) network visualization map using VOSviewer; according to the Manual of the software each node in network represent an entity, respectively in this case a keyword, where (i) *the size of the node* represents the occurrence of the keyword (the number of times that the keyword occurs), (ii) *the link between the nodes* represents the co-occurrence between keywords (keyword that co-occur together in multiple situations in different settings (studies)), (iii) *the width of the link* indicates the occurrence of co-occurrence between keywords (namely the number of times that co-occur or occur together), (iv) *the bigger the node* the bigger the larger the occurrence of the keyword, and (v) *the thicker the link between the nodes* the greater the occurrence of the co-occurrence between keywords. Each colour represents a thematic cluster, wherein the nodes and links in that cluster can be used to explain the them's (cluster) coverage of topics (nodes) and the relationships (links) between the topics (nodes-keywords) manifesting under that theme (cluster).

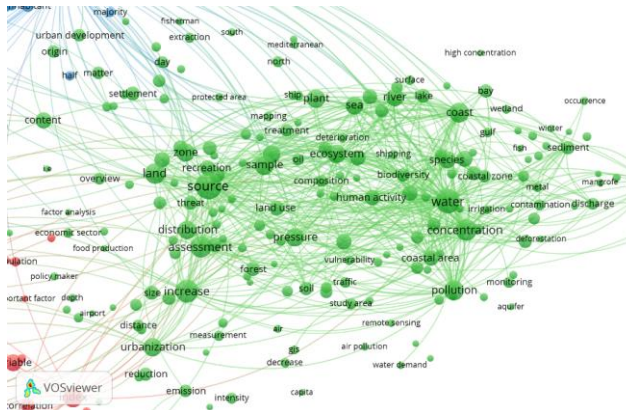
Therefore, we have identified three clusters in the period: 1875- 2021 as follows; **Cluster number 1 (the red one)**, 217 items with the most important in terms of co-occurrence being: tourism industry, enterprise, market, economic growth countermeasure, behaviour, hospitality, internet.



**Figure 7 Cluster no.1 Tourism industry**

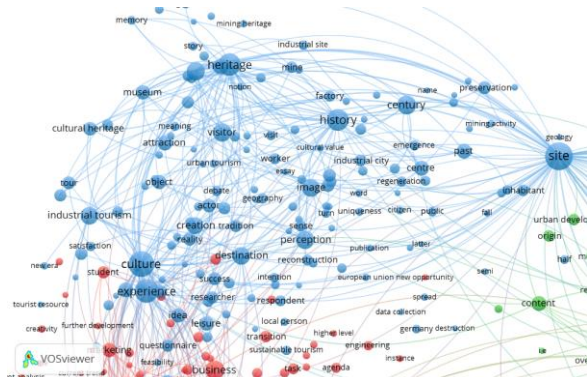
*Source: Own generation*

**Cluster number 2 (green one)**, 200 items, is identified its main co-occurrence terms in the environmental approach: ecosystem, waters, pollution, assessment, forest, biodiversity, wetland, sediment, pressure, monitoring, species, as it is noticeable in Figure no. 8



**Figure 8 Cluster no.2 Tourism industry**  
Source: Own generation

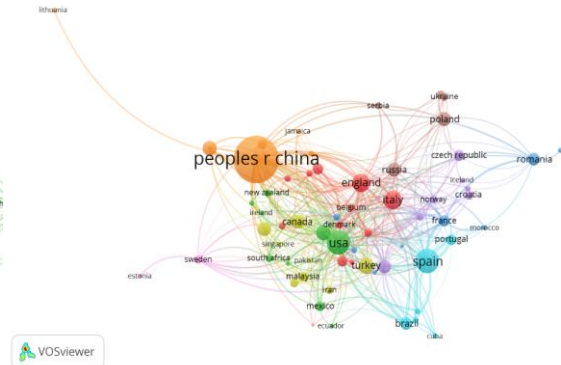
**Cluster number 3 (blue one)**, 168 items, is identified its main co-occurrence terms in the industrial tourism and heritage tourism: heritage, preservation, site, industrial tourism, creation tradition, culture, cultural value, regeneration, as it is noticeable in Figure no. 9



**Figure 9 Cluster no.3 Tourism industry**  
Source: Own generation

We have taken a further inquiry to assert the connections identified in the first part of our research can be certified by a networking map with the highlight the links between these keywords, in this case the authors. We have processed the information, VOSviewer offers the possibility of making a map that graphically represents the links between the words that appear most frequently, thus constructing a map based in bibliographical data selecting the countries that have a minimum number of 5 document, and from a total of 118 countries, only 64 meet the thresholds, as it can be observed in figure no. 10 VOSviewer network visualization map – industrial tourism research – publication countries Association strength

of on WOS platform, the most important node is PR of China, basically connected with all the other countries. Furthermore we can identify ten clusters of countries, Romania being part of one together with France, Portugal, Croatia, Iceland, Morocco.



**Figure 10 VOSviewer network visualization map – industrial tourism research – publication countries Association strength of on WOS platform**

#### 4. CONCLUSIONS

The research on industrial tourism as per the WOS platform increased, with three important inflection points: 2007, 2012 and 2015, the period following this inflection point leading to exponential increase in number of publications. Regarding the countries with researchers in this area it recognized as the main leader in terms number of published research papers PR of China with five out of top six Institutes affiliated, from this country (Chinese Academy of Sciences, University of Chinese Academy of Sciences CAS, Institute of Geographic Sciences Natural Resources Research CAS, Sichuan University, Sun Yat Sen University). It has been noticed that the WOS platform does not have a dedicated research area on Tourism, the retrieved results being mainly from the Business Economics research area.

After performing a bibliometric analysis on the material retrieved from the WOS platform (2200 records) on the most frequently used terms in industrial tourism, the co-occurrences map of terms generated in VOSviewer revealed that there are three main topics of research (clusters). The first one centres around terms such as tourism industry, market, tourism resource, hospitality, the second one on environment, pollution, resources, water, contamination, and finally the third one on industrial tourism, heritage tourism, culture, tradition, reconstruction.

Thus, industrial tourism is researched especially in terms of conceptual framework, economic, social and protected area impact, especially in the US.

As a limitation of our research we can mention the fact that a more in depth analysis should be applied trying to study the industrial tourism in correlation with other relevant terms such as: heritage tourism, preservation, cultural value, industrial city, being a large number of bibliographic material analysed (2200 records) as per the results retrieved by the search performed on the Web of Science platform.

Thus, a significant part of the relevant research literature as well as other contributions to this field are worthy of further and more detailed research.

We consider that the results of this research could have considerable implications for researchers, academics, and students, as they disclose the research gap in this area, indicating zones that could be the subject of research in the future.

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