



**Journal of Association of Arab Universities  
for Tourism and Hospitality (JAAUTH)**

journal homepage: <http://jaauth.journals.ekb.eg/>



## The TAPLINE as a Model for Developing Industrial Heritage Tourism in Saudi Arabia

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### ARTICLE INFO

### Abstract

#### Keywords:

Industrial Heritage (IH);  
Industrial Heritage  
Tourism (IHT);  
Saudi Arabia;  
Trans-Arabian Pipeline  
(TAPLINE);  
World Heritage.

**(JAAUTH)**  
**Vol.27 , No. 1 ,**  
**(2024),**  
**pp.419 -443.**

This research examines the potential of Industrial Heritage Tourism (IHT), focusing on the Trans-Arabian Pipeline (TAPLINE) as a leading model in Saudi Arabia, which was included in the Tentative List of World Heritage in 2023. TAPLINE exemplifies the integration of IHT into national tourism strategies, fostering sustainable development and elevating the Kingdom's global cultural presence. The study reveals TAPLINE's potential to contribute to cultural preservation, local economic regeneration, and sustainable tourism through adaptive reuse strategies such as museums, cultural hubs, and heritage tours. The methodology involves identifying and analyzing industrial heritage sites from the World Heritage List, utilizing data collection and GIS mapping to assess their geographical distribution and significance. The study draws on global case studies of industrial heritage (IH) sites inscribed on the World Heritage List (WHL) for comparative analysis, offering insights into effective preservation and tourism strategies. The study reveals the potential of the Trans-Arabian Pipeline (TAPLINE) as a model for Industrial Heritage Tourism (IHT) in Saudi Arabia, showcasing its role in cultural preservation, economic regeneration, and sustainable tourism through adaptive reuse strategies like museums, cultural centers, and tourist routes. The research proposes practical strategies for leveraging the site in tourism, including innovative adaptive reuse approaches such as establishing museums, developing tourist routes, and creating cultural centers, as these contribute to enhancing the cultural landscape and supporting sustainable economic growth in Saudi Arabia.

### 1.Introduction

Industrial Heritage (IH) has been called the 'landscapes of nostalgia' (Halewood & Hannam, 2001: 566), where, in the context of IH, the place identity and industry ingrained in the communities are closely related (Ilovan & Mutica, 2023). But the concept itself might originate in different ways, for different purposes, and for different reasons. Hence, the ideas may be thought of in various ways (Xie, 2015).

Despite the rising interest in IH, it remains one of the most complicated heritage concepts (Herrera, 2013; Xie, 2015; Cimadomo & Varagnoli, 2023). In this scenario, the study paraphrases Sir Neil Cossons, a leading expert in the field, who argues that Industrial Heritage (IH) represents a distinct cultural discourse. It poses unique challenges within the heritage sector and demands innovative solutions due to the lack of established precedents. Cossons emphasizes that addressing IH is not a task to be undertaken lightly (Cossons, 2012). Moreover, tangible components of the landscapes has received more attention than the intangible aspects of the IH. Rebuilding emotional safety, place attachment, identity, community spirit and narrative are examples of intangibles that are still considered as secondary factors (Sutestad & Mosler, 2016).

Therefore, the topic of research is crucial, particularly for Saudi Arabia, which has shown an elevated recent interest in this field. The country serves as a symbol of leadership in the oil industry, and it is home to a wealth of IH sites, including factories, mines, transportation systems, ports, and trains. Historical industrial advancements can be found in water desalination facilities, oil refineries, mining operations, cement plants, food processing plants, excavation, paper mills, infrastructure projects, energy generation methods, and other human-made sites that represent their economic and industrial accomplishments. Consequently, it is important to develop plans based on good international practices to direct large-scale revitalization initiatives and, within this framework, repurpose the abandoned industrial properties (Ifko, 2018; Cimadomo & Varagnoli, 2023). Reconstruction and repurposing IH have been vital tools for its preservation and have been essential in advancing sustainable urban development and urban renewal (Han & Zhang, 2022; Sun & Chen, 2023). There is a widely held belief that industrial heritage (IH) sites possess the potential to evolve into modern tourism destinations (Harfst et al., 2021; Zhao & Liu, 2021). On the other hand, little is known about how and by whom they are turned into tourist attractions (Zhao & Liu, 2021).

The research problem centers on the lack of attention to industrial heritage, particularly in Saudi Arabia, where sites like the Trans-Arabian Pipeline (TAPLINE) represent a significant part of industrial history. Despite its inclusion as the first industrial heritage site for Saudi Arabia on the World Heritage Tentative List under the petroleum industries category, there is a scarcity of studies and global expertise on how to repurpose such sites to achieve sustainable tourism development. This study focuses on the TAPLINE site, emphasizing the need to address both tangible and intangible aspects of industrial heritage through adaptive reuse while highlighting the limited literature exploring the history of the oil industry and global experiences in this field.

This study aims to:

- Identify industrial heritage sites listed on the World Heritage List.
- Analyze the geographical distribution and significance of these sites.
- Categorize and document industrial heritage sites based on a five-category classification system.
- Explore the inclusion criteria and associated activities of industrial heritage sites.
- Provide recommendations for utilizing industrial heritage sites, such as TAPLINE, for sustainable tourism and urban regeneration.

## 2. Industrial Heritage

Since the industrial landscape is always being rebuilt, reinterpreted, and packaged into a sense of renewed meaning, its core is firmly entrenched in a postmodern imagination (Xie, 2015). The definition of the term IH has been a primary concern for

authors who specialize in the relevant fields. They have therefore inquired about its meaning. When discussing the topic, it is only natural to link the term to a specific era of history, such as modern industry's connection to the Industrial Revolution (Herrera, 2013).

Meanwhile, the international adoption of the Nizhny Tagil Charter for IH, which has been presented by the International Committee for the Conservation of Industrial Heritage (TICCIH), offered a precise definition of IH. They define it as:

*"The remains of industrial culture which are of historical, technological, social, architectural or scientific value. These remains consist of buildings and machinery, workshops, mills and factories, mines and sites for processing and refining, warehouses and stores, places where energy is generated, transmitted and used, transport and all its infrastructure, as well as places used for social activities related to industry such as housing, religious worship or education."* (TICCIH, 2003).

This definition of IH aligns with the International Council on Monuments and Sites (ICOMOS) definition. However, they added landscapes as they find that industrial processes, whether ancient or modern, rely on natural raw materials. What is more, they added the intangible aspects like the knowledge, skills, and cultural traditions associated with industrial activities. The ICOMOS definition also added all documents that provide evidence of past or ongoing industrial processes of production (ICOMOS, 2011). This is an acknowledgement that some IH sites are still in operational condition, and the World Heritage List (WHL) gave evidence of that, as some sites were inactive while others were still working in the same field.

The great interest that the IH is witnessing from specialists in this field has developed two approaches to dealing with the IH and the historic industrial environment. According to Ambrose (2013), there are two main (often linked) approaches to conservation, preservation, development, and use as a result of this interest:

- Cultural tourism: the repurposing of historical industrial sites and monuments as tourist destinations, including industrial museums, ecomuseums, heritage centers, art galleries, performance spaces, etc. (the cultural heritage approach).
- Commercial development and reuse: such as the creation of homes, shops, offices, catering services, holiday homes, etc. (the commercial approach).

Concurrently, with the growing public fascination with IH, there has been a surge in industrial tourism as tourists seek to witness the production methods and processes.

### **2.1. Industrial Heritage Tourism**

As explained by Xie (2015) and Harfst et al. (2021), the development of Industrial Heritage Tourism (IHT) was influenced by Europe's exhausted coal mines and the desire to develop a new tourism product that would positively influence the image of industrial areas. This kind of tourism serves as a means of economic development for local communities by attracting tourists, creating jobs, and stimulating the growth of businesses in the region. Sustainable practices and community involvement are key aspects of ensuring the long-term viability and authenticity of these tourism initiatives (Xie, 2015).

According to Otgaar (2010) and Harfst et al. (2021), IHT can be understood as thematic tours to inactive production and industrial facilities in order to explore the territory and its IH sites, studying the technology for creating a particular product, becoming familiar with the history of industrial enterprises, visiting industrial zones or

cities seeking a functional transformation to achieve urban regeneration, as well as learning about the cultural and social aspects of the communities and workers involved in industrialization. Hence, IHT not only preserves historical treasures but also provides unique and educational opportunities for tourists interested in history, technology, and cultural heritage, as well as playing a vital role in enhancing local community identity and fostering economic development (Xiaodong & Zhichao, 2023).

UNESCO plays a vital role in the recognition and preservation of industrial heritage sites through its World Heritage List. These sites are recognized for their cultural, historical, and technological significance, often representing the milestones of industrialization that shaped modern society. The inclusion of industrial heritage on the World Heritage List helps to raise awareness about the importance of preserving these sites, ensuring that they are protected for future generations. Additionally, UNESCO provides a framework for the sustainable management of these sites, promoting adaptive reuse strategies that allow for their continued relevance while maintaining their cultural integrity. The recognition of industrial heritage by UNESCO also contributes to the global understanding of industrialization's impact on local communities, economies, and the environment, further enhancing their role in cultural tourism and sustainable development.

### **3. Methodology**

To achieve the objectives of this study concerning the identification of industrial heritage sites listed on the World Heritage List, the following methodological procedures were followed:

#### **3.1. Data Collection**

- A. **Keyword Search:** A comprehensive search of the World Heritage List (WHL) was conducted using a variety of keywords related to industrial heritage.
- B. **Site Refinement and Review:** The initial search results were carefully reviewed and refined to ensure that only sites that genuinely represented industrial heritage were included. This involved examining the site descriptions, photographs, and other relevant information.

#### **3.2. Data Organization**

- A. **Excel Sheet Creation:** An Excel sheet was created to systematically record the identified industrial heritage sites.
- B. **Data Fields:** The following data fields were included in the Excel sheet: Site Name, Country, Year of Inscription, Year of Boundaries Modifications (if applicable), Inclusion Criteria, Surrounding Environment, Main Activity, Secondary Activity, Railway Inclusion, Classification (based on the researchers' five-category system) (see Fig. 1).

#### **3.3. Geographical Analysis and Mapping**

- A. **Location Determination:** The geographical location of each cultural property was determined based on the information provided in the World Heritage List.
- B. **GIS Mapping:** The identified sites were spatially projected on the map using the Geographic Information System (GIS) software QGIS. This allowed for a visual representation of the spatial distribution of industrial heritage sites (see Fig. 2).

### 3.4. Global Case Studies

This paper will present five case studies of IH sites inscribed on the WHL. These examples will offer valuable insights into effective management practices, transformative processes, and adaptive strategies for preserving and revitalizing industrial heritage, thereby informing and enriching the study area of TAPLINE.

### 3.5. Industrial heritage sites in World Heritage LIST

By applying the methodology outlined in the previous section, the analysis of the World Heritage List (WHL) up to 2023 identified only 65 industrial heritage (IH) sites out of 1,199 properties, including the recently added Žatec and the Landscape of Saaz Hops in the Czech Republic (UNESCO, 2023). By employing a rigorous methodology, a comprehensive database of these sites was created, including detailed information and GIS mapping. This data serves as a valuable resource for future research, analysis, and conservation efforts related to industrial heritage.

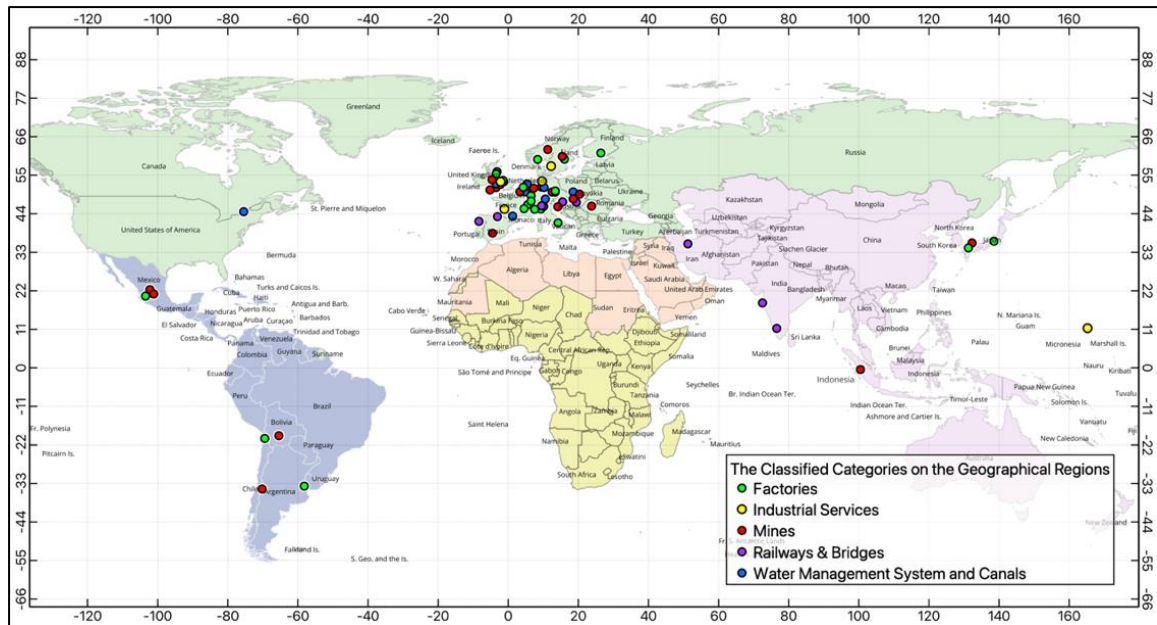
This study classified these sites into five categories: railways and bridges; mines; water management systems and canals; and industrial services, which do not produce products but rather provide services such as observatory and radio stations, warehouses, office buildings, and others. Finally, there are the factories that vary in their activities, such as textile industries, iron and steel, foods, and many others (see Fig. 1). The agro-industrial sector is also included under this last category, and despite its scarce representation on the list, as its first submission was in 2006 and the latest was in 2023, The researchers believe that this industry is one of the most distinctive IH sites, particularly in terms of the degree to which it is entirely dependent on local activities. A full cycle of planting, harvesting, processing, packaging, and storing is carried out.



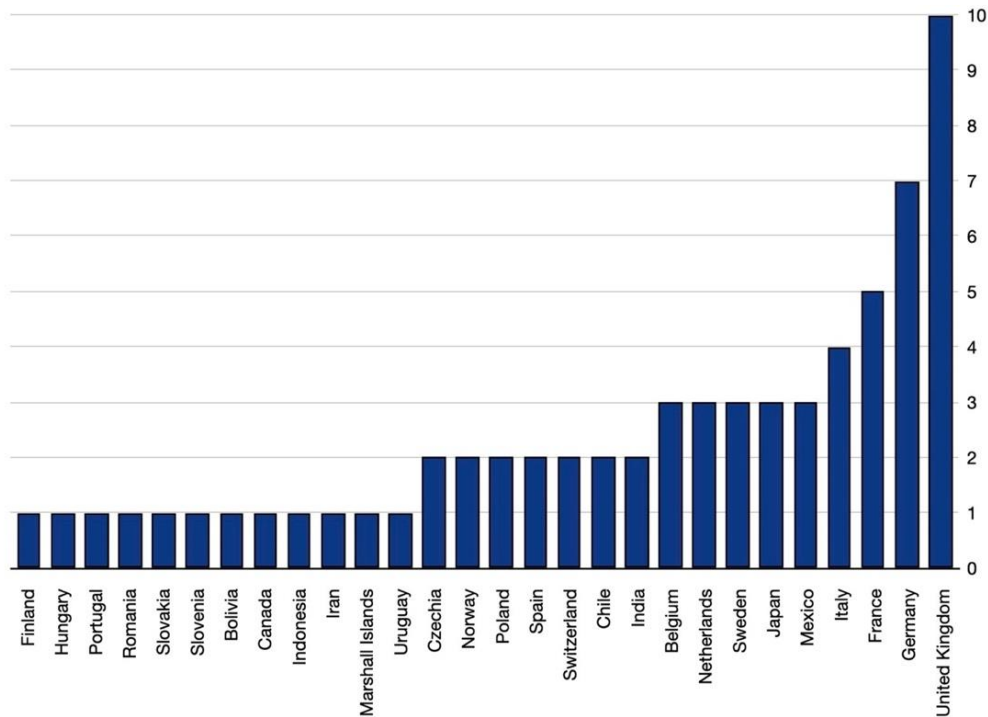
**Fig. 1** The classified categories and their percentage of the IH sites on the WHL.

Compared to all properties on the list, IH only accounts for 5.4% of the entire list, most of which is located on the European continent, with 73.8%, while the Arab and African regions do not have any IH sites registered on the WHL as of yet (see Fig. 2). This shows how little attention is given to IH globally. And it is noteworthy that the UK has ten sites thus far, making it the country with the most industrial cultural properties on the WHL (see Fig. 3). However, one of the first ever registered sites on the list in 1978 was the Wieliczka and Bochnia Royal Salt Mines site, which is a major industrial undertaking that has royal status and is the oldest of its type in Europe.





**Fig. 2** Distribution of listed IH sites across the geographical regions.



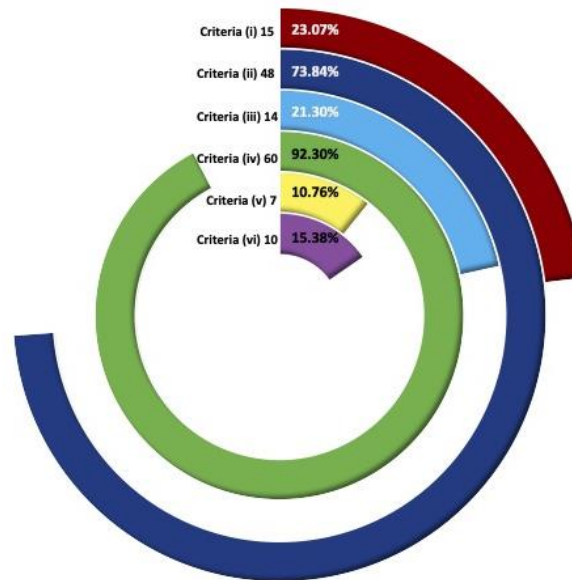
**Fig. 3** Number of properties listed for each country.

Moreover, analyzed statistics show that the registration of mining and industrial sites is of major relevance, as 21 of the registered IH sites include mining activities. There was also great interest in sites with railway activities, as almost 34% of the sites either had a work field in train transportation or owned some of the forms of railways that transported goods or were put to use in mines for transporting equipment, ore, and dirt down the narrow mine canals.

Speaking of railways, it's important to note that, contrary to the common belief that IH sites that draw visitor, must be ceasing operation, our analysis of the WHL shows that a significant number of railroads and bridges remain operational today. In fact, over one-third of the listed industrial heritage sites continue to function in their original capacity

or are engaged in related activities. Notably, 22 of these sites, primarily water management systems, canals, and railroads, are still actively operating in their original fields, attracting numerous tourists .

Furthermore, we noticed that according to the criteria for which sites are listed, the most are criteria (iv) 60 times, followed by criteria (ii) 48 times, and they are often enlisted together. The remaining criteria (i), (iii), (v), and (vi) do not exceed 15 times, the least of which is criterion (v), which was listed only 7 times (see Fig. 4).



**Fig. 4** The criterions for which sites are listed and the rate of their occurrence. Source: Constructed by authors.

### 3.6.The Industrial Heritage in Saudi Arabia

Saudi Arabia has a rich cultural, historical, and evolutionary heritage that attests to its contribution to human civilization. It also owns many IH sites that helped Saudi Arabia's diverse regions achieve continuous development and built the foundation for the industrial renaissance that the country experiences today. The Heritage Commission has classified Saudi IH into six categories: water desalination, transportation, traditional industries, mines, oil and gas, and agriculture (Heritage Commission, 2024). Recognizing the importance of its past even among rapid modernization, Saudi Arabia actively preserves and promotes its IH sites, solidifying their role in achieving Vision 2030's ambitious goals (GOV.SA, 2016).

Since the 1930s, Saudi Arabia has experienced unparalleled urban growth as a result of oil discoveries, resulting in the development of modern cities and structures (Mazzetto and Vanini, 2023). The country's Renaissance history mostly focuses on the discovery and export of oil as its starting point. Thus, the pre-oil architecture period, which lasted until the 1930s; the oil architecture period, which lasted from the 1930s to the 1990s and was marked by the discovery and extensive exploitation of oil wells; and the post-oil architecture period, which was centered on the creation of new economically sustainable strategies and a post-oil economy, represent the three periods that various scholars have classified them in (Bay et al., 2022; Albaqawy, 2018; Ashraf, 2012) Furthermore, the governmental policies in Saudi Arabia have led to an increase in urbanization from 10% to 75% in just forty years (around 1950–1992) (Mazzetto and Vanini, 2023). It also illustrates the industrial revolution that accompanied this rapid rebirth to meet its demands.

Moreover, Saudi Arabia is the first country in the Middle East to set an association for the preservation of IH (Amin et al., 2020). The association aims to shed light on the IH in Saudi Arabia, raise community awareness on the value of cultural industry landmarks. In other words, Saudi Arabia's industrial legacy represents a complex story spanning civilization, culture, and history (see Table 1).

**Table 1.** The historical development of the IH in Saudi Arabia. Source: Constructed by authors.

Efforts	1964	1972	1978	2000	2008	2010	2014	2015	2018	2019	2020	2021	2022	2023
Establishing the Dept. of Antiquities & Museums	x													
Issuance of the Antiquities Law		x												
Ratification of the World Heritage Convention			x											
The establishment of Supreme Commission for Tourism and Antiquities (SCTA)				x										
Inscription the 1 <sup>st</sup> site in WHL (Al-Hijr)					x									
Inscription the 2 <sup>nd</sup> site In WHL (A- Turaif)						x								
Inscription of the 3 <sup>rd</sup> site in WHL (Historic Jeddah)							x							
Issuance of the Antiquities, Museums, and Urban Heritage Law							x							
The amendment of the SCTA to the Saudi Commission for Tourism and National Heritage (SCTH)							x							
Establishing the Custodian of the Two Holy Mosques Program for Attention to the Cultural Heritage.							x							
Inscription the 4 <sup>th</sup> site in WHL (Hail Rock Paintings)								x						
Inclusion the (Hejaz Railway) in the Tentative List of WH								x						
Inscription the 5 <sup>th</sup> site in WHL (Al-Ahsa Oasis)									x					
Establishment of the Ministry of Culture									x					
Saudi Arabia became a member of the WHC										x				
Introducing the Saudi Industrial Heritage Program										x				
Launching the Industrial Heritage Competition										x				
Issuance of the implementing regulations for Antiquities and Urban Heritage										x				
Establishing the Heritage Commission, which became concerned with IH											x			
Inscription the 6 <sup>th</sup> site in WHL (Hima Cultural Area)												x		
Introducing the Industrial Heritage National Registry												x		
Inscription of the 7 <sup>th</sup> site in WHL (Urug Bani Ma'arid)														x
Inclusion the Oil Industrial Heritage in the Tentative List of WH														x
Hosting the 45th session of the WHC in Riyadh														x

According to the Ministry of Culture (n.d.-a), they are investing in IH by developing laws and strategies for dealing with the sites aligned with the best modern global experiences. The Ministry will govern issuing these laws, overseeing their application, and coordinating this with regional and international governmental organizations, in addition to local NGOs.

Furthermore, the Ministry of Culture is judiciously employing *crowdsourcing* to build a database for IH. Originally, the term "crowdsourcing" was used to refer to the practice of outsourcing work once performed within an organization to the broader public through an open call for volunteers. This was made possible by technological developments, and it is frequently used for tasks that require little time and, consequently, pay very little (Howe, 2006).

In this case, the Ministry is utilizing the crowdsourcing strategy by urging the crowd to take part in the listing of locations they believe should be included in the IH database. By doing so, individuals will participate in gathering as much as they can of the primary metadata to store in the database the Ministry is creating for IH (Ministry of Culture, n.d.-a). The Ministry is also encouraging individuals through the Industrial Heritage Competition, which launched in 2019, with handsome prizes for the winners in exchange for discovering industrial landmarks and documenting their material and social history (Ministry of Culture, n.d.-b).



As of the date of writing this paper, the National Industrial Heritage Registry has officially recognized two sites: the TAPLINE in Arar (our area of study) and the Jaxx District in Ad Diriyah (Ministry of Culture, n.d.-c). With an additional 68 nominations pending inclusion, the Kingdom boasts 70 IH sites distributed across six of its thirteen administrative regions. The Eastern Region leads the distribution with 38% of the sites, followed by Makkah (20.6%), Riyadh (19.4%), Madinah (11%), Qassim (6.3%), and Asir (4.7%) (Heritage Commission, 2024). On the other hand, the ministry had already included two properties on the tentative list of WH sites that are considered IH. The first was the Hejaz Railway, submitted in 2015. The second site is The Oil Industrial Heritage in Saudi Arabia, which draws our attention to the fact that no property associated with the petroleum industry is included in the main WHL. It is also the second oil-related site on the tentative list worldwide, with Awali Oil Settlement in Bahrain being the first.

### 3.7. Case Studies

This paper will present five case studies of IH sites inscribed on the WHL. These examples will offer valuable insights into effective management practices, transformative processes, and adaptive strategies for preserving and revitalizing industrial heritage, thereby informing and enriching the study area of TAPLINE. By carefully selecting sites from across the UNESCO regional distribution, we have ensured comprehensive coverage of the five categories outlined in Section 4, (Railways & Bridges, Mines, Factories, Water Management System and Canals, and Industrial Services). Given the absence of inscribed IH sites in the Arab and African regions, we have chosen case studies for sites in each of the remaining three regions.

- A. Mountain Railways of India: this site includes three railways that are still fully operational since they were first opened in 1881 and were inscribed in the WHL in 1999. The Indian Railways are a tourist attraction in and of themselves (Kumar, 2017). Some of these mountain rails are run by the authorities, and they encourage tourism by providing a range of marketing initiatives, travel packages, special trains, charter trains, luxury trains, and coaches for both domestic and international travelers. In addition to being a dependable and affordable mode of transportation, rail travel in India connects practically all of the country's tourist attractions. Thus, it can be claimed that the Indian Railways is an income generator to the nation's tourism industry (Mishra & Singh, 2023).
- B. Sites of Japan's Meiji Industrial Revolution: are a series of 23 component parts characterized by the diversity of its industries. and were inscribed on the WHL in 2015 (Cabinet Secretariat Japan, 2018). The buildings and infrastructure that remained from Japan's industrial revolution are known as the Meiji Industrial Revolution due to their occurrence during the Meiji era. This revolution saw the establishment of Kitakyushu, the first city in Asia to introduce heavy industries in 1901 (Kawano, 2019) (see Fig.5). A study conducted in this city by Zhao and Liu (2021) demonstrated how important it is for stakeholders to collaborate at the outset to support the growth of IHT. Furthermore, the study verified that the growth of the tourism industry was caused by the Kitakyushu City Chamber of Commerce and Industry's official recognition in 2010 that IH is a strategic tourism resource for the area's rehabilitation. Consequently, science and technology tourism, environmental tourism, and other forms of industrial tourism have all grown rapidly as a result of the thriving IHT industry. This, in turn, led to an increase in the number of visitors in 2019, reaching 24,208, and the number of foreign visitors from 65 thousand in 2011 to 556 thousand in 2019.



**Fig. 5** The area's most fascinating industrial site for visitors nowadays, with bilingual informational panels explaining the Higashida Daiichi Blast Furnace's steel-making process. Source: from Japan-guide.com (2021).

- C. Wieliczka and Bochnia Royal Salt Mines in Poland were nominated for the first batch of World Cultural Heritage in 1978. Numerous mines, particularly those in which production has ceased, have turned into historical relics and components of the cultural landscape (Tost et al., 2021), which is referred to as Underground Built Heritage (UBH) (Kimic et al., 2021). Today, the mine serves as a healing purpose destination, a tourist attraction, a museum, entertainment halls (see Fig.6), a Salt Lake, and prayer halls that were filled with numerous salt-carved sculptures and ornaments, in addition to offering accommodation and overnight stays (Yang & Li, 2019; Puławska et al., 2021; Tost et al., 2021). According to Puławska et al. (2021), the combination of geo-sites and other attractions significantly boosts tourism and student visits. The mines continually enhance their offerings with new routes and expanded accessibility. Innovative ICT initiatives, such as official websites, mobile apps, and virtual tours, have fueled growing interest from both domestic and international visitors, reaching two million annual visits as stated by Kimic et al. (2021). Moreover, the inclusion of an elevator and wheelchair-accessible areas demonstrates a positive social commitment (Garlicki, 2008).



**Fig. 6** On the left is an event that took place in the Wieliczka and Bochnia Royal Salt Mines' halls. Source: from wieliczka-saltmine (n.d.). On the right is the same hall for a different use. Source: from UONESCO WHL.

- D. The Canal du Centre and their Environs in Belgium: they were added to the WHL in 1998. This highest-quality industrial monuments offer a remarkably well-preserved example of an industrial landscape from the 19<sup>th</sup> century, and they belong to the Water Management System and Canals category. Only eight lifts like these have been built in the world, and these are the only four still operating in their original condition (Service public de Wallonie, 2013). It was a technical achievement for the era and was Wallonia's economic lifeblood. Though the four Canal du Centre lifts that first opened in 1888 have been replaced by Strépy-Thieu Lift (TICCIH, 1994), they are still serving as an important river tourism destination. To facilitate access to over 200 options for rediscovering southern Wallonia, the official authority for the promotion of tourism in Wallonia has developed a digital touristic pass (VISITWallonia.be, n.d.). Among the sites that have been promoted are these four lifts with multiple experiences. An example of this would be the over-two-hour guided boat ride down the canal that crosses through lift No.4. and then a visit to lift No.3 to see the machine room and discover the inner workings of the elevator's construction and operation. Ultimately, they will take the small train along the canal to the historic center (see Fig.7). Other services they offer to tourists include bicycle and electric boat rentals, which allow the visitors to cruise the Historic Center's oldest stretch of the Canal and discover Belgium's oldest boat lift, hydraulic lift No.1(1888) (Canal du Centre, n.d.).



**Fig. 7** The guided boat rides through the canal, experiencing the lift. Source: from Canal du Centre (n.d.).

- E. Speicherstadt and Kontorhaus District with Chilehaus in Germany: It is the best site to represent the Industrial Services category and was inscribed in the WHL in 2015. Hamburg's development has always been significantly influenced by trade and shipping. Throughout the 19<sup>th</sup> century, this process gained especially momentum when the Port of Hamburg was recognized as one of the world's most significant ports, coming in third only to London and New York (Lange, 2012). In addition to representing the port city's economic might, they also perfectly capture the essence of archetypal local building traditions (Pelka, 2012). The site also involved the Old Port of Trieste's hydrodynamic plant, and it is the only fully operational example of an energy generator in the world (Palladini, 2012). In 2004, the Italia Nostra association began working with public institutions to improve this significant cultural asset, which is currently under protection measures. The goal of the project is to fully restore the buildings and increase their uses for tourism in terms of tourist-cultural-



port activities (see Fig.8). These uses include the establishment of a permanent exhibition, the preservation of historical materials, and the provision of guided tours. To begin the old port district's rehabilitation and revitalization, the proposal to designate it as a "historic port site of international interest" may be made (ibid).



**Fig. 8** Speicherstadt and Kontorhaus district with Chilehaus. Source: from UNESCO-Welterbestätten Deutschland e.V. (n.d.).

Taking the IH sites in the WHL into account, we argue that the diversity of North American and European regions' activities sets them apart as the regions with the highest IH shares, with prudent oversight. Furthermore, their enthusiasm for IH and its growth in tourism have made it a model to emulate. As in the UK tourism economy alone, it is likely that IHT will result in direct and indirect income of around €2.5 billion. Similarly, the demand driven by IH is estimated to bring in €4.8 billion from overnight travel and €4.1 billion from day trips for local economies across Europe (Lane et al., 2013).

### 3.8.study Area: Tapline

Since this study focuses on the potential for developing industrial heritage tourism in Saudi Arabia, this section will concentrate on the study area, represented by the Trans-Arabian Pipeline (TAPLINE). We maintained a standard framework that had three stages for our study area, the TAPLINE.

**In the first stage**, we organized documentation based mainly on a literature review and supported by data from official websites of the Ministry of Culture, Heritage Commission, Aramco, and the Emirate of the Northern Borders Region. All the information collected from different sources was divided into five main groups of aspects that reflect the complex characteristics of TAPLINE:

- a) The overall and geographical context emphasizes the physical and structural components utilized in oil extraction. A complex of areas, tools, and facilities is examined, along with their characteristics and connections to adjacent urban areas.
- b) Oil extraction activity: this pertains to the site's history, the oil industry's operations, and its post-industrial use, and it considers the potential for adaptive reuse with regard to IHT.
- c) A protection system is a crucial component when discussing the oil industry and WHL, including international and national regulations and protection measures. Being the inaugural site in the Kingdom of Saudi Arabia to be listed in the Industrial Heritage National Registry.

- d) The reuse of properties considers the growth and adjustment to new roles in connection with IHT. This encompasses potential public activities and the manner in which they are disclosed.
- e) Impact: the role that IH plays in development plans and in various degrees of economic growth (local and regional). A crucial element concerning IHT is the growth of interest in tourism, both domestically and abroad.

**In the second stage**, a comparative evaluation of the gathered information is conducted to pinpoint prospects and obstacles. The aforementioned five aspects of properties' functioning and modern transformation have been further developed in light of the characteristics of properties found in the literature review. The goal is to determine the essential elements and characteristics that best describe the adaptive reuse of the properties.

It was considered that the presence or intensity of the factors and features of the aforementioned aspects may vary. As a result, for their precise identification, a three-level scale (applicable, partially applicable, and not applicable) was employed. In the framework of IHT, this assessment serves as a comparative tool to find TAPLINE opportunities associated with its adaptation to new functions.

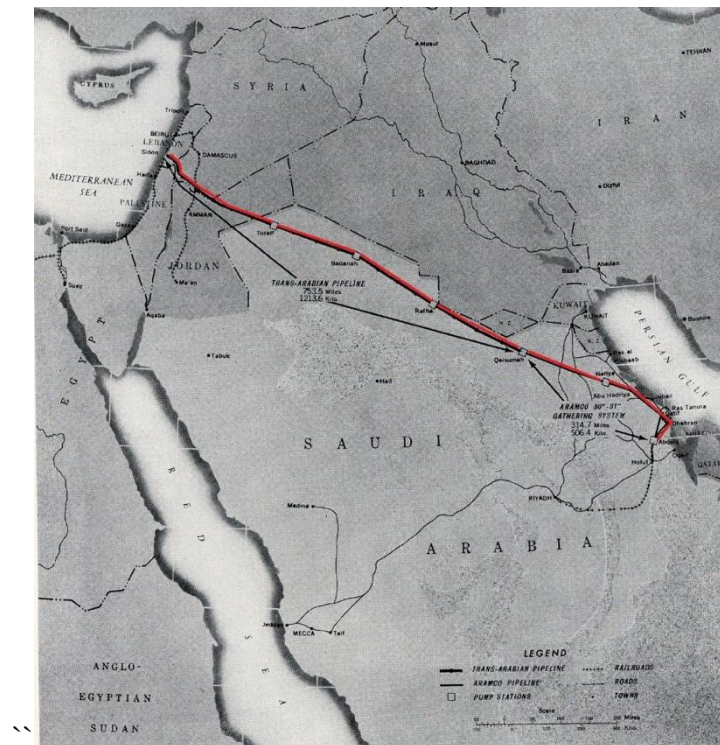
**The third stage** of the study involves identifying and elucidating the possible advantages and disadvantages of TAPLINE metamorphosis and adjustment to new roles in relation to initiating IHT. These problems were discussed in relation to the comparative analysis's findings as well as the major ideas that this paper's case studies brought up in the literature review.

### **3.9. The study area TAPLINE will be addressed through five main axes**

#### **3.9.1. General and Territorial Context**

The TAPLINE is a steel oil pipeline extending from Abqaiq on the Arabian Gulf to the Mediterranean port of Sidon in Lebanon (see Fig.9) (Aramco, 2021). The Trans-Arabian Pipeline Company, known as TAPLINE, was founded in 1945 (Al-Mutlaq et al., 2020), the name of the TAPLINE came from the abbreviation of the phrase Trans Arabian Pipeline, as it crosses several Arab countries. These countries are Saudi Arabia, Jordan, Syria, and Lebanon (Allamie, 2017). This ambitious, innovative engineering project is built from a 1,648 km crude oil pipeline (Aramco, 2021), 1,213 km of which are within Saudi borders (UNESCO, n.d.). When completed, the TAPLINE was the longest oil pipeline in the world (Ibnlaboun, 2017; Aramco, 2021). This large-scale project was completed in a very short amount of time between 1948 and 1950. At a construction cost of \$230 million, over 200,000 pipe joints were used in conjunction with 3,000 pieces of heavy equipment (Al-Mutlaq et al., 2020). This region was initially called the Pipeline Governorate until its name was changed to the Northern Borders Province in 1957 (Al-Talhi et al., 2003; Allamie, 2017). The construction of this pipeline played a great role in the renaissance of the surrounding areas, as it was the nucleus of modern population settlement centers. It is worth noting that the pumping stations belonging to the TAPLINE Company had numbers instead of names until Aramco decided to send researchers specializing in Arab culture to track the path of the pipeline. And writing the names of those stations, which often refer to the local terrain (Allamie, 2017).





**Fig. 9** The route of the Trans-Arabian Pipeline, Adapted from Aramco (2021).

The Middle East's political relations, the national development of the participating Arab countries, and the global petroleum trade were all impacted by the TAPLINE. But TAPLINE's significance extends beyond its influence on the world economy and energy security; it played a significant role in shaping the region's cultural identity and fostering social and economic development, leading to the establishment of four cities in the kingdom with a combined population of 360,000 (Al-Mutlaq et al., 2020). The TAPLINE effect was immense: housing was constructed for the workers; restaurants started operating; sports stadiums and amusement centers, including movie theaters, were opened; and Arar became the home of the first television broadcasting center in the northern region. The pipeline was the impetus for the construction of airports in multiple cities, including a regional airport in Arar, along with government buildings, schools, hospitals, power plants, and water stations. The company also provided scholarships for its employees to develop their knowledge and build capabilities; workers learned new languages, cultures, and skills (Al-Talhi et al., 2003; Allamie, 2017). Most of these facilities are still standing and can be re-adapted to serve new functions.

### 3.9.2. History

After World War II, Western countries became thirsty for oil (Ibnlaboun, 2017; Al-Mutlaq and Al-Anazi, 2020; Aramco, 2021). To quench their thirst for the project of rebuilding, reconstructing, and reviving their dilapidated economies from the flames of war. They called for this project, which was known as the Marshall Project and aimed to establish and own the pipeline by the American government, but after the famous TAPLINE Agreement in 1947, the broad outlines appeared when King Abdel Aziz's (Founder of Saudi Arabia) met with US President Franklin Roosevelt on board the American frigate Quincy. The King did not object to the construction of the line by the Americans, but he objected to the American government's ownership of it (Al-Mutlaq and Al-Anazi, 2020).

The purpose of this pipeline was to shorten the distances traveled by oil via marine oil tankers from the Arabian Gulf and around the Arabian Peninsula and across the Red Sea to the Suez Canal (Aramco, 2021). This reduces transportation costs; Aramco saved about \$75 million annually in shipping expenses after operating this line in 1950 (see Fig.10 and 11) (Al-Mutlaq and Al-Anazi, 2020). It used to take ten days for a tanker traveling from Ras Tanura to the Mediterranean, and it cost \$30,000 per tanker to cross the Suez Canal (Al-Mutlaq et al., 2020). In addition to reducing the risks to which tankers may be exposed (Ibnlaboun, 1999; Al-Mutlaq and Al-Anazi, 2020).



**Fig. 10** 200,000 steel tubes, each 9 meters long were used to construct the TAPLINE. Source: from Aramco (2021).



**Fig. 11** Six original pumping stations were built along the TAPLINE route to pump oil, five of which are in Saudi Arabia and one in Jordan. Source: from Aramco (2021).

The TAPLINE remained one of the essential components of Aramco's oil transportation network for more than 40 years, until a new generation of giant oil tankers came along that surpassed it in terms of size and economic feasibility, reducing the economic advantages of the TAPLINE Company (Aramco, 2021). What's more, the Gulf War is affecting the TAPLINE functions, resulting in its official end of operations in 1990 and the ceasing of the four Saudi pumping stations in the beginning of 2000 (Al-Mutlaq et al., 2020).

### 3.9.3. Protection Regime

One of the most significant symbols of Saudi Arabia's material and spiritual oil culture is the TAPLINE. For those living nearby, it is also one of the most well-known heritage sites; it has a great place in their hearts, which makes the local community highly aware of the significance of the site, and this is what supports integrated protection and community involvement.

An overview of the TAPLINE's remains will show 1,213 km of steel pipeline with diameters of 30 and 31 inches and the four major pumping stations (Qaisomah, Rafha, Arar, and Turaif) that have been shut down and fenced off by the local government to safeguard their land areas. Conversely, the auxiliary pumping stations (Al-Shabah, Al-Uaigaliyah, and Hizam Al-Jalameed) were demolished (Al-Mutlaq et al., 2020).

After being selected by the Saudi Ministry of Culture to be the first IH site in the Kingdom of Saudi Arabia in December 2020, the TAPLINE file was transferred to the Ministry of Culture (Aramco, 2021). The sites are now enjoying additional protection and a site management program that ensures the protection of their Outstanding Universal Value (OUV), since they were submitted in 2023 as part of the Oil Industrial Heritage in Saudi Arabia on the tentative list of UNESCO. According to the nomination file submitted in the tentative list, all the TAPLINE's components have been highly authentically preserved throughout its extensive journey across the Saudi desert (UNESCO, n.d.).

### 3.9.4. Rearrangement, Reuse, and Functions

The oil production and extraction industry, often shrouded in mystery and fascination, is further enhanced by the association with the renowned brand 'ARAMCO.' This powerful brand identity serves as a significant attraction factor for IHT in the region.

Despite the official launch of the TAPLINE project and the preservation of Valve Room 300 as a museum and learning center, the potential for repurposing the remaining structures remains vast. Many of the abandoned pumping stations could be adapted for new uses, like being used as a museum or gallery, library, school, or vocational training center for the petroleum industry, community centers, research facilities, conference centers, restaurants or cafes, wellness centers, or they may be re-adapted into a boutique hotel.

As for the steel pipes, their parts have been dismantled, and their future remains uncertain. Nevertheless, parts of it may be placed and employed in museums for educational purposes. We also encourage using parts of the pipes in children's playgrounds and parks after good maintenance as it is an advantageous way to link subsequent generations with their past in a way that is enjoyable and has a positive impact. Some components of the pipes can also be utilized in collaboration with local artists to create artistic sculptures and strategically position them in front of significant government buildings or city squares, highlighting that stage while preserving its symbolism and history. To enhance the presence of the TAPLINE in the community and raise awareness of its importance in the early stages of Saudi Arabia's oil renaissance, models of it were created in some cities located along the pipeline (see Fig.12).





**Fig. 12** The TAPLINE model located in the village of Al-Deedab east of the city of Arar, SPA

### **3.9.5. Impact**

The high tourist attraction of the IH calls for the development of tourist facilities in the cities created by the TAPLINE period and their surroundings. Which, in return, will positively impact the employment opportunities for the local community related to the operation of these cultural and tourist sites as a post-industrial area and its new program, resulting in local economic growth. The potential of TAPLINE in these contexts is considered one of the main factors for development strategies applied at the local and regional levels.

The TAPLINE project is one of the most significant projects that the Ministry of Culture aims to develop and launch to represent the identity of Saudi industries. In order to support IHT, the Ministry is working to develop IH in a sustainable manner from an economic, social, and environmental standpoint to create spaces in which the potential of IH is utilized. To gain from international experiences and create heritage industrial sites that will benefit the country's economy and society, the Ministry of Culture organized a number of workshops and conferences with the participation of international experiences, such as the TICCIH organization.

## **4. Results of the Comparison**

The main aspects of the transformation and adaptation process, within the context of a comparative evaluation, including the assessment of the key factors and features of TAPLINE related to its characteristics and specificities in the context of IHT, are presented in Table 2.

**Table 2.** XX = applicable; X = partially applicable; - = not applicable. Source: Constructed by authors.

Aspects	Factors/Features	Applicability
General and territorial context	- basic exploration equipment - complex of supporting facilities/areas - other natural and/or anthropogenic areas/resources - amidst urban setting - easy transportation /airport	- XX XX X XX
Stage of extraction activity	- oil extraction works - post-industrial area with new functions	- XX
Protection regime	- national register of monuments - national historical monument - UNESCO World Heritage	XX XX XX
Reuse for new functions	- sightseeing tours - virtual tours - historic center - museum/permanent exhibition - art exhibitions/sculptures - events (meetings, conferences, concerts, etc.) - sport facilities/events - scientific research - educational programs - digital layer (webpage, virtual tours, mobile apps, etc.)	XX X XX XX XX X X XX XX XX
Impacts	- local and/or regional development strategies - local and/or regional economic growth - local community activation strategy - job opportunities - regional tourist interest - international tourist interest	XX XX XX XX XX XX

## 5. Discussion

This research explores the transformative potential of Industrial Heritage Tourism (IHT) in Saudi Arabia, using the TAPLINE as a central model. TAPLINE, with its significant historical, technological, and cultural attributes, exemplifies how industrial heritage sites can be leveraged for sustainable development and tourism.

The discussion of the TAPLINE model for developing IHT in Saudi Arabia presents a comprehensive overview of its historical significance, protective measures, potential reuse, and expected impact. Let's delve into each aspect and its implications:

- The TAPLINE's extensive geographic reach, coupled with its significant role in economic development and integration into urban environments, underscore its status as



a cultural and historical landmark, thus amplifying its attractiveness for tourism.

- The historical narrative traces the TAPLINE's establishment in the post-World War II period, highlighting its crucial role in oil transportation, economic rebuilding, and societal development.
- Recognition of the TAPLINE site as the first site in the Saudi Arabia to be included in the National Industrial Heritage Register underscores its cultural significance and the commitment to preserving its authenticity. Furthermore, its listing in the UNESCO Tentative List also demonstrates a collective endeavor to protect its Outstanding Universal Value (OUV).
- The discussion explores the potential reuse of TAPLINE infrastructure, such as pumping stations, administrative buildings, hospitals and workers' housing for diverse purposes according to a sustainable approach:
  - o Converting some buildings into museums containing photos and documents about the inception of the pipeline, along with some steel pieces from the pipeline.
    - o Utilizing some buildings for food and beverage services such as shops, restaurants, and small cafes.
    - o Meeting rooms and exhibition halls can be used to hold meetings and workshops for Aramco and the oil sectors.
    - o Tourist routes in some areas that were crossed by the oil pipeline, including rural tourism, camping, and camel riding.
    - o Establishing visitors' offices at some stations along the pipeline route.
    - o Using some buildings as educational and cultural centers, banquet halls, and music theaters.
    - o Utilizing steel pipe components in artistic installations and innovative methods to preserve heritage.
- The discussion outlines the expected impacts of reusing the site, encompassing local and regional economic growth, job generation, and the engagement of the local community through tourism initiatives. The TAPLINE project aligns with overarching development strategies aimed at harnessing IH for sustainable economic and social benefits.
- The comparative assessment highlights the distinctive attributes of the TAPLINE site in the context of IHT. Through an analysis of factors such as territorial context, protection regime, reuse possibilities, and projected impacts, stakeholders can assess the project's applicability and its capacity to stimulate tourism growth.

## 6. Conclusion

Industrial Heritage IH encompasses the historical, technological, and social significance of industrial sites, including buildings, machinery, and related cultural artifacts. Two principal approaches to IH emerge: cultural tourism, repurposing sites for heritage tourism, and commercial development, converting sites for commercial use. Industrial Heritage Tourism IHT aims to preserve history, promote economic growth, and offer educational opportunities, contributing to regional regeneration.

This research underscores the transformative potential of IHT for sustainable development, exemplified by the Trans-Arabian Pipeline (TAPLINE) in Saudi Arabia. Although industrial heritage is underrepresented globally, with only 65 out of 1,199 properties on the WHL—primarily in Europe—the potential for economic development and cultural preservation is substantial. Key categories include railways

and bridges; mines; water management systems and canals; and industrial services, pointing to untapped potential in regions like the Arab and African continents.

The research methodology, which involved the comprehensive identification and mapping distribution of world industrial heritage sites, demonstrates that a systematic approach to documenting and classifying IH can be a valuable tool for future research and development efforts. By examining global examples of industrial heritage revitalization, the study highlights how IH can become a viable component of sustainable tourism strategies, contributing to urban regeneration, economic diversification, and social cohesion.

TAPLINE, as Saudi Arabia's first industrial heritage site to be included in the Tentative List of the World Heritage, spanning 1,648 km from Saudi Arabia to Lebanon, serves as a powerful symbol of the Kingdom's industrial legacy and its role in shaping both the national and regional economy. The pipeline's infrastructure, including pumping stations, railways, and oil extraction facilities, stands as a testament to the country's industrial achievements. The adaptive reuse of such facilities—whether as museums, cultural centers, or tourist routes—not only preserves the material heritage but also revives its cultural and social significance, thereby making it accessible and relevant to contemporary society.

Local community involvement, driven by initiatives such as the Ministry of Culture's crowdsourcing efforts, is essential for the success of IHT projects. Public participation enriches heritage conservation with authenticity and inclusivity, while also bolstering community identity and pride. TAPLINE, with its historical significance and potential for adaptive reuse, is poised to be a leading model for integrating industrial heritage into Saudi Arabia's cultural and economic framework.

The research highlights TAPLINE's alignment with Saudi Vision 2030 that emphasizes tourism and heritage development to diversify income and achieve sustainable growth, demonstrating how industrial heritage can drive cultural preservation, economic growth, and sustainable development. TAPLINE's transformation into a tourist site showcases its potential as a cultural asset and economic catalyst, setting a model for integrating IH into national strategies while preserving its historical significance.

This study underscores the transformative potential of industrial heritage tourism (IHT) as a driver for sustainable development, regional regeneration, and cultural preservation. By showcasing the TAPLINE case, the research provides a pioneering model for leveraging IH within Saudi Arabia, aligning with national goals and fostering global recognition.

Future research should focus on exploring the direct economic benefits of adaptive reuse projects, providing concrete evidence to support investments in industrial heritage and highlighting its role as a driver of sustainable economic growth.

## 7. Recommendations

Focus on systematically documenting industrial heritage sites to highlight their cultural and economic potential.

- Develop TAPLINE into a flagship IHT project through museums, cultural hubs, and heritage tours.
- Actively involve communities in heritage projects to ensure inclusivity, authenticity, and a shared sense of pride.

- Incorporate industrial heritage into strategic frameworks such as Saudi Vision 2030 and work toward registering these sites on the World Heritage List.
- Strengthen partnerships between public and private sectors to secure resources and expertise for heritage preservation.
- Develop initiatives to educate stakeholders and communities on the significance and value of industrial heritage.
- Evaluate economic impacts by conducting research on the benefits of industrial heritage projects to emphasize their importance and attract investments.

## 8. Abbreviations

ICOMOS	International Council on Monuments and Sites
IH	Industrial Heritage
IHT	Industrial Heritage Tourism
OUV	Outstanding Universal Value
SCTA	Supreme Commission for Tourism and Antiquities
SCTH	Saudi Commission for Tourism and National Heritage
TAPLINE	Trans-Arabian Pipeline
TICCIH	International Committee for the Conservation of Industrial Heritage
UNESCO	United Nations Educational, Scientific and Cultural Organization
WH	World Heritage
WHC	World Heritage Committee
WHL	World Heritage List

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## التابلاين كنموذج لتطوير سياحة التراث الصناعي في المملكة العربية السعودية

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المخلص	معلومات المقالة
<p>يتناول هذا البحث إمكانات سياحة التراث الصناعي، مع التركيز على خط الأنابيب عبر الجزيرة العربية (التابلاين) كنموذج رائد في المملكة العربية السعودية، والذي أُدرج في القائمة المؤقتة للتراث العالمي في عام ٢٠٢٣. يُظهر البحث كيفية دمج السياحة التراثية الصناعية في استراتيجيات السياحة الوطنية، مما يعزز التنمية المستدامة ويرفع الحضور الثقافي العالمي للمملكة. تعتمد منهجية الدراسة على تحديد وتحليل مواقع التراث الصناعي المدرجة في قائمة التراث العالمي، باستخدام جمع البيانات ورسم الخرائط الجغرافية (GIS) لتقييم توزيعها الجغرافي وأهميتها. كما تستند الدراسة إلى دراسات حالة لمواقع تراث صناعي مدرجة على قائمة التراث العالمي، مما يوفر رؤى حول استراتيجيات الحفظ والترويج السياحي الفعالة. يكشف البحث عن الإمكانيات الكبيرة لخط الأنابيب (التابلاين) كنموذج للسياحة التراثية الصناعية في المملكة العربية السعودية، مسلطاً الضوء على دوره في الحفاظ على التراث الثقافي، وإنعاش الاقتصاد المحلي، وتعزيز السياحة المستدامة من خلال استراتيجيات إعادة الاستخدام التكميلي، ويمكن أن يسهم بشكل كبير في تعزيز التنمية المحلية وصون التراث الثقافي وتوظيفه في تحقيق مستهدفات السياحة في رؤية ٢٠٣٠. ويقترح البحث استراتيجيات عملية للاستفادة من الموقع في السياحة، ومنها إعادة استخدامه بطرق مبتكرة تشمل إنشاء المتاحف، وتطوير مسارات سياحية، وإقامة مراكز ثقافية؛ كون ذلك يسهم في تعزيز المشهد الثقافي ويدعم النمو الاقتصادي المستدام في المملكة.</p>	<p>الكلمات المفتاحية</p> <p>التراث الصناعي؛ سياحة التراث الصناعي؛ المملكة العربية السعودية؛ التابلاين؛ التراث العالمي.</p> <p><b>(JAAUTH)</b> المجلد ٢٧، العدد ١، (٢٠٢٤)، ص ٤١٩-٤٤٣.</p>