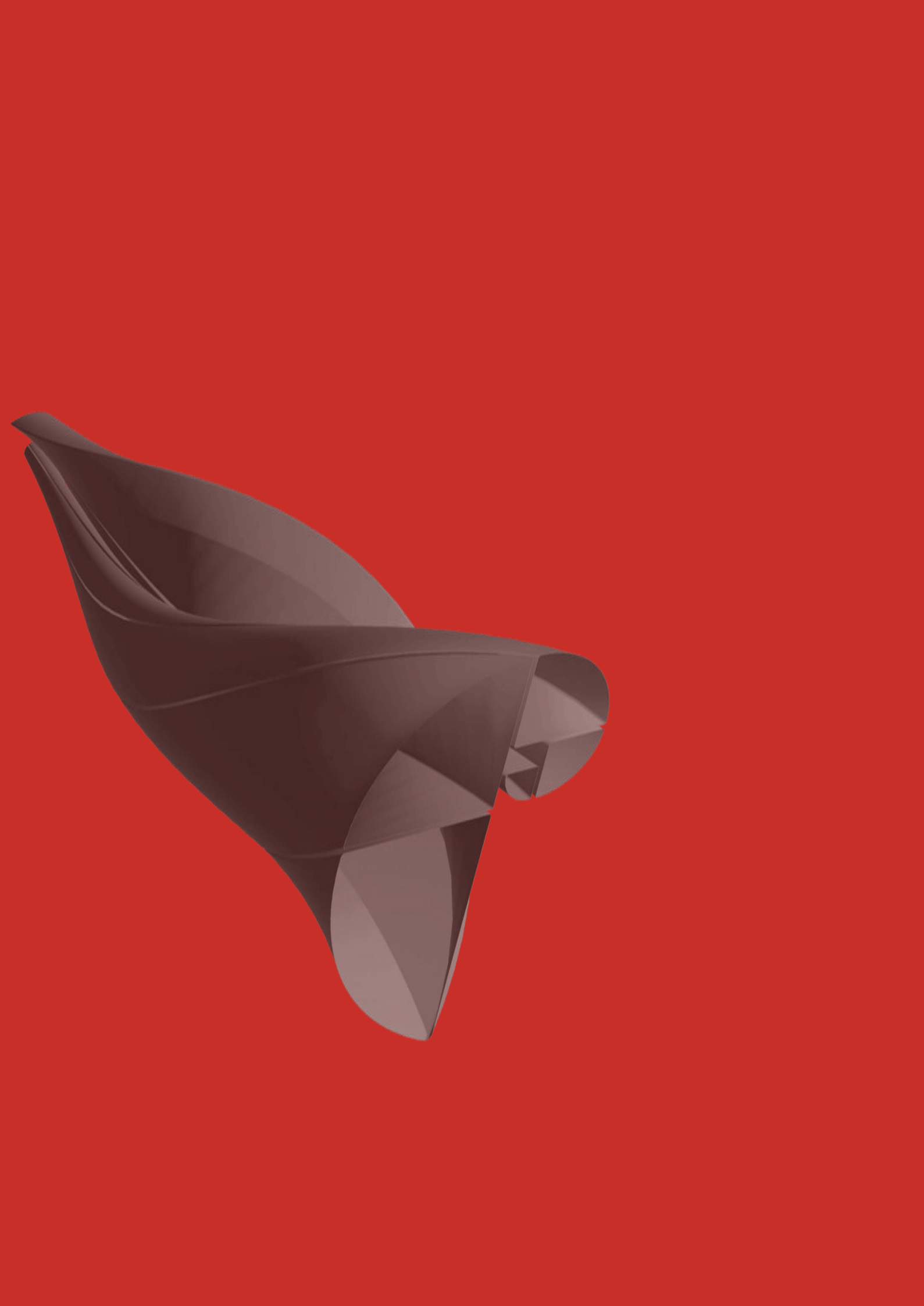


IX Regional

HELIX 25

Transforming regions through
innovation, sustainability
and collaboration

Bragança . 2025



TOPICS

Management
Innovation
Sustainability
Digital Transformation
Collaboration and Networks
Entrepreneurship and Regional Economy
Tourism and Cultural Heritage



Book of Extended Abstracts

IX Regional Helix'25

Transforming regions through innovation, sustainability and collaboration

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Acknowledgement and Gratitude

On behalf of the Organising Committee, we would like to extend our sincere thanks to everyone who contributed to the success of the IX International Regional Helix'25 Congress, held from 26th to 28th June at the School of Technology and Management of the Polytechnic Institute of Bragança (IPB), and organised by the Applied Management Research Unit (UNIAG).

The event demonstrated the essential role of collaboration among the four key actors of the Quadruple Helix model - academia, industry, government, and civil society - as a driver of sustainable regional development. We were especially pleased to count on the participation of members from the STARS EU consortium and the Thematic Interest Group (TIG) on Entrepreneurship & Innovation, whose contributions to the organising and scientific committees, as well as to the scientific programme, reflected a strong commitment to cooperation and innovation.

A particularly memorable moment of the congress was the round table "Transforming Regions through Innovation, Sustainability and Collaboration", which fostered critical dialogue on the challenges and opportunities of collaborative innovation and the role of the Quadruple Helix in regional transformation. We thank all speakers for their valuable contributions and for enriching this important session with meaningful perspectives.

The programme also included a Doctoral Forum, offering PhD students a valuable platform to present their research and receive feedback from experienced academics. This initiative supported scientific quality, intergenerational exchange, and the visibility of emerging researchers in an international context.

A total of 62 papers were submitted, representing over 150 authors and addressing a wide range of themes, including management, digital transformation, tourism, cultural heritage, entrepreneurship, regional economics, sustainability, and green transitions. Eleven of these papers were recognised during the closing session for their scientific excellence.

The quality and impact of the congress are a direct result of the outstanding work presented and the depth of discussion led by all participants, researchers, keynote speakers, and moderators. With participants from Albania, Brazil, Chile, Colombia, Mexico, the Netherlands, Spain, and Portugal, the congress reinforced its international dimension and its role as a platform for knowledge sharing, collaboration, and regionally focused innovation.

We are grateful to the Presidency of the Polytechnic Institute of Bragança, the Management Board of the School of Technology and Management, the Vice-Presidency for Communication, and the IPB Image Services and IT Technical Services for their support, as well as to the Foundation for Science and Technology, UNIAG, and all sponsoring organisations, both public and private, for making this event possible.

A special thank you goes to the Scientific Committee and the Steering Committee, whose valuable guidance and support were instrumental to the success of Regional Helix'25. Last but not least, heartfelt thanks to the Organising Committee and its dedicated team for their commitment, professionalism, and enthusiasm throughout what was both a challenging and rewarding mission.

As this chapter closes, we reaffirm our belief in the relevance and future potential of the Regional Helix initiative. We hope it continues to inspire reflection, foster meaningful debate, and open new paths for cooperation, knowledge transfer, and shared development.

Many thanks to all!

Paula Odete (General Chair)
UNIAG, Instituto Politécnico de Bragança, Bragança, Portugal

Awards

Best Paper Award Certificate

Session: Doctoral Symposium

Paper: The University as an Ecosystem: Exploring Relationships with Environment and Stakeholders

Authors: Paula Marchant-Pérez, João Ferreira, & David Urbano

Session: Collaboration and Networks

Paper: Defining Industrial Tourism in the Cross-Border Region of Portugal and Spain

Authors: Elaine Scalabrini, Francisco Alves, Reginaldo Neto, Felipe L. Teixeira, Joaquín Garcia, Miguel Velasco, João Paulo Teixeira, Roberto Ivo Vaz, & Paula Odete Fernandes

Session: Digital Transformation

Paper: Does Virtual Reality Tourism Have a Future? An Application of the PPM Framework

Author: Sonia San-Martín

Session: Innovation

Paper: What's Behind China's Technological Paths? A Study on Green Patents in Nuclear Energy

Authors: Frederico Donadon, Geciane Porto, & Alexandre Dias

Session: Management

Paper: The Impact of Corporate Governance on the Debt: The Hospitality Industry

Authors: Barbara Pereira, Jorge Alves, & Nuno Moutinho

Session: Regional Economy

Paper: Motivations to Interact with Industry and Academic Engagement

Authors: Alexandre Dias, Camilly Ferreira, & Flávia Vicentin

Session: Sustainability

Paper: Enhancing Renewable Energy Utilization Through Residential Peer-to-Peer Trading

Authors: Paulo Borges, Maria Varanda Pereira, & Ângela Ferreira

Session: Tourism and Cultural Heritage

Paper: Within the Walls: An Augmented Reality and Serious Game to Engage Generation Z in Historical Sites Visits

Authors: Roberto Vaz, Márcia Vaz, Paula Odete Fernandes, & Hélder Gonçalves

Honourable Mention Award Certificate

Session: Digital Transformation

Paper: Big Data Analysis in Cost Management: Opportunities and Challenges in a Regional SME

Authors: Joaquim Leite, Cecília Carmo, & Virgínia Guedes

Session: Entrepreneurship and Regional Economy

Paper: AI-Driven Sustainable Alliances for Regional Innovation: Strategic Governance and Digital Transition

Authors: Diederich Bakker & Daniela Naydenova

Session: Tourism and Cultural Heritage

Paper: Growing Younger through Travel: Senior Tourism Strategies for Well-Being in Ageing and Low-Density Territories

Authors: Jessica Ferreira, António B. Fernandes, & Sofia Cardim

Regional HELIX'25 Programme

26 . 27 . 28 June 2025

Day 1

26 June • Thursday

09h30 Participants Reception | Escola Superior de Tecnologia e Gestão (ESTiG)

09h45 Doctoral Symposium | Eng. Alcínio Miguel Auditorium

12h30 Lunch | IPB Canteen

14h00 Secretariat for Registration | Eng. Alcínio Miguel Auditorium

14h30 Musical Moment | Eng. Alcínio Miguel Auditorium

14h45 Opening Session | Eng. Alcínio Miguel Auditorium

Orlando Rodrigues, President of the Instituto Politécnico de Bragança
Nuno Ribeiro, Head of the Escola Superior de Tecnologia e Gestão
Luís Farinha, Member of the Steering Committee of Regional Helix'25
Paula Odete Fernandes, General Chair of Regional Helix'25

15h15 Round Table: "Transforming regions through innovation, sustainability and collaboration" | Eng. Alcínio Miguel Auditorium

Luís Pais, Vice-President of the Instituto Politécnico de Bragança and STARS EU
Coordinator at IPB
Raquel Meira, Director of the Regional Planning and Development Unit, Northern Regional
Coordination and Development Commission (CCDR-N)
Marina Ranga, Manager of the Ulyseus Innovation Hub, University of Seville
Augusto Oliveira, CEO of C-Pack Creative Packaging Portugal
Moderator: António José Rodrigues, Mensageiro de Bragança

16h45 Coffee Break | Auditorium Foyer

17h25 Parallel Sessions

20h15 Gala Dinner with D'Alma Fado | Pousada São Bartolomeu

Day 2

27 June • Friday

09h30 Social Programme – Bragança: Walk, Feel, Discover | Meeting Point: Praça da Sé, Bragança
13h30 Free time for lunch

09h15 Participants Reception | Escola Superior de Tecnologia e Gestão (ESTiG)

09h30 Parallel Sessions

11h00 Coffee Break | Auditorium Foyer

11h30 Parallel Sessions

13h00 Lunch | IPB Canteen

14h30 Parallel Sessions

16h30 Awards Ceremony Regional Helix'25 | Eng. Alcínio Miguel Auditorium

17h00 Closing Session | Eng. Alcínio Miguel Auditorium

Dionísio Gonçalves, President of the General Council of the Polytechnic Institute of Bragança
Orlando Rodrigues, President of the Instituto Politécnico de Bragança
Pedro Lima, President of CIM Terras de Trás-os-Montes
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Paula Odete Fernandes, General Chair of Regional Helix'25

17h40 Musical Moment | Eng. Alcínio Miguel Auditorium

18h00 Port of Honour | Auditorium Foyer

Day 3

28 June • Saturday

09h30 Social Programme – Bragança: Walk, Feel, Discover | Meeting Point: Praça da Sé, Bragança

13h30 Free time for lunch

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Collaboration and Networks

IX Regional

HELIX 25

Defining industrial tourism in the cross-border region of Portugal and Spain

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Abstract

This paper deals with the definition and valorisation of industrial and pre-industrial tourism in the cross-border region of *Terras de Trás-os-Montes* (Portugal) and *Castilla y León* (Spain). Industrial and pre-industrial heritage is crucial to collective memory and has significant cultural, historical and tourist value. Industrial tourism is emerging as an initiative that enhances historic landscapes and contributes to urban development, the revitalisation of communities and the preservation of heritage. It is considered an innovative strategy for rehabilitating territories, transforming old facilities into attractions, exploring historic sites or operating companies. The “IN_GENIOS_DUERO_DUORO” project focused on promoting this heritage in the Douro-Douro Euroregion. The methodology included detailed mapping and characterisation, creating a database with 1,079 sites identified in 22 Portuguese and 80 Spanish municipalities. The results show that most sites are in Spain (77.1 %). The municipalities with the most identified sites are Valladolid (250) in Spain and Mirandela (32) in Portugal. The main heritage categories include transport infrastructure (335), wineries (255) and the food industry (221). Around 47.27 per cent of the sites identified are accessible to tourists. The database created is fundamental for valuing, safeguarding and designing tourist routes.

Keywords: Industrial tourism, Industrial heritage, Cross-border region.

1 INTRODUCTION

Industrial and pre-industrial heritage represents a fundamental dimension of the collective memory of territories, reflecting the past and present ways of life, production techniques and economic systems. In recent years, there has been growing recognition of this heritage's cultural, historical and tourist value, driving the development of integrated valorisation and promotion strategies, particularly in regions with a strong territorial identity and tourist potential [1, 2, 3].

Industrial tourism has emerged as an initiative that enhances historic industrial landscapes, contributing to urban development, the revitalisation of communities and the preservation of cultural and historical heritage. It involves reusing tangible elements of industrial history, such as factories, mines, and transport infrastructure, which are transformed into museums and spaces for interaction with the public and the promotion of sustainable development [1, 3].

Industrial tourism is an area with high economic, cultural, and social value, offering unique experiences by allowing visitors to explore historic sites or companies during the entire operation and demonstrating manufacturing and production processes [2].

It is also addressed as an innovative strategy in the rehabilitation of industrial territories, highlighting the potential of transforming former industrial facilities into tourist attractions, allowing visitors to learn about historical production processes to learn about the evolution of processes and the socio-economic

impacts of industries, contributes to the preservation of cultural heritage, focuses mainly on economic opportunities in degraded areas [4].

Andrade-Suárez and Caamaño-Franco [5] identify three main categories in industrial tourism: pre-industrial heritage, industrial heritage and active industries, which can be classified into industrial archaeological heritage and industries in operation, dividing industrial tourism activities between visits to active factories and inactive industrial heritage sites [6].

Pre-industrial tourism highlights structures that predate the Industrial Revolution, such as churches and cathedrals, preserved for their cultural, social and religious value. Industrial tourism, conversely, can be defined as the tourist activity centred on visiting and interpreting sites, equipment, processes and memories linked to industrial activity, whether active, decommissioned or converted for museum and cultural purposes [7].

In this context, the project 'IN_GENIOS_DUERO_DOURO: Cooperation for the valorisation of the industrial culture of the Duero-Douro through tourism' arose. Its main objective is to promote knowledge and valorisation of the industrial and pre-industrial heritage in the cross-border cooperation territory between the region of *Terras de Trás-os-Montes* (Portugal) and *Castilla y León* (Spain). The initiative aims to consolidate an integrated and sustainable tourism system in the Duero-Douro Euro-region, taking advantage of the rich history and heritage shared by both sides of the border.

The Douro/Duero River route, as the unifying and structuring element of the territory, serves as the guiding thread for identifying, analysing and promoting spaces and structures of industrial and pre-industrial significance, from mills, factories, hydraulic systems and railways. These tangible and intangible testimonies are tourist resources with great potential for attracting new audiences and fostering local and regional development dynamics.

The 'IN_GENIOS_DUERO_DOURO' project is realised through strong institutional coordination between Portuguese and Spanish entities, focusing on research, technical cooperation and creating innovative tourism products that enhance shared identity. During the implementation period, several key actions were carried out, including an in-depth literature review on industrial tourism and creating a comprehensive database with 1079 sites identified in 22 municipalities in Portugal and 80 municipalities in Spain.

This paper aims to present the mapping and characterisation of industrial attractions in the project region, organising the information into thematic sections that cover the theoretical and institutional framework of the methodology for inventorying heritage elements, the territories involved, and the tourism enhancement strategies adopted. So, the paper is divided into four sections; after this introduction, the methodology used to characterise the industrial attractions is presented, followed by the main results and the conclusion.

2 METHODOLOGY

Collecting and mapping industrial heritage in Portugal and Spain aimed to identify, catalogue and subsequently promote sites of interest in industrial tourism. Data was collected using a structured questionnaire based on the previous literature aligned with the project's objectives. The questionnaire was validated by all the partners involved and sent to local councils between October 2024 and March 2025.

The collection of this information allowed for the construction of a detailed database, essential for the valorisation and promotion of industrial tourism in the region. Identifying and mapping these elements was fundamental to encouraging the development of cultural and industrial tourism, contributing to the preservation of heritage and the economic dynamisation of the territories involved. The database made it possible to catalogue the attractions in the following respects: location (country, county, municipality and full address); name of the heritage site; GPS coordinates (latitude and longitude); category; description; availability for visits; website; classification of level of interest; level of importance for the project.

The data is available in Excel files in the project's cloud. The analysis is based on a survey of 1,079 heritage sites in Portugal and Spain. In this paper, descriptive statistics were used to characterise the attractions. In addition, the attractions have been distributed on a map to make it easier to visualise the industrial heritage in the region under analysis.

3 RESULTS

The characterisation of industrial tourism begins with its geographical distribution (Figure 1). In this case, most attractions are in Spain (77.1%). This disparity may be associated with the territorial dimension of each country, as well as the diversity and history of industrialisation in both regions.

Regarding the distribution by municipality in each country, specifically in Portugal, the municipalities with the highest number of heritage sites identified are Mirandela, with a total of 32, followed by *Bragança* and *Tabuaço*, both with 28 sites, *Peso da Régua* with 19 sites and *Torre de Moncorvo* with 17. In Spain, the most significant number of heritage sites identified is Valladolid with 250 attractions, followed by Toro with 75, *Zamora* with 53 attractions and *Peñafiel* with 38.

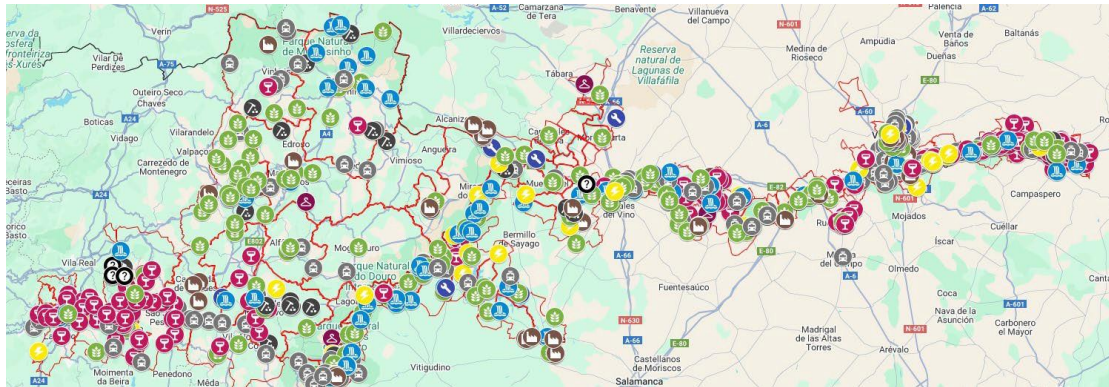


Figure 1. Geographical Distribution of Industrial Heritage

The heritage sites identified were classified into various categories, reflecting industrial activity and infrastructure diversity. The category with the most records is transport infrastructure, with 335 heritage sites, highlighting the historical importance of communication routes and logistical means. This is followed by wineries, with 255 sites, underscoring the importance of wine production and culture. The food industry also represents a significant proportion, with 221 heritage sites, demonstrating the essential role of this sector in the economy and industrial tradition. Water heritage brings together 100 heritage sites, covering infrastructure for managing and utilising water resources. Transformation and manufacturing industries account for 73 heritage sites, reflecting the diversity of production activities over time. Energy production infrastructures account for 44 assets, while extractive industries account for 25 assets, illustrating the exploitation of natural resources. The metal and steel industry sector has 12 heritage sites, and the textile heritage, associated with producing fabrics and clothing, has six heritage sites. Finally, the 'Other' category covers eight heritage sites, encompassing elements that do not fit into the previous classifications.

The division by country reveals that the most representative category in Portugal is wineries, with 62 records, followed by the food industry (62 records) and transport infrastructure (47 records). In Spain, the most representative category is transport infrastructure (288 records), followed by wineries (189 records) and hydraulic heritage (159 records).

Finally, the level of accessibility of the heritage was analysed, and the percentage of heritage sites declared as accessible to receive tourists is approximately 47.27%. This indicates that less than half of the heritage sites identified are officially ready to welcome visitors, suggesting a possible need to improve accessibility and tourist reception infrastructures.

4 CONCLUSIONS

The categorisation of the heritage identified covers various types, reflecting the richness and historical diversity of the cross-border region. The main types of heritage identified include wineries, illustrating the strong wine-growing tradition of the *Douro-Duero* region, and transport infrastructure, namely old railway stations and bridges, which witness industrialisation's impact on regional connectivity. There are also hydraulic structures, such as water mills and historic dams, which show how water resources have been used for industrial activity over the centuries.

The spatial analysis of the data also made it possible to identify areas of greater heritage density, suggesting the existence of centres of high historical and cultural value. The typological diversity and

geographical distribution of heritage assets reinforce the region's relevance in the context of industrial and pre-industrial heritage, providing a comprehensive view of its evolution over time. In this sense, the map is a fundamental tool for valuing and safeguarding this legacy. It enables a more in-depth knowledge of its distribution and characteristics and the definition of strategies to promote its preservation and sustainable tourist use. The database preparation had some limitations, namely the difficulty in obtaining information from all the municipalities in the sample. We suggest an on-site visit to fill in all the information for future studies.

This was an essential practical study for the region under analysis, since the database will enable industrial tourism routes to be drawn up based on the specific interests of tourists and the categorisation of industrial heritage.

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