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From **railway to cycling**: Lost chance or future expectation?

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Abstract | National rail networks are under serious transformations. While new, technologically advanced rails are being built, old lines are left abandoned. This change reveals the opportunity for alternative uses on the derelict network, as it stands on historical routes and penetrates notable settlements. Alternative tourism models promote walking and cycling as a key element of recreational activities. Derelict rail lines are being reused worldwide, through regeneration schemes in the rural environment. The aim of this paper is to explore the prospects of the transformation of rail lines into redeveloped walking and cycling paths under the wider scope of cycle tourism and integrated programs of abandoned rail lines utilization. This is an ongoing research and an overview of expected results is presented.

Keywords | Mobility, Athens, Cycle tourism, Rural development, Re-use.

Resumo | As redes ferroviárias nacionais estão a sofrer grandes transformações. Ao mesmo tempo que novos trilhos tecnologicamente avançados estão a ser construídos, as linhas antigas estão a ser abandonadas. Esta mudança revela a oportunidade para usos alternativos da rede abandonada, uma vez que se localiza em rotas históricas e atravessa importantes localidades. Modelos de turismo alternativos promovem passeios a pé e de bicicleta como um elemento fundamental das atividades recreativas. As linhas ferroviárias abandonadas estão a ser reutilizadas em todo o mundo, através de esquemas de regeneração no ambiente rural. O objetivo deste trabalho é explorar as perspetivas de transformação dessas linhas em percursos pedestres e de bicicleta, reconstruídos no âmbito mais amplo de cicloturismo e programas integrados de utilização de linhas ferroviárias abandonadas. A investigação ainda se encontra em curso, pelo que este trabalho apresenta uma visão geral dos resultados esperados.

Palavras-chave | Mobilidade, Atenas, Cicloturismo, Desenvolvimento rural, Reutilização.

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1. Introduction

Despite the Greek economic hardship, the tourism sector continues to grow at some point, but is mostly being remodelled. The mass tourism model is being argued and alternative ways of sustainable tourism development are emerging. At the same time, the rail network is being transformed worldwide. New rail lines are being developed while old ones are left abandoned, as the demand for immediate connection between large urban centres is increasing and technology calls for higher speeds and bigger curvature radius alignment. Hence, modernization in transport leaves 'gap corridors'. The old railway network alignment though, passes through valuable countryside areas and in the past has been a growth engine for many of the suburban settlements it was crossing. Until 2013, more than 360 km of the old rail network of Greece had been abandoned.

In the above direction, this research explores the potential of the development of a cycling tourism strategy through the use of the above derelict zones. Cycling tourism, in Greece, is a slow growing sector with few coordinated initiatives (i.e. Eurovelo, local paths, etc.) and limited completed infrastructures.

Urban and regional planning in regard to tourism development in Greece, during the last decades, was limited to large scale plans close to seaside zones, unified tourist villages, as well as fragmentary, private and individual developments subject to all-inclusive concepts. The concerns for the expansion of this mass tourism model as well as the potentials revealed by the rich Greek countryside have somehow induced the discussions for alternative, sustainable and eco-tourism development related to walking and cycling activities.

2. Aims and objectives

This paper discusses the potential upgrade of existing rail lines into recreational, cultural and educational routes in the Greek countryside and more specifically around the Athens Metropolitan Area, in Attica Prefecture. It explores alternatives in transformation of rail lines and future uses of the routes in favour of locals and visitors. It explores theoretically the transition from abandoned rail lines into recreational cycling paths supporting tourist development, through an overview of cases and attributes.

Figure 1 | Draisine platforms in rail trail.

Furthermore, this paper will refer to the basics of cycling tourism in the Greek environment focusing on Athens, in order to promote the potential restoration of rail lines. Special attention is paid on the importance of integrated schemes for the reuse of derelict rail lines through cycling tourism. A pilot implementation on the route from Agioi Anargiri (Athens) to Lavrio (Sounio) forms a suitable example of railway transformations, useful for conducting a preliminary evaluation and for setting the basis for future research. Limitations will also be examined, as occurring from the perplexing legal framework and ownership status.

3. Methodology

This research started with an exploration of international experience and many paradigms were analysed, regarding any potential utilization of

Figure 2 | Draisine from *Régie Autonome des Transports Parisiens* (RATP).

Figure 3 | Rail bikes in Costa Rica.

abandoned rail lines. On parallel, we did focus on cycle tourism methods and applications, as seen in the Greek and the European environment. Drasines technology was analysed and design features were gathered, in order to assist the formulation of an alternative cycling culture in the countryside. Considering the existing abandoned rails around Attica, we examined some potential routes both in urban and rural areas. Agioi Anargiri to Lavrio route was studied in more detail.

In order to ease the reading of the paper, definitions of some basic terms and concepts are provided below:

i) Rail trail: is a term used to describe former rail lines that have been converted to facilitate walking, cycling and other infrastructures (i.e. horse riding).

ii) Draisine (or a hand-car): is a term used to describe rail vehicles formerly used for track control that are increasingly being redesigned as tourist attractions. They can be common draisines powered with hand operated lever, motorized with petrol engine or electric motor and rail bikes with foot pedals (Brauckmann, 2012a, 2012b).

iii) Bike draisine/rail bike: Draisine-like structures embedded with bicycles. They can have platform seats for two or more passengers. They can also consist of metal structures and two bicycles (which are either stabilized on the rails) or simply one bicycle which is attached by the skeleton on both rails. The attached bikes can be conventional portable bicycles. Also called cyclo-draisines.

4. From railway to cycling: An exploration of cases

It is true that the alignment of old railway lines has numerous interesting features. Firstly, it is their almost flat inclination, as old alignments follow mostly contour lines, which makes it easier to carve new walking and cycling paths. Secondly, the old railway networks are following the backbone of old urban and rural settlements network and reveal some of the best countryside characteristics while also promote and maintain the railway heritage.

The European experience shows that old rail lines are being converted into walking and cycling routes as part of tourist development schemes that promote contact with nature, exercise, culture and the rail way architecture (i.e. metal or wooden train bridges, tunnels, traditional stations-landmarks, etc.). The above conversion is usually carried out following two alternatives; the first being the covering (completely or partially) with asphalt or other material coating over the old rails and the shaping of a walking and/

or cycling path, complementary greening facilities and urban furniture (benches, etc.). It is seen in Austria, Belgium, Denmark, France, Germany, Hungary, United Kingdom (UK) and many more.

The second common practice deals with complete conservation of the existing rail lines and the use of bike-draisines. The latter has been applied in various places around England, France, Germany and the United States of America (USA) through territorial planning schemes but also in Greece through a pilot implementation on the rails inside Tritsis Environmental Awareness Park (in Athens).

Restoration procedures of derelict trail infrastructures are becoming a frequent phenomenon in Europe and the USA. Abandoned rail lines and deserted station-buildings are reclaimed and shifting into public open spaces through regeneration schemes. Interesting implementations demonstrate linear recreational parks, such as the Bloomingdale Trail in Chicago, the Old High Line in New York city, the Olympic Sculpture park in Seattle and other overambitious and controversial schemes like the low line project in the lower east side in Manhattan (underground linear park). The above are mostly applied in dense urban areas, revitalizing spatial gaps, addressing mainly to locals, while tourists are also benefited at the second level.

In Germany, on the contrary, rural rail links' transformation and the use of draisines seem to be prioritized. According to Brauckmann (2012), draisines are gaining more ground as an interesting tourist attraction. However, there is a need for services to become more professional and diverse. More than thirty tourist draisine operators, public and private, have developed a new state of alternative tourism in Germany. Similarly in the UK, the Cuckoo Trail at East Sussex, the Millennium Coastal Park at Llanelli and many others have been transformed from previous rail links into walking and cycling paths. Nevertheless, there is still inadequate experience in integrated cycling tourism schemes that would use rail platforms and links, by promoting rail heritage and upgrading the adjoining urban and rural centres they bypass.

Within our research, we have considered, as a first step, the area around Athens Metropolitan Area (AMA) as it is one of the most important territories of Greece in terms of economy and society. It also has most of the characteristics of a metropolitan area, in the global context, and more than 85 kilometres of derelict rail lines passing through focal nodes in urban and rural landscape. Cycling schemes have been applied in a rather fragmented way among some municipalities and Athens Metropolitan Cycling Network proposal (a study integrated in the *Strategic Plan of Athens 2020*) is gaining attention and provides an iconic image of the future.

The Rail network in AMA is owned and managed by the Hellenic Railways Organization. Greece, in general, had a relatively well distribution of rail lines but in the last decades has been subject to various changes, due to the economic hardship, the emergence of car-motorized transport, etc. Parts of the network have been modernized, while many sections have been abandoned, covered with street network or left free. Service levels are constantly reducing and the network is shrinking due to the upcoming reconfiguration of organization's strategy and privatization scenarios. Infrastructure is left underused and station-buildings are neglected. At the time, there are some scenarios explored by public and institutional bodies, for the expansion of existing lines and the densification of routes. However, there are still no proposals for the re-use of the derelict lines and the subsequent improvement of mobility and restoration of continuity around those underused urban and rural zones.

This research argues that the utilization of abandoned rail lines, in integrated cycling and walking tourism programs, should include a range of projects and accompanying policies in various fields, relevant to culture, education, economy, environment etc. and be part of a national tourist strategy, which Greece substantially lacks. The *Special Spatial Framework for Tourism* does not recognize cycling tourism as a separate tourism model and includes it in Naturalist-

Ecotourism aspect, which is mostly due to the lack of infrastructure and complementary policies. Repurposing land that was previously neglected by the State may boost an alternative era of projects in tourism with low cost, conventional policies.

An indicative list of projects in the case of Athens, which can also be applied elsewhere with similar characteristics, is the following:

Configuration of the old rail line into a pleasant and comfortable cycling and walking corridor;

Proper selection of signage, signalling and lighting;

Installation of information network targeted to rail users, cyclists and pedestrians, updating them for places and points of interest;

Installation of a service point network (bike repairs, health centre, etc.) and local shelter structures;

Improvements in road intersections, especially those leading to main landmarks around the regeneration zone and proper signage;

Progressive development of local bicycle networks in the neighbouring areas, in order for residents to include the revived rail lines in the daily travels;

Progressive restoration of railway property (buildings and open spaces) in order to accommodate complementary activities and services (commercial, leisure), which will attract further users and contribute to cost maintenance;

Enhancement of neighbouring landmarks and development of new focal points;

Development of a network of accommodation (hotels, hostels, etc.), friendly to cyclists, in the close vicinity of the intervention;

Adaptation of public transport travel timetables;

Progressive development of intermodal transportation system;

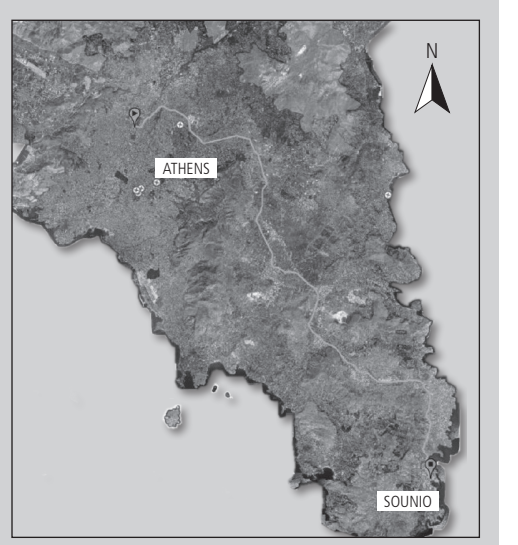
Development of bike sharing system close to train and bus stations;

Development of park and ride spaces;

Development of Internet booking system for all services;

Integration of the line into a development strategy for the neighbouring areas;

Systematic integration of the regenerated line in other complementary programs of tourism industry.



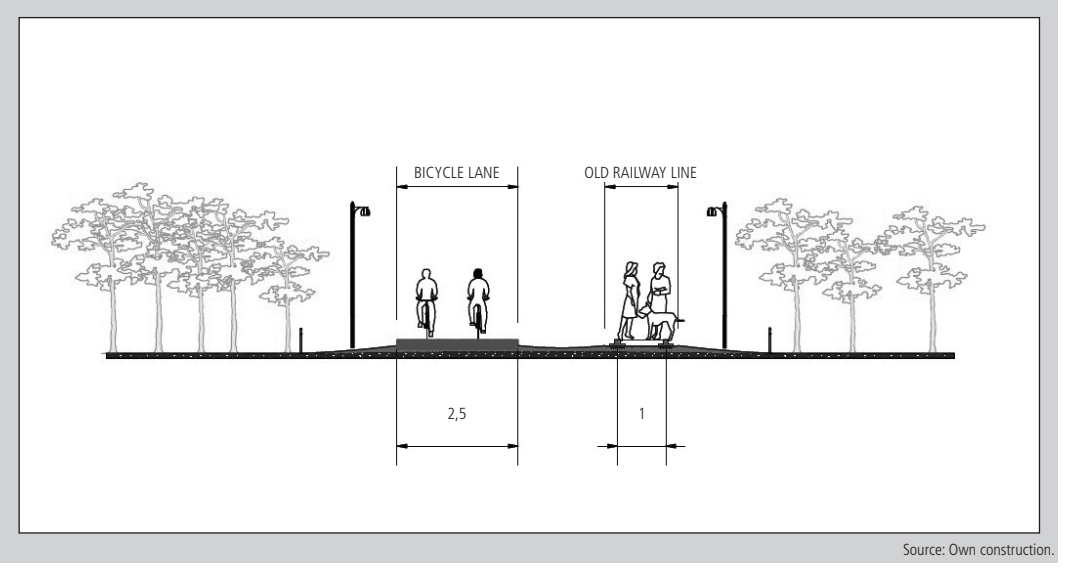
Source: Own construction.

Figure 4 | AgioiAnargiri-Lavrio old rail link and its extension to Sounio.

5. The route from Agioi Anargiri (Athens) to Lavrio (Sounio) in Athens

The examined underused rail link had a crucial meaning for the capital city of Greece as from 1885 until 1962. According to Papanikolaou (2008), it contributed a lot on the shaping of the social and economic character of Athens creating new perspectives on labour and transportation. Crossing AMA from almost one edge to the other, the 62.5 kilometre route strengthened social cohesion among isolated settlements and the centre of Athens (through its connection with suburban railway) and, in a way, played an important role in the early industrialization in Greece.

It passed through many municipalities such as Agioi Anargiri, Nea Filadephia, Nea Ionia, Iraklio, Maroussi, Chalandri (figure 4) and it gave access to various critical urban elements (historical industries and crafts) and landmarks, such as the



Source: Own construction.

Figure 5 | Indicative distribution of uses, in wider parts of the rail line zone (12-20 meters).

Roman Aqueduct (from 2nd century a.C.), Tritsis Environmental Awareness Park, etc. Moreover, it crosses major urban thoroughfares (Kifissias Avenue, Papanikoli Street, current National Road, etc.) and streams, but most importantly it leads to Lavrio, one of the main Athenian industrial ports. Officially it belongs to Public Real Estate Corporation.

Our research started there, due to the high importance of the line, the historic identity of the neighbouring zones and mostly because of its challenging planning characteristics. This rail line passes, as seen in figure 4, through municipality centres (Nea Ionia, Chalandri, Agioi Anargiri, etc.), sparse suburban areas in Mesogia (Keratea, Koropi etc.), rural unbuilt land and agriculture zones. In most of the places the line has disappeared due to the alignment of the street network, either covered completely by roads (New National Road Athens to Thessaloniki), or little appears in traffic islands.

Its expropriation zone expands from eight to twenty meters wide, widening further close to stations. A part of 17.6 km of the total 62.5 km, has been transformed into suburban highway, while another 17.6 km section is completely free and underused. The remaining 28.6 km part, according to studies, is going to be used for the expansion of the Suburban Railway line. It is important that in the latter part, there is no provision for walking and cycling paths.

The fact that the line passes through urban and suburban land, presents a strong potential for a strategic metropolitan cycling scheme. The beginning of the line adjoins the largest open public park in Athens (Tritsis Environmental Awareness Park) and first findings show that the regenerated cycling path could follow the existing delineation and utilize enlarged pedestrian bridges in the parts where the line is covered by the street network or follow new detours where the above is not possible. Local solutions and the analytical study will be provided in the next phase of the research.

Indicative sections show the proposed cycling and walking paths in the wide (Figures 5) and narrow parts (Figures 6) of the rail line.

The integrated regeneration scheme in Agioi Anargiri–Lavrio route should not solely deal with the optimal delineation of a cycling project, but rather be incorporated in a wider strategic urban and spatial

planning vision which would address the cease of urban sprawl at a first level and the concept of cycling tourism as a development perspective.

6. The potential of cycling tourism in Athens, Greece

The time for Greek cycling is at a critical point, as although there have been some attempts and a number of development schemes by local authorities, the dominance of car-dependent culture does not allow for holistic development schemes. Cycling is not promoted as an urban means of transportation and neither as an element to support local and national tourist agenda. Greek cycling tourism is a slow growing sector mainly supported by private stakeholders and local initiatives.

However, walking and hiking tours are constantly increasing in demand in the European environment. According to the Institute of Transport and Tourism (University of Central Lancashire) and the Centre for Sustainable Transport and Tourism (Breda University) (2009), 2-4% of total travels refer to cycling holidays, which is expected to double or triple in the coming decade reaching 6-12%. Cycling tourism market in Europe, according to Koucky (2007), is expected to reach 8.5-11 billion Euros in 2025, while Keeling (1999) forecasted a value of £14 billion in 2009. Cycling tourism is related to environmental sensibilities as well as trends. It refers to natural environment, healthy living and money saving while it also provides the sense of actual contact with the identity of places and routes. The few cycling tourists in Greece share some typical characteristics such as; they move into small groups, have a higher budget than the average traveller for their transportation and chose quality places as they intend to weigh the quality of given services. There are different types of bike travelling such as full bike holidays, partial bike holidays (1-day bike tour), etc.

Indeed, the only integrated attempt for a national, and mostly international network, is Eurovelo programme that has two routes in Greece and the one is incomplete. EV8 (Cadiz, Andalucía to Athens) crosses Greece from Igoumenitsa to Athens (complete) and EV11 (North Cape, Norway to Athens) crosses Greece from Thessaloniki to Athens (incomplete). When other small European countries have a cycling network of more than 2.500 kilometres (Sverigeleden, 2014), such as Sweden,

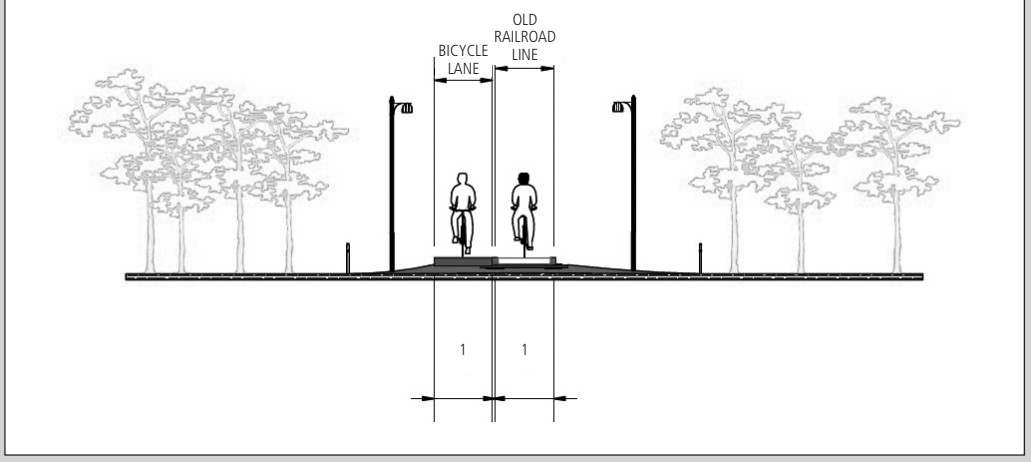


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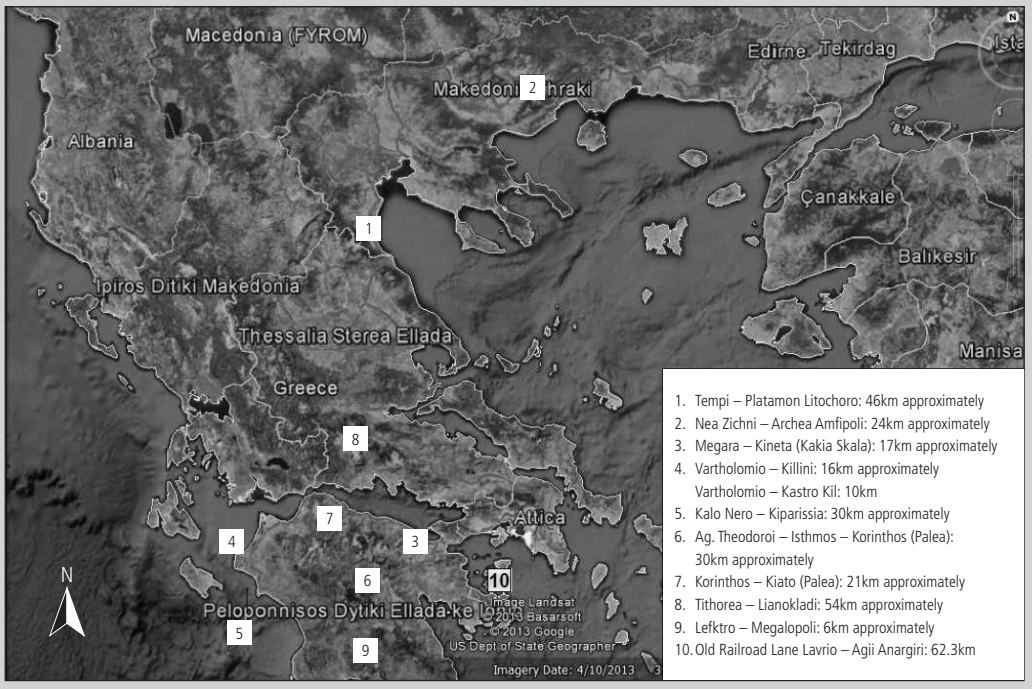
Figure 6 | Indicative distribution of uses, in narrow parts of the rail line zone (8-12 meters).



Source: Own construction.

Figure 7 | Derelict rail lines in Greece.

which expands only to 41.284 km², we estimate that Greece, with a total area of 131.957 km², only devotes to cyclists 150 kilometres.

The underused 368.5 km of rail lines expanding to the Greek mainland (Figure 7) provide the opportunity for the development of an integrated scheme that could support a national network of cycling and recreational routes attached to the adjoining urban and rural centres. In Athens more than 85 km of rail lines are underused (Figure 8).

Each year more than 15 millions of tourists come to Greece and almost 6 million visit Athens (Greek National Tourism Organization & Hellenic Statistical Authority, 2011). Most of them stay in Athens city centre and very few visit the periphery. It is observed that cycling tourists prefer the historic centre and the coastal zone and some of the visit the Temple of Poseidon in Sounio through bike tour excursions, organized by private leisure companies.

The above described concept for the utilization of derelict rail lines and the specific case examined in section 5, the case of Agioi Anargiri to Lavrio route, presents a great opportunity for cycling tourism in Athens to be expanded, if integrated in a strategic tourist agenda. Prerequisites for an integrated cycling tourism programme, in terms of infrastructure and policies are analysed in section 3 of the present paper.

7. Initial results and research limitations

The reuse of abandoned rail lines, through a strategic development scheme, can boost alternative tourism development and become the backbone of the revival of historic settlements in Attica. Among others, an important outcome is related to the revitalization of the actual infrastructure, as rails

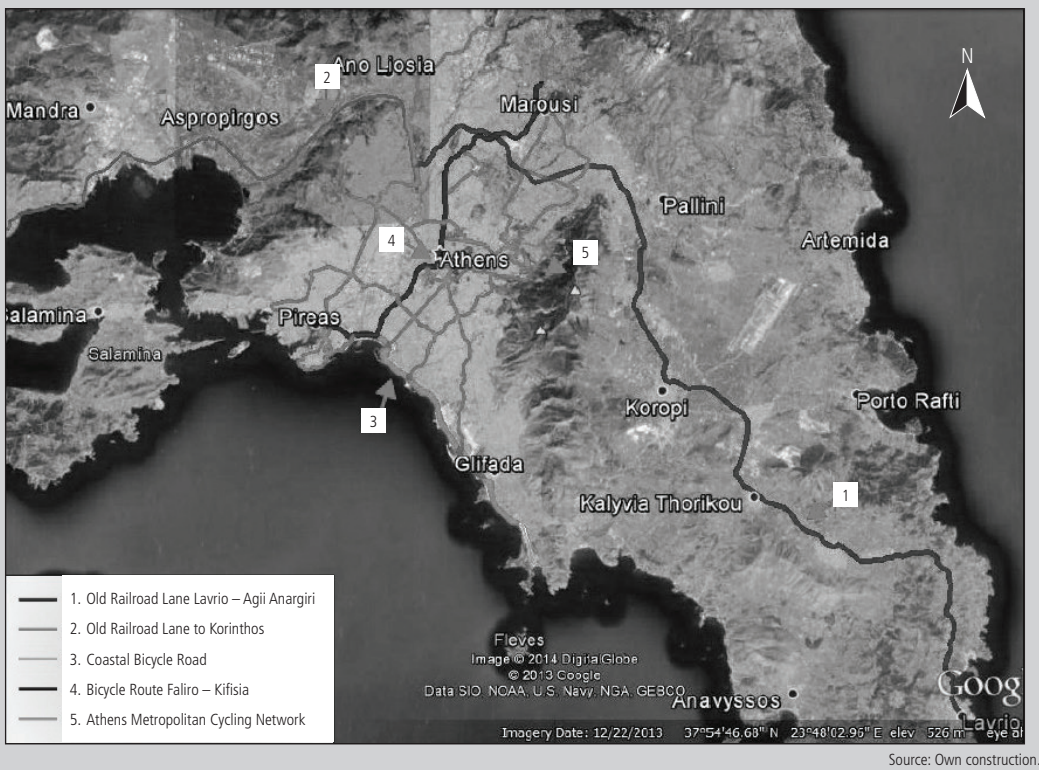
themselves become the main landmark and their history is revealed.

Most importantly, the proposal marks the second generation of bicycle infrastructure projects in Greece. So far, cycling projects were dealing mainly with urban or rural areas separately and this is expected to be the first attempt for a metropolitan network using historical connections of the city and the periphery.

Research limitations may occur regarding the range of the intervention as well as management issues. Although, the concept of rail lines restoration and cycling tourism may appear simple and highly promising, a number of issues occur regarding the actual application and managerial aspects of the endeavour. Rails and a determined spatial zone around them are owned by the Hellenic railway organization (OSE, TRAINOSE) and are managed by the operating authority which is the Railway Enterprise (S.E.). OSE cannot allow any change of use or simply grant concession in local government bodies, private enterprises or any other without the approval of the Ministry of Infrastructure, Transport and Networks and the Regulatory Authority for Railways.

Such a strategic scheme that involves the above bodies together with local and governmental authorities should also develop an access agreement with the OSE and coordination with the Ministry of Touristic Development, the Greek National Tourist Organization, etc. and a consortium among others. It is worth mentioning that the examined rail line, Agioi Anargiri–Lavrio, belongs to the Public Real Estate Corporation, which may ease some of the procedure in regard to transformation.

Expected obstacles in the development of the scheme can vary from legislation complexities to authorities' and citizen's objections. Lastly, the economic viability of the scheme remains arguable,



Source: Own construction.

Figure 8 | Abandoned rail network in Athens and proposed metropolitan cycling network.

as there will not be immediate large economic profits and the development of the strategy requires relatively high funding.

8. Conclusions

'Re-inventing' rail lines, through integrated programs of walking and cycling tourism, serves a double purpose: on one hand it is the re-use of derelict infrastructure through a creative way that does not always imply the removal of lines, while on the other, it is the enhancement of the countryside with the simultaneous preservation of rail heritage.

Such transformation, in order to be successful in socio-economical terms, demands a range of projects and some supporting policies in several sectors, such as culture, environment, economy, education, etc. Moreover, the intervention should be light and resilient, in order to serve potential future plans to accommodate tram or light rails.

Through this first attempt, we explored alternatives in the underused Greek national rail network and the potential for a national and/or regional strategy promoting cycling tourism in the examined abandoned zones. A brief overview of international practices is mentioned, while the case of Athens is looked in more detail. Such a proposal develops also the motives for utilization of rails through a different approach allowing light investment for bike-related and leisure enterprises. Lastly, we looked in depth the limitations for such a perspective due to the complexities deriving from the ownership status of the network.

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