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An endangered aspect of the Industrial Heritage. Study and mapping of the Decauville Systems in Greece of the 19th and 20th century

Keywords: Industrial Heritage, Decauville railways, GIS, historical maps, thematic information

Summary: The railway marked the developments of the 19th century. The industrial revolution brought significant changes in human activity motivated by economic growth. Railway networks were developed and installed around the world for both cargo and passenger services. The Decauville system played a key role in the development of the railways.

In Greece, as in many other places, such systems were developed and installed in various areas, both in the mainland and in the islands. They were developed for different purposes such as e.g., the permanent connection of isolated areas with urban centres, military purposes, the transport of industrial products mainly in ports, the extraction and the transport of mineral deposits in mines, even within the framework of archaeological excavations.

Today most of them are abandoned and need protection, restoration and reuse. In the context of the preservation of this important industrial heritage, the first step is the recording and mapping of these systems. This work takes an approach by creating a Geographic Information System which provides geographical and thematic information on a number of such facilities in Greece including historical maps, aerial and terrestrial photographs and other data that are crucial in such a study.

Introduction

Industry has played an important role in shaping modern culture as a key element in the economic and social development and an essential part of the cultural heritage. A technical monument is considered an important carrier of information and knowledge, as it captures cultural and environmental influences. The study of industrial heritage secures the historical knowledge and shapes the perception of the modern social reality. Therefore, the prospect of its rescue is a significant project (Lampropoulos *et al.*, 2018).

The International Committee for the Conservation of the Industrial Heritage (TICCIH) is the world organization for industrial heritage and a special advisor to ICOMOS (International Council on Monuments and Sites). TICCIH aims to promote international cooperation regarding the conservation, study, documentation, research and education on industrial heritage. The term "Industrial Heritage" includes the remains of industry, such as industrial sites, structures and infrastructure, machinery and equipment, housing, settlements, landscapes, products, processes, embedded knowledge and skills, documents, records and of course the use and treatment of this heritage in the present (Hughes 2017: 83-84).

The steam engine and especially the steam-powered locomotive is considered as the symbol of the industrial revolution. The railways, as the union of steam and iron rails, became a new form of transport that flourished in the later nineteenth century, enhancing industry and social life (Wilde, 2019). The roots of the railways are located in England with the original locomotive "Locomotive" by George Stephenson that was adapted to a passenger railroad in 1825. The railway spread to England, Europe, the rest of the world and Greece (Documentary of the Hellenic Broadcasting Corporation - ERT [GR] 2022a).

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After the collapse of the Ottoman Empire, the areas of Greek territory were cut off from the rest of the Balkan countries. The main trade routes were by sea, while in the mainland the roads were few and inaccessible. The need for the development of a network that would unite the Greek cities with each other arose and the railway was chosen as the most suitable means. The first proposals for the construction of a railway in Greece appeared as early as 1835. A number of documents and contracts testify the first steps of the railways in Greece (Documentary of the Hellenic Broadcasting Corporation - ERT [GR] 2022a).

Compared to other countries, the Greek railway network was very limited even in 1912, when the first phase of its development was completed, but its contribution to the infrastructure of the economy was crucial. Given the huge shortcomings of the road network and the high cost of its construction, the railway was the only means of transportation that could unify local markets. It remained the most important means of transportation, in combination with maritime transport, until the widespread use of the car, until the 1960s. that made it financially unviable (Dertilis, 2009).

A special form of narrow railway network that was installed in Greece are the Decauville lines, invented by the French industrialist Paul Decauville (1846-1922). He first engaged in cultivating land and later he set up a factory in Petit-Bourg for the manufacture of small portable narrow-gauge railway equipment, intended mainly for large agricultural holdings. Such a railway consisted of portable short line elements (0.40 to 0.60 meters) that could be installed easily and their use was particularly suitable for public works and infrastructure projects (Encyclopedia "Papyrus Larousse Britannica" 1991: 43).

The recording and mapping of Decauville systems in Greece is a challenge in the context of the effort to protect the industrial heritage. In this study, a documentation application for the Greek Decauville railway lines was organized and developed using ArcGIS Pro software. This Geographic Information System (GIS) proved to be a necessary tool that can integrate on a single basis all available spatial information, such as historical maps, aerial photographs and terrestrial photographs and digital terrain models, combining it with thematic - descriptive information concerning Decauville systems in Greece.

Documentation of Decauville Systems in Greece

The documentation process of the Greek Decauville networks includes the collection and categorization of the thematic information for each line, the research in cartographic collections for the location of the Decauville railways in historical maps of their operational period, as well as the collection of topographic data and photographic documentation files. The GIS application with the above data includes maps of Decauville railways integrated and superimposed on the modern topographic map of Greece and accompanied by the corresponding thematic information and photographic documentation.

1. Recording and mapping of Decauville Systems

The first step for the documentation of Decauville systems was a systematic literature review and internet research on the railways that operated in Greece and afterwards a methodical recording of the thematic information that concerns them (Fig. 1). Thus, information was obtained such as location, year of construction, active period, length, type and use of the line, stops and infrastructure. The connection of the lines with central railway networks, the ownership status, the maintenance status and the mechanical equipment were also studied. It was observed that most of the Decauville

networks have been completely removed, in others some parts or equipment of historical value have been preserved, while only the Rack Railway (Odontotos) Diakopto-Kalavryta and the now tourist line of Pelion are still in operation.

id	Name	Location	Construct	Active period	Length	Type	Use	Stops
1	The Almopia Decauville train (Skydra-Aridiza)	Pella	1916	1916-1939	28 km	Decauville 0.6m	Military network (1916-1918), Commercial use (1919-1939)	Skydra, Apsalos, Ksifani, Aridaia.
2	Decauville line & cable car Luventa Mesonisi-Florina-Pisoderi	Florina	1916	1916-1918	21 km	Decauville 0.6m + a cable car	Military network (1916-1918)	Mesonisi, Florina, Alonia, Viglia, Pisoderi.
3	Kodza Déré Decauville Railway	Kilkis	1917	1917-1918	13.5 km	Decauville 0.6m	Military network (1916-1918)	Axioupoli, Vroncho Spirai, Pigi, Black Tree.
4	Decauville railway Naria-Englis-Topçin-Vatliak	Thessaloniki	1916	1916-1918	30-35 km	Decauville 0.6m	Military network (1916-1918)	Nea Filadelfeia, Anchoalos, Gelyna, Vathyiakos.
5	Decauville narrow-gauge railway in Naoussa - Vermio	Imathia	1910	1910-1921	20 km	Decauville 0.6m+ a cable car	Commercial use (1910-1921)	Metamorfoosi, Galaria, Gurnosovo, LeKadia.
6	Train of the lignite mines of Moschopotamos (Pieria)	Pieria	1918	1918-1929	27 km	Decauville 0.6m	Military network (1918-1919), Commercial-industrial	Moschopotamos (Dryanista), Aronas, Katerini, Skala Vromeni (Kallithea)
7	The Pelion Train	Magnesia	1894-1903	1903-1979, 1996-present	28 km	Decauville 0.6m	Commercial use	Volos, Agria, Ano Lechonía, Ano Gatzzea, Milies.
8	Delphi Archaeological Excavation Railway	Fokida	1892	1892-1903	3 km	Decauville 0.6m	Archaeological purposes.	Delphi.
9	Odontotos rack railway	Achaia	1889	1889-present	22 km	Gauge 0.75m + a toothed part (3.4 km)	Commercial use.	Diakopto, Niamata (Mikrohelidou), Triklia, Kato Zachloro, Mega Spileo, I.
10	Tsalapatas RoofTile and Bricksworks Factory (Volos)	Magnesia	1926	1926-1978	1 km inside + Decauville 0.6m	Decauville 0.6m	Industrial use.	Volos.
11	Kronos Factory (Elefsina)	Attica	1923-1928	1966	1 km inside + Decauville 0.6m	Decauville 0.6m	Industrial use.	Elefsina.
12	Hilarion Roux et Cie Company Railway, Lavrio	Attica	1865	1865-1873	10 km	Decauville 0.6m	Mining.	Lavrio.
13	The emery mines of Naxos	Cyclades	1925	1925-1982	15 km	A cable car	Mining.	Pigi (Koronosi), Pezoules, Stravolagada, Alonistres, Moutsounas (port of Limnora)
14	Copper mines in Other (Limnora) (Lamia)	Phthiotis	1868	1868-7	unspecified	Decauville 0.6m	Mining.	Lamara
15	The Limneria (Thassos) Mining Complex	Thassos	1903	1903-1962	2 km	Decauville 0.5m	Mining.	Limneria
16	Domokou Mines (Ombriaki)	Phthiotis	1923	1923-1991	11 km	Decauville 0.6m	Mining.	Ombriaki
17	Barytes mines (Mykonos)	Cyclades	1955	1955-1983	An outer sec	Decauville 0.6m	Mining.	Barytes
18	White stone quarry of the Vasilikon-Polichnitos (Lesvos)	Cyclades	1928	1928-1952, Initially (1928)	An outer sec	Decauville 0.6m	Mining.	Vasilikon-Polichnitos
19	Megaló Leivadi (Serifos)	Cyclades	1873	1873-1963	An outer sec	Decauville 0.6m	Mining.	Megaló Leivadi

Figure 1: Thematic information concerning the Decauville railways in Greece.

The existence of Decauville railways in Greece was then documented by locating them in historical maps that refer to their operational period and include geographic information about the railway network of each area (Fig. 2). A thorough research was carried out in order to find such maps in the "Cartographic Heritage Archives" of Thessaloniki, on a number of maps of special historical value that belong mainly to private collections. Maps were also found through internet research on the "Bibliothèque Nationale de France" website, which is an open-source platform for cartographic material, as well as on other websites.

Title	Decauville railways	Year	Scale	Map source
Routes de Macédoine	Narés-Ingliš-Topçin-Vatluk	1918	1:200 000	Bibliothèque nationale de France
Kodza Déré River Railway (Historic Map)	Kodza Déré	1917	1:200 000	Wikimedia Commons, the free media repository
Thessaloniki (Saloniki)	Kavallari-Myrkinos	1940	1:500 000	Private collection of S. Demertzis. Digital Copies: Cartographic Heritage Archives
Geophysical and political map of Greece	Pelion (Volos-Agria-Ano Lechonía-Ano Gatzzea-Milies)	1924	1:1.000.000	Bibliothèque nationale de France
Selánik	Pelion (Volos-Agria-Ano Lechonía-Ano Gatzzea-Milies)	1943	1:800.000	Private collection of S. Demertzis. Digital Copies: Cartographic Heritage Archives
Railway map of Greece	Pelion and Odontotos rack railway (Diakopto-Kalavryta)	1968	1:1.000.000	Private collection of S. Demertzis. Digital Copies: Cartographic Heritage Archives
Map of Pieria	Moschopotamos lignite mines	1941	Not mentioned	larissanet.gr
PLAN DU VILLAGE DE DELPHES	Delphi Archaeological Excavation Railway	1897	Not mentioned	Bulletin de correspondance hellénique, Volume 21, Persée
PLAN DU VILLAGE DE DELPHES (Edited)	Delphi Archaeological Excavation Railway	1897	Not mentioned	Hellenic Railway Heritage

Figure 2: Collection of historical maps that depict Decauville railways in Greece.

The study of Decauville systems in Greece led to their classification into five main categories based on their use (Fig. 3). At the beginning of the 20th century, Decauville railways were created in Macedonia to serve military needs. Other networks, such as the Pelion line (Volos-Milies), were created for the transportation of passengers and goods. Also, short Decauville railways were used to serve the needs of industry (e.g., Tsalapata factory in Volos, Kronos factory in Elefsina). At the end of the 19th century the Decauville type railway lines dominated in most of the mining areas of the islands (e.g., Thassos, Naxos, Mykonos, Serifos, Lesvos) (Pougakioti, 2017). We can also find Decauville lines in mines in the mainland, such as in Moschopotamos, Pieria, Lavrio and Domokos. The Decauville network was used for archaeological excavations in Delphi during the period 1892-1903, which was then transferred to Delos.

Use of Decauville Systems	
1	Military networks (Macedonia)
2	Passenger and commercial networks
3	Industrial networks
4	Mining networks
5	Archaeological excavation network of Delphi

Figure 3: Classification of the Decauville systems in Greece based on their use.

II. Creation of a Geographic Information System

The GIS application developed for the Decauville railways in Greece contains a cartographic background (World topographic map and Hillshading) which integrates a number of spatial data in raster format (historical maps, aerial orthophoto maps, DTMs) and vector format (digitized Decauville railways and stations). Pop-up tables of the database with thematic information and attachments such as historical and modern photographic documentation and pdf files with detailed thematic information are attached to the vector data.

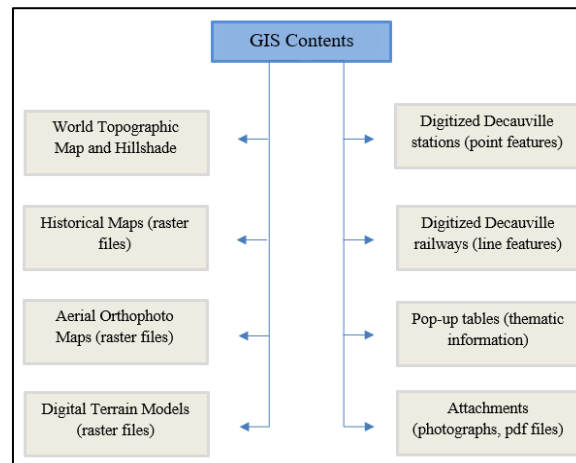


Figure 4: Contents of the GIS application for the Decauville systems in Greece.

The following are some examples documented in the GIS application for each of the five categories of the Decauville systems in Greece:

a. Military networks (Macedonia)

In the geographical region of Greek Macedonia, at least five Decauville networks are spotted that were built for military use during the First World War, such as "the Almopia Decauville train", "the Decauville line & cable car Liverta Mesonisi – Florina – Pisoderi", "the Kodza Déré Decauville Railway", "the Decauville railway Narès – Inglis – Topçin – Vatiluk" and "the train of the lignite mines of Moschopotamos (Pieria)".

The line "Narès – Inglis – Topçin – Vatiluk" is depicted on a historical map of 1918 in the digital archive of the "Bibliothèque nationale de France" with a black dashed line. This line seems to be connected to another railway line that follows the route "Anchialos to Sindos (Tekeli) and Chalas-tra". The train stops at the respective locations were digitized based on the modern cartographic background and symbolized by points with yellow color pins. The historical map was inserted into the application and adapted to the cartographic background (Fig. 5).

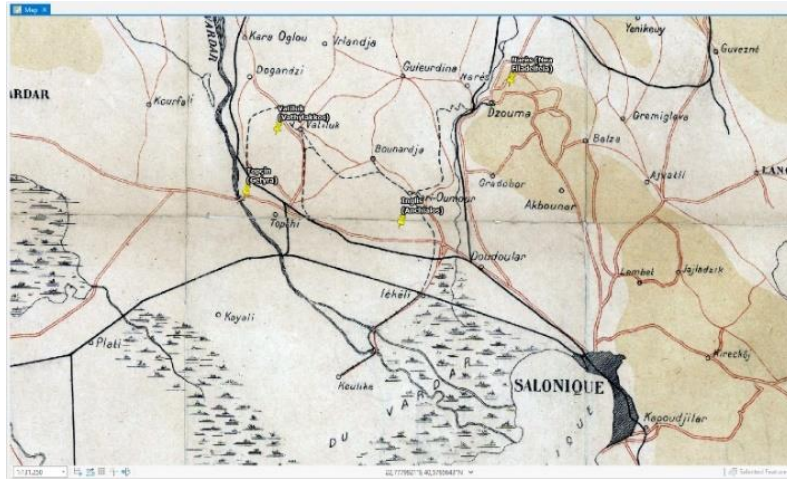


Figure 5: Integration of a historical map of the Decauville railway "Narès–Inglis–Topçin–Vatiluk" (1918) in the GIS Application (Map Source: Bibliothèque nationale de France).

The route "Narès – Inglis – Topçin – Vatiluk" was digitized linearly in yellow and was linked to the thematic information. The table contains, among other things, a hyperlink (URL) to a web page in which that route is described (Fig. 6). Additional historical photographs of the train, the Decauville lines and the bridge at Vathilakkos were attached to the vector line (Fig. 7).

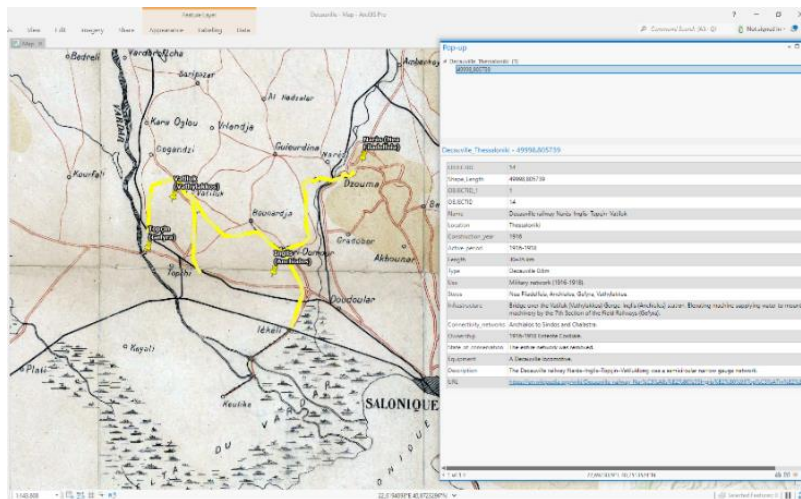


Figure 6: Digitization of the Decauville railway "Narès–Inglis–Topçin–Vatiluk" and linkage to thematic information.

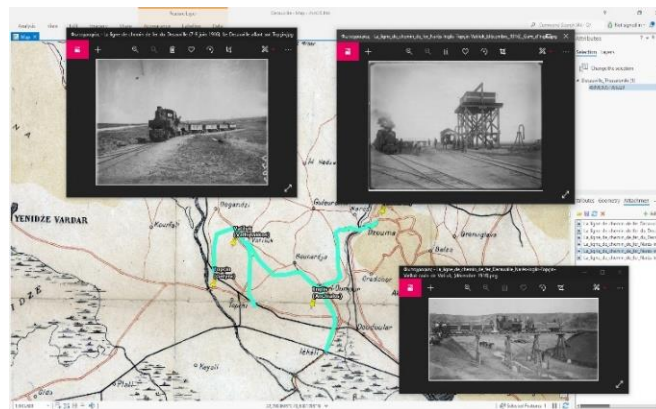


Figure 7: Attachment of historical photographs of the railway "Narès–Inglis–Topçin–Vatiluk".

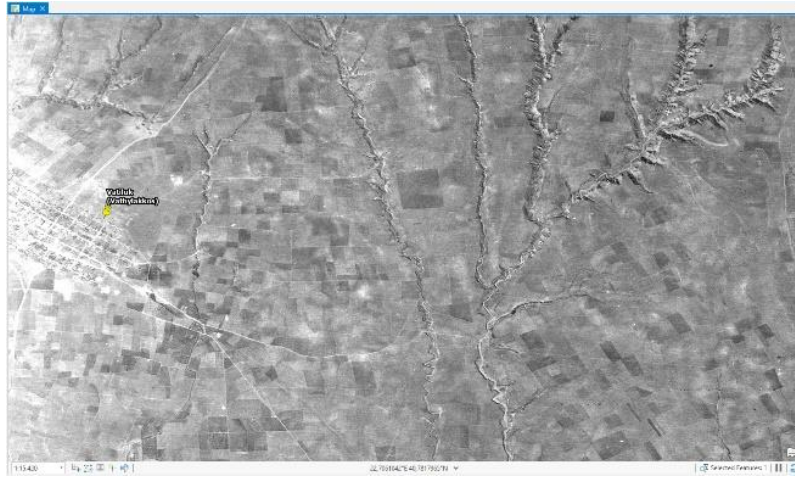


Figure 8: Integration of an aerial orthophoto map 1:42.000 of the area "Narès–Inglis–Topçin–Vatiluk" (1945) in the GIS application.

The Kodza Déré Decauville Railway was another 13.5 km long narrow-gauge military railway, built and operated by French troops during World War I from 1917 to 1918 near Polykastro (Karasuli) in Macedonia (Fig. 9). The French headquarters were based near Axioupolis (Bohemica), so the valley of the Kodza Déré River was of strategic importance to the Allied Forces. There was also a camp of the 122th Division and a military hospital located near Pigi (Isvor). Just a few kilometers above, on the height of the Skra-di-Legen Canyon, the Battle of Skra-di-Legen took place (Wander, 2022).

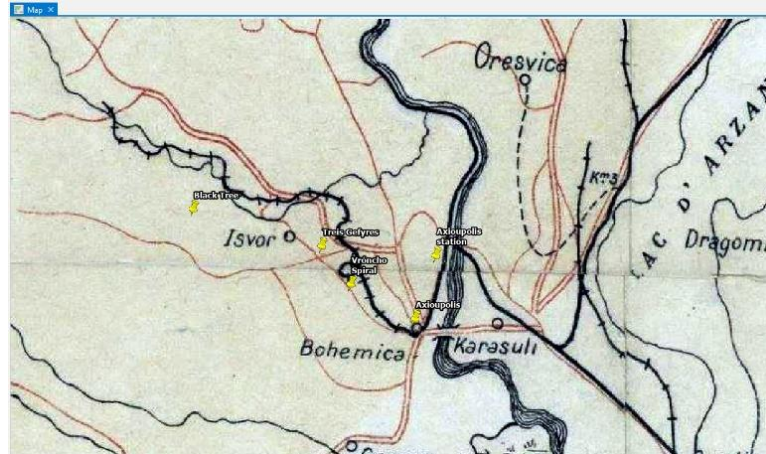


Figure 9: Integration of a historical map of the Kodza Déré Decauville Railway (1917) in the GIS Application (Map Source: Wikimedia Commons, the free media repository).

A Decauville line that connected Kavallari (Thessaloniki) with Myrkino (Serres) following the course of the Old National Road Thessaloniki - Kavala is depicted on a German map of 1940, scale 1: 500.000 with the designation "Schmalspurige Eisenbahn", that is, as a narrow-gauge railway. A document dated 15/02/1941 states that this Decauville line had already been abolished by the Germans during the occupation in order to build a road network (Fig. 10).

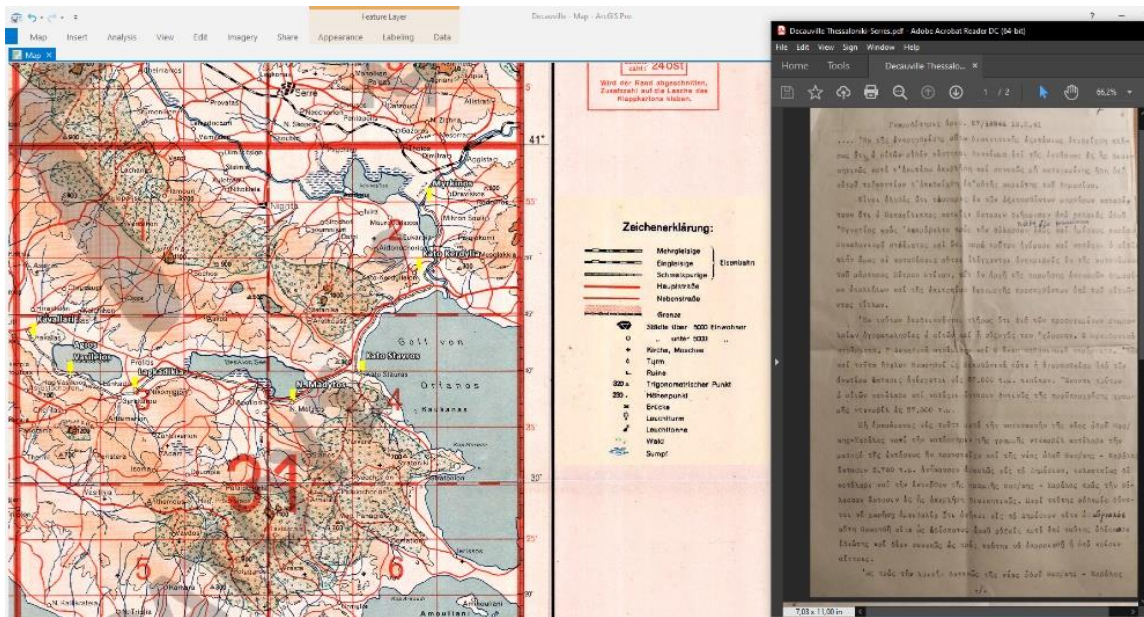


Figure 10: Integration of a German historical map of the Decauville Railway of Kavallari-Myrkinos (1940) and attachment of a relevant document (1941) in the GIS Application (Map Source: Private collection of S. Demertzis. Digital Copies: Cartographic Heritage Archives).

b. Passenger and commercial networks

An interesting case of Decauville line for passenger and commercial use is located in the region of Magnesia. In 1891, the first discussions began for the construction of a new line connecting Volos with the most important villages of Pelion, with 60cm width for reasons of economy in materials and technical works, as such a narrow line could be maneuvered in the most steep and inaccessible mountain passes. The construction of the 28 km long Volos-Milies line offered a bright future for the Thessalian railways and for the producers and residents of the mountain settlements (Documentary of the Hellenic Broadcasting Corporation - ERT [GR] 2022b).

On a map of the year 1924 (Fig. 11) the railway line "Volos-Agria-Ano Lechonia-Ano Gatztea-Milies" is located which according to the map legend has a width of 0.6 meters. This line operated during the period 1903-1971 and is still operating from 1996 until now as a tourist attraction. Figure 12 shows a historical map 1:800.000 of the year 1943, which also displays the Decauville line of Pelion and is referred to as "Dekovil" (Decauville) in Turkish on the map legend.

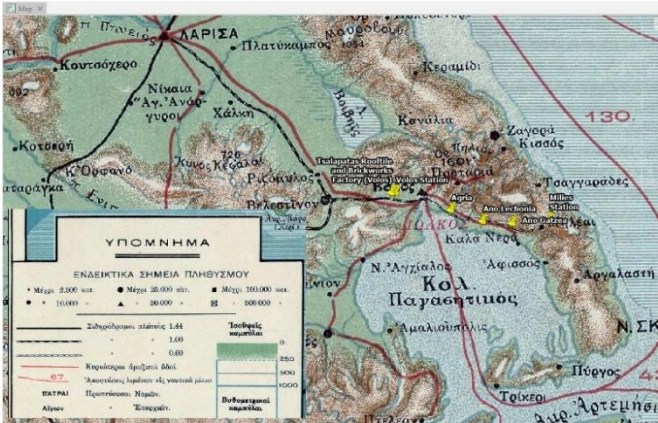


Figure 11: Integration of a historical map of the Decauville railway "Volos-Agria-Ano Lechonia-Ano Gatztea-Milies" (1924) in the GIS application (Map Source: Bibliothèque nationale de France).

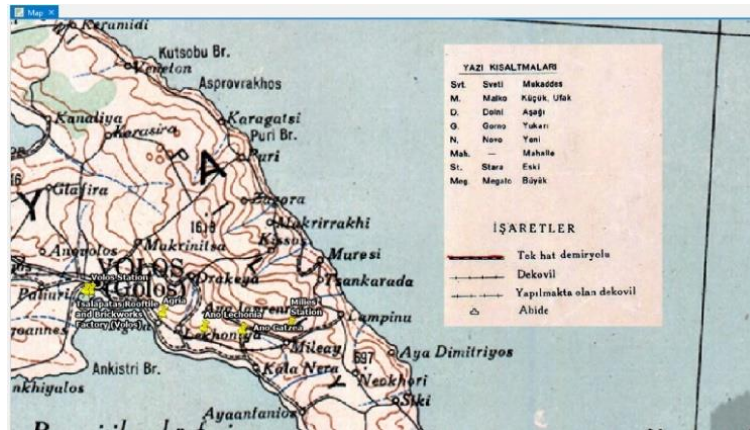


Figure 12: Integration of a historical map of the Decauville railway "Volos-Agria-Ano Lechonia-Ano Gatzzea-Milies" (1943) in the GIS application (Map Source: Private collection of S. Demertzis. Digital Copies: Cartographic Heritage Archives).

The Digital Terrain Model and old orthophotomaps of the area were also integrated in the application. Milies, the last station of the network, is distinguished as a mountainous area served by the Decauville line (Fig. 13).

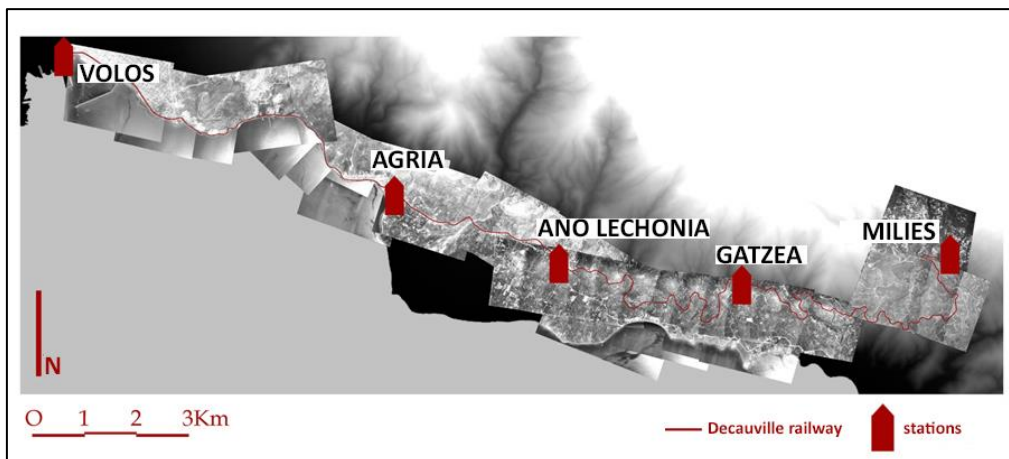


Figure 13: Integration of a Digital Terrain Model and old orthophotomaps of the area "Volos-Agria-Ano Lechonia-Gatzzea-Milies" in the GIS application.

Figure 14 shows the connection of the railway line with thematic information and the hyperlink to an informational website about the Pelion train, which from the first years of its operation played a primary role in the economic development of the region. In particular, it helped the fast and safe transportation of agricultural production from the villages of Pelion to the export areas and vice versa, reduced to a minimum the transport costs of agricultural production and was the only means of transportation for products and inhabitants during the German occupation. The Volos-Milies railway contributed to the development of Volos in one of the largest commercial and industrial centers of Greece and made it an attraction for many investors and entrepreneurs from various parts of Greece and abroad. It was also directly connected with the traditions, culture and customs of Pelion and became an essential part of the life of the inhabitants. The painter and writer Giorgio de Chirico, son of Evaristo de Chirico, the Italian engineer and director of the Thessalian Railways, drew inspiration from the railway and used in some paintings the figure of the train as a basic visual element (Michala, 2012).

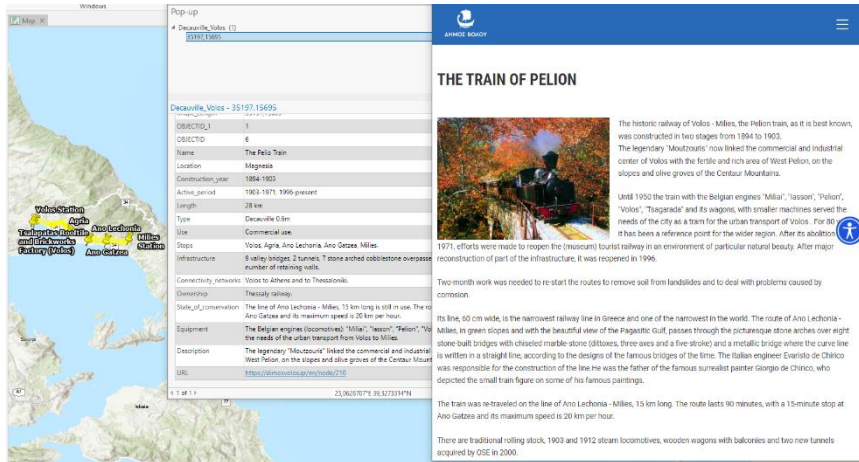


Figure 14: Linkage of the digitized railway "Volos-Agria-Ano Lechonia-Gatzea-Milies" to thematic information and hyper-linking to an informational website.

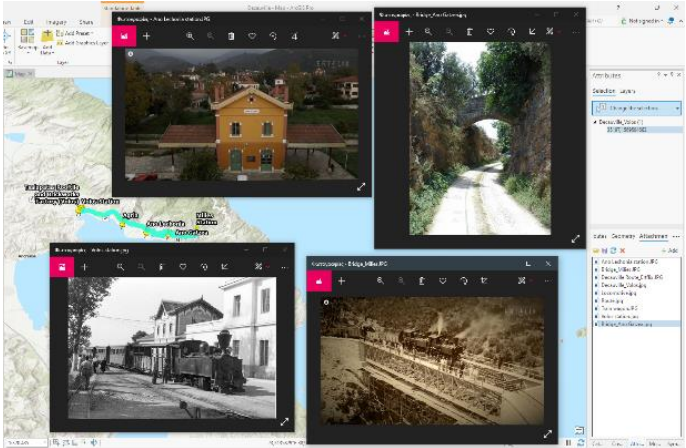


Figure 15: Attached photographs of stations and bridges of the railway "Volos-Agria-Ano Lechonia-Gatzea-Milies".

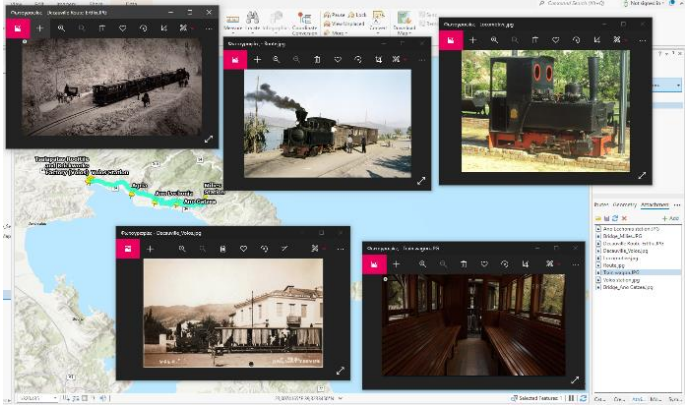


Figure 16: Attached photographs of the route, the locomotive and the train wagons of the railway "Volos-Agria-Ano Lechonia-Gatzea-Milies".

On a railway map of Greece of the year 1968, the 0.60m wide Decauville lines of Pelion (Volos-Milies) and Odontotos in Achaia (Diakopto - Kalavrita) can be spotted (Fig. 17). The "Odontotos" rack railway is one of the few rack trains in the world and a unique attraction as the most mountainous railway line in Greece. It is so named in Greek after the mechanism that such trains use in order to climb safely on steep slopes. For the longest part of the journey the train moves on conventional

rails and it moves on the rack rails when the degree of slope exceeds 10%. It covers the 22km journey at a speed of 30 to 40km/h on conventional rails and 6 to 15km/h on rack rails, passing through areas of spectacular natural beauty (Trainose 2022).



Figure 17: Railway map of Greece (1968): Decauville railways of Pelion (Volos-Milies) and the Odontotos rack railway in Achaia (Diakopto-Kalavryta) (Map Source: (Private collection of S. Demertzis. Digital Copies: Cartographic Heritage Archives).

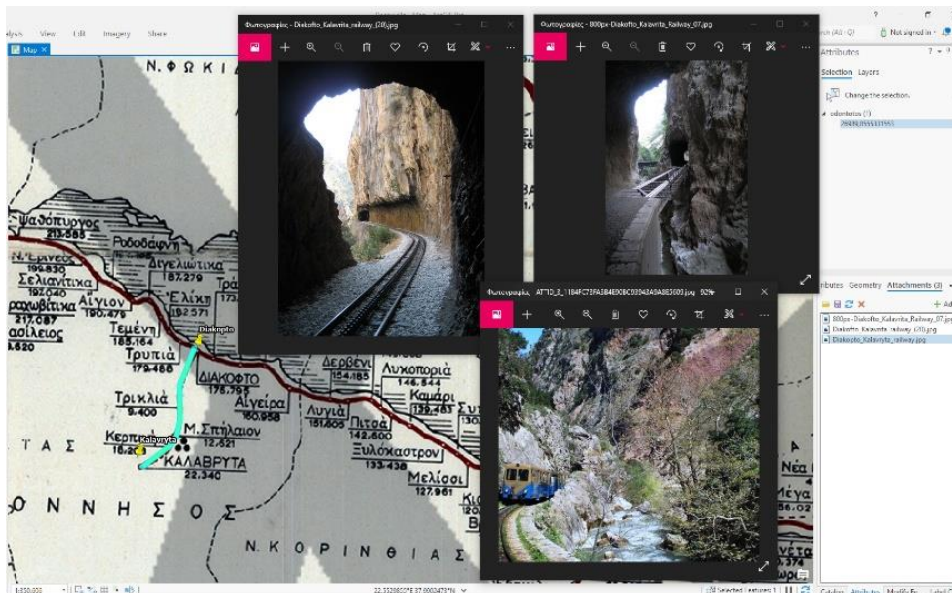


Figure 18: Attached photographs of the Odontotos rack railway in Achaia (Diakopto-Kalavryta).

c. Industrial networks

The N. & S. Tsalapatas Rooftile and Brickworks Factory in Volos is a significant sample of industrial heritage in which a Decauville railway was used. It was founded in 1926 covering a total area of 22.000m². The dryers were a vital part of the production cycle. In the outdoor dryers, the products

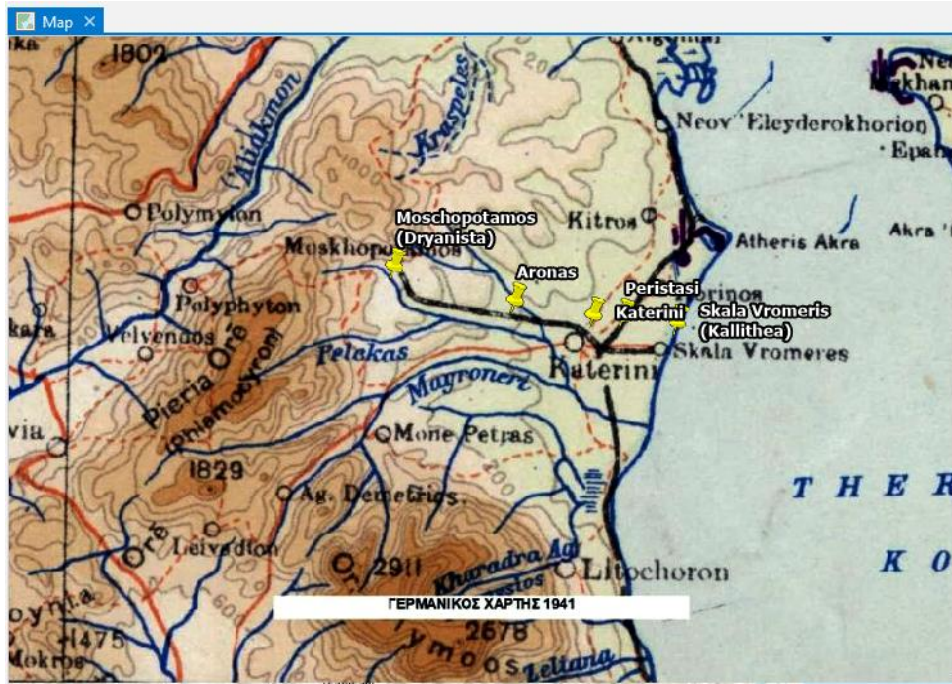


Figure 20: German historical map of Pieria (1941) that depicts the Decauville railway of the Moschopotamos lignite mines "Moschopotamos (Dryanista)-Aronas-Katerini-Skala Vromeris (Kallithea) " (Map Source: larissanet.gr).

As already mentioned, the installation of Decauville lines in mines of the Greek islands was frequent. On the thematic map of figure 21, the mines in the Cyclades region are marked with orange dots, with Decauville lines being located on the islands of Serifos, Mykonos, Naxos and in the mainland in Lavrio.

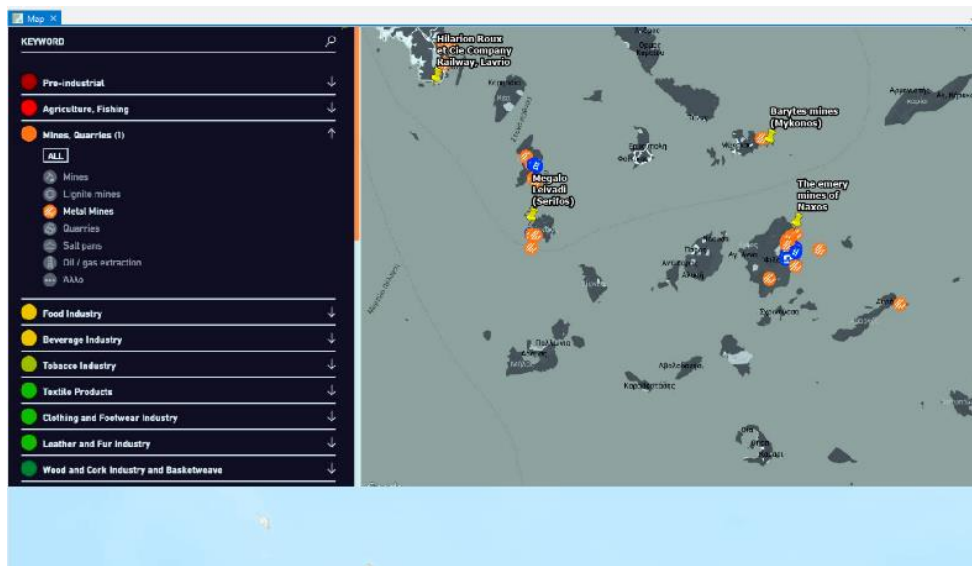


Figure 21: Thematic map of metal mines in the Cyclades islands (Map Source: V.I.D.A.Team, 2022).

Indicatively, in Serifos the mines were scattered in Megalo Livadi, Voladia and Koutalas and reached also the place Plagia. Until 1952 there were no highways and for over 80 years the transportation of minerals to cargo ships was done without self-propelled mechanical means. The solution was the

Figure 22: Attached pdf file with information about the mines of Megalo Leivadi, Serifos.

small Decauville railway network with rolling wooden wagons, able to move with the forces of people or animals. In 1910 the railway network had covered the entire area of mining in the south-western part of the island and remained in operation until 1963 (Pougakioti, 2017).

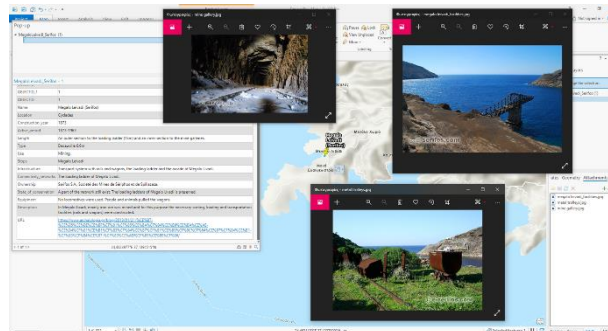


Figure 23: Thematic information and attached photographs of the mines in Megalo Leivadi, Serifos (Image Source: e-serifos.com 2022).

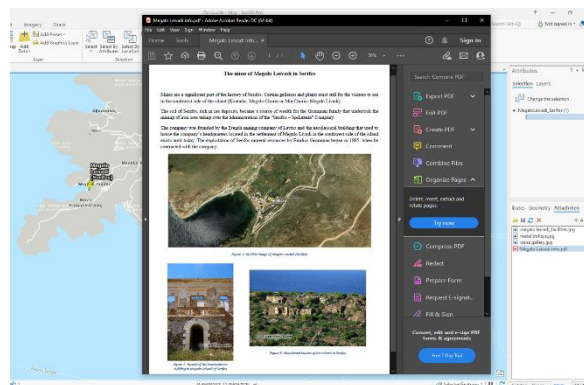


Figure 24: Thematic information and attached photographs of the mines in Megalo Leivadi, Serifos (Image Source: e-serifos.com 2022).

e. Archaeological excavation network of Delphi

The "Great Excavation of Delphi" (La Grande Fouille de Delphes) started in 1892 under the auspices of the French School of Athens (École française d'Athènes). For the easier transportation of aggregates from the excavation sites to the landfills, from July to September 1892, a Decauville railway network was constructed with a total length of 1.8km and a line width of 0.5m. Gradually, another 1.2km of line was constructed by 1897, with the result that the total length of the network was 3 km. The achievement was great, as the rails were placed on ground with large height differences. After the end of the excavations in 1903, the network was dismantled and transported together with the wagons to the island of Delos, where it was used for the excavations that had begun. On the elaborate topographic diagram of the French engineer Henry Convert, the Decauville network of Delphi with its extensions is marked in red (Fig. 25) (Hellenic Railway Heritage, 2015). Thanks to the Great Excavation of Delphi, the Hieron of Apollo, one of the major sites of Greek cultural heritage, has regained its place at the forefront of ancient sites. The «resurrection» of the sanctuary of Apollo was possible only after the expropriation and transfer of the village of Kastri (Picard, 1992). The «Great Excavation» uncovered a lot of other amazing remains, including about three thousand significant inscriptions that concern public life in ancient Greece. Today, the Greek Archaeological Service in collaboration with the French School of Athens continue to research, excavate and conserve the Delphic sanctuaries (Partida, 2012).

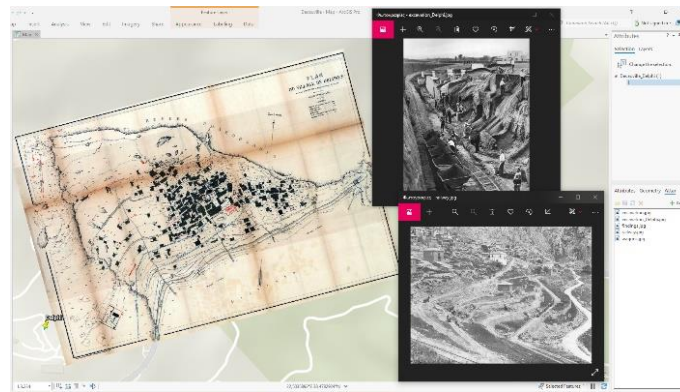


Figure 25: Integration of a historical map of Delphi (1897) and attachment of historic photographs in the GIS application (Map Source: Bulletin de correspondance hellénique. Volume 21. Persée).



Figure 26: Edited historical map of Delphi (1897) with the Decauville railway marked in red color (Map Source: Hellenic Railway Heritage).

Conclusion

This research shows that the presence of Decauville narrow portable lines in Greece was important in serving military, passenger, commercial, industrial, mining and archaeological purposes and stimulated its social, economic and cultural development. Today, only the Pelion line and the impressive Odontotos line in Achaia, which is one of the most famous railway networks in the world, operate as tourist attractions. The remains of other lines and the surviving mechanical equipment are elements of the industrial heritage worth preserving and highlighting.

The Decauville railways recording application in ArcGIS environment integrates a wide range of spatial and thematic data and can serve as an easy-to-use digital documentation database, giving access to historical maps, historical and contemporary photographs from the network's remains and descriptive information that keep alive this part of the Greek industrial heritage. The study continues and explores the possibility of spotting other locations where Decauville lines were installed, as well as other data that more fully document the already identified ones. Finally, it is suggested that similar applications can be developed for other cartography-related research that provides a wealth of documentation material.

References

- Brochure of the Rack Railway* (2022) *Trainose*. Available at: www.trainose.gr (Accessed: 16 May 2022).
- ‘Decauville, Paul’ (1991) *Encyclopedia ‘Papyrus Larousse Britannica’, Series No.16*.
- Delphi Excavations Railway 1892-1903* (2015) *Hellenic Railway Heritage*. Available at: <http://railwayheritage.blogspot.com/2015/05/delfi-excavations-railway-1892-1903.html> (Accessed: 12 May 2022).
- Dertilis, G. V. (2009) *History of the Hellenic Republic 1830-1920*. No.B. Athens: Bookstore of ‘Estia’, ISBN: 978-960-05-1433-9.
- Dimitrakopoulos, T. (2022a) ‘The History of the Greek Railways - The birth of the Greek Railways, season 1, episode 1’. Greece: Hellenic Broadcasting Corporation - ERT [GR]. Available at: <https://www.ertflix.gr/vod/vod.180517-e-istoria-ton-ellenikon-siderodromon-1>.
- Dimitrakopoulos, T. (2022b) *The History of the Greek Railways - The Railways of Thessaly, season 1, episode 8*. Greece: Hellenic Broadcasting Corporation - ERT [GR]. Available at: <https://www.ertflix.gr/vod/vod.187667-e-istoria-ton-ellenikon-siderodromon-8>.
- e-serifos.com (2022) *The mines of Serifos*. Available at: <http://serifos-en.e-serifos.com/what-to-do-in-serifos/mines-of-serifos.php> (Accessed: 1 May 2022).
- File:Kodza Déré River Railway 000 (Historic Map).jpg* (1917) *Wikimedia Commons, the free media repository, Kostis Manasis: Axioupolis - Bohemitsa*. Available at: [https://commons.wikimedia.org/wiki/File:Kodza_Déré_River_Railway_000_\(Historic_Map\).jpg](https://commons.wikimedia.org/wiki/File:Kodza_Déré_River_Railway_000_(Historic_Map).jpg) (Accessed: 5 May 2022).
- Hughes, S. (2017) *Protection and Reuse of Industrial Heritage: Dilemmas, Problems, Examples*. Edited by M. Ifko, S., Stokin. Ljubljana: Monographic Publication of ICOMOS Slovenia. Available at: <http://www.icomos.si/files/2015/06/publication-icomos-slovenia-2.pdf>.
- Kodza Déré Decauville Railway AXIOÚPOLIS, GREECE* (2022) *Wander*. Available at: <https://www.wander.am/travel/axioupolis-80661/places/kodza-dere-decauville-railway-130564.en.html> (Accessed: 10 May 2022).
- Kontogoni, K.A., Kollaros, J. D. (1924) *Geophysical and political map of Greece 1:1.000.000, Bibliothèque nationale de France, département Cartes et plans, GE C-19301*. Available at: <https://gallica.bnf.fr/ark:/12148/btv1b532005945?rk=214593;2> (Accessed: 10 May 2022).
- Lampropoulos, C., Vakalopoulou, M., Daniil, M., Fassourakis, I. (2018) ‘V.I.D.A.: an attempt to record the Greek Industrial Heritage’. Available at: <https://wp.vidarchives.gr/wp-content/uploads/2021/04/Elleusis2021-Culture2030-BIDA.pdf>.
- larissanet.gr (2022) *THE FAMOUS TRAIN OF THE LIGNITE MINES OF MOSCHOPOTAMOS, PIERIA - 100 years ‘Decauville’ (1918 – 2018)*. Available at: <https://www.larissanet.gr/2018/05/21/100-chronia-ntekovil-1918-2018/>.
- ‘Map of Selanik 1:800.000’ (1943). Thessaloniki, Greece: Private collection of S. Demertzis. Digital Copies: Cartographic Heritage Archives. Available at: www.maplibrary.gr.
- ‘Map of Thessaloniki 1:500.000’ (1940). Private collection of S. Demertzis. Digital Copies: Cartographic Heritage Archives. Available at: www.maplibrary.gr.
- Michala, A. (2012) *THE STABLE TRACK MEANS FROM THE 19TH CENTURY TO 1974*. Doctoral T. Panteion University of Social and Political Sciences. Available at: <https://docplayer.gr/70739544-Ta-mesa-statheris-trohias.html>.

Partida, E. (2012) *Delphi History, Ministry of Culture and Sports*. Available at: http://odysseus.culture.gr/h/3/eh351.jsp?obj_id=2507 (Accessed: 13 May 2022).

Picard, O. (1992) 'Le centenaire de la grande fouille de Delphes (information)', *Comptes rendus des séances de l'Académie des Inscriptions et Belles-Lettres*, 136^e année, N. 4, 1992. pp. 669-673. Available at: https://www.persee.fr/doc/crai_0065-0536_1992_num_136_4_15144.

PLAN DU VILLAGE DE DELPHES (1897) *Bulletin de correspondance hellénique. Volume 21. Persée*. Available at: https://www.persee.fr/docAsPDF/bch_0007-4217_1897_num_21_1_6483.pdf (Accessed: 10 May 2022).

Pougakioti, V. (2017) *Diploma Thesis: Study of the construction system and metal carrier of the port scaffolding in Megalo Leivadi, Serifos. Proposal for Restoration*. NTUA, Interdepartmental Program of Postgraduate Studies 'Conservation and Restoration of Historic Buildings and Sites'.

'Railway map of Greece 1:1.000.000' (1968). Private collection of S. Demertzis. Digital Copies: Cartographic Heritage Archives. Available at: www.maplibrary.gr.

Rooftile Museum Volos (2019) *Domotel Hotels & resorts*. Available at: <https://domotel.gr/rooftile-museum/> (Accessed: 10 May 2022).

Service topographique des armées alliées (1918) *Routes de Macédoine Service topographique biv1b84590504 1(High Res)*, *Bibliothèque nationale de France, département Cartes et plans, GE D-8707*. Available at: <https://gallica.bnf.fr/ark:/12148/btv1b84590504/f1.item.langEN.zoom> (Accessed: 1 May 2022).

The Rooftile and Brickworks Museum N. & S. Tsalapatas (2016) *Piraeus Bank Group Cultural Foundation*. Available at: <https://www.piop.gr/en/diktuo-mouseiwn/Mouseio-Plinthokeramopoieias-Tsalapata/Istoriko.aspx> (Accessed: 10 May 2022).

V.I.D.A.Team (2022) *Vault of industrial digital archives*. Available at: <https://vidarchives.gr/en/reports> (Accessed: 11 May 2022).

Wagons, Rooftile and Brickworks Museum (2022) *Archeology and Arts*. Available at: <https://www.archaiologia.gr/blog/photo/βαγονέτα-μουσείο-πλινθοκεραμοποιία/> (Accessed: 10 May 2022).

Wilde, R. (2019) *The Railways in the Industrial Revolution, ThoughtCo*. Available at: <https://www.thoughtco.com/railways-in-the-industrial-revolution-1221650> (Accessed: 14 May 2022).