UNIVERSIDADE DE ÉVORA

Mestrado em Gestão e Valorização do Património Histórico e Cultural

Master Erasmus Mundus TPTI

(Techniques, Patrimoine, Territoires de l'Industrie: Histoire, Valorisation, Didactique)

The ways behind the railways: Algarve's railway line.

Technique transfers and transport development in Southern Portugal

Tânia Alexandra Anica Fernandes

Orientadora / Sous la direction de : **Ana Cardoso de Matos**

Évora, Setembro de 2015 | Évora, Septembre 2015

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Os caminhos por detrás dos caminhos-de-ferro: A linha do Algarve.

Transferências técnicas e desenvolvimento do transporte no Sul de Portugal

Esta dissertação pretende contribuir para um melhor conhecimento da complexidade das redes de transferência de conhecimentos e técnicas, no domínio da engenharia civil e mais concretamente através dos caminhos-de-ferro, nos séculos XIX e XX.

Em Portugal, os caminhos-de-ferro estiveram no cerne de um vasto debate, sobretudo político, concomitante com uma instabilidade crescente no cenário político e uma fase de fragilidade económica.

É neste contexto que a Linha do Sul e Sueste vai ser construída (seguida pela sua extensão até Vila Real de Santo António e pela construção do ramal de Portimão, que chegará a Lagos).

Este empreendimento é uma clara ilustração da realidade portuguesa de então, no que concerne ao desenvolvimento desta rede de transportes, que nos permite, igualmente, conhecer e compreender quem interveio no processo de construção da linha (os engenheiros, as empresas, entre outros aspectos) e assim determinar quais as influências e transferências técnicas que tiveram lugar.

Palavras-chave: Caminhos-de-ferro ; Algarve ; Engenheiros ; Ensino Industrial ; Património Industrial; Século XIX; Século XX

Aos avôs Zé e Manel;
À tia Tina;
Ao Tio Mé…

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To my family, because they are my safe haven... because they're a reason to live for.

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ABBREVIATIONS CHARTER

AHMOP – Arquivo Histórico do Ministério das Obras Públicas

CDFMNF – Centro de Documentação da Fundação do Museu Nacional Ferroviário

FMNF – Fundação do Museu Nacional Ferroviário Eng.º Armando Ginestal Machado

GCF – Gazeta dos Caminhos-de-ferro

CRCF – Companhia Real dos Caminhos-de-Ferro

CFE – Caminhos-de-ferro do Estado

REFER - Rede Ferroviária Nacional

CP – Comboios de Portugal

MNACTEC – Museu Nacional de la Ciència i de la Tècnica de Catalunya

CSOPM – Conselho Superior de Obras Públicas e Minas

JCOPM – Junta Consultiva de Obras Públicas e Minas

NMFL – Núcleo Museológico Ferroviário de Lagos

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RESUMEE

« Tout le monde sait que la méconnaissance du passé rend difficile la compréhension du passé et la prospection du futur. Et personne ne remet en question l'importance que les études historiques prennent en tous les disciplines techniques ou scientifiques »[1]

Cette mémoire attire à la contribution pour une meilleure connaissance de la complexité des réseaux de transfert de techniques et connaissances qui ont eu lieu dans le domaine de l'ingénierie civile, surtout dans les chemins de fer, au XIXème et XXème siècles.

Au Portugal, les chemins de fer sont été le cerne d'un très vaste débat, coïncidant avec une croissante instabilité dans le scenario politique et aussi une phase économique fragile. C'est dans ce contexte que la Ligne du Sud et Sud-est va être bâti (suivi par l'extension jusqu'à Vila Real de Santo António et la construction de l'embranchement ferroviaire Portimão).

Cette entreprise c'est une illustration claire de la réalité portugaise, en concernant l'implémentation de cette réseau de transport, que nous permettre de comprendre et également bien connaitre qui a intervenu dans le processus de construction de la ligne (les ingénieurs, entreprises, etcetera), ainsi que déterminer les influences et les transferts techniques qui ont eu lieu.

Mots-clé: Chemin de fer; Algarve; Ingénieurs; Enseignement Industriel; Patrimoine Industrielle; Siècle XIX ; Siècle XX.

[1] "Todos sabem que o desconhecimento do passado dificulta a compreensão do presente e a prospeção do futuro. E ninguém põe em dúvida a importância que os estudos históricos assumem em todas as disciplinas técnicas ou científicas" In Silva, F. G. (1995). Bosquejo duma sucinta história da contabilidade em Portugal. In *Revista de Contabilidade e Comércio*, 205, p. 118

ABSTRACT

"Everyone knows that the ignorance of the past hinders the comprehension of the present and the prospection of the future. And no one questions the importance that historical studies assume in all technique or scientific disciplines."[2]

With this master's thesis, the aim is to be able to contribute to a better understanding of the complex network of technique's and knowledge transfers, that took place within the field of civil engineering, in the 19th and 20th centuries, namely on the railways.

In Portugal, railways take-up was a wide and ample debate, coinciding with an uprising turmoil on the Portuguese political outskirt and a phase of economic frailty. It's in this context that the construction of the South and Southeast Line took place (followed, later on, by its extension until Vila Real de Santo António and by the construction of the Portimão's branch).

This enterprise is, as we pretend to prove in this master's thesis, a clear example of the Portuguese reality, enabling us to understand and to get to know those who intervened in the construction's process (the engineers and the companies) as well as determining influences and technique transfers that have taken place.

Keywords: Railways; Algarve; Engineers; Industrial teaching; Industrial heritage; 19th century; 20th century.

[2] "Todos sabem que o desconhecimento do passado dificulta a compreensão do presente e a prospeção do futuro. E ninguém põe em dúvida a importância que os estudos históricos assumem em todas as disciplinas técnicas ou científicas" In Silva, F. G. (1995). Bosquejo duma sucinta história da contabilidade em Portugal. In *Revista de Contabilidade e Comércio*, 205, p. 118

CHAPTER I – INTRODUCTION

Ce chapitre a, comme objectif, expliciter tout le corpus méthodologique et théorique qu'entour ce travail de recherche, aussi comme montrer le objet d'étude, en ce qui concerne leur contexte géographique, bien comme ça limite chronologique. De plus, on se fera la révision de la littérature scientifique existant sur ce sujet, dans le panorama portugais et aussi la description du contenu de chaque chapitre.

1.1. RESEARCH JUSTIFICATION

The national historiography that verses over the universe of railways in Portugal, encompassing such aspects as the technology involved is, in its vast majority, recent. Moreover, the one crossing the analysis of the railways and the mobility of knowledge and techniques, we come to the conclusion that is still scarce.

On the other hand, contemporary historiography versant over the socioeconomic characterization of the Algarve area in the 19th and 20th centuries is practically non-existent[1].

The immense political agitation that Portugal suffered from in the second half of the 18th century and first half of the 19th century, contributed to the tardiness that the modernization campaign that took place endured, when comparing with its centre-European counterparts, namely the creation of modern civil engineering schools. Therefore, in the lacking of this specific kind of teaching in Portugal, there were several Portuguese engineers that were forced to complete their training abroad, most specifically in the Parisian Polytechnic School (MATOS: 2009 and 2012). Also, the influence of these schools is also felt in the creation of the several schools opened in Portugal in the course of the 19th century, such as Lisbon's Polytechnic School, opened in 1837. (MATOS: 2013)

The aim of this research project is to, in quite a modest and still at an early stage, to contribute to the knowledge of the railway universe in Portugal, through the analysis

[1] However, we cannot overlook that, for previous times, there are some studies undertook, of paramount importance, such as the ones made by Romero de Magalhães.

of the career paths of those that have intervened in the construction of railways, in the South of Portugal, between the second half of the 19th century and the beginning of the 20th century.

By key players we comprise the engineers that took part in this endeavour, whether by the ones that took place in consulting committees that issued reports on the routes or acquisition call for tenders, whether the construction engineers, responsible for the execution projects, routes and for surveying the construction works or of the hired companies.

We argue that the analysis of the professional and academic paths of the engineers associated to the Portuguese public works allows us to understand and demonstrate the knowledge and technical transfer that took place at a global scale, not limiting itself in pre-established standards, nor chronologically nor evolutionary, as David Edgerton states quite remarkably in his work "The shock of the old", which he recaptures again in his papers "The linear model' did not exist: Reflections on the history and historiography of science and research in industry in the twentieth century" and "Creole technologies and global histories: rethinking how things travel in space and time"[2].

Despite the existence of some studies on some Portuguese railway lines, the Algarve railway line hasn't been thoroughly studied in a historiographer point of view nor analysed as a case study for the engineers in charge of building a railway line.

This railway line, as the majority of the Portuguese railway lines, was built in stretches. Nevertheless, in this case, the construction prolonged itself and, considering that it still in function to this day, has suffered some changes in the stations, such as enlargements in some or the construction of some brand new stations[3], bestowing her of an industrial and architectural heritage that we pretend to highlight as well.

[2] See general bibliography.

[3] The actual Vila Real de Santo António railway station was built in the dictatorship, being markedly of rationalist and modernist traits. On the other hand there are some completely contemporary stations, such as Lagos railway station (on the vicinity of the ancient one, still standing), Faro railway station or the new stop: Parque das Cidades.

1.2. CASE STUDY OBJECT

One has to point out that when we refer ourselves to the Algarve railway line, this nomenclature doesn't apply to one single railway route, neither today nor at the time it was built.

Due to the restructuration that the *CP – Comboios de Portugal* endured, two different public companies were created in 1997: the CP (that maintained the name and the exploitation of the traffic in the railway lines) and *REFER – Rede Ferroviária Nacional*, that manages the infrastructures.

If, due to its function, CP denominates all the railway stops existing in the Algarve region and served by a single passengers traffic route as Algarve Railway Line, the same doesn't apply in REFER. In the map that REFER made with all the railway network in August 2012, it is considered as the South Line all the railway stretch since Pragal to Olhão, whilst the stretches between Tunes and Lagos, as well as the stretch between Olhão and Vila Real de Santo António, are considered the Algarve Railway Line, as we can observe in the images below:

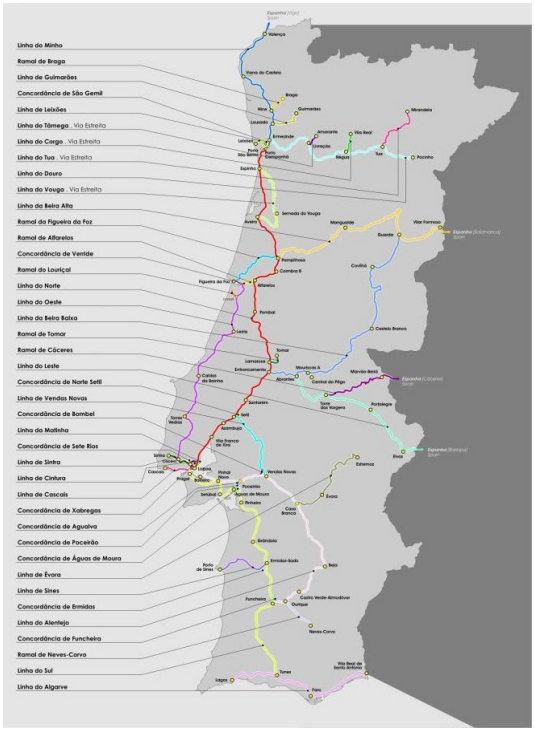

Image 2 – Nomenclature of railway lines in use, by CP.

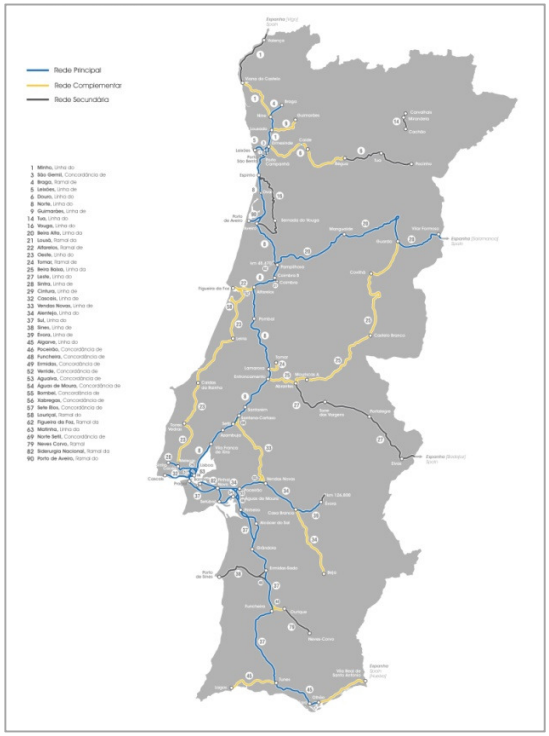

Image 1 – REFER'S Map, showing the Portuguese Railway Infrastructure. August 2012.

From this starting point onwards, we face the first challenge of this research project: how to define our case study object? Should we limit ourselves to what the REFER, nowadays, considers the Algarve railway line or, on the other hand, we adopt the standard of CP and encompass the entire route that crosses the Algarve region?

Furthermore, difficulty in defining what is the Algarve railway line increases while we step backwards. In his doctorate thesis regarding the national railway politics between 1845 and 1899, Hugo Pereira states that by "Algarve railway Line it was understood the railway line that connected Beja to that national province"[4]. Notwithstanding, the connection that actually exists, links the South Line (according to the REFER map), passing through Grândola and Funcheira, with the Algarve.

Extrapolating this multiple reality on the denomination of this railway line, one can infer that there might be other projects that were presented to this same space and received the same denomination.

In this regard, the option that was made – to the study of the railways on the Algarve region -, was to take into consideration and analysis all the documentation that did refer to this geographical space, independently of the project or proposed route.

The Algarve region, in its all, is a naturally confined space and detached from the remaining continental Portuguese territory, by its geographical features.

On the North, it's bounded by a range of hills, in the East by the Guadiana River and, on the remaining space, bathed by the Atlantic Ocean which, by itself, justifies why all the agricultural activity and artisanal industry was oriented to the sea.

We believe that it is necessary to apprehend the reality of socioeconomic conditions of the 19th century Algarve, in order to try and understand the dynamics and logic underlining the construction of the Algarve railway.

This region, in terms of transportation, has endured a chronic detachment in regard the rest of the country. João Baptista Silva Lopes that, in 1840, wrote one of the few works intending to characterize the Algarve, at that time, stated that "transports are made, in the Algarve, on mules and donkeys, because there are no roads, just by the

[4] PEREIRA, Hugo. (2012). A política ferroviária nacional (1845-1899). Universidade do Porto, p. 192.

shore and outskirts of Silves until S. Bartholomeu where ox-carts are used"[5]. In fact, the only description of a road that communicated with the "Além Tejo"[6], relatively in good shape, was the one that passed through S. Bartolomeu de Messines, in the interior of Algarve's hills and that continued to S. Marcos da Serra, also in the interior.

Hence, it was decided to analyse the construction of a railway in a quite geographically bounded reality, allowing the focus on a space that, geographically speaking, presents several technical challenges, whether it is the crossing of the range of hills or the crossing of all the Algarve's littoral, filled with marshes and streams, rivers and its tributaries mouths/estuaries.

The construction of the railway connection to the Algarve region, and its expansion in the territory on the South of Portugal was considered, debated and proposed, almost since the beginning of the debate over the railways in Portugal[7]. Notwithstanding, the arrival of the train to the Algarve would reveal itself complex and protracted, as we will see.

As stated before, and will analyse in suite, when referring the Algarve railway line, this nomenclature comprises a range of proposals that have never seen the daylight as well as the line that was actually built and crosses all of the Algarve.

Consequently, the definition of our analysis timeframe was governed by three fundamental criteria: 1 – focus on the implementation and development of industrial

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[5] "Os transportes fazem-se no Algarve em muares ' ou jumentos, porque não ha estradas; apenas na beira-mar , e arredores de Silves até S. Bartholomeu se usa de carros de bois". In LOPES, João Baptista da Silva (1841). Corografia ou Memória Económica Estadistica e Topográfica do Reino do Algarve, Lisboa, Tipografia da Academia R. das Sciencias de Lisboa, pág.33.

[6] The region past the Tagus River.

7 As demonstrated by António Lopes Vieira in his doctorate thesis (Vieira, A. L. (1983). The role of Britain and France in the finance of the Portuguese Railways (1845-1890). A comparative study in Speculation, Corruption and Inefficency . Dissertação de Doutoramento, Univesidade de Leicester; Vieira, A. L. (1988). A política da especulação - uma introdução aos investimentos britânicos e franceses nos caminhos-de-ferro portugueses. Análise Social, XXIV (101-102), pp. 723-744) and Magda Pinheiro, the debate over the railways, in Portugal starts around the 1840's (Pinheiro, M. (1986). Chemins de fer, structure financiere de l' État et dependance éxterieure au Portugal: 1850-1890. Paris: Université de Paris; Pinheiro, M. de A. (1979). Investimentos estrangeiros, política financeira e caminhos-de-ferro em Portugal na segunda metade do século XIX. Análise Social, XV (58), 265–286). This question is reprised again by Hugo Pereira, in his Master's dissertation "Caminhos de Ferro nos Debates Parlamentares (1845-1860)". Nevertheless, in the first half of the 19th century there will be no railway built. The proposals to prolong the South Line to the Algarve date from 1861, with the connection between Casével and Faro, comprised in this 1st phase of railway development, as we will see later on.

teaching in Portugal; 2 – clustering the railway projects made, including those that weren't built; 3 – focus on the original phase of construction.

In order to include all projects, including those that remained unbuilt, it will be necessary to include the debated line between Beja and Faro, contemporary to the 1st phase of railway building in Portugal, starting from 1860; on the other hand, the last stretch to be built, between Portimão and Lagos, was in 1922.

Coincidently, with this flexible timeframe, we may analyse the development of civil engineering in Portugal in a large period – 52 years -, as well as to have a scope on paradigmatic moments of Portugal's contemporary history.

Also, within this timeframe, we can verify the moments of rupture or continuity, regarding the institutions connected to public works and their human resources, starting from the relatively calm period of economic and political stability of the mid 19th century (key point on the investment and development of public works), as well as the transition between two government regimens – Constitutional Monarchy and Republic, deterring ourselves at the dawn of a new ideological government system: the dictatorship, that would last until 1975.

Moreover, this chronological timeframe encompasses the period where the vast majority of railway lines were built, which will allow to develop new scopes of analysis, inferring what would occur in the engineering field related to the railways.

1.3. METHODOLOGY AND PROBLEMATIC

This study, willing to analyse who were the intervenient in the construction of a specific branch of the Portuguese railway network, between 1860 and 1922, lies mainly on archive sources: the documentation of the *Caminhos de ferro do Estado* and the documentation it has inherited, safeguarded at the *Centro de Documentação da Fundação do Museu Nacional Ferroviário*; the plans and maps in REFER's Technical Archive and the Bulletins, legislation and employees personal files that are available in the AHMOP – *Arquivo Histórico do Ministério das Obras Públicas*.

In this work we have opted by the case study methodology, suited to when one intents to explore events or facts that are complex, to which several facts concur, as is the context of building and implementing a railway system in Portugal.

Also, it will be applied the systematic consultation of archives, in order to gather the maximum amount of information and data crossing, to aid eliminating lapses of information.

In this research the railway building projects will be explored, as well its proposers and their academic and professional paths, having been chosen the interpretative investigation, applying qualitative methods to documentation analyses.

With this work frame, the aim is to be able to respond to three different problematic regarding the Algarve Railway Line:

1 - How it was built, why it was built, how it has been maintained in function and, therefore, to what extent is it representative of the railway development in Portugal;

2 – Which were the possible technical or knowledge transfers that might have occurred, whether by the engineers or by the construction or investment companies;

3 – How to valorise a railway line still in function, retaining its original purpose.

1.4. STATE OF THE ART

The bibliographical production about railways and transport history in Portugal, when it's compared with what is observable in other European countries, such as France, Great Britain or Spain, can still be depicted as scarce.

Until the last quarter of the 20th century, the vast majority of published work about railways were the product of ancient railwaymen, such as José Fernando de Sousa or Pedro Romano Folque and published in a railway concerned publication: *Gazeta dos Caminhos de Ferro.* Notwithstanding, nowadays there are some paradigmatic works that gave a definite push to historiography publications on this matter.

In the field of Economic History we can find two doctorate thesis and two master's dissertations.

In 1983, António Lopes Vieira defended his doctoral dissertation, in Leicester, intituled "The role of Britain and France in the Finance of the Portuguese Railways 1850-90. A comparative study in speculation, corruption and inefficiency". In his work he aimed at studying and to demonstrate the anglo-french alliance as a major influence on Portugal's railways financing policies, in the timeframe in analysis, as well as to

clearly state the structuring aspects of the Portuguese economics and politics that based the national railway network[8].

Yet, in 1985, Amélia Torres defended her Master's dissertation, at Paris IV University, "Les investissements français dans les chemins de fer portugais (1850-1900)", also focusing on the universe of financial investment in Portuguese railways, but narrowing her analysis on the French investors.

Magda Avelar Pinheiro, in 1986, defended her doctoral dissertation, at Sorbonne University, intituled "Chemins de fer, structure financiere de l'état et dépendance exterieure au Portugal 1850-1900". In her work she scoops on several aspects related to the railways in Portugal, such as the political and diplomatic liaisons between Portugal and Spain, the impact of this endeavour in public finances, the determining factors to the national railway network, as well as the effects of the railways on the national economy, concluding that Portugal aggravated its extern dependency despite some positive effects of this investment.

Quite recently, in 2014, Paula Slva defends, in Minho University, her Master's dissertation intituled "As práticas contabilísticas e de relato financeiro na Companhia Real dos Caminhos de Ferro Portugueses (1860-1910)". She argues that the railway companies were the forerunners of several accounting practices, nonexistent at that time, most especially when they had both the building and the exploitation of these railway lines.

Still related to the financing problematic, António Lopes Vieira and Magda Avelar Pinheiro published papers based on some specific points of theirs doctoral dissertations, as well as some papers previous to theirs dissertations. As such, we can see the articles written by António Lopes Vieira on the investments on the national railways, such as "Os caminhos de ferro antes dos caminhos de ferro: a especulação ferroviária em Portugal em 1845-46" or "A política de especulação: uma introdução aos investimentos britânicos e franceses nos caminhos de ferro portugueses". Still on the subject there are Magda Avelar Pinheiro's articles on financing and building of the railway network, namely "A construção dos caminhos de ferro e a encomenda de

[8] This thesis was considered a "fundamental and innovative work on the study of railway history in Portugal", by Nuno Valério, in 1988. On the other hand, in 1990, Maria Fernanda Alegria considered it "the most important work divulged, so far, about the portuguese railways". See Valério:1988 and Alegria:1990

produtos industriais em Portugal" and "Le rôle de l'État dans la construction des chemins de fer du Portugal au XIX siècle" or "Les chemins de fer portugais: entre l'exploitation privée et le rachat".

On the other hand, Maria Fernanda Alegria defended her doctoral dissertation, in the field of geography, intituled A organização dos transportes em Portugal 1850-1910: as vias e o tráfego". Despite the fact that it isn't entirely dedicated to the railways, three of her chapters analyse them, focusing on the development of the railway network and the traffic of merchandise through this system. Even though her doctoral dissertation aim is to portray a global vision on national transport systems, this work constitutes, to this day an insurmountable work when studying the railways.

Though it doesn't focus on the railways and that it doesn't focus on this dissertation's timeframes, Carlos Martins defended his doctoral dissertation in Coimbra University, in 2014, intituled "O Programa de Obras Públicas para o Território de Portugal Continental, 1789-1809. Intenção Política e Razão Técnica – o Porto do Douro e a Cidade do Porto". He aims at verifying "if the public works initiated by the Ministers José Seabra da Silva and Luis Pinto de Sousa matched a State's politics to the betterment of the communication and transportation paths"[9], defending that "the ensemble of projects and works taken on embody an idea of network to the territory"[10] and concluding that "by the relevance of this public works program whose territorial structure, despite its partial and unfinished implementation, was carried on by Costa Cabral and consolidated by Fontes Pereira de Melo, determining the network of roads that lasted until today"[11]. This study presents interesting data that allows contextualizing the period previous to this dissertation's timeframe, not only in the scope of this dissertation but also to other research projects on railways.

[9] "se as obras públicas iniciadas em 1789 pelos ministros José de Seabra da Silva e Luís Pinto de Sousa corresponderam a uma política do Estado para o fomento das vias de transportes e comunicações". In MARTINS, Carlos (2014). "O Programa de Obras Públicas para o Território de Portugal Continental, 1789-1809. Intenção Política e Razão Técnica – o Porto do Douro e a Cidade do Porto"; vol. II; Universidade de Coimbra; p. 9

[10] "o conjunto de projectos e obras empreendidos contêm uma ideia de rede para o território". In MARTINS, Carlos (2014). "O Programa de Obras Públicas para o Território de Portugal Continental, 1789-1809. Intenção Política e Razão Técnica – o Porto do Douro e a Cidade do Porto"; vol. II; Universidade de Coimbra; p. 9

[11] "pela relevância deste programa de obras públicas cuja estrutura territorial, apesar da sua parcial e inacabada implementação, foi continuada por Costa Cabral e consolidada por Fontes Pereira de Melo vindo a determinar a rede de vias que veio até aos dias de hoje". In MARTINS, Carlos (2014). "O Programa de Obras Públicas para o Território de Portugal Continental, 1789-1809. Intenção Política e Razão Técnica – o Porto do Douro e a Cidade do Porto"; vol. II; Universidade de Coimbra; p. 9

Still related to the subject of transportation, but not related to the railways, there is the work of Maria Fernanda Alegria "Os Transportes em Portugal antes do Caminho de Ferro.".

The diplomatic issues and the Iberian relation was equally analysed at the doctoral dissertation of Luis Santos "Politica ferroviaria ibérica: de principios del siglo XX a la agrupacion de los ferrocarriles (1901-1951)", and in articles of Magda Avelar Pinheiro, Maria Fernanda Alegria and Hugo Pereira. Luis Santos' doctoral dissertation revolves around the Iberian railways politics in the first half of the 20th century – time of the networks consolidation -, and, to such extent, carries out a synthesis of the railways reality in both countries on the 19th century. Hugo Pereira also writes on the subject, in his article "As políticas ferroviárias ibéricas (1845-1860)", whilst the articles of Magda Avelar Pinheiro "Portugal e Espanha, integração ou ruptura" and "L'Histoire d'un divorce: l'integration des chemins de fer portugais dans le réseau ibérique", revisits her consideration on her doctoral dissertation. On the other hand, Maria Fernanda Alegria argues how the Iberian railway crelations weren't fruitful to Portugal and argues on the Iberian railway connection, by the Spanish counterpart, in her articles "O caminho-de-ferro e a função de trânsito nas relações comerciais luso-espanholas na segunda metade do século XIX", "Las comunicaciones ferroviárias entre Portugal y España en la segunda mitad del siglo XIX e su fracaso com Andalucia" and "O Desenvolvimento da Rede Ferroviária Portuguesa e as relações com Espanha no Século XIX".

Hugo Pereira, focusing on the railway politics, makes a thorough analysis on the discourse and political debate around the railways, through the content analysis of the parliamentary debates and subsequent political documentation, such as legislation drafts, decrees and administrative rules, in his master's dissertation "Caminhos-de-ferro nos debates parlamentares (1845-1860)", in Oporto University in 2008, where he aims at portraying the relations between railway and politics and how that can be observed in the political discourse at that time. Followed it with his doctoral dissertation "Política Ferroviária Nacional (1845-1899)", defended in 2012 at Oporto University, where, according to the author, he "pretends to analyse the national railway politics between 1844 and 1899, the period when the main stretches of the

national railway network was built"[12], as well as "to know how the governors and national technicians reacted, in termos of railway politics, during the years of economic instability [1890's], before showing yet again, the interest in retaking the investment, through the Law of July 14th 1899, that instated a special fund allotted to the construction of new railways"[13]

The field of civil engineering and its affirmation as a professional class is, likewise, a research field still nderdeveloped in Portugal, despite the efforts of Ana Cardoso de Matos, Maria Paula Diogo and Maria Fernanda Rollo.

For several years now, this theme has interested Ana Cardoso de Matos that has directed the research project "Engineers and Engineering in Portugal (from late 18th century until 1931)", between 1999 and 2001, as well as the research project "Urban Infrastructure Networks (1850-1950)", between 2006 and 2009, where the engineers were the main characters once again. The outcome of that project was a database comprising information on, approximately, 300 engineers.

One of the research fields of Maria Fernanda Rollo is History of Engineering and, within this scope, has in her résumé two main projects: 'Engenho e Obra. História da Engenharia em Portugal no Século XX' and 'História da Ordem dos Engenheiros'. Concomitantly, she has published several articles and papers about the history of the Engineers Bar and her predecessor the Portuguese Civil Engineers Association, as well as about the history of Lisbon Polytechnic School, published in the magazine *Ingenium*. Also, she has coordinated the following works: 'Momentos da Inovação e da Engenharia em Portugal no Século XX' and 'Engenho e Obra. Uma abordagem à História da Engenharia em Portugal no Século XX'.

Notwithstanding, specifically on technical influences and engineers mobility, as well as on models of engineering teaching, the most specialized corpus of works is comprised of the works of Maria Paula Diogo and Ana Cardoso de Matos, whose conjoint work we list here and whose importance is self-explanatory: "Jogos de

[12] " (…) pretende analisar a política ferroviária nacional no período compreendido entre 1844 e 1899, durante o qual se construíram os troços principais da rede férrea nacional". In PEREIRA, Hugo. (2012). A política ferroviária nacional (1845-1899). Universidade do Porto, p. 6

[13] "(…) saber como reagiram os governantes e técnicos nacionais em termos de política ferroviária durante estes anos de vacas magras [década de 1890], antes de mostrarem novamente vontade de retomar o investimento através da lei 14-7-1899, que criava um fundo especial destinado à construção de novas vias-férreas". In PEREIRA, Hugo. (2012). A política ferroviária nacional (1845-1899). Universidade do Porto, p. 6

Identidade: os engenheiros entre a formação e a acção (Les enjeux identitaires des ingénieurs: entre la formation et l'action)"; "From the École des Ponts et Chaussées to Portuguese railways: the transfer of Technological Knowledge and Practices"; "Aprender a ser ingeniero: La enseñanza de la ingeniería en el Portugal de los siglos XVIII y XIX"; "Jogos de Identidade: dois séculos na formação e na prática dos engenheiros portugueses (séculos XVIII-XIX)"; "Obra , engenho e arte nas raízes da engenharia em Portugal"; "A afirmação da engenharia em Portugal ao longo do século XIX"; "As raízes da engenharia em Portugal"; "Le Rôle des Ingénieurs dans l'Administration Portugaise, 1852-1900"; "Bringing it all back home: Portuguese engineers and their travels of learning (1850-1900"; "Being an engineer in the European Periphery: three case studies on Portuguese engineering"; "The Training of the Portuguese Technical Intelligentsia: Balancing the Old and the New" and "Os engenheiros civis e o desenvolvimento económico português da segunda metade do século XIX a 1931".

On the current topic there is the individual work of each of the former authors.

Maria Paula Diogo defends her doctoral dissertation on the topic "A Construção de uma Identidade Profissional - A Associação dos Engenheiros Civis Portuguezes (1869-1937)". Later on, publishes the papers "In search of a professional identity – The Associação dos Engenheiros Civis Portuguezes" and "Engenharia e Modernidade: os Engenheiros Portugueses entre as Obras Publicas e a Indústria", as well as a specific paper, alongside J.K. Brown e G.L. Downey, tituled "Engineering Education and the History of Technology".

On the other hand, Ana Cardoso de Matos presents an extensive yet eclectic bibliography on the subject of mobility of engineers, ranging from the importance of the Universal Exhibitions to the introduction of gas and lightning companies in Portugal, besides some articles on hydro-electric industry. Nevertheless, besides the extensive work that was published conjoining with Maria Paula Diogo, has also published several articles on the influence of the French schools on the Portuguese engineering schools, whether on curricula, whether on the engineers that went abroad to finish their training, namely in France, and discoursing on how these experiences has helped to shape the practice of engineering in Portugal, such as: "The influence of the École des ponts et chaussées of Paris on the Lisbon Polytechnic School

(1836?1860)"; "Going Public: The 1st Portuguese National Engineering Meeting and the Popularization of Technical Knowledge (Portugal, 1931)"; " Etudier en France, travailler au Portugal : le cas de l'ingénieur Cândido Xavier Cordeiro (seconde moitie du XIXe siècle)" and "Asserting the Portuguese Civil Engineering Identity: the Role Played by the École des ponts et chaussées".

Quite recente are the works of Marta Macedo's "Projectar e construir a Nação: Engenheiros, ciência e território em Portugal no século XIX" and Maria Helena Lisboa's "Os engenheiros em Lisboa. Urbanismo e Arquitectura (1850-1930)" that gives us a broad understanding of the engineering in Portugal at the 19th century and how it was a keystone in changing the landscape and our relation with the territory.

Despite the fact that it has been already referenced, the article of Maria Paula Diogo and Ana Cardoso de Matos "From the Ecole des Ponts et Chaussées to Portuguese Railways: the transfer of technological knowledge and practises" must be highlighted since it makes a direct liaison with the engineers responsible for the construction of railways and the training they received, most specifically the French school, an multidisciplinary approach that acts as the epistemological foundation of this research project.

1.5. DISSERTATION'S STRUCTURE

This dissertation is structured in 7 chapters, all of them with an hierarchic structure of, maximum, one sublevel.

The first chapter presents the entire theoretical and methodological corpus that encompasses the case study. Adding, it presents a critical revision of the existing literature about railways in Portugal and on the training of Portuguese engineers in the 19th century.

In the second chapter we will put the evolution of railways in Portugal into context, focusing in the building of several railway lines and their translation into several proposals of a railway network plan that never came to be. We aim to picture the political and technical context that surrounded the railways, as well as the objectives and ideals that the train would be the answer to, in the eyes of its contemporaries.

The reality of the Algarve in the 19th century, as well as its constraints, is going to be characterized in the 3rd chapter. Also, we'll depict the demographic and economic context and the demographic dynamics, in order to infer if there were local/regional factors that have influenced the choice on the railway route in the Algarve region.

The fourth chapter presents the why's that based the idea of building a railway on the South of Portugal. Having the previous contextualisation's in mind, we'll demonstrate how this railway line is representative and a by-product of the material progress and public works politics and how it fits into the technical and political discourse at that time. In this chapter we'll present the several projects that were made and built (or not).

The fifth chapter recaptures and analyses the information that was gathered in the analysis of the line proposals with the information that is available on the engineers that worked on that line. In this chapter we'll make clear how the technical human resources that worked in this railway line are completely representative of the professional class of engineers in Portugal, as well as the state of engineering training and education, at that time.

The sixth chapter overpasses the historiography and aims at evaluating and to pinpoint some key points on safeguarding an heritage that, as our contemporary, is still underrated and not sufficiently valorised. The Algarve railway line runs until today with no major alterations and, therefore, we aim at demonstrating why this heritage should be preserved as well as its adjacent spaces. In this sense, we'll be presenting to railway valorisation examples and how they bestow some key indicators to what can be done to safeguard this specific type of heritage.

The seventh, and last chapter, presents the conclusion we've reached as well as a critical reflexion and analysis of all the constraints felt throughout the research and redaction period. All the more, it presents future research areas or problematic within this field, that came to be whilst preparing this dissertation.

CHAPTER II – PORTUGUESE RAILWAYS

L'introduction du chemin de fer au Portugal a été une question pertinent mais sensible qui a coïncidé avec un panorama politique tumultueux et aussi avec une époque de faiblesse économique.

Dans ce chapitre on y va montrer le contexte sociale, politique et économique qui existaient au Portugal pendant le 19ème siècle et, a travers de ça, démontrer comment cette réalité là a contribué, ou pas, pour le développement du réseau ferroviaire nationale portugais.

La première partie du chapitre c'est consacrée au panorama nationale, en générale, et, le deuxième partie du chapitre c'est dédié à expliquer comment la construction des chemins de fer au Portugal va être divisé et quelles sont les différences entre qu'est qu'ils ont divisé et qu'est qu'ils ont bâti.

2.1. PORTUGAL'S ECONOMIC, SOCIAL AND POLITICAL CONTEXT IN THE 19TH AND 20TH CENTURIES

The introduction of the railways in Portugal, as in so many other cases throughout Europe, was a delicate matter that coincided in time with a persistent turmoil in Portuguese politics and of economic frailty, albeit being wrapped in the liberal official ideology that the material progress and the economic development that had been thwarted by the French Invasions and the loss of Brazil, was, in a great deal, in need of good means of communication to naturally flourish, because " small countries can't prosper in another way than by the development of their commerce, their agriculture and their industry and this can't otherwise be accomplished than by the enhancement of their transport infrastructures, because only them can bring public prosperity"[1].

[1] "Os paizes pequenos não podem prosperar senão pelo desenvolvimento do seu commercio, da sua agricultura e da sua industria, e este não se adquire senão pelo melhoramento das suas vias de comunicação, porque só elas é que podem trazer a prosperidade publica". Baron of Almeirim's discourse, in *Diario da Camara dos Deputados*, February 21st 1854, act number 42, p. 139. Apud PEREIRA, Hugo (2008). *Caminhos-de-ferro nos debates parlamentares (1845-1860)*; Faculdade de Letras da Universidade do Porto. Dissertação de Mestrado em História Contemporânea.

Considering that "in 1913, the gap that separated us [Portugal] from the richest countries was, probably, bigger than it ever had been"[2], it's important to analyse the causes, social and politic that materialized Portugal's economic environment, since the late 18th century until the dictatorship that was instituted in 1926. Moreover, it is of the utmost importance to comprehend what role was played by the railways in this period, considering it hasn't had the desired effect of automatically boosting Portugal's economic scenario.

As observable in the following table, if in the mid 19th century the percentage of Portugal's Gross National Product compared to other countries was relatively close (and almost even with Italy or Denmark, for example), by 1913 (the evening of the dictatorship and debut of World War I), or even in 1950, it was nearly half of the so called developed countries, still relatively close to other peripheral countries, such as Hungary but already quite estranged to economies such as the Western Germany, Denmark or even Italy.

TABLE 1 - PORTUGAL'S COMPARED GROSS NATIONAL PRODUCT (%)

Countries	1860	1913	1950	1975
Western Germany	77%	37%	41%	34%
Denmark	93%	34%	31%	36%
France	75%	42%	33%	32%
Hungary	n.a.	79%	68%	49%
Great Britain	47%	29%	28%	44%
Italy	92%	66%	65%	59%
Developed Countries	86%	45%	37%	38%

Source: REIS, Jaime (1984), p.7. Apud P. Bairoch (1976). "Europe's Gross National Product 1800-1975".

In Journal of European Economic History, vol. 5, pp.273-340

Departing from this analysis, Jaime Reis considers that "it becomes hard not to recognize that Portugal's economic retard has its roots in the second half of the 19th

[2] "Em 1913, a distância que nos separava dos países mais ricos era provavelmente maior do que jamais tinha sido". In REIS, Jaime (1984). "O atraso económico português em perspectiva histórica (1860-1913)", in *Análise Social*; vol. XX (80), p. 7

century"[3], despite the fact that it is contemporary with an effective politic that promoted the development of infrastructures and material progress, a real liberal economic agenda that emerged from the new political structure that established and cemented itself from the 1851's *Regeneração*[4] Coup onwards.

The major outbreak of the industrial revolution was that, for the first time, economies started to grow at an even pace, gradually, releasing itself from the insecurity of the primary products prices fluctuation, meaning that "Progress became attainable by consecutive generations"[5].

In this ever more competitive international market, the data reveals the difficulties that the development of the Portuguese economy had, struggling to keep up, while Great Britain consolidated its prominence[6]. Nevertheless, as Pedro Lains states "we have to keep in mind the exceptionality of the British industrialization as well as the fact that it has expanded more quickly to its neighbouring countries, while the European periphery, where Portugal figures, took some decades until picking up the course of a successful industrialization"[7].

Notwithstanding, that doesn't mean that there had had no effort in the development of manufactures or of a more competitive market. Nor does it mean that there was no planning, concerning transports and communications (despite being executed or not).

Even as early as the reign of Queen Maria I (1777-1816), there has been a reformist impulse "whose dynamics was moved by active territory politics, envisaging the

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[3] " (…) se torna difícil não reconhecer que o atraso económico de Portugal tem as suas raízes na segunda metade do século XIX". In REIS, Jaime (1984). "O atraso económico português em perspectiva histórica (1860-1913)", in *Análise Social*; vol. XX (80), p. 8

[4] By *Regeneração* one defines the political period that started with the 1851's political coup that defeated a rival political party, and lasted sensibly 17 years, until 1868. Its programme was based on the ideal of a total renovation of the political system and the firm believe that through the enhancement of the communication means and basic infrastructures, one could solve the chronic economic detachment of Portugal, in face of its counterparts, as we will see later on. If not entirely successful, it inaugurated a period of a relative political stability, with lesser radicalism or military intervention.

[5] "O progresso passava a estar ao alcance de sucessivas gerações". In LAINS, Pedro et al (2012). "O Liberalismo, 1807-1914", in *História Económica de Portugal*; Esfera dos Livros, Lisboa, p. 290

[6] LAINS, Pedro et al (2012). "O Liberalismo, 1807-1914", in *História Económica de Portugal*; Esfera dos Livros, Lisboa, p. 289

[7] "(…) ter em atenção a excecionalidade da industrialização britânica e também o facto de que ela se expandiu mais rapidamente para os países vizinhos, enquanto a periferia europeia, onde Portugal se insere, demorou algumas décadas até entrar na onda da industrialização bem sucedida". In LAINS, Pedro et al (2012). "O Liberalismo, 1807-1914", in *História Económica de Portugal*; Esfera dos Livros, Lisboa, p. 290

territories' knowledge, management and transformation"[8], which were to come to be through three fundamental programs: "the construction of a new geographic and military chart of Portugal, whose works of geodesic triangulation, astronomic observations and measurement of a degree of the Meridian constitute the debut of the scientific knowledge in the continental territory; the juridical and administrative reorganization of the Kingdom, by trying to draw a new districts outline, designed as uniform administrative units; and the implementation of a public works program, to the development of transports and communications."[9]

Their main objective was to promote the economic growth, either by reducing external dependency as by reducing the local asymmetries, always highly dependable of the two main coastal cities: Lisbon and Porto. The overall structure in mainland Portugal shaped itself around these two main cities, since they were the confluence of the maritime, fluvial and land routes and, through this stance, functioned as the centres of all economic and social life, as the major consumption centres and main distribution and redistribution platforms. Oporto's *hinterland* were the Northern provinces (Minho, Trás-os-Montes and Beira), with an average of two million inhabitants, while Lisbon's *hinterland* comprised itself of the Central and Southern provinces (Estremadura, Alentejo and Algarve) with an estimate one million inhabitants.[10]

In fact, the late 18th century can be characterized by a phase of economic prosperity, which would hold until the first French invasion, enforced by the internal production and market growth as well as by the expansion of trade relations with Brazil, Northern Europe, Baltic region and the Orient and Mediterranean regions, albeit the fact that it had been quite constrained by the war on the European continent and in

[8] "(…) cuja dinâmica era movida por políticas activas para o território, visava o conhecimento, ordenamento e transformação do território". In MARTINS, Carlos (2014). "O Programa de Obras Públicas para o Território de Portugal Continental, 1789-1809. Intenção Política e Razão Técnica – o Porto do Douro e a Cidade do Porto"; vol. II; Universidade de Coimbra; p. 570

[9] Idem, ibidem.

[10] See: MARTINS, Carlos (2014). "O Programa de Obras Públicas para o Território de Portugal Continental, 1789-1809. Intenção Política e Razão Técnica – o Porto do Douro e a Cidade do Porto"; vol. II; Universidade de Coimbra; p. 685. Also, regarding the population censos see: SERRÃO, Joaquim Veríssimo (1970). "A População de Portugal em 1798. O censo de Pina Manique". Paris, Fundação Calouste Gulbenkian, Centro Cultural Português; [ARAUJO, Manuel Travassos da Costa] "Taboas Topograficas e Estatísticas de todas as Comarcas de Portugal, e das terras de cada huma em ordem Alfabetica. Com a Povoação existente no Anno de 1801", ca. 1802, in Subsídios para a História da Estatística em Portugal, Lisboa, edição fac similada, Instituto Nacional de Estatística, 1948, p.2

the seas and by the subsequent intent on maintaining a neutral status by the Portuguese[11].

The French invasions and the subsequent fled of the royal family to Brazil can be considered the milestone that set the end of the *Ancien Régime*, that is to say an absolutist monarchy, without elections or a representative parliament. Nevertheless, the evanescence of the institutions and mental frame that encompassed this way of ruling was slow and painful, lasting throughout the first half of the 19th century[12].

This downfall (of the absolutist monarchy) can be attributed to its inadequacy and shortcomings that it portrayed at the end of the 18th century but also one has to take into account all the convulsions and consequent instability on Portugal's political structure during the French Invasions and all the Liberal Wars[13].

Enclosed between the French pretensions and the alliance with England, Portugal struggled to secure its neutrality. This neutrality would be deemed in check with the escalating hostility between these two nations that, ultimately led to the Continental Block, decreed by Napoleon and France's demand that Portugal acceded to it.

The displacement of the royal family to Brazil is, to the day, a controversial but indispensable topic on Portuguese historiography that "has received somewhat divergent interpretations, being associated whether to an act of cowardice, whether to an act of subservience towards Great Britain (...) [but] the truth is that D.João has made impossible Napoleon's political victory in Portugal".[14]

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[11] See: MARTINS, Carlos (2014). "O Programa de Obras Públicas para o Território de Portugal Continental, 1789-1809. Intenção Política e Razão Técnica – o Porto do Douro e a Cidade do Porto"; vol. II; Universidade de Coimbra; p. 690; LAINS, Pedro et al (2012). "O Liberalismo, 1807-1914", in *História Económica de Portugal*; Esfera dos Livros, Lisboa, p. 290. Most specifically, about Portuguese constraints in its economic and politics see: MACEDO, Jorge Borges de (1990). "O Bloqueio Continental: Economia e Guerra Peninsular", 1962, Lisboa, 2ª edição revista, Gradiva.

[12] LAINS, Pedro et al (2012). "O Liberalismo, 1807-1914", in *História Económica de Portugal*; Esfera dos Livros, Lisboa, p. 289

[13] The term Liberal Wars coins a quite turbulent period in Portugal's history, which characterized itself by a armed conflict between the absolutist factions, that wished the continuation of the Ancien Régime, and the liberal factions, that defended a liberal form of government, with a parliament and a constitution. The Evoramonte Convention, in 1834 put term to the armed conflict that opposed the absolutist and the liberal faction but the turmoil between constitutionalist factions remained until the second half of the 19th century as we will see afterwards.

[14] " (…) tem recebido interpretações algo díspares, sendo associada quer a um ato de cobardia, quer a um ato de subserviência relativamente à Grã-Bretanha (…) a verdade é que D.João impossibilitou a vitória política de Napoleão em Portugal". In LAINS, Pedro et al (2012). "O Liberalismo, 1807-1914", in *História Económica de Portugal*; Esfera dos Livros, Lisboa, p. 291

The consequences of the Napoleonic wars and subsequent protectorate, firstly held by the French and afterwards by the English, had a direct impact on Portuguese agriculture, commerce and industry, concurring on the short term to a contraction of the economy because "since 1808 a situation of economic misery is amplified in Portugal, with the decline of factories, the decaying of agriculture, that provoked, in the years between 1808 and 1820, a collapse in public revenue, that dragged along misery, unemployment and delays on the public workers and militaries payments"[15]

In synthesis, although Portugal had seen an increase in its agricultural production it had been through the increase of used land, and not by the increase of productivity on the already cultivated areas, independently of the exploitation method[16]. Moreover, its industry was still, when in comparison with its direct competitors, "artisanal and manufactured"[17], and suffered, alongside with the agriculture exploitation, from the unavoidable instability that all the political and military conflicts bring as well as by the geo-economics shift that took place in foreign commerce at the beginning of the 19th century. As Jaime Reis has put it "the last decades of the 19th century were favourable to the entrance of small peripheral European economies in the interstices of the manufactured international trade"[18]. That said, due to the factors that have influenced its economy (like its natural resources, the dimension and structure of its domestic market, geographical location and the setup of the international market, as well as its shift during the late 18th century and beginning of the 19th century), stopping its growth through industrialization[19], one reaches the conclusion that "if,

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[15] " (…) a partir de 1808 amplia-se uma situação de miséria económica em Portugal, com as fábricas em declínio, a agricultura em decadência, o que provocava nos anos entre 1808 e 1820 um colapso nas rendas públicas, que arrastava consigo a miséria, o desemprego e os atrasos nos pagamentos ao funcionalismo e aos militares." In VARGUES, Isabel Nobre (1998). "O processo de formação do primeiro movimento liberal: a revolução de 1820"; in *História de Portugal*, José Mattoso (direcção); Vol. 5; Lisboa, Editorial Estampa; p.42

[16] The Northern Portugal area characterized itself by small independent units whilst at South what dominated were the big estates, traditionally aristocratically owned. See LAINS, Pedro et al (2012). "O Liberalismo, 1807-1914", in *História Económica de Portugal*; Esfera dos Livros, Lisboa

[17] " (…) ao seu carácter artesanal e manufactureiro". In MENDES, J. Amado (1998). "Evolução da economia portuguesa" in *História de Portugal*, José Mattoso (direcção); Vol. 5; Lisboa, Editorial Estampa; p.315

[18] " (…) as últimas décadas do século XIX foram favoráveis à inserção das pequenas economias periféricas da Europa nos interstícios do comércio internacional em manufacturas". In REIS, Jaime (1984). "O atraso económico português em perspectiva histórica (1860-1913)"; in *Análise Social*, vol. XX (80); p. 20

[19] See REIS, Jaime (1984). "O atraso económico português em perspectiva histórica (1860-1913)"; in *Análise Social*, vol. XX (80); LAINS, Pedro et al (2012). "O Liberalismo, 1807-1914", in *História Económica de Portugal*; Esfera dos Livros, Lisboa.

by 1900, Portugal was sunk in an economic retard, the situation could hardly have been otherwise"[20], despite the efforts and the view on the matter that 19th century politicians had and what solutions they envisaged to remedy that situation.

In fact, it is only by mid-19th century that we can observe a period of relative tranquillity and political and military stability, called *Regeneração*[21], whose most notorious period is named *Fontismo*.

Nevertheless, not even the second half of the 19th century or the first quarter of the 20th century can be described as periods of great stability and normalization of the government. If not military, there were several factions that battled themselves in parliament, aided by the remnants of some multisecular institutions and habits of the *Ancien Régime*, such as the influence of local chieftains, that supported by the ignorance of the reality of the country served as boosters or promoters on the elections of parliamentarians.

Notwithstanding, elections and governments resignations followed, allowing a rotation of the most influential political parties, situation that maintained even with the implantation of the Republic, until the evening of the dictatorship that seized power in 1926 until 1975, as we can observe by the chart of the number of governments by reign and for the 1st republican period.

TABLE 2 – NUMBER OF GOVERNMENTS (1834-1926)

Form of government	Running time	Number of governments
Reign D. Maria II	1834-1853	22
Reign D. Pedro V	1853-1861	6
Reign D. Luís	1861-1889	17
Reign D. Carlos	1889-1908	15
Reign D. Manuel II	1908-1910	6
1st Republic	1910-1926	51

Source: Annex 2

[20] " (…) se, em 1900, Portugal estava afundado no atraso económico, dificilmente a situação poderia ter sido outra". In REIS, Jaime (1984). "O atraso económico português em perspectiva histórica (1860-1913)"; in *Análise Social*, vol. XX (80); p. 25

[21] See note 5.

The *Fontismo* (designation of the political view of Fontes Pereira de Melo) as an effective policy, played a major role in structuring economical areas within the Portuguese borders, as well in shaping their development rates, due to the differences between the littoral areas, in general more developed and with a wider and better communication network than the more rural and interior areas.

The first Minister of Public Works, Commerce and Industry, in 1852, was the military and engineer António Maria Fontes Pereira de Melo, a major figure of the *Regeneração*. A technocrat statesman, quite pragmatic, was utterly engaged and relieving the country from its lethargic state of being and to bring forward material progress, by the construction and development of first rate essential infrastructures, such as roads and railways, the establishment of Industrial Schools and Agricultural Schools, the introduction of the electrical telegraph, naval transport system in several of the main Portuguese rivers such as Sado, Tejo and Douro.

This discourse of the need to better transport networks and to develop infrastructures would be carried out by all quadrants of the political sector in Portugal, and not only in the 19th century, as we will see, only differing in the means of obtaining capital to undertake such high national design: the development of the economic tissue by the development of Portugal's infrastructures.

2.2. NETWORK'S EVOLUTION

At the 19th century, the ideal of the railways as a major creator of development and economic development was transversal to several countries and several continents: Belgium regarded it has the most important public works endeavour, a matter of national interest, whilst France expected, by the development of the railways, to surpass England while, in the United States of America, it was envisaged that, to keep ahead of civilization, one had to thoroughly explore these new transport means.[22]

[22] PEREIRA, Hugo. (2012). A política ferroviária nacional (1845-1899). Universidade do Porto, p. 279. Too further information on France's railway history, see the work of CARON, François (1997-2005). See also, for Belgium, the work of HERTEN et al (2001) and, for the United States of América, FOGEL (1972).

Independently of the influential facts, the truth is that, in Portugal, the development of the railways didn't translate into being the keystone of societal and economic development as men had thought it capable of, at that time[23], "because it answers only to one step of the production process: circulation"[24]. Therefore, we need to understand how the railway network developed; the ideals that supported it and the constraints it endured. To achieve these goals we'll be focusing on the network plans presented, countering it with what was actually built, and considering the criteria that sustained these choices.

As we've seen above, Portugal's political and economic reality was frail. Adding to it, statistical information, as well as geographical surveying of the territory hadn't begun until the mid-19th century[25]. Likewise, in the planning of the railways "the means of transportation or traffic that circulated (or would circulate) in these routes weren't measured or quantified by the public sector (or were insufficiently done) and were, as well, a secondary concern to the economic groups that invested in them (their affair was, in great part, safe kept by the financial agreements on contracts)".[26]

As we've seen, until 1850's, there weren't any material conditions that would allow the development of a railway network in Portugal, failing the only effort made by Costa Cabral with the 'Companhia das Obras Públicas' and, consequently, failing the idea of using national funds; the discourse, "from 1851 onwards, advocates the resource

[23] ALEGRIA, Maria Fernanda (1990). A organização dos transportes em Portugal (1850 1910): as vias e o tráfego. Lisboa: Centro de Estudos Geográficos, p. 223

[24] "porque apenas dão resposta a uma etapa do processo produtivo: a circulação". ALEGRIA, Maria Fernanda (1990). A organização dos transportes em Portugal (1850 1910): as vias e o tráfego. Lisboa: Centro de Estudos Geográficos, p. 223

[25] The first topographic survey was made between 1860 and 1865, whilst the first geological chart dates from 1876. Besides that, estimates on population or domestic economics were also quite deficient, the first statistic yearbook being published in 1875. See ALEGRIA, Maria Fernanda (1990). A organização dos transportes em Portugal (1850 1910): as vias e o tráfego. Lisboa: Centro de Estudos Geográficos, pp. 235-236.

[26] "Os meios de transporte ou o tráfego que circulava (ou circularia) nessas vias, não foram objecto de medidas, ou quantificações, pelos poderes públicos (ou foram-no insuficientemente) e constituíram também preocupação secundária para os grupos económicos que nelas investiram (os seus interesses estavam em grande parte salvaguardados pelas condições financeiras dos contratos)". In ALEGRIA, Maria Fernanda (1990). A organização dos transportes em Portugal (1850 1910): as vias e o tráfego. Lisboa: Centro de Estudos Geográficos, p. 29

to foreign funding"[27], opening the field to the foreign contractors and speculators to require authorization to construct railway lines[28], namely French and English.

Portugal's dependency on foreign economics can consubstantiate why these companies and speculators are going to be a major lobbying and pressure group, alongside Spain, and seize control on the definition of railway lines to be built, on an early stage, at least[29], allowing Prof. Maria Fernanda Alegria to conclude that "the railways were (...) considered as obligingly lucrative on short term and not as public service infrastructures"[30].

Although the incumbency of defining the lines fell on the State, this prerogative wasn't put into practice nor often nor soon enough and, in most cases, the lines were proposed by the investing companies to the governments or by pressure of the Spanish government, conditioning the choice of which lines to build. Even when decreed by the government, it would be referenced the starting and ending point but no specific details, situation that also profited of only having an approved plan in the beginning of the 20th century, when most of the network was already formed.[31]

Nevertheless, there are lines that are going to be built by the State, or with State's direct intervention, and not only by the private companies but this fact "doesn't translate a coherent and assumed position: its international economic crisis episodes and the absence of private investors that has determined it"[32].

This absence of a concrete, definite and binding railway network plan, caused by the indefinite indecision about who should construct (State and/or privates) and which

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[27] " (…) desde 1851 que se advoga o recurso aos capitais estrangeiros" In PINHEIRO, Magda (1979). "Investimentos estrangeiros, política financeira e caminhos-de-ferro em Portugal na segunda metade do século XIX". Análise Social, XV (58), pp. 265-286

[28] VIEIRA, A. Lopes (1988). A política da especulação - uma introdução aos investimentos britânicos e franceses nos caminhos-de-ferro portugueses. Análise Social, XXIV (101-102), pp. 723

[29] ALEGRIA, Maria Fernanda (1990). A organização dos transportes em Portugal (1850 1910): as vias e o tráfego. Lisboa: Centro de Estudos Geográficos, p. 327

[30] "os caminhos-de-ferro foram entre nós prioritariamente considerados como investimentos necessariamente lucrativos a curto prazo e não como infra-estruturas de serviço público". In ALEGRIA, Maria Fernanda (1990). A organização dos transportes em Portugal (1850 1910): as vias e o tráfego. Lisboa: Centro de Estudos Geográficos, p.332

[31] ALEGRIA, Maria Fernanda (1990). A organização dos transportes em Portugal (1850 1910): as vias e o tráfego. Lisboa: Centro de Estudos Geográficos, p. 327;

[32] "(…) construção e exploração de caminhos-de-ferro não traduz uma política coerentemente assumida: são situações de crise económica internacional e a ausência de concorrentes privados que a determinam". In ALEGRIA, Maria Fernanda (1990). A organização dos transportes em Portugal (1850 1910): as vias e o tráfego. Lisboa: Centro de Estudos Geográficos, p.331

ones to construct, by the never ending state subsidies and the copy of foreign models unadjusted to Portuguese reality and, last but not least, the passive attitude of the governments as a mere proposal receiver has constrained the design of a railway network.[33]

In general, one can observe three different phases regarding the network development, according to the summary made by Maria Fernanda Alegria: the construction of several lines had, as a principal objective, the increase of the international economical relationships and, these lines are going to be the first ones to be built[34]; the technical criteria for the choice of the route of the railway lines "were, essentially, the lesser distance between the two extreme points and the smaller construction cost predicted"[35].

The first phase encompasses the attempts and politics undertook by the governments before the creation of the 'Ministério das Obras Públicas, Comércio e Indústria', in August 30th 1852. In this first phase it was the government's prerogative to choose, define and approve the railway lines. In reality it consisted in a single line, decreed by the government: the 'Leste' Line (at that time designated Linha do Centro de Espanha), besides the several private companies that had requested it. Nevertheless, none of these projects saw daylight.

The second phase began with first proposal of a general network for Portuguese railways, in 1877, made by the 'Associação dos Engenheiros Civis Portugueses', followed suit by several others, although none has been officially approved. By and by, this period maintains the general criteria discussed above and the technical studies multiply, coincidently with the construction of railway lines. The State, conjoined with private sector, intervenes in the construction phase and it's in this period that the broader extension of railways in Portugal it's open to the public.

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[33] "(…) construção e Centro de Estudos Geográficos, pp.230;231

[33] ALEGRIA, Maria Fernanda (1990). A organização dos transportes em Portugal (1850 1910): as vias e o tráfego. Lisboa: Centro de Estudos Geográficos, p. 327exploração de caminhos-de-ferro não traduz uma política coerentemente assumida: são situações de crise económica internacional e a ausência de concorrentes privados que a determinam". In ALEGRIA, Maria Fernanda (1990). A organização dos transportes em Portugal (1850 1910): as vias e o tráfego. Lisboa: Centro de Estudos Geográficos, pp.230;231

[34] ALEGRIA, Maria Fernanda (1990). A organização dos transportes em Portugal (1850 1910): as vias e o tráfego. Lisboa: Centro de Estudos Geográficos, p. 327

[35] Idem, ibidem, p.329

Whilst the first two phases are determined by the discourse and the ideal of connecting to the rest of Europe through Spain and to have our ports being the entrance gate into Europe, developing foreign economics and increasing the export of goods, the third phase pins down a period of crisis, between 1891/2 and 1898 and "the plans elaborated on late 19th century translate (...) a major alteration: at that time it's not only the international liaisons that are championed, but the ones that concern inter-regional communications within the national territory"[36]. In time of crisis, the only railway lines that are built are the ones whose construction had already begun. After 1898, new studies are made, conjoint plans to the north, centre and south of Portugal but, due to the shift on the commercial politics, quite more protectionist, leads to a more dynamic and leading State.

From the analysis of the several proposals, comparing them with the network set in place by 1911, one understands that both the road and railway infrastructures developed concomitantly and they overlap on a great percentage of the territory. Also, the dichotomy interior/littoral still applies, suggesting that they weren't planned as a network with several points of contact (roads, railway and ports), but simultaneously.[37]

[36] " (…) os planos elaborados no fim do século traduzem (…) uma grande alteração: nessa altura não são já as ligações internacionais que se defendem, mas as que dizem respeito a comunicações inter-regionais dentro do território nacional" In ALEGRIA, Maria Fernanda (1990). A organização dos transportes em Portugal (1850 1910): as vias e o tráfego. Lisboa: Centro de Estudos Geográficos, pp. 327-328

[37] See annex 3 and 4.

CHAPTER III – ALGARVE'S REGION IN THE 19TH CENTURY

Pour meilleure comprendre l'introduction d'un chemin de fer dans la région de l'Algarve on doit aussi comprendre comment cette région a été considérée, à cette époque-là, par les gouvernements et comment cette région s'insère dans le réseau ferroviaire qu'ils ont essayé de planifier.

Pour ça, dans cette chapitre, on va caractériser la région de l'Algarve, regarder son économie et qu'est qu'ils produisaient et aussi quelles moyens de circulation on y avait, avec le but de vérifier se la réalité de l'Algarve et l'idée qu'on avait était pareille et se la construction de la ligne de chemin de fer était justifiée, en considérant qu'elle a été toujours prévue dans les propositions de réseau ferroviaire nationale.

3.1. ECONOMIC AND SOCIAL CONTEXT OF THE ALGARVE IN THE 19TH CENTURY

To understand the dynamics and logics that underlay the Algarve Railway Line construction, beforehand it is needed to understand Algarve's reality at the 19th century, a time of so many and paradigms shift[1]. Firstly, one has to take into account that the Liberal Wars were more expressive in this region and lingered longer; secondly, that an exchange in the soil exploitation to agriculture has occurred, having been applied the new legislation approved by Mouzinho da Silveira, promoting the end of estates and/or its allocation to tenants. [2]

1 FERNANDES, T. (2011). "Linha do Algarve: Encontros e Desencontros…". In Comboios em Linha, n.º 1. Lisboa: Fundação Museu Nacional Ferroviário, p. 77.

2 See, for instance, the Decree of August 13th 1832, known as the "Lei dos Forais", extinguishing the Crown estates, also expropriating part of the aristocracy in favour of the tenants that were, until that date, unable to take full possession of the lands they worked. See MANIQUE, António Pedro (1999). "O Algarve face ao liberalismo económico"; in O Algarve da Antiguidade aos nossos dias; Maria da Graça Maia Marques (coordenação); Edições Colibri; Lisboa, p. 363

Algarves' market was already intense by 1841, exporting its agricultural products, either to the internal market, directed at Lisbon[3], whether abroad, "mostly directed at France, Belgium, Holland and Great Britain".[4]

The weight of agriculture and fishing was such that Bonnet didn't hesitate in characterizing Algarve's population and main activities, stating that "the main trait of commerce is the export of earth products"[5] and that in the region's interior area "man and women occupy themselves with cropping and fruit collection"[6], whilst "in the villages and places on the littoral the gross of the population dedicates to fishing"[7].

In 1841, Silva Lopes described the region has quite rich in resources and economically interesting, despite the fact of lacking a competitive and dynamic industry which, in his view, was what lacked, as well as good communication infrastructures, wishing for the creation of a association that would promote the development of industry in the Algarve, that would make the better use of its natural resources.[8]

According to Joaquim Rodrigues the Algarve was a "peripheral zone, geographically isolated, namely in its northern part, relatively poor in raw materials [that] although had had some proto-industrial experiments, waited until very late to trigger its industrial outburst".[9] In fact, by 1850 "Bonnet declares that "the manufacturing industry in nonexistent", just mentioning the fabrication of coarse cloths, ceramics

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3 See ALEGRIA, Maria Fernanda (1990). "A organização dos transportes em Portugal (1850 1910): as vias e o tráfego". Lisboa: Centro de Estudos Geográficos and MARTINS, Carlos (2014). "O Programa de Obras Públicas para o Território de Portugal Continental, 1789-1809. Intenção Política e Razão Técnica – o Porto do Douro e a Cidade do Porto; vol. II; Universidade de Coimbra

4 " (…) destinando-se os produtos, sobretudo, a França, Bélgica, Holanda e Grã-Bretanha". MANIQUE, António Pedro (1999). "O Algarve face ao liberalismo económico"; in O Algarve da Antiguidade aos nossos dias; Maria da Graça Maia Marques (coordenação); Edições Colibri; Lisboa, p. 365. Apud LOPES, João Baptista da Silva (1841). "Corografia, ou Memoria económica, estadística e topografica do reino do Algarve, por João Baptista da Silva Lopes, socio da academia r. das sciencias de lisboa"; Lisboa: Typografia da Academia R. das Sciencias de Lisboa

5 " (...) o principal ramo do comércio é a exportação de produtos da terra". BONNET, Charles (1850). Algarve (Portugal). Description Géographique et Géologique de cette Province ; Lisboa, pp. 108-109

6 " (…) homens e mulheres ocupam-se da cultura das terras e da recolha de frutos". Idem, ibidem.

7 " (…) nas vilas e aldeias do litoral, a maior parte da população ocupa-se da pesca". Idem, ibidem.

8 LOPES, João Baptista da Silva (1841). "Corografia, ou Memoria económica, estadística e topografica do reino do Algarve, por João Baptista da Silva Lopes, socio da academia r. das sciencias de lisboa"; Lisboa: Typografia da Academia R. das Sciencias de Lisboa, pp. 134-200

9 "zona periférica, geograficamente isolada, nomeadamente na sua vertente norte, relativamente pobre em matérias-primas, embora tivesse conhecido algumas experiências proto-industriais (…) – esperou até muito tarde para o despoletar do seu surto industrial". In RODRIGUES, Joaquim Manuel Vieira (1999). "Produção capitalista e organização do trabalho"; in O Algarve da Antiguidade aos nossos dias; Maria da Graça Maia Marques (coordenação); Edições Colibri; Lisboa, p.393

(household utensils, brick and roofing tiles), and palm leaf pieces", vision that is corroborated by the declarations of Faro's District Civil Governor, in response to the inquiry ordained by the Crown in 1852.[10]

Nevertheless, there were some industrial endeavours namely in esparto, silk[11], linen, tanning, dried fruits[12] (such as fig and locust). Most interesting and that would be one of the turning points of industrialization in Algarve is the development that occurred in two proto-industries based in an already known and established artisanal practice: salt and tuna fishing, in the littoral, alongside the development of the cork industry. In fact, "the industrial revolution in the Algarve would arrive by mid-19th century, with the start-up of the canning and cork industries."[13] They came to be cornerstone pieces of Algarve's industrial tissue, fostered by massive foreign investment and "both moved vast amounts of capital, had hundreds of factories and many thousands of employees, of both genders".[14]

The development of these industries maintains the secular structure of territory occupation, so much that one can boldly infer that "In Algarve's industrial geography, still in 1903, we can consider the existence of an intra-regional division of work: Olhão, Portimão, Vila Real de Santo António e Lagos, major canning industry centres; Vila Real de Santo António as the main producing and exporting centre of tuna canning; Silves and São Brás de Alportel, prominent cork industry

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[10] MANIQUE, António Pedro (1999). "O Algarve face ao liberalismo económico"; in O Algarve da Antiguidade aos nossos dias; Maria da Graça Maia Marques (coordenação); Edições Colibri; Lisboa, p. 365. Apud BONNET, Charles (1850). Algarve (Portugal). Description Géographique et Géologique de cette Province ; Lisboa, p. 108

[11] We infer that this proto-industry must have been significant, taking into account that specific legislation was decreed on this topic as early as in the 18th century. Therefore, it comes as no shock the issuing of a license of operation, issued in May 31st 1776, to install the 'Fábrica de Tapeçarias de Tavira', aiming at the production of woolen and silk based cloth and tapestries.

[12] This particular industry was quite widespread throughout the territory, whose main production centres were Faro, Portimão, Silves and Lagos. Moreover, there were some attempts at the implementation of two distilleries to produce fig and locust licquor. See MANIQUE, António Pedro (1999). "O Algarve face ao liberalismo económico"; in O Algarve da Antiguidade aos nossos dias; Maria da Graça Maia Marques (coordenação); Edições Colibri; Lisboa, p. 396

13 "A revolução industrial no Algarve chegará cerca de meados do século XIX, através do arranque das indústrias de conservas e de cortiça". In RODRIGUES, Joaquim Manuel Vieira (1999). "Produção capitalista e organização do trabalho"; in *O Algarve da Antiguidade aos nossos dias*; Maria da Graça Maia Marques (coordenação); Edições Colibri; Lisboa, p. 397

14 "Ambas movimentaram avultados capitais, dispuseram de centenas de fábricas cada uma e de muitos milhares de operários de ambos os sexos". In RODRIGUES, Joaquim Manuel Vieira (1999). "Produção capitalista e organização do trabalho"; in *O Algarve da Antiguidade aos nossos dias*; Maria da Graça Maia Marques (coordenação); Edições Colibri; Lisboa, pp. 397-398

centres, although Faro, Portimão and Messines were important nucleus of this activity as well, and milling in Tavira and Portimão".[15]

Demography accompanied this slow but steady transformation of the economic tissue, with a moderate increase on the late 18th century and a more rapid growth rate in the 19th century, maintaining the same pattern in territorial concentration, since the population growth rate was more intense in the littoral area. As João Cosme puts it, the "analysis of population by municipalities in 1787 and 1801 corroborates the predominance of Faro, the demographic prosperity of Castro Marim, Alcoutim and Lagos, an positive yet insignificant physiological balance of the two major agricultural municipalities of the province, Loulé and Silves, the stagnation of Monchique and the accentuated decadence of Tavira."[16]

The first census on the Portuguese population is dated from 1864 and, therefore, it's only from this date onwards that we have regular and systematic data on Algarve's demographic profile. From the analysis of the existent data one can conclude that the 19th century was a phase of high demographic growth, almost doubling its population and that the discrepancy between municipalities still applies, as we can observe on the following table:[17]

[15] "Na geografia industrial do Algarve, ainda em 1903, podemos considerar uma divisão intra-regional do trabalho: Olhão, Portimão, Vila Real de Santo António e Lagos importantes centros conserveiros; Vila Real de Santo António, o grande centro produtor e exportador de conservas de atum; Silves e São Brás de Alportel, destacados centros corticeiros, embora Faro, Portimão e Messines também fossem núcleos importantes desta indústria, e a moagem em Tavira e em Portimão". In RODRIGUES, Joaquim Manuel Vieira (1999). "Produção capitalista e organização do trabalho"; in *O Algarve da Antiguidade aos nossos dias*; Maria da Graça Maia Marques (coordenação); Edições Colibri; Lisboa, p. 399

[16] COSME, João (1999). "A população do Algarve de meados do século XIX a meados do século XX"; in *O Algarve da Antiguidade aos nossos dias*; Maria da Graça Maia Marques (coordenação); Edições Colibri; Lisboa, p. 430

[17] Idem, ibidem.

TABLE 3 – NUMBER OF INHABITANTS BY MUNICIPALITY

	Inhabitants			
Municipalities	1787	1801	1864	1911
Albufeira	4193	4530	7453	12852
Aljezur	1375	1773	3956	5720
Lagos	8330	9790	10953	15991
Monchique	4725	4653	8164	12770
Portimão	3335	4153	9383	15980
Vila do Bispo	515	684	3791	5953
Faro	19690	23754	22747	36195
Lagoa	4674	4903	10094	12992
Silves	10205	10512	18996	31790
Catsro Marim	3317	5020	7046	8908
Loulé	13038	13498	26122	44355
Tavira	12219	10547	21429	25755
Vila Real de Santo António	1918	2082	5059	10881
Alcoutim	5671	6995	8061	9204

Source: COSME, João (1999). "A população do Algarve de meados do século XIX a meados do século XX"; in *O Algarve da Antiguidade aos nossos dias*; Maria da Graça Maia Marques (coordenação); Edições Colibri; Lisboa, pp. 429 and 431

Having asserted the positive tendency whether in Algarve's economic structure, as well in its demographic profile, it lacks only to understand how population and goods could move within the territory and the communication that existed with Algarve's economic markets.

As we've observed before, the gross of the road infrastructure in Portugal has been considered and planned since the late 18th century but only developed and enhanced during the 'Regeneração', alongside with the implantation of the railways. Taking this macro scenario into consideration, how can we characterize Algarve's traffic infrastructure at the late 18th century and beginning of the 19th century, before the construction of the railway line?

The description that Silva Lopes made in 1841 stated that the Algarve's communication system was practically nonexistent, since "transports are made, in the Algarve, on mules and donkeys, because there are no roads, just by the shore and outskirts of Silves until S. Bartholomeu where ox-carts are used"[18]. In fact, the only road that communicated with the rest of the continental territory worth mentioning was the one that crossed the Algarve hills range, in the interior, from S. Bartolomeu de Messines through S. Marcos da Serra.[19] To go to Lisbon by road, main economic centre and a market destination for the Algarve commerce, there were not many choices. At the beginning of the 19th century the best option was to use the "ancient road that followed the Guadiana River, upstream, until Mértola, afterwards through Serpa until Beja. From Beja there was a road until Alcácer do Sal, relatively fit, one of the main routes of wheat, which henceforth was carried by boats to Lisbon".[20]

In general, the roads used at that time were ancient and naturally formed by the usual crossing of people and animals. Deficient and ineffective, it limited traffic almost to nonexistent during the winter, especially because water courses had to be crossed on foot because there were no bridges.[21] Therefore, it is of no surprise that the bulk of Algarve's communication system, until late 19th century, was by sea or fluvial and that their exports were mainly made by boats, as well as passengers traffic, as we can attest by the establishment of a steamboat line between the Algarve's ports and Lisbon, after 1853.[22]

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[18] "Os transportes fazem-se no Algarve em muares ' ou jumentos, porque não ha estradas; apenas na bei-ra-mar , e arredores de Silves até S. Bartholomeu se usa de carros de bois". In LOPES, João Baptista da Silva (1841). Corografia ou Memória Económica Estadistica e Topográfica do Reino do Algarve, Lisboa, Tipografia da Academia R. das Sciencias de Lisboa, pág.33.

[19] LOPES, João Baptista da Silva (1841). Corografia ou Memória Económica Estadistica e Topográfica do Reino do Algarve, Lisboa, Tipografia da Academia R. das Sciencias de Lisboa, pág.75

[20] " (…) estrada antiga que subia pela margem do rio Guadiana até Mértola seguindo depois por Serpa até Beja. De Beja saía então uma estrada para Alcácer do Sal, relativamente boa, uma das principais vias de transporte de trigo, que dali seguia por via marítima para Lisboa.". In SANTOS, Luis Filipe Rosa (1999). "As vias de comunicação"; in *O Algarve da Antiguidade aos nossos dias*; Maria da Graça Maia Marques (coordenação); Edições Colibri; Lisboa, p. 387

[21] SANTOS, Luis Filipe Rosa (1999). "As vias de comunicação"; in *O Algarve da Antiguidade aos nossos dias*; Maria da Graça Maia Marques (coordenação); Edições Colibri; Lisboa, p. 387

[22] SANTOS, Luis Filipe Rosa (1999). "As vias de comunicação"; in *O Algarve da Antiguidade aos nossos dias*; Maria da Graça Maia Marques (coordenação); Edições Colibri; Lisboa, p. 385. An intensive study on merchandising traffic routes, as well as of the organization of the maritime and fluvial transport system, depicting its importance on the Algarve region is the one made by Maria Fernanda Alegria to

Afterwards, with the reform and enhancement of the roads infrastructures alongside the construction of the first railway lines, a mixed system of transport was put in gear: "by the royal road number 78 until Vila Real de Santo António, upstream by the river Guadiana until Mértola, again by road until Casével to, after a railway trip until Barreiro, cross the river on a steam boat that, as today, within 35 to 40 minutes, placed us in Terreiro do Paço [Lisbon]."[23]

her doctorate: ALEGRIA, Maria Fernanda (1990). "A organização dos transportes em Portugal (1850 1910): as vias e o tráfego". Lisboa: Centro de Estudos Geográficos. For the macro planning and political regard over the importance of maritime and fluvial communication in Portugal see also: MARTINS, Carlos (2014). "O Programa de Obras Públicas para o Território de Portugal Continental, 1789-1809. Intenção Política e Razão Técnica – o Porto do Douro e a Cidade do Porto; vol. II; Universidade de Coimbra.

[23] "(…)rodoviário pela Estrada Real n.º 78 até Vila Real de Santo António, fluvial pela subida do rio Guadiana até Mértola, novamente rodoviário até Casével para, depois de uma viagem de comboio até ao Barreiro, atravessar o rio num vapor que, tal como hoje, em cerca de 35 a 40 minutos, nos colocava no Terreiro do Paço". In SANTOS, Luis Filipe Rosa (1999). "As vias de comunicação"; in *O Algarve da Antiguidade aos nossos dias*; Maria da Graça Maia Marques (coordenação); Edições Colibri; Lisboa, p. 385

CHAPTER IV – RAILWAYS IN THE ALGARVE. THE SOUTH LINE AND ITS BRANCHES

On pourra considérer la ligne de chemin de fer de l'Algarve comme un exemplaire représentatif de l'évolution et croissance du réseau ferroviaire portugais, surtout quand on pense que parmi le débat et la construction de cette ligne-là, elle traverse les 3 phases principales de cette entreprise ?

Dans cette chapitre et on essayant de répondre à cette question, on va analyser les projets et les tracées qui ont été proposées, n'importe s'ils ont été bâti ou pas.

On y va arriver à la conclusion que cette ligne a été toujours considérée comme nécessaire et, de plus, elle va traverser la zone littoral, la plus développée, en ayant le chemin de fer et le réseau routier que se superpose.

4.1. THE LINE: DEFINITION, CONSTRAINTS AND CONSTRUCTION

The construction and subsequent commercial exploitation of the railroads by private companies wasn't successful. Therefore, the State claimed that task for itself, by the *Caminhos de Ferro do Estado*, allowing the expense with the construction of several railroads, to be paid with the national budget, including the *Linha do Sul*, between Faro and Vila Real de Santo António.

When arguing why was this line interesting and important enough to be considered since the debut of this enterprise, one has to bear in mind that this region was perceived as a very rich but underdeveloped area (see chapter 3), in great and desperate need of communication and traffic infrastructures, considering the railways not only as an asset but, in fact, as an imperative need, as an efficient means of connection with the rest of the country and as a more quick and safe way of flowing their products to Lisbon[1]. It comes as no surprise that the municipalities pressured the governments, not only demanding a railway line but also battling for railway

[1] FERNANDES, T. (2011). "Linha do Algarve: Encontros e Desencontros…". In Comboios em Linha, n.º 1. Lisboa: Fundação Museu Nacional Ferroviário, p. 77

routes that would be most beneficial to their cities, in detriment of their neighbouring counterparts[2].

In the regional context, one can conclude that it was very much pertinent and proved by the immediate adhesion to this new way of transport, hence the successive "drawings and platform enlargement processes or line adaptations that took place, roughly, in almost all stations"[3].

Another interesting point of this railway line is that the denomination Algarve Railway Line has been attributed to different railway stretches: firstly, it meant the liaison between Casével and Faro, afterwards called *Linha do Sul*, including the extension of this railway line until Olhão, whilst the two other stretches were named *Ramal de Portimão* and *Extensão a Vila Real de Santo António*. It's only in 1992 that the denomination *Linha do Algarve* comprises all railway route in this region, forming a single traject between Lagos and Vila Real de Santo António[4]. Therefore, we'll take both pathways into account and make a brief summary of the development of this railway line[5]

Even so, the first debate over a connection between Beja and Faro dates from 1858, opposing two different views: one defending the connection should follow through Mértola, alongside the Guadiana River until Vila Real de Santo António, while the other one would cross the interior, close to São Bartolomeu de Messines. The first project, although escaping from the hardship of construction through the hills and allowing a future connection with Spain, was rejected since it passed far away from

[2] As is the case of the requirements made by Faro and Tavira Municipalities that, as early as 1864, wrote to the government defending the idea of a railroad from Beja to Faro instead of Vila Nova de Portimão. Source: Documentation on box number 2356.

[3] " (…) desenhos e processos de ampliação das plataformas de passageiros ou adaptação das linhas de quase todas as Estações". See, by means of example: Arquivo Técnico da Refer - Infra-Estruturas, Memória Descritiva e Justificativa "Meia-Praia ampliação de plataforma" – 3 de Julho de 1929, Caixa 438 – Meia-Praia; Desenho n.º 8860, Planta de construção de plataforma intermédia, Caixa 107 – Lagos; Memória Descritiva e Justificativa "Instalações para a 16ª Secção na estação de Messines" – 1 de Abril de 1930, Caixa 440 – Messines-Alte; Desenhos n.º 523, de 25 de Outubro de 1922 e n.º 3661, de 27 de Outubro de 1969, Plantas Gerais , Caixa 440 – Mexilhoeira Grande. In FERNANDES, T. (2011). "Linha do Algarve: Encontros e Desencontros…". In Comboios em Linha, n.º 1. Lisboa: Fundação Museu Nacional Ferroviário, p. 79.

[4] Decree-law 116/92, of June 20th.

[5] See Annex --: full timeline on Algarve's railway line.

Aljustrel (and its mines) and due to Spain's opposition in having an international line crossing through this area[6].

Nevertheless, it doesn't mean that we have no signs of interest in the development of a railway line in this particular region. As early as 1857 there's a proposal of an 'american' tramway system proposed to the littoral area of the Algarve (the most developed and densely populated), that was never built[7].

The first contract to build this line was celebrated in April 21st 1864, with the *Companhia dos Caminhos de Ferro do Sul*, a English capital dominated company, that brought their own engineers along with them, regarding the railway line between Beja and Faro[8]. The construction should be finished by January 1st 1869 but that didn't come to pass, because by 1866 the State terminates the contract with this company and takes administrative possession of the railway lines already built and constitutes the public company *Caminhos de ferro do Estado*.

Being built in small stretches, at the time of contracts dissolution there were some of the preparatory works already concluded, between Boliqueime and Faro, as well as some main buildings, like Loulé and Boliqueime stations. The main objective of construction in small stretches didn't revolve around any technical constraints. The purpose was to profit from these public works to employ the unemployed population in several regions that survived of seasonal work in agriculture or fishing and were fighting a phase of famine[9].

July 1st 1875, the Engineer Nuno Augusto de Brito Taborda is in charged with presenting the definitive plan to the railway line as at the same time, by decree, the State is charged with the responsibility of building it and, therefore, the construction works recommenced the building works, also in independent stretches and, by 1876, the line was ready, between Faro and São Bartolomeu de Messines, lacking the stretch between this location and Casével.

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[6] Santos, 1995:123-124.

[7] BMOP, 1858, n.º 1: 96-103. There were, through time, another 7 proposals, in this system, that were never built, all regarding the Algarve region. See Annex --: full timeline on Algarve's railway line.

[8] The terminus was defined by a Decree-law, dating from January 25th 1866.

[9] MARQUES, Maria da Graça Maia et al.(1999). O Algarve Da Antiguidade aos Nossos Dias: Elementos para a sua História. Lisboa: Edições Colibri, p.390

This first phase of the Algarve Railway Line had been devised by the English enginners[10] but suffered some posterior alterations, devised by the Portuguese engineers assigned to the Algarve railway line[11]. Despite the delays and the alterations, that the objective of diminishing construction costs and high curve ratios, the railway line to Faro begins its public exploitation on July 1st 1889.

Concomitantly, there is another project that, based on the network plans to the Portuguese railway infrastructure, that studies the extension of the railway line, between Lagos and Amoreiras, connecting the Algarve to the South Line through the interior southwest, in a much more direct route to Lisbon. This project dates from May 10th 1890 but it was never built[12].

As we can observe in the Portuguese railway network plans that were proposed, the connection to the Algarve and its expansion through the littoral area of this region is almost always present.

Being state owned, the projects of these two enhancements – from Faro to Vila Real de Santo António and from Tunes to Lagos -, were responsibility of the State engineers admitted to the Public Works, Commerce and Industry Ministry. Although the ouverture to the public would come to be only 10 years after the arrival in Faro, these studies were made before, while the first phase was in construction, like the project made by Engineer João Pedro Tavares Trigueiros, to the stretch between Faro and Vila Real de Santo António, that date from 1889.

Therefore, these two extensions were built simultaneously, but also in a phased way, opening to the public in different dates:

1. Stretch between Tunes and Algoz: October 10th 1899;
2. Stretch between Poço Barreto and Silves: February 1st 1902;
3. Stretch between Silves and Portimão: 1903;
4. Stretch between Faro and Olhão: May 15th 1904;

[10] See the Project between Barreiros Vermelhos and Boliqueime, dating from June 8th 1865, signed by James Fford and White. CDFMNF, inventory box number 2350

[11] See: project memoire, comparing the english system and the system of Five-Lille to building a bridge in the Algarve Railway Line, choosing as preferable the french system, signed by the engineer João Augusto de Abreu e Souza. CDFMNF, inventory box number 2350; project with alternative route, between Boliqueime and Faro, comparing with the Englishman's project, signed by the engineer Augusto Cezar Paes de Faria. CDFMNF, inventory box number 2559.

[12] Descriptive document, master plan and profiles. CDFMNF inventory box number 2331

5. Stretch between Olhão and Fuzeta: September 1st 1904;
6. Stretch between Fuzeta and Luz de Tavira: February 4th 1905;
7. Stretch between Luz de Tavira and Tavira: March 10th 1905;
8. Stretch between Tavira and Vila Real de Santo António: April 14th 1906.

Technical reasons were at the base of the route devised to the extension between Faro and Vila Real de Santo António, following, in general, the coastline, almost parallel to the ancient road. This allowed it to pass near the coast, between Olhão and Fuzeta (deflecting the terrain accidents in the interior), and inflected inland, between Fuzeta and Vila Real de Santo António, averting the swamp terrain in that area.

On the other hand, the final stretch of the Portimão extension, connecting Portimão and Lagos, was much more complicated. Foreseen in the Network South of Tagus Plan, dating from 1899, it wasn't imediatly built, due to the financial intake that building a bridge over the Arade River implicated. Tehnical studies were then conducted, in order to overcome this natural obstacle. As early as the first trimester of 1900 a study is conducted, by the Engineer António da Conceição Parreira, in order to consider the hypothesis of adapting the existing road bridge to sustain the double function: road and railway bridge.

Despite this study, this solution was never adopted, since another study, this time conducted by the Engineer António Augusto da Silva Marques, presented on July 3rd 1909 and corroborated by the *Conselho Superior de Obras Públicas e Minas*, considered a dangerous and quite expensive option, when comparing with an existing study for a new bridge[13].

Nevertheless, it didn't end here. On March 27th 1909, Portimão Municipality sends a letter to the *Caminhos de Ferro do Estado*, requiring that they would change the planned route, to pass on a different side of the road bridge. Adds to it, the petitions posed by the Viscountess of Bivar and João António Júdice Fialho also aiming to change the route and location of the bridge. In response, the technical corpus produced a technical report, dating from November 25th 1909, explaining the

[13] "Parecer do Conselho Superior de Obras Públicas sobre o possível aproveitamento da ponte da estrada de Portimão para a linha férrea. 29 de julho de 1909". CDFMNF, inventory box number 2333.

technical procedures to study the river's current and flow and to discard the new proposals, due to the technical constraints[14].

In fact, this project was concluded only on July 30th 1922, with the grand opening of Lagos railway station. This railway station hasn't followed the original plan, since it was planned to the northern part of town, obliging to build a bridge to cross the Bensafrim stream. Finnaly, it was built on the Eastern side of the Bensafrim stream.

[14] Letters, plans and technical report. CDFMNF inventory box number 2333.

CHAPTER V – ENGINEERING IN THE ALGARVE RAILWAY LINE

Dans ce chapitre on y va démontrer la relation entre la formation des ingénieurs portugais, son travail au sein du Ministère des Travaux Publiques et le rôle que leur ont joué dans la conception d'un nouveau pays, plus moderne.

De plus, on va analyser sa formation et son parcours professionnelle et académique, en démontrant les processus de transfert de connaissances et des techniques, où la France a joué un rôle très important.

Finalement, on va analyser les données des ingénieurs de la ligne de chemin de fer de l'Algarve et vérifier le fait qu'ils sont un cas exemplifiait de cette réalité.

5.1. ENTERPRISES KEY ACTORS AND THEIR TRAINING: ENGINEERS, COMPANIES AND POLICY MAKERS

It then comes as no surprise that the new major engineering teaching institutions created in Portugal will also belong to the military: the Army School is created in 1836[15], including in its curricula a major in military engineering and another on civil engineering; Lisbon Polytechnic School and the Polytechnic Academy at Oporto, were founded in the following year, "under the auspices of the Ministry of War,[and] included preparatory courses in their curriculum, the contents of which were considered an indispensable theoretical basis for the training of engineers"[16].

Nevertheless, there is a civil teaching institution that, even though it didn't had a degree in Civil Engineering, was deemed equivalent, in order to enter the profession and requiring the Professional Chart as a Civil or Military Engineer: the Mathematics Faculty of Coimbra University. By decree it was determined that this course, that included disciplines such as Arithmetic, Geometry, Trigonometry, Physics,

[15] See also: Maria Paula Diogo e Ana Cardoso de Matos, "Jogos de Identidade. Dois séculos na formação e na prática dos engenheiros portugueses (séculos XVIII-XIX)". In BRITO, J. M. Brandão de, HEITOR, Manuel, e ROLLO, Maria Fernanda (coord.), *Momentos de Inovação e Engenharia em Portugal no século XX*., Lisboa, Dom Quixote, vol. I, 2004 pp. 181-199 e Maria Paula Diogo e Ana Cardoso de Matos, "Aprender a ser ingeniero. La enseñanza de la ingeniería en Portugal de los siglos XVIII y XIX". In LAFUENTE, António, MATOS, Ana Cardoso de, e SARAIVA, Tiago (ed.), *Maquinismo Ibérico*, Madrid, Doce Calles, 2007, pp. 123- 145

[16] In MATOS, Ana Cardoso (2009). Asserting the Portuguese civil engineering identity: the role played by the École des Ponts et Chaussées. In Jogos de Identidade Profissional / Les Enjeux Identitaires dês Ingénieurs / The Quest for a Professional Identity; Lisboa : Edições Colibri/CIDEHUS-EU/CIUHCT, pp. 178

Mineralogy, Metallurgy, Hydraulics and Civil, Military and Underground Architecture would suffice[17].

We'll have to wait until 1911 when it will be created another teaching institution that bestowed a degree in Civil Engineering, as well as other specialized degrees: the *Instituto Superior Técnico*.

TABLE 4: NEW ENGINEERING TRAINING SCHOOLS, CREATED FROM THE 1830'S ONWARDS

School	Year	Branch	Town	Training
Mathematics Faculty	1836[18]		Coimbra	Preparatory courses on Civil and Military Engineering
Oporto Polytechnic Academy	1837	Civil	Oporto	Preparatory course on Civil and Military Engineering; Degree in Roads and Bridges Civil Engineering, Degree in Public Works Civil Engineering[19];
Lisbon Polytechnic School	1837	Military	Lisbon	General course; Preparatory courses on Civil and Military Engineering
Army School	1837	Military	Lisbon	Military Superior Studies; Military Engineering, Civil Engineering
Technical Superior Institute	1911	Civil	Lisbon	General course; Special Superior Degrees: Civil Engineering, Mining Engineering, Mechanics Engineering, Electrotechnic Engineering and Industrial Chemistry Engineering

SOURCE: LISBOA, Maria Helena (2002). "Os engenheiros em Lisboa. Urbanismo e Arquitectura (1850-1930)". In Cidade de Lisboa; Lisboa: Livros Horizonte, pp.51-54.

Nevertheless, there were still an insufficient number of engineers "to secure the planning and supervision of works that were wanted in the country"[20]. Moreover, the conceptual choice made, in Portugal, regarding the training of engineers, was to have an "academic curricula that would bestow a generic background, aimed at the several

[17] Idem, ibidem

[18] The creation of the Mathematics Faculty is far more ancient than this date. It is from this point onwards that the studies made at this faculty were deemed sufficient to demand the Professional Chart of Civil or Military Engineer. LISBOA, Maria Helena (2002). "Os engenheiros em Lisboa. Urbanismo e Arquitectura (1850-1930)". In Cidade de Lisboa; Lisboa: Livros Horizonte, p.61

[19] By the law issued in 1885, este curso orienta-se para as áreas consideradas urgentes: construção de vias, construções hidráulicas, mecânica e administração de obras públicas. LISBOA, Maria Helena (2002). "Os engenheiros em Lisboa. Urbanismo e Arquitectura (1850-1930)". In Cidade de Lisboa; Lisboa: Livros Horizonte, pp.60-61

[20] In MATOS, Ana Cardoso (2009). Asserting the Portuguese civil engineering identity: the role played by the École des Ponts et Chaussées. In Jogos de Identidade Profissional / Les Enjeux Identitaires dês Ingénieurs / The Quest for a Professional Identity; Lisboa : Edições Colibri/CIDEHUS-EU/CIUHCT, pp. 179

branches of Civil Engineering instead of, from the beginning, focusing on specializations"[21]. And why was it so?

Maria Helena Lisboa puts forward an explanation that deems logic the choice guarantying further specialization to some engineers abroad, in order to respond to the ever increasing demand of specialized skills and also the structure of the Public Works Ministry itself: it was of the Ministry convenience that their engineers had a very good basic training, allowing them to be shifted to different roles and works inside the Ministry. In fact, the vast majority of the engineers will be civil servants and work under the scope of the Ministry[22] and this constant shift or accumulation of different kinds of works is quite clearly observed in the Public Works Ministry employees' personal files. [23]

Therefore, in the first years of the '*Regeneração'* they've decided, as second course of action, to address some shortcomings in the training of engineers, by sending them to study abroad[24]. "Just as it happened in other European countries, a number of Portuguese engineers[25] sought to complete their training in those countries where

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[21] " (...) formação dos engenheiros, optou-se por currículos académicos que fornecessem uma habilitação geral destinada aos vários ramos da Engenharia Civil, e não, logo desde o começo, voltados para especializações" In LISBOA, Maria Helena (2002). "Os engenheiros em Lisboa. Urbanismo e Arquitectura (1850-1930)". In Cidade de Lisboa; Lisboa: Livros Horizonte, p. 43. See also: MATOS, Ana Cardoso de and DIOGO, Maria Paula (2007). "Bringing it all back home: Portuguese engineers and their travels of learning (1850-1900)". In HoST, 1, p.163

[22] MATOS, Ana Cardoso de and DIOGO, Maria Paula (2009). "Le role des ingénieurs dans l'administration portugaise, 1852-1900". In Quaderns d'Història de l'Enginyeria, vol X. Barcelona : Universitat Politècnica de Catalunya - Escola Tècnica Superior d'Enginyeria Industrial de Barcelona, p. 360

[23] In LISBOA, Maria Helena (2002). "Os engenheiros em Lisboa. Urbanismo e Arquitectura (1850-1930)". In Cidade de Lisboa; Lisboa: Livros Horizonte, p. 43-45

[24] LISBOA, Maria Helena (2002). "Os engenheiros em Lisboa. Urbanismo e Arquitectura (1850-1930)". In Cidade de Lisboa; Lisboa: Livros Horizonte, p.67; MATOS, Ana Cardoso de and DIOGO, Maria Paula (2009). "Le role des ingénieurs dans l'administration portugaise, 1852-1900". In Quaderns d'Història de l'Enginyeria, vol X. Barcelona : Universitat Politècnica de Catalunya - Escola Tècnica Superior d'Enginyeria Industrial de Barcelona p. 354. Also, in what concerns the models of training and formation at the EPC see: PICON, Antoine (1992) "L'invention de l'ingénieur moderne. L'École des Ponts et Chaussées 1747-1851", Paris: Presses de l'École Nationale des Ponts et Chaussées. On the importance of this school to the training of foreign and students as well as their referent models see: GOUZÉVITCH, Irina; GRELON, André; KARVAR, Anousheh (ed.) (2004). « La formation des ingénieurs en perspective: Modèles de référence et réseaux de médiation: XVIIIe-XXe siècles ». Rennes; GOUZÉVITCH, Irina; GOUZÉVITCH, Dimitri (2003). "Se former et s'informer: Un regard sur l'émigration scolaire est-européenne dans les établissements français d'enseignement technique entre 1800 et 1940". In: RUDIGER, Peter; TIKHONOV, H. (éd) Les universités: des ponts à travers l'Europe, Frankfurtam-Main; Berlin; Bern, Peter Lang.

[25] These engineers would have already made a preparatory course and training in engineering, as it was mandatory to enroll in the EPC, in institutions such as the Army School, the Lisbon Polytechnic School, the Oporto Polytechnic Academy and the University of Coimbra. See MATOS, Ana Cardoso

technical training in general and civil engineering in particular was more advanced, as was the case in France"[26] and, consequently, all the students awarded a State scholarship enrolled at the École des Ponts et Chaussées, a quite well reputed teaching establishment, whose method was unique, based on a "type of mutual apprenticeship, where the older students taught the younger ones the rudiments of the several sciences; on the other hand, their training consisted, fundamentally, in the practice of project and design, resorting to the system of competitions and internships"[27]. These methods are quite explicit on the report made by one of these scholars, João Evangelista d'Abreu (an engineer that will work on the Algarve railway line), to present to the Public Works, Trade and Industry Ministry.

The engineers that went abroad to study and, when they came back, they occupied key offices in the Public Works Ministry, teached in the Portuguese institutions[28], dedicated themselves to politics, were socially engaged in building a professional association[29], participated in the Universal Exhibitions and in State appointed committees, as well as, sometimes, going into the private sector, while maintaining a professional liaison with the Ministry[30].

(2009). Asserting the Portuguese civil engineering identity: the role played by the École des Ponts et Chaussées. In Jogos de Identidade Profissional / Les Enjeux Identitaires dês Ingénieurs / The Quest for a Professional Identity; Lisboa : Edições Colibri/CIDEHUS-EU/CIUHCT

[26] In MATOS, Ana Cardoso (2009). Asserting the Portuguese civil engineering identity: the role played by the École des Ponts et Chaussées. In Jogos de Identidade Profissional / Les Enjeux Identitaires dês Ingénieurs / The Quest for a Professional Identity; Lisboa : Edições Colibri/CIDEHUS-EU/CIUHCT, pp. 179

[27] "tipo de aprendizagem mútua, em que os alunos mais avançados ensinavam aos seus colegas mais novos os rudimentos das várias ciências; por outro lado, a formação incidia, fundamentalmente, na prática do projecto, recorrendo-se ao sistema de concursos e de estágios". In LISBOA, Maria Helena (2002). "Os engenheiros em Lisboa. Urbanismo e Arquitectura (1850-1930)". In Cidade de Lisboa; Lisboa: Livros Horizonte, p.68

[28] "The activity of some of engineers graduated in Paris as teachers in Portuguese technical schools enabled them to transmit the theoretical and practical knowledge on the various branches of civil engineering they had acquired in France to their students". In In MATOS, Ana Cardoso (2009). Asserting the Portuguese civil engineering identity: the role played by the École des Ponts et Chaussées. In Jogos de Identidade Profissional / Les Enjeux Identitaires dês Ingénieurs / The Quest for a Professional Identity; Lisboa : Edições Colibri/CIDEHUS-EU/CIUHCT, pp. 200

[29] "The vast majority of them belonged to the Associação dos Engenheiros Civis Portugueses (Portuguese Civil Engineers Association), founded in 1869" In MATOS, Ana Cardoso (2009). Asserting the Portuguese civil engineering identity: the role played by the École des Ponts et Chaussées. In Jogos de Identidade Profissional / Les Enjeux Identitaires dês Ingénieurs / The Quest for a Professional Identity; Lisboa : Edições Colibri/CIDEHUS-EU/CIUHCT, pp. 200

[30] MATOS, Ana Cardoso de and DIOGO, Maria Paula (2009). "Le role des ingénieurs dans l'administration portugaise, 1852-1900". In Quaderns d'Història de l'Enginyeria, vol X. Barcelona : Universitat Politècnica de Catalunya - Escola Tècnica Superior d'Enginyeria Industrial de Barcelona, p. 360

This complex environment has created "a network of formal and informal channels, which acted has vehicles for learning and spreading new skills, new machines and new expertise. Studying abroad was part of this overall strategy aiming to appropriate foreign knowledge and to adapt it to local needs and expectations"[31].

The engineers in charge of building the Algarve Railway Line are the perfect example of this scenario. Through the analysis of their personal files, as employees of the Public Works, Trade and Industry Ministry, as well as accessory information published in the *Gazeta dos Caminhos de Ferro*, it was possible to build personal biographic synthesis[32] on the engineers that we could gather information and, furthermore, to compile a comparative table, in order to verify if the profile of those engineers fitted, or not, to the known information[33].

We've been able to recognize 30 engineers that have been associated to the Algarve Railway Line but we weren't able to gather thorough information on 17 of them.

Of the compiled information we observe only 5 of these engineers were trained in Portuguese institutions with no military attachment. Nevertheless, 2 of these continued their education in a military institution. On the other hand, João Evangelista d'Abreu and Pedro Ignacio Lopes attended the École de Ponts et Chaussées and became directors of the South and Southeast Railway Line, accumulated different functions in different fields of expertise, such as railways and hydraulics as well as the vast majority of them.

Being a State owned railway line it would be mandatory that all of the analysed engineers would be technicians of the Public Works Ministry. Curious enough, there are 6 engineers that have also worked in the private sector, just before entering the public sector, in one case, or while public technicians, by appointment or authorized leave of absence.

When perusing the personal biographic profiles there are yet other points of interest and that concur to reinforce the scenario of knowledge and techniques transfer, based on a professional corpus of technocratic technicians that materialized the ideal of

[31] MATOS, Ana Cardoso de and DIOGO, Maria Paula (nd). "From the École de Ponts et Chaussées to Portuguese Railways: the transfer of technological knowledge and practices". In II IRHA INTERNATIONAL CONFERENCE | RAILWAY MODERNIZATION: AN HISTORICAL PERSPECTIVE, p.4

[32] See annex 6.

[33] See annex 5.

material progress: the vast majority of the engineers travelled throughout the country, being constantly transferred or appointed to different functions regardless of an area of expertise. The main exceptions are Henrique Neves Cabral that despite starting in the railways, came to specialize himself in hydraulics, the same occurring with António Conceição Parreira.

We've already established the importance of the training and formation of engineers and how the railways have been a major set to the affirmation of the engineers' professional class. Nevertheless, it could be considered outside the scope of analysis the implementation of an industrial teaching in Portugal, was it not that one of the predecessors and main responsible for the implementation of an industrial teaching in Portugal is connected with the Algarve Railway Line: António José Arroyo.

His biographic profile is the epitome of a 'Regeneração' engineer: he worked on the private sector whilst being in the Ministry and started by the railways. In the course of his work as a ministry's engineer he made several travels abroad, namely to study industrial schools and, when returning, reported on the teaching methods and its evolution abroad, in countries such as France, Belgium, Germany and Great Britain, as well as inspected and was in charge of procuring and acquire teaching material to the Industrial School of Guimarães.

The vast majority of the engineers that work in this line haven't studied abroad and are of military background, which suits the notion of a second phase of engineering formation in Portugal. It was in the early years of the Public Works, Trade and Industry Ministry that a larger number of engineers are sent abroad to complete their education. With the return of these engineers and the adaptation of the curricula in the national schools, a larger number of engineers do all their training in domestic schools and specialize themselves 'on the job', as is the case of the Algarve's railway line engineers.

A third phase is also observable, with a single engineer working in this line, Henrique Neves Cabral, that majored in Civil Engineering in the *Instituto Superior Técnico*, the only totally civil school of engineering that, concomitantly, presents an academic formation designed to the specialization, right from the start, as we can observe in the table number 4.

As an overall analysis, one can conclude that the Algarve railway line is, in fact, a timeline, not only of the development of infrastructures in Portugal, but also, of the practice of engineering within the national territory.

CHAPTER VI – A LINE IN USE. PAST, PRESENT AND FUTURE

Le but de cet chapitre c'est de définir le concept de patrimoine industriel, comment on l'a appris dans le Master Erasmus Mundus TPTI et, l'appliquer au notre objet d'étude.

On va commencer par la définition du concept de patrimoine industriel, et aussi d'industrialisation, pour arriver au but de qu'est qu'on peut considérer patrimoine et, tandis que complètement notre contemporaine, comment transmettre la notion de que c'est un patrimoine, une richesse et qu'on doit le sauvegarder ?

Ensuite, on montrera deux cas des musées des chemins-de-fer, en ayant le but de expliquer leur concept de musealization, son discours avec le public et, par fin, réfléchir de façon critique, sur les principles de valorisation que doive être présents quand on analyse la ligne de chemin de fer de l'Algarve dans cette point de vue.

6.1. THE CONCEPT OF INDUSTRIAL HERITAGE, ITS CONSERVATION AND VALORISATION

A multidisciplinary view of industrial heritage, states it as a very broad research field. All that includes the idea of producing isn't quite straightforwardly perceived when one regards the industrial heritage at a determined region or place.

Until recently, one would regard the industrial heritage as the architectural and/or structural remains of any given industrial facility, not considering its surroundings, the means of fabrication or the technical complexity that involves a facility.

One of the major breakthroughs in the understanding of industrial heritage or, if one prefers, of the technical complexes, it's the diachronic and not just a simple evolutionary trait of one given technique, model, architecture, etc.

In a dialectic approach, let's revisit the concept of industrialisation, leading to the identification of how historiography should deal and "use" this concept within its field of research analysis. The common mislead idea is that the processes phases are linear, and therefore the process of industrialisation is itself linear. On the contrary,

we should talk about the process of techno-economic change of a society, instead of an evolution (within the Darwinist concept of evolution).

Industrialisation doesn't necessary mean large/major factories or production units. These units are adapted to their spatial context, to their market, to the demand, to the production capacity, but they're always an industrial production unit. The process of industrialisation is a process of change in the production chain, based on the accumulation of technical knowledge, intertwined with a cultural mindset that favours that accumulation, conducing to a hybridization process, and therefore, a change on the production method.

What pushed the industrialisation process through were some leverage points in time, such as the passage from the wood to the coal as an energetic material; the introduction of the steam engine, as an hydraulic energetic application; the advent of electricity until, nowadays, we assist the change in the technological point of view, with the computational and informatics engineering possibilities.

The use of a technique regimen, the implement of technical norms or regulations, based on precision and accuracy, having a period of time when parallel activities exchange knowledge, an open-technique such as the nowadays very common open-source (for computational engineering) and the implement of a system on its social scale, that is the complex network that encompasses the technical complex, the product and the market, such as the social, cultural, religious and political organisation/mindset of a community.

The historical analysis of the industrialisation process has to have an everlasting critical approach and that even what happens nowadays allows, and should be used to continuously question our sources, whether direct or indirect. Contemporary archaeology isn't just the study of the ancient anymore and there has been an evolution on the regard over this discipline. This evolution of the concept of archaeology (passage from only the classical, to the medieval, and afterwards to the post-medieval) is contemporary with the upstart of the concept of industrial archaeology that has allowed the systematisation of the concept of contemporary archaeology. Paradoxically, the chronological boundaries, apparently, don't exist on the industrial archaeology because it can be applied whenever one observes a process of series production. Nevertheless this concept is still open to a lively debate. When

one speaks of industrial archaeology, we are always and only speaking of material remnants of the production reality (in time) and contextualized through documental sources. So, what is the main difference between industrial archaeology and industrial heritage?

Generally speaking, one can define industrial archaeology has the specific and physic work of research, done over a material remnant of a production activity. Has an objective approach (although it doesn't use the classical methodologies of this field, since there is almost never an excavation), combined with those of other disciplinary fields, being, by norm, multidisciplinary. On the other hand, industrial heritage is a far more subjective concept, involving not only field work and research over material remnants (includes other fields of research, far more subjective) but also valorisation, not only of physical spaces but also of all the industrial culture, namely that of the 18th till the 20th century.

These two concepts, however, are not contemporary of one another. The term industrial archaeology has been undisputedly used for about 20 to 25 years (until the 90's) being almost entirely replaced by the term industrial heritage. This concept, as a more encompassing concept, appears to be tied to the outburst of the development policies. The concept of industrial heritage, being more subjective and broader (encircling the concept of industrial archaeology within itself), is easier to understand and to use since the objects that can be considered as industrial heritage are quite varied, taking into consideration that they are remnants of our own actual civilization and that that surrounds us.

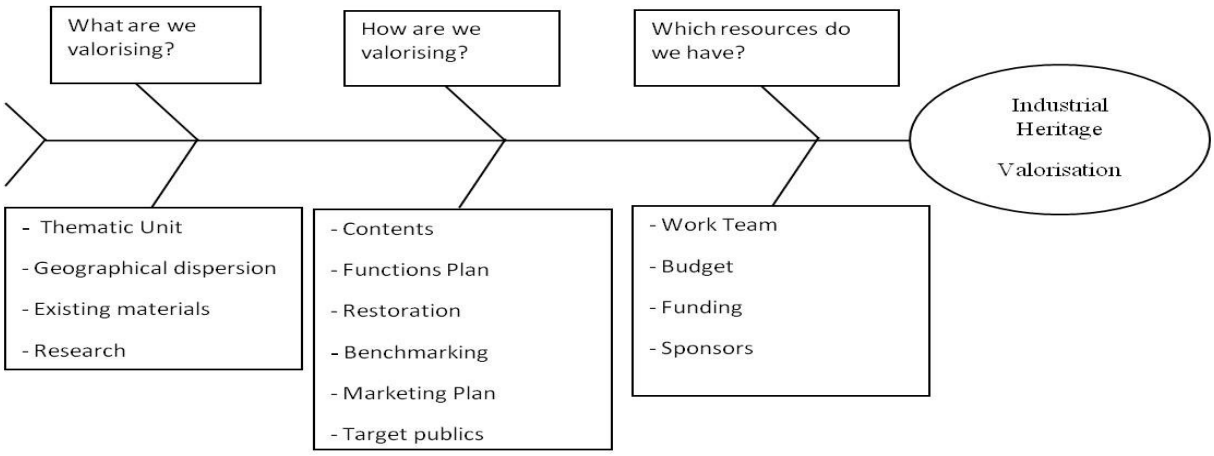
This passage, from industrial archaeology to industrial heritage, is tied to the actual way of selecting what to salvage, and which criteria shall be used in order to do it so and, moreover with the passage from the monumental history to the industrial history: we've shifted from the monument to the site, to the system (physic/territorial: locals, infra-structures, regions of determined types of productions, etcetera; cultural: attitudes, behaviours, traditions, values, transference of ways of doing or producing, etcetera), to the landscape.

Considering all of the above, we can infer that due to this huge variety of assets or 'objects' of value, a mere aesthetic or architectural analysis of industrial heritage would be one far simplistic and, necessarily insufficient way of regarding the

industrial heritage. Even so, the concept of industrial heritage isn't exempt of challenge. On the first hand, this heritage is mostly our contemporary. Normally, one attributes historical value to the remnants of previous periods, making it more difficult to recognize their intrinsic value. Also, memory, functioning as base of our understanding of heritage and of our regard about it, plays an essential role in the construction of a narrative discourse to promote and valorise the industrial heritage.

Consequently, when one has to define the criteria to safeguard and valorise an industrial heritage 'object', there is the need to always have in mind that the most important thing is to try to keep a coherence of the ensemble, allowing to understand its use, function, relation with the environment, surroundings and with what regards to the production. Now, it has to be kept in mind what are the necessary and natural steps to pursue a project of this nature. Following the Ishikawa diagram for problem analysis and problem solving, we can identify what are the main questions to bear in mind and what do we need to respond to those questions:

CHART 1 – ISHIKAWA DIAGRAM OF PROBLEM ANALYSIS, ADAPTED TO INDUSTRIAL HERITAGE VALORISATION ASSESSMENT



From the analysis of the diagram, we can infer that, first of all we have to locate and define the material objects still remaining and also all the material and socio-economic-cultural values associated to these objects, until nowadays, that will constitute the core of what we intend to enhance. The objective is to convey the meaning and significance through a coherent and unifying theme, defining the values and criteria through which this industrial heritage is going to be observed. To this extent, we have to carry out all the diagnosis, inventories and source/documental research (define ownership, actual conservation state, geographical dispersion,

energetic sources, machinery, documents and archives, living former workers, and etcetera).Having all the research done, one has to define how this industrial heritage will be conveyed and enhanced to the public. Therefore, first of all, we have to understand the surroundings of our 'object' and understand which the target publics there are, the 'competition' (other neighbouring museums, interpretation centres, and etcetera). Afterwards, we have to assign functions to the spaces we have and how they'll be interconnected. Simultaneously, a communication plan has to be established, as well as a marketing plan, which will promote the industrial heritage we aim to safeguard.

Now, the critical question is, how do we accomplish all of the above and with which resources? The most critical aspect of devising a valorisation project is the choice of the team to carry it through. As we've seen, the industrialisation process, in any given place, has its own specificities, adapting to their context, to their type of production, to the energy sources available, etcetera, etcetera. Hence, there is no 'one solution fits all'. Consequently, one of the major characteristics that a team has to possess, undertaking this kind of projects, is to be multidisciplinary.

Taking into example of the railways, there are also several factors contributing to its development, in a differentiating manner, in different countries and/or regions:

1. The different stages of engineering development and teaching;

2. The interest of the Governments;

3. The economical possibilities of personal enrichment within the construction of the railways (by private investments, with stocks);

4. The interest of having a railway in a specific region (the pre-existence of an industrial space or spaces, or large agricultural exploitations, for instance).

The railway, as a complex system, allows varied research fields to interact with this specific heritage.

When dealing with industrial heritage (not just the material remains of any kind of production), it is mandatory to have a team that can work all the aspects of a specific project. Maybe there will be the need to organise archives and create a documentation centre. Or, there is a vast importance on the labouring and living

conditions in a given factory, and we'll have the need of an oral historian. Also, if dealing with restoration or the adaptation of a building to a new function, there is the need of an architect and an engineer. The other major characteristic is adaptability. The team has to be chosen to fit and to be able to give response to the particular challenges that each place holds. Also, depending on the resources available, data and particularities of a project, the team has to have the capacity of redefining the scope or the approach to any given subject.

To fully understand the importance of retaining the value of the industrial heritage, *per se*, one as to acknowledge the place it still holds within its community (primary safeguarding measure), as well as, to understand how it can be communicated and promoted, assuring its sustainability.

Furthermore, bearing in mind the concept of applied history, to the industrial heritage history, it is of the utmost importance to understand and to convey to others, the implications and all the relations of one determined course of action, or of the economical influences, because as Prof. Giovanni Luigi Fontana remarked that "En lo referente al ámbito histórico, ella marca el paso de la arqueología industrial tradicional, a la historia del patrimonio industrial, con una óptica de historia aplicada, que comporta una notable cantidad de implicaciones también – y en particular – en el ámbito de las relaciones entre economía y patrimonio."[1]

If the railways were a major factor in the development of the so called industrialized world, in what regards to the railways as an industrial heritage, much more is to be said.

Studying the railways, and specific lines, is of the utmost importance, to understand the why and when and by whom those railway systems were built. And, moreover, how were we able to build those lines, bestowing us the tools to a proper valorisation of this specific heritage.

[1] FONTANA, G. Luigi. Historia del patrimonio industrial. Objetivos y metodología; p.7

6.2. RAILWAY MUSEUMS AS A WAY OF VALORISATION

Throughout the history of the railway industry in Portugal, there was a myriad of privately held and public companies or investors that operated at the same time, but, due to the several constraints related above, there was always an overseeing of the government or a direct implication in the railway construction.

The unification of all these companies began, partially, with the establishment of the Companhia Real dos Caminhos de Ferro (CRCF), in 1860 and culminated with the creation of CP – Caminhos de Ferro Portugueses E.P., a Public Enterprise, nationalized, in 1975, as the sole company responsible for the management of Portuguese railways.

Afterwards, in 1997, the responsibilities were divided between two companies: CP and REFER – Rede Ferroviária Nacional E.P., the first became responsible for the operational part and REFER with the infrastructures management.

Last, in 2005, the Fundação Nacional do Museu Ferroviário (FNMF) was constituted, aiming at the conservation and enhancement of the Portuguese historical, cultural and technical railways heritage that gave birth to its head museologic complex, its museologic nucleus (including one in the Algarve Railway Line that is closed to the public) and its documentation centre.

Nowadays, it comprises the Entroncamento Complex, siege of the National Railway Museum, comprising all the circulating material (wagons, the royal locomotive, and etcetera) and a permanent exhibition that ranges from the materials, to the development of the railway network.

An Iberian counterpart lies in the Catalonian 'Museu de la Ciència i de la Tècnica de Catalunya' (Mnactec), siege of the Mnactec territorial system that encloses 25 museums/nucleus, with a wide range of topics that stretch from textile industries to the railways.

The aim of this territorial system is quite well expressed in their presentation text, since they assume that the "Museum of Science and Technique of Catalonia considers as one of its most important goals the preservation of the industrial heritage through

which it can convey the Catalonian industrialization as one of the most significant characteristics of its national persona/identity".[2]

Concerning only the railways there are three spaces: the 'Museu del Ferrocarril de Catalunya' and 'Trens històrics de Ferrocarrils de la Generalitat'

The case of the Museu del Ferrocarril de Catalunya (Vilanova i la Geltrú), and the visit we've made, presented a specific way of interpreting the railway heritage, not only as a motor of the industrial revolution, but also as a marvel in itself where they have an area dedicated to the chronology of the line and the specificities of its construction: the political battles, the economical investors, the interest of the population in having a railway, etc., underlining the social aspects of that enterprise, alongside the technical aspects of it, that one can observe in the type of line, by the train stations or even by the type of locomotives utilized (to which they have explanation panels.

They are both an example of one model of industrial heritage safekeeping: musealization, with one main focal point, functioning as a siege.

6.1. VALORISATION ASSUMPTIONS

The Algarve railway line, as stated above, comprises a museologic nucleus, framed within the scope of the Railway National Museum.

Although an interesting concept, it only comprises the locomotive shed, near Lagos railway station, being detached of the actual use of the line: transport of passengers.

According to the principles stated in the first part of this chapter, that solution doesn't convey the reality of this heritage that isn't enclosed on a single space: its richness derives from the fact that it is a line that hasn't suffered any major transformations, within a national province with an high touristic value, and still runs.

On the other hand, there are some buildings, pertaining to this railway line, that are in complete abandonment and that, due to the continuous mergers and detachments in

[2] "El Museu de la Ciència I de la Tècnica de Catalunya ha considerat com un dels seus objectius més importants la preservació del patrimoni industrial a través del qual poder explicar la industrialització catalana com una de les característiques més significatives de la seva personalitat nacional". Available at http://sistema.mnactec.cat/cat/sistema-museus.html [visited in 20-07-2015]

the railway sector in Portugal, there is no knowledge of what belongs to whom, derailing an actual attempt to have an integrated response.

The valorization project of this railway line should, when considering the analysis diagram we've presented, guarantee the following key points, on our point of view:

1 – Guarantee the thematic unit: in this case the thematic unit is already set, having the route of the railway line as a conductor;

2 – Take advantage of the geographic dispersion: the railway stations are scattered throughout the landscape that the railway line crosses. Being so, what one can valorize it's the location, the route and the remaining buildings that convey a timeline of the development of the railways in Portugal.

In the case of Vilanova I la Geltrù, the railway is still in use and retains its original function. Nevertheless, the available space to the museum was vast and adjacent to the line, transforming the line in the main means of transport to the visitors, in a symbiotic relationship between museum and function of a railway line.

In the case of the Algarve railway line, Lagos could function as the main museologic section, is certain, but it would require one of two hypotheses:

1 – Enlargement of the museum space, comprising the ancient station. This is a major setback, since the building is currently for sale, open to private investment, non-related to the Foundation or the National Railway Museum;

2 – A complementary project, such as the one put into place on the Tua railway line, with the implementation of historical travels, by train, on the railway itself.

Given the case, the second option is the hypothesis that enhances the railway line main function, transport people, as well as allowing a phased project of valorization, sustainable and adaptable according to the public's reaction

CHAPTER VII – CONCLUSIONS

Dans ce dernier chapitre on fera la synthèse des points principaux de chaque chapitre. On s'expliquera les faits par lesquelles les ingénieurs pouvaient être considéré la face visible du développement et, par son métier, comment ils ont contribuée pour le transfert des techniques et des connaissances.

Ensuite, on réfléchit sur les contraints qui on a souffert et, surtout, comment on a réussi à développer notre recherche, malgré les défis qui s'ont été posée.

Finalement, on montrera les points de recherche que pourront être développés dans le futur et qui ont attiré notre attention.

7.1. MAIN CONCLUSIONS

The development of the railways is in deep connection with a concrete ideological and political agenda that wished to promote material progress and economic development in the 19th century Portugal.

Although it didn't succeed in being the great motor of economic change, as predicted by its contemporaries, this politics changed the face of Portugal in a most indelible way.

The engineers played a major role in the effective implementation of this ideology, based on the scientific and technical progress as the basis of a modern society.

Despite the fact of being a peripheral country, Portugal's elite, in which we can consider this new social class with high status, wasn't nor unaware, nor ignorant, of what occurred in its European counterparts. This can be observed by the regular participation of Portuguese engineers in the Universal Exhibitions, by the correspondence between professional associations, by the exchange of technical manuals and magazines that allowed the Portuguese engineers to keep up to date.

Concurring to this technological exchange, the Public Works Ministry also played a vital role, sponsoring engineers to study abroad, as a way of gain specific skills, in high demand on the country.

This sponsorship was a part of a conscious decision of having a good basic domestic engineering formation, leaving the specialization as an on job recurrence or by these periods abroad. This concept of formation of engineers allowed the Ministry to have a body of engineers that were adaptable and that could, cumulatively, work in different projects of different fields.

Regardless of their specialization abroad, the vast majority of the Portuguese engineers were trained in military schools that also offered courses of civil engineering, situation that would remain a current practice for a long period.

Also, the sponsored engineers, quite often, would become teachers in the Portuguese schools, maintaining the circle of continuous indirect influence, concomitantly with their work as public engineers, shaping the working and designing methods.

The engineers, responsible for the construction of the Algarve Railway Line are a spot on perfect example of these processes of technical and knowledge acculturation, whether by the teaching methods or by the manuals and teaching materials that would be bought abroad.

7.2. STUDY LIMITATIONS

The main limitation to a research project that relies in unpublished information is, as always, the access to the sources.

In this particular case, all the documentation pertaining the railways isn't treated and described and of open and general access. Therefore, having a vast amount of documentation to which no previous method of sorting can be applied nor establishing dismissing criteria, it was difficult to ascertain a timeframe and do time micromanagement in order to analyse all of the information.

Regarding the South and Algarve Railway Line, the CDFMNF has 62 French archiving cases, untreated, of which I was only able to consult 36.

Consequently, all the gathered information is, necessarily, a sample of the existing information and all data collected is, forcibly, preliminary data and preliminary conclusions, since we cannot verify the representativeness of the available information.

7.3. FUTURE RESEARCH AREAS

Besides the thorough analysis of the remaining documentation on the Algarve Railway Line and its engineers and having been asserted the role played by the Portuguese engineers that studied abroad, their influence in the construction of a professional identity, of a methodological approach to the training of an engineer, there was one question that has surfaced.

Whilst we've been addressing the engineers that went to study abroad and returned, as well as the foreign engineers that came to Portugal, it would be of interest to pinpoint the representativeness of Portuguese engineers that, in the 19th century, worked outside of Portugal and the ones that, returning to Portugal, entered the private sector, as representatives of foreign companies operating in Portugal, such as the case of Ernesto Navarro, that presented himself as an *Ingenieur des Arts et des Manufactures*, that represented the *Société de Construction et des Ateliers de Willebroeck*, of Brussels[3].

As well as researching on the role of engineers and their professional and academic backgrounds, notwithstanding their influences, one has to consider the sharing of knowledge, nowadays.

A major lack in these studies, despite the effort of Ana Maria Cardoso de Matos, a comprehensive, thorough and researchable database, with the data of all these engineers is lacking.

Considering the many points of analysis that can be studied and verified, based on the available information on these engineers, it would be pivotal the elaboration of a virtual comprehensive database on the matter and that could, afterwards, have mechanisms of showing the correlation of several variables and criteria.

[3] Plant of the "Pont sur la riviere Tavira. Epures" Bruxelles, le 12 Décembre 1903. Stamp of Ernesto Navarro, representing the Société de Construction et des Ateliers de Willebroeck, Bruxelles. CDFMNF inventory box number 2305

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Annexes

1 – Portuguese Governments (1834-1926)

Reign	Mandate	
	Beginning	Ending
D. Maria II (1834-1853)	23-04-1834	24-09-1834
	24-09-1834	28-04-1835
	04-05-1835	27-05-1835
	27-05-1835	18-11-1835
	25-11-1835	19-04-1836
	19-04-1836	10-09-1836
	10-09-1836	04-11-1836
	04-11-1836	05-11-1836
	05-11-1836	01-06-1837
	02-06-1837	10-08-1837
	10-08-1837	18-04-1839
	18-04-1839	26-11-1839
	26-11-1839	09-06-1841
	09-06-1841	07-02-1842
	07-02-1842	08-02-1842
	09-02-1842	20-05-1846
	20-05-1846	06-10-1846
	06-10-1846	28-04-1847
	28-04-1847	18-12-1847
	18-12-1847	18-06-1849
	18-06-1849	26-04-1851
	26-04-1851	01-05-1851

Reign	Mandate	
	Beginning	Ending
D. Pedro V (1853-1861)	01-05-1851	06-06-1856
	06-06-1856	16-03-1859
	16-03-1859	26-04-1860
	26-04-1860	01-05-1860
	01-05-1860	04-07-1860
	04-07-1860	12-09-1862

Reign	Mandate	
	Beginning	Ending
D. Luís (1861-1889)	12-09-1862	06-10-1862
	06-10-1862	17-10-1865
	17-04-1865	04-09-1865
	04-09-1865	04-01-1868
	04-01-1868	22-07-1868
	22-07-1868	11-08-1869
	11-08-1869	19-05-1870
	19-05-1870	29-08-1870
	29-08-1870	29-10-1870
	29-10-1870	13-09-1871
	13-09-1871	05-03-1877
	05-03-1877	29-01-1878
	29-01-1878	01-06-1879
	01-06-1879	25-03-1881
	25-03-1881	14-11-1881
	14-11-1881	20-02-1886
	20-02-1886	14-01-1890

Reign	Mandate	
	Beginning	Ending
D. Carlos (1889-1908)	14-01-1890	14-10-1890
	14-10-1890	25-05-1891
	25-05-1891	17-01-1892
	17-01-1892	27-05-1892
	27-05-1892	22-02-1893
	22-02-1893	07-02-1897
	07-02-1897	18-08-1898
	18-08-1898	25-06-1900
	25-06-1900	28-02-1903
	28-02-1903	20-10-1904
	20-10-1904	27-12-1905
	27-12-1905	20-03-1906
	20-03-1906	19-05-1906
	19-05-1906	02-05-1907
	02-05-1907	04-02-1908

Reign	Mandate	
	Beginning	Ending
D. Manuel II (1908-1910)	04-02-1908	25-12-1908
	25-12-1908	11-04-1909
	11-04-1909	14-05-1909
	14-05-1909	22-12-1909
	22-12-1909	26-06-1910
	26-06-1910	05-10-1910

1st Republic	Mandate	
	Beginning	Ending
1st Republic (1910-1926)	05-10-1910	03-09-1911
	03-09-1911	12-11-1911
	12-11-1911	16-06-1912
	16-06-1912	09-01-1913
	09-01-1913	09-02-1914
	09-02-1914	23-06-1914
	23-06-1914	12-12-1914
	12-12-1914	25-01-1915
	25-01-1915	14-05-1915
	14-05-1915	15-05-1915
	15-05-1915	17-05-1915
	17-05-1915	19-06-1915
	19-06-1915	22-07-1915
	22-07-1915	29-12-1915
	29-12-1915	15-03-1916
	15-03-1916	25-04-1917
	25-04-1917	08-12-1917
	08-12-1917	11-12-1917
	11-12-1917	14-12-1918
	14-12-1918	23-12-1918
	23-12-1918	07-01-1919
	07-01-1919	27-01-1919
	27-01-1919	30-03-1919
	30-03-1919	29-06-1919
	29-06-1919	15-01-1920
	15-01-1920	15-01-1920
	15-01-1920	21-01-1920
	21-01-1920	08-03-1920
	08-03-1920	06-06-1920

	06-06-1920	26-06-1920
	26-06-1920	19-07-1920
	19-07-1920	20-11-1920
	20-11-1920	30-11-1920
	30-11-1920	02-03-1921
	02-03-1921	23-05-1921
	23-05-1921	30-08-1921
	30-08-1921	19-10-1921
	19-10-1921	05-11-1921
	05-11-1921	16-12-1921
	16-12-1921	06-02-1922
	06-02-1922	30-11-1922
	30-11-1922	07-12-1922
	07-12-1922	15-11-1923
	15-11-1923	18-12-1923
	18-12-1923	06-07-1924
	06-07-1924	23-11-1924
	23-11-1924	15-02-1925
	15-02-1925	01-07-1925
	01-07-1925	01-08-1925
	01-08-1925	17-12-1925
	17-12-1925	30-05-1926

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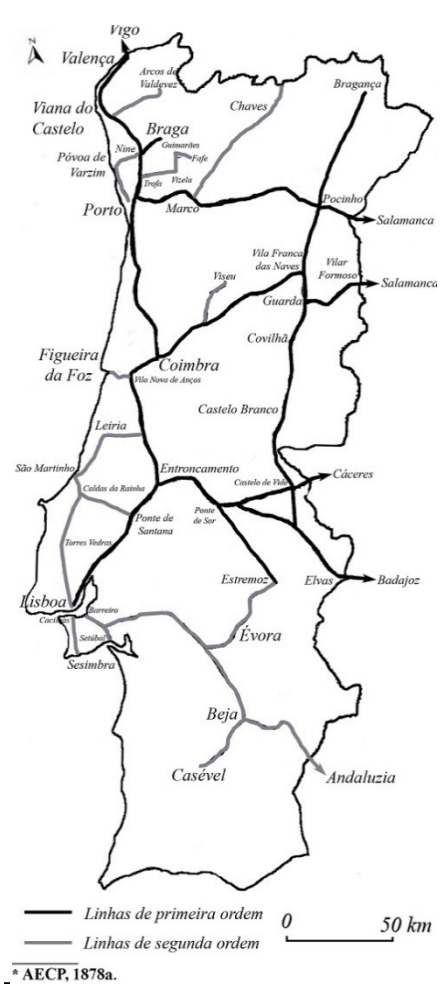
2 - PHASES OF RAILWAY DEVELOPMENT IN PORTUGAL

1st PHASE: …. – 1852: List of proposed railway lines (never built)

YEAR	PROPONENT	DIRECTION
1835	Bento Guilherme Hlingloefer	Da margem do Tejo a Alenquer.
1835	José Maria O'Neill e Juan Alvarez Mendizabal	Entre os rios Sado, Tejo e Guadiana através de canais e caminhos-de-ferro.
1845	Jacinto Reis Ruas Dâmaso	De Évora a Alcácer do Sal e Aldeia Galega com ligação fluvial até Lisboa
1845	Sá Nogueira e Benjamin de Oliveira (Companhia das Vias Férreas Transtaganas)	De Cacilhas a Setúbal, Évora, Estremoz e fronteira com ramais até Beja e Portalegre.
1845	Sá Nogueira e Benjamin de Oliveira (Companhia das Vias Férreas do Norte)	De Lisboa a Santarém e Tomar.
1845	M. Huguin e Nuno Augusto Garvelle	De Lisboa ao Porto com ramal até Bragança e fronteira.
1845	Samuel Clegg, William Law, José Street de Arriaga e Cunha e Fernando de Sousa Botelho	Do Porto à Régua e à fronteira
1845	Alto Douro Railway.	Do Porto até Salamanca ou Torre de Moncorvo
1845	General Bacon, Lord Uxbridge, Conde de Coursay e Thomas Duncombe	De Lisboa a Madrid, pelo Tejo, com ligações ao Porto, Évora, Mértola, Beja e fronteira e ramais até Estremoz e Elvas
1846	Luís Augusto Pinto Soveral	Do Porto à Régua e à fronteira
1846	COPP	De Lisboa à fronteira
s/d	António Barroso	Linhas no norte e sul até à fronteira
s/d	Hardy Hislop	De Lisboa a Sintra e do Porto a Valença.
s/d	Jean Charles Jucqeau	De Lisboa ao Porto com ramal até Bragança e fronteira
s/d	George Knox, William Law, Edward Carrer, Samuel Clegg, Sir William Young Joseph Brown e outros (Companhia do Caminho de Ferro de Lisboa e Porto)	De Lisboa ao Porto por Sintra
s/d	Benjamin de Oliveira e outros (Alentejo Railway Company)	De Lisboa à fronteira com ramal entre Évora e Alcácer do Sal.
s/d	???	De Lisboa por Sintra, Torres, Caldas, Coimbra e Porto, com ramais de Coimbra para Castelo Branco e Espanha e de Castelo Branco para o Algarve.

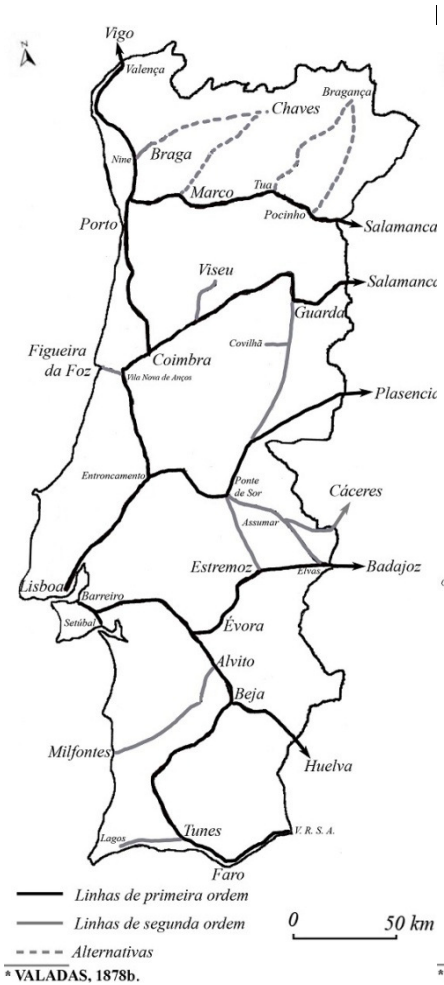
Source: PEREIRA, Hugo. (2012). A política ferroviária nacional (1845-1899). Universidade do Porto; VIEIRA, António L. (1983). The role of Britain and France in the finance of the Portuguese Railways (1845-1890). A comparative study in Speculation, Corruption and Inefficency . Dissertação de Doutoramento, Univesidade de Leicester

2nd PHASE: 1852-1891

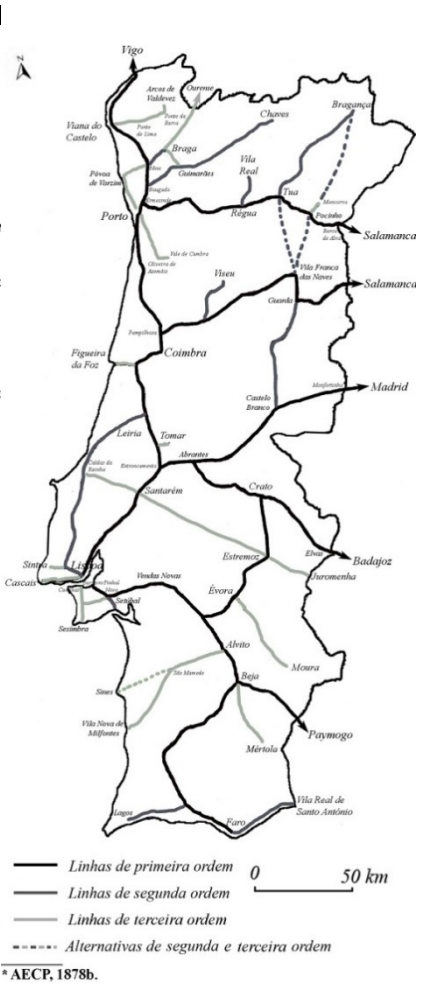


* AECP, 1878a.

* BRANDÃO, 1878a.

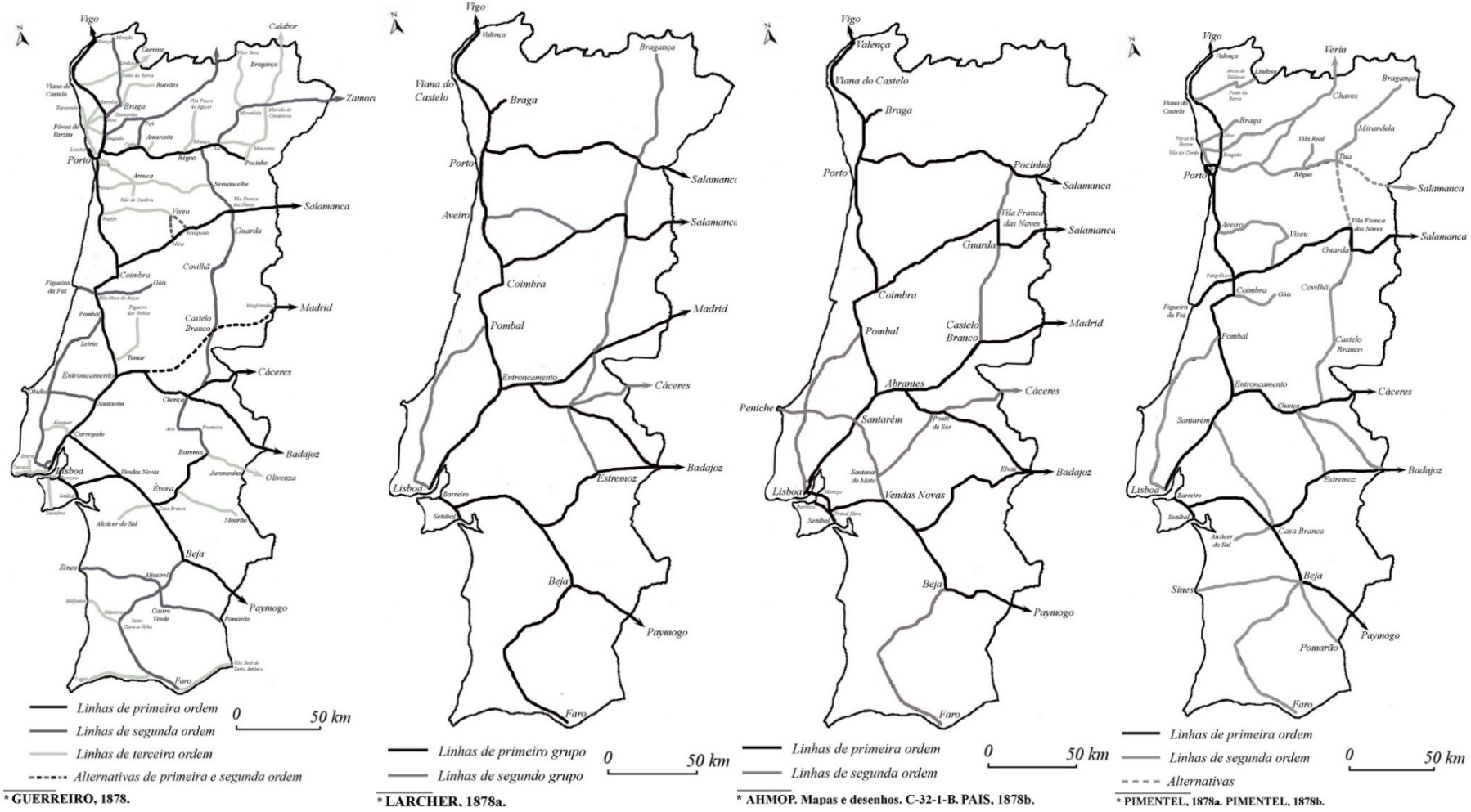


* VALADAS, 1878b.

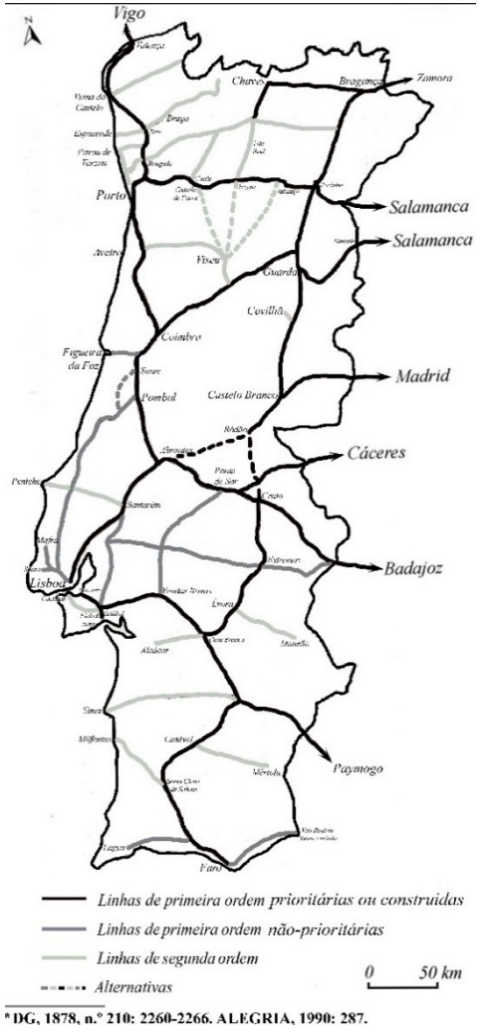


* AECP, 1878b.

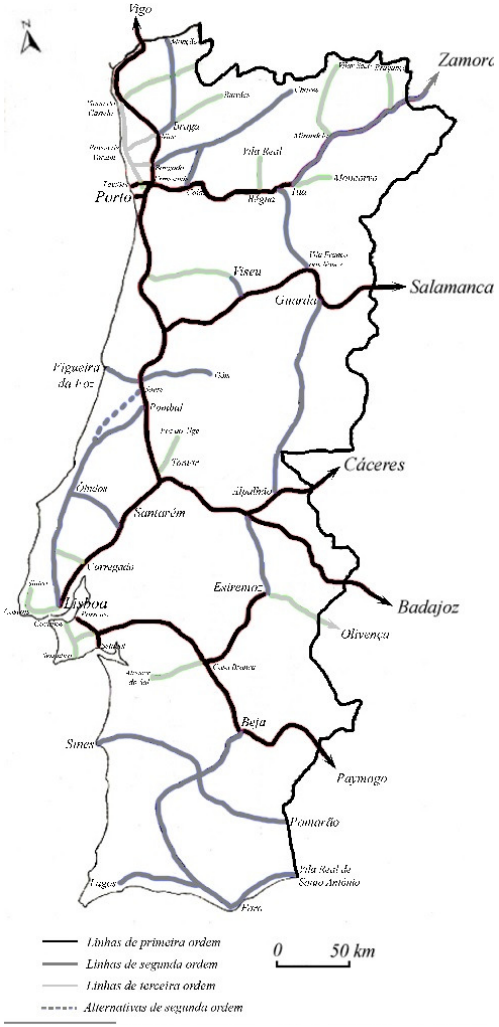
Source: PEREIRA, Hugo. (2012). A política ferroviária nacional (1845-1899). Universidade do Porto

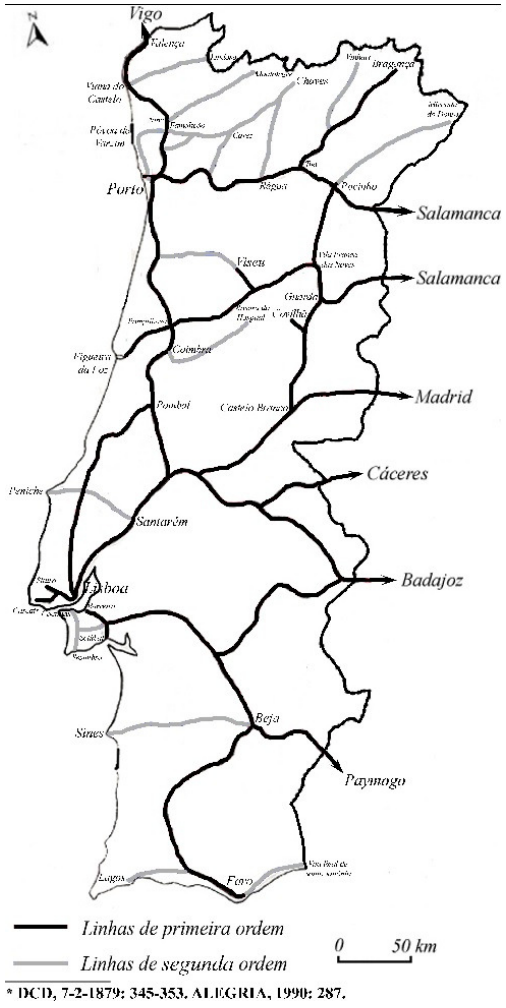


Source: PEREIRA, Hugo. (2012). A política ferroviária nacional (1845-1899). Universidade do Porto



* DG, 1878, n.° 210: 2260-2266. ALEGRIA, 1990: 287.





* DCD, 7-2-1879: 345-353. ALEGRIA, 1990: 287.

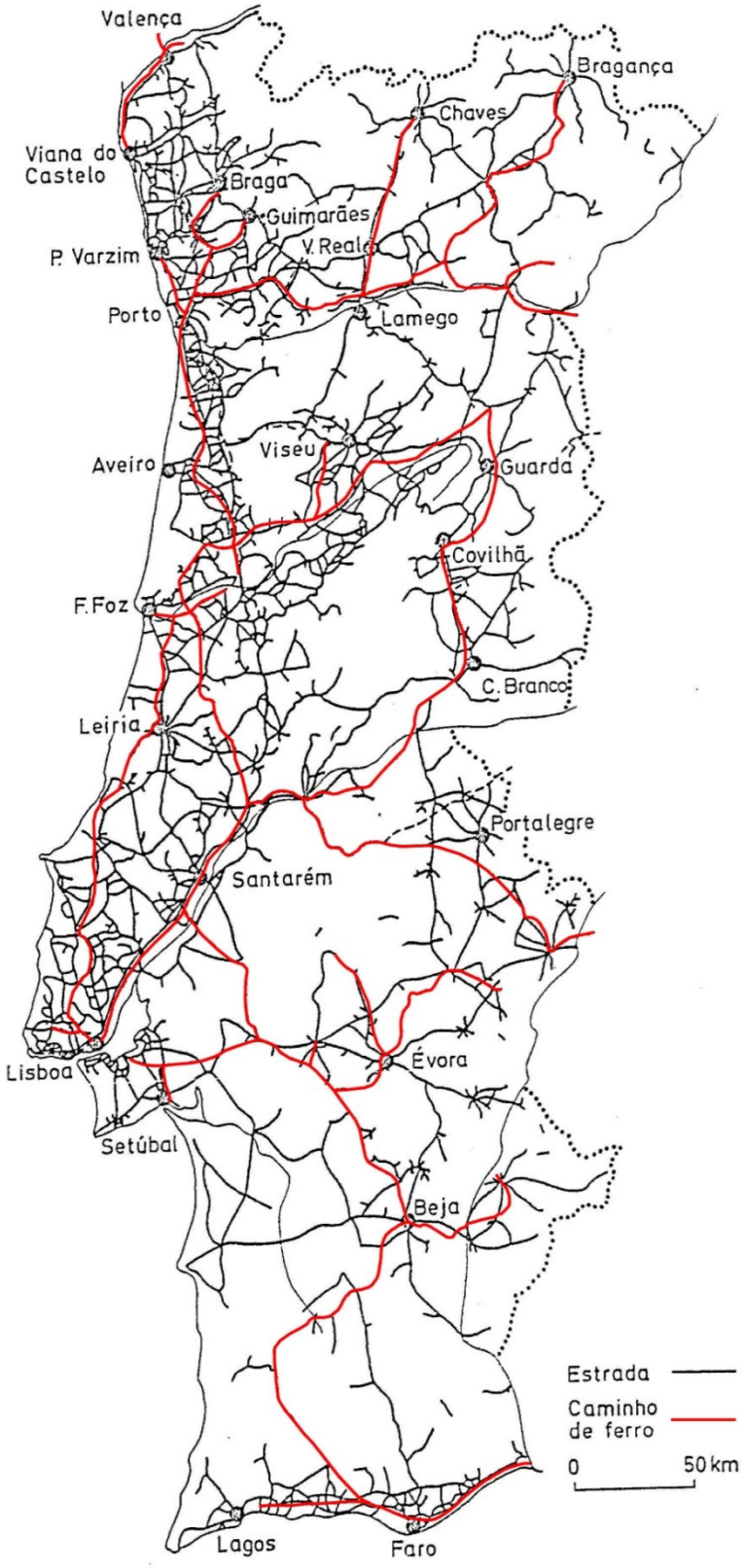
Source: PEREIRA, Hugo. (2012). A política ferroviária nacional (1845-1899). Universidade do Porto

3rd PHASE: 1891-1911

* PORTUGAL, 1899a. PORTUGAL, 1901. PORTUGAL, 1905.

Source: PEREIRA, Hugo. (2012). A política ferroviária nacional (1845-1899). Universidade do Porto

3 – ROADS AND RAILWAYS ACCORDING TO THE VACUUM OIL COMPANY MAP (1913'S SURVEYING, 1915'S EDITION)



Source: ALEGRIA, Maria Fernanda (1990). A organização dos transportes em Portugal (1850 1910): as vias e o tráfego. Lisboa: Centro de Estudos Geográficos [Adapted]

4- Algarve's Railway Line Timeline [Portuguese]

Date	Observations
24.07.1854	Contrato entre o Governo e os Pares do Reino, Marquês de Ficalho e José Maria Eugénio de Almeida, em representação de uma sociedade, para a construção do caminho-de-ferro de Aldeia Galega a Vendas Novas, e outras linhas que com estas possam vir a entroncar
06.02.1855	Decreto que aprova os Estatutos da Companhia Nacional de Caminho de Ferro ao Sul do Tejo.
--.12.1855	Relatório do Engº Watier sobre a construção dos caminhos-de-ferro em Portugal
05.12.1857	Sistema americano, proposto por Luís Vicente d'Afonseca e o conde de Courson mas não construído, entre Vila Real de Sto. António, Faro, Portimão e Lagos com ramal para Silves
06.08.1861	Contrato de aquisição pelo Governo à Companhia Nacional dos Caminhos de Ferro ao Sul do Tejo, do caminho-de-ferro Barreiro-Vendas Novas e do Ramal de Setúbal
07.08.1861	O Governo toma posse da Linha do Sul e do Ramal de Setúbal
01.12.1861	O Governo assina o contrato de concessão da Linha do Sueste com Hardy Hislop
23.07.1863	São aprovados os estatutos da Companhia do Sueste
18.04.1864	Sistema americano, proposto por José Eugénio Chabert mas não construído, no Alentejo e Algarve
21.04.1864	Contrato entre o Governo e a Companhia dos Caminhos de Ferro do Sul e Sueste para o prolongamento da Linha de Beja ao litoral algarvio, adjudicando-lhe as linhas do sul e o Ramal de Setúbal
--.--.1864	Bitola da via da Linha do Sul é alterada de 1,44 m para 1,67 m
20.03.1865	Estudo do traçado entre Barreiro vermelho e Boliqueime, proposto pela companhia de caminhos-de-ferro, levado a cabo por joaquim josé d'almeida
14.06.1865	Parecer do conselho de obras publicas, aprovando o projecto de 10 kilometros do caminho de ferro de Beja a Faro, entre Barreiros-Vermelhos, a 15 kilometros da estação de Faro e Boliqueime. Projecto datado de 8 do corrente e vem assignado por James Fford e White
23.05.1866	Decreto rescindindo o contrato com a Companhia do Sueste em virtude da mesma não satisfazer as condições contratadas
12.03.1869	Governo toma posse administrativa dos Caminhos de Ferro do Sul e Sueste – origem dos Caminhos de Ferro do Estado
02.11.1869	Abertura à exploração pública do troço entre Beja e Quintos, na Linha do Sueste
25.11.1869	Planta para a estação do outeiro, elaborado pelas obras publicas caminho-de-ferro do sueste - prolongamento de Beja a Cazevel - assinado pelo director nuno augusto da silva Taborda
11.07.1871	Sistema americano, proposto por Bernardino Martins da Silva mas não construído, entre Faro e Vila Real de Sto. António
01.07.1875	Portaria encarregando o Coronel de Engenharia Nuno Augusto de Brito Taborda, Diretor do Caminho de Ferro do Sueste, da elaboração do projeto definitivo do Caminho de Ferro do Algarve
01.07.1875	Decreto ordenando a construção do Caminho de Ferro do Algarve, por conta do Governo
26.01.1876	Governo abre concurso para a construção dos caminhos-de-ferro da Beira Alta, Beira Baixa e do Algarve

29.03.1876	Memoria justificativa da comparação entre o sistema inglês e o de Five Lille, para a construção do caminho-de-ferro do algarve, onde conclui pelo interesse e prevalência deste ultimo, ainda para mais considerando que foi o mesmo utlizado na ponte do guadiana - assinado por João Augusto de Abreu e Souza
05.07.1880	Parecer da junta consultiva á proposta de construção em via reduzida do caminho de ferro do Algarve, de Cazevel a Faro, proposta pelo engenheiro João Pedro Tavares Trigueiros, com a qual concorda
10.05.1884	Revisão do traçado, com proposta de novo traçado, do Monte da ribeira de Cima ao Rio Mira, assinado por António José Arroyo
17.09.1884	Decreto determinando que se proceda, por conta do Estado, à conclusão e exploração de toda a rede do Caminho de Ferro do Sul e Sueste
20.01.1886	Projecto de pequenas modificações ao traçado, com supressão de obras necessárias, assinado pelo Engenheiro chefe da Secção Diniz Moreira da Horta e visto pelo Engenheiro Chefe de Construção Francisco Perfeito de Magalhães
03.04.1886	Projecto de variante do traçado entre boliqueime e faro, comparativo ao plano dos ingleses. Assinado pelo engenheiro chefe da 4 secção Augusto Cezar Paes de Faria. Tem ofício de remessa e parecer da junta consultiva de obras públicas, positivo e com despacho de execute-se
06.12.1886	Sistema americano, proposto por António Agostinho Lobo de Miranda mas não construído, entre Portimão e Monchique
02.12.1887	Sistema americano, proposto por Joseph William Henry Black mas não construído, pelo litoral do Algarve entre Lagos e Vila Real de Sto. António
--.--.1889	Projecto de troço entre Faro e Vila Real de Santo António, junto à Ria Formosa, elaborado pelo Engenheiro João Pedro Tavares Trigueiros (foi construído)
01.07.1889	Abertura à exploração pública do troço entre Amoreiras e Faro, na Linha do Sul
22.03.1890	Sistema americano, proposto por Frederico Pinto Pereira de Vasconcelos e J. J. Lima de Azevedo mas não construído entre Faro e Vila Real de Sto. António
10.05.1890	Direcção dos estudos do Ramal do Caminho de ferro do Sul ao porto de Lagos 4ª Secção. Reconhecimento. Memoria descriptiva e justificativa, planta geral e perfil longitudinal. Projecto de linha de caminho-de-ferro entre Lagos e estação das Amoreiras, que nunca foi construído
16.01.1893	Sistema Decauville, proposto por Frederico Pinto Pereira de Vasconcelos mas não construído entre S. Bartolomeu de Messines e Silves
20.05.1896	Peças escriptas, memoria descriptiva, medição, serie de preços e orçamento do lanço de Tunes a Silves, elaborado por Eduardo Magalhães Braga
--.--.1897	Sistema americano, proposto por Henrique Mitchell e João da Câmara mas não construído entre a estação de Garvão e Portimão por Odemira e Aljezur com ramal para Lagos
18.08.1897	Memoria descriptiva, medição, series de preços e orçamento, com projecto de Ramal de Tunes a Lagos, Lanço de Silves a Portimão (margem esquerda), assinado pelo Engenheiro Augusto Victor Sequeira
13.04.1898	Memória justificativa do2º lanço do prolongamento do caminho-de-ferro de Faro a Vila Real de Santo António, compreendido entre Olhão e Fuzeta, elaborado pelo Engenheiro João Nepomuceno Macedo Lacerda
08.02.1899	Data do projecto do 1º lanço da 1ª secção do caminho-de-ferro de Faro a Vila Real de Santo António, compreendido entre Faro e Olhão, elaborado pelo Engenheiro Eduardo Magalhães Braga
20.03.1899	Ante-projecto de caminho de ferro do kilometro 301.368 da Linha do Sul a Lagos passando por Silves e Portimão, assinado pelo Engenheiro António C. Parreira
10.10.1899	Abertura à exploração pública do troço entre Tunes e Algoz, no Ramal de Portimão
29.10.1902	Projecto do lanço de Olhão à Fuzeta, do prolongamento do caminho-de-ferro de Faro a Vila Real de Santo António, elaborado pelo Engenheiro

	Arthur Mendes
27.11.1902	Decreto aprovando o plano geral da rede ferroviária ao sul do Tejo
08.01.1903	Projecto de variante entre perfis 114 e 163, na extensão de 1791m,63, elaborado pelo Engenheiro Arthur Mendes
14.04.1906	Abertura à exploração pública do troço entre Tavira e Vila Real de Santo António. Conclusão da Linha do Sul
28.02.1907	Projecto de prolongamento de Portimão a Lagos, incluindo planta geral, planta de sondagens geológicas no rio de Portimão e memória descritiva
11.04.1917	Lei autorizando o Governo a conceder aos CF Estado um suprimento de 400.000$00 para a continuação das obras de construção das Linhas férreas do Vale do Sado, Barreiro a Cacilhas, Évora a Reguengos e Portimão a Lagos
24.05.1921	Projecto de uma ponte de cimento armado sobre a Ribeira de Bensafrim na estrada de acesso à estação de caminho-de-ferro de Lagos, com memória descritiva e cálculos justificativos, da autoria do Eng. Joaquim Maria Valente
19.08.1925	Portaria mandando iniciar os estudos de uma linha férrea de Lagos a Sines
16.11.1926	Publicação do Decreto n.º 12.684, que abre concurso entre companhias portuguesas para concessão da exploração das linhas férreas do Estado (Minho e Douro, Sul e Sueste)
09.03.1927	Decreto autorizando o Governo a contratar com a CP o arrendamento dos CF Estado
11.05.1927	Ato de tomada de posse, pela CP, das Linhas Férreas do Estado

Sources: **Direcção Geral dos Caminhos de Ferro (fund) / Caminhos de Ferro do Estado (subfund)**. **Boxes Inventory Numbers**: 2288 – Ramal de Portimão a Lagos; 2301 – Planta Geral prolongamento de Portimão a Lagos; 2302 – Medições e desenhos relativos à Ponte de Tavira; Peças escritas e desenhos relativas à Ponte de Tavira; Expediente e memória descritiva da parte metálica da Ponte de Tavira; 2303 – Ponte sobre a Ribeira da Torre – Ramal de Portimão; 2304 – Fornecimento de tabuleiros metálicos para pontões nos lanços de Tavira a Cacela e Cacela a Vila Real; Ponte de FERO DA Linha do Sul; Fornecimento e montagem de tabuleiros metálicos do ramal de Tunes a Portimão; Pontes de ferro da linha do Algarve; 2305 – Lanço de Fuzeta a Tavira; Ramal de Lagos; 2327 – Abertura à exploração da linha Portimão – Ferragudo e Lagos; Linha de Tunes a Portimão; 2328 – Linha de Tunes a Portimão; 2329 – Expropriações para a linha de Tunes a Portimão; 2330 – Expropriações e guias de depósito para a linha de Tunes a Portimão; 2331 – Linha de Tunes a Portimão; 2332 – Lanço de Tunes a Portimão; 2333 – Ramal de Portimão a Lagos; Ramal de Tunes a Lagos; 2334 – Ramal de Portimão a Lagos; Ramal de Tunes a Lagos; 2349 – Abertura à exploração da linha do Sul; Caminho de Ferro do Sueste; Processo de concurso para a construção e exploração do CF Sul e Sueste; 2350 – Caminho de Ferro do Sul e Sueste; 2351 – Guias de depósito e de expropriações realizadas para a construção do CF de Faro a Vila Real de Santo António; 2352 – Linha Férrea do Sul; 2353 - Linha Férrea do Sul; 2354 - Linha Férrea do Sul; 2355 – Obras – Linha do Sul; 2356 – Caminho de Ferro do Sul e Sueste – Linha do Algarve; 2357 a 2370 - Caminho de Ferro do Sul e Sueste – Linha do Algarve; 2380 – Caminho de Ferro de Lagos a Sines; 2383 – Caminho de Ferro Sul e Sueste; 2385 - Caminho de Ferro Sul e Sueste; 2413 – Linha do Sul e Sueste – Ramal de Portimão a Lagos; 2416 - Linha do Sul e Sueste – Ramal de Portimão a Lagos; 2422 – Linha de Portimão a Lagos – estado dos trabalhos; 2429 – Direção do Sul e Sueste – Correspondência; 2430 - Direção do Sul e Sueste – Correspondência; 2431 Direção do Sul e Sueste – Correspondência; 2432 – Linha de Portimão a Lagos – estado dos trabalhos; 2444 – Ramal de Portimão a Lagos – Empreitada nº 11, 5, 6, 7, 8, 9 e variantes; 2448 – 19 pastas da Secretaria da Direção do Sul e Sueste; 2474 – Ramal de Portimão a Lagos;

2488 – Estação de Lagos; 2497 – Ramal de Portimão a Lagos – Ponte metálica de Bensafrim; 2507 – Ponte Portimão – Tramos metálicos; 2510 – Ramal de Portimão a Lagos – empreitada de construção de elevações de cocheiras; 2512 – Ramal de Portimão – Ponte metálica de Bensafrim / ponte Portimão; 2513 a 2515 – ponte de Portimão e Bensafrim; 2524 – Portimão a Lagos – Ponte Portimão; 2549 – Ramal de Portimão – Documentação diversa; 2550 - Ramal de Portimão – Documentação diversa;

WEBsource: https://www.cp.pt/institucional/pt/cultura-ferroviaria/historia-cp/cronologia

5- Algarve's Railway Engineers: Synthesis Table

Engineer	School	Type	Studies Abroad	School Abroad	Private sector	MOPCI				Professor	Univ. Exhibitions Representations	Politics
						Railways	Hydraulics	Agriculture	Others			
…, Eduardo Frederico de Mello	WK	WK	WK	WK	WK	Y	WK	WK	WK	WK	WK	WK
…, Gaspar da Rocha Paes	WK	WK	WK	WK	WK	Y	WK	WK	WK	WK	WK	WK
Abecasis Junior, José	EPL /EME	M	N		Y	Y	N	N	Y	N	N	N
Abreu, João Evangelista d'	UC	C	Y	EPC	N	Y	Y	N	Y	Y	N	N
Almeida, Joaquim José d'	WK	WK	WK	WK	WK	Y	WK	WK	WK	WK	WK	WK
Amaral, Alípio Coelho de	WK	WK	WK	WK	WK	Y	WK	WK	WK	WK	WK	WK
Arez, João Batista de Almeida	WK	WK	WK	WK	WK	Y	WK	WK	WK	WK	WK	WK
Arroyo, António José	APP	M	N	N	Y	Y	N	N	Y	N	Y	N
Borba Junior, Gilberto António	WK	WK	WK	WK	WK	Y	WK	WK	WK	WK	WK	WK
Braga, Eduardo de Magalhães	WK	WK	WK	WK	WK	Y	WK	WK	WK	WK	WK	WK
Cabral, Henrique Neves	IST	C	N	N	N	Y	Y	N	N	N	N	N
Esteves, Raul Augusto	EPL/EME	M	N	N	N	Y	N	N	Y	Y	N	N
Faria, Augusto Cezar Paes de	WK	WK	WK	WK	WK	Y	WK	WK	WK	WK	WK	WK
Guedes, Carlos Augusto Cardoso	WK	WK	WK	WK	WK	Y	WK	WK	WK	WK	WK	WK
Lacerda, João Nepomuceno de Macedo	WK	WK	WK	WK	WK	Y	WK	WK	WK	WK	WK	WK
Leitão, Joaquim Faustino de Poças	WK	WK	WK	WK	N	Y	N	N	N	N	N	N
Lopes, Pedro Ignacio	UC	C	Y	EPC	Y	Y	Y	N	Y	N	N	N
Magalhães, Francisco Perfeito de	UC/EME	C/M	N	N	Y	Y	Y	N	Y	Y	N	N

Mendes, Arthur Augusto	EME	M	N	N	N	Y	Y	N	Y	N	Y	N
Mota, Diniz Moreira da	UC/EME	C/M	N	N	Y	Y	N	N	Y	Y	Y	Y
Parreira, Antonio Conceição	EPL/EME	M	N	N	N	Y	Y	Y	N	N	N	N
Pimentel, Frederico Augusto	WK	WK	WK	WK	WK	Y	WK	WK	WK	WK	WK	WK
Sequeira, Augusto Victor	WK	WK	WK	WK	WK	Y	WK	WK	WK	WK	WK	WK
Silva, Plínio Octavio de Santana e	WK	M	WK	WK	WK	Y	WK	WK	WK	WK	WK	WK
Souza, João Augusto de Abreu e	WK	WK	WK	WK	WK	Y	WK	WK	WK	WK	WK	WK
Symonds, …	WK	WK	WK	WK	WK	Y	WK	WK	WK	WK	WK	WK
Taborda, Nuno Augusto de Brito	WK	WK	WK	WK	WK	Y	WK	WK	WK	WK	WK	WK
Teixeira, Augusto Cesar Justino	WK	WK	WK	WK	Y	Y	N	N	N	N	N	N
Trigueiros, João Pedro Tavares	WK	WK	WK	WK	N	Y	N	N	N	N	N	N
Valente, Joaquim Maria	WK	WK	WK	WK	WK	Y	WK	WK	WK	WK	WK	WK

LEGEND: Y – Yes; N – No; WK – Without Knowledge; M – Militar; C – Civil; APP – Academia Politécnica do Porto; EPL – Escola Politécnica de Lisboa; EME – Escola Militar do Exército; IST – Instituto Superior Técnico; UC – Universidade de Coimbra; EPC – École des Ponts Chaussées; PC – École Polytechnique de Paris ; EM – École des Mines; MOPCI – Ministério das Obras Públicas, Comércio e Indústria.

Source: Biographical Personal Profile Files of the Algarve's Railway Engineers. (Annex 6)

6- ALGARVE'S RAILWAY ENGINEERS: BIOGRAPHICAL PERSONAL PROFILE

Name	Abecasis Junior, José	
Dates	--.--.1863 / --.--.----	
Place of Birth	Vila Real de Santo António	
Parentage		
Education	Made its preparatory studies to military officials and military and civil engineering in the Polytechnic School, in Lisbon. Graduated as a civil engineer by the Army School.	
Career	Worked on the private sector, on the company in charge of the Beira Baixa Railroad, on the company in charge of the Santa Comba-Dão to Viseu Railroad and on the *Companhia Nacional dos Caminhos de Ferro*. Entered the Ministry of Public Works, Trade and Industry on April 17th 1891. Whilst on the public sector: - Worked on several Public Works Divisions: Évora, Beja, Lisbon, between 1891 and 1901; - Named interim sub-director on the South and Southeast Railways by decree of 24.5.1912; by 15.5.1914, was officialy appointed as sub-director; - Attached to the Work Ministry on 22.5.1916; - Attached to the Commerce Ministry on 5.11.1917; - Attached to the Land Transportation General Office on 9.3.1918; - Exonerated, at his request, of the office of director on the south and southeast railways on 1.10.1920; - Attached to the Sanitary Enhancement Commission on 23.3.1921; - Appointed as the General Administrator of the Buildings and National Monuments Administration on 22.9.1921; - Exonerated, at his request, from the office of administrator on 1.6.1928 and named Inspector Engineer; - Retired on 7.11.1931 due to health issues.	
Sources	AHMOP – Employees Personal File	
Observations		

Name	Abreu, João Evangelista d'	
Dates	24.12.1827/--.--.1869	
Place of Birth	Castelo Branco	
Parentage	Manuel Mendes de Abreu (Surgeon)	
Education	Baccalaureate in Mathematics on Coimbra University, in 1850; Graduates as a Military Engineer in the Army School, in 1854; Attends the École des Ponts et Chaussées, in 1856, with a State scholarship. Returns to Portugal in 1860, with a diploma and a special mention from that school.	
Career	Teaches Geometry and Applied Mechanics in the *Liceu Nacional de Lisboa*; By 1855 is invited to the commission in charge of teaching the disciplines of roads and railroads construction, being the substitute teacher, in the Army School. Joins the Ministry of Public Works, Trade and Industry on 28.09.1860. Nevertheless, for one year, joins the company in charge of building the North Railway Line and the East Line, by special recommendation of the École des Ponts et Chaussées In 1865 returned to the Army School and the Ministry and put in charge of studying the railways to be built on the South. Directed the improvement works on the Navy Arsenal, encompassed on the work of enhancement of Lisbon's Port, of which is descriptive memory and preliminary draft were the basis of all subsequent literature and work on the project. Worked incessantly on several other projects, such as the Santa Apolónia Railway Station.	
Sources	AHMOP – Employees Personal File Luciano de Carvalho, João Evangelista de Abreu. Elogio Histórico (Lisboa: Imprensa Nacional, 1903) http://ciuhct.org/pt/abreu-joao-evangelista-de-	
Observations		

Name	Arroyo, António José	
Dates	19.02.1856/25.03.1934	
Place of Birth	Oporto	
Parentage	José Francisco Arroyo (Spanish musician and composer, director of São João Theater)	
Education	In 1878, graduated in Engineering (Roads and Bridges) on the Polytechnic Academy of Oporto.	
Career	Worked on the private sector, in 1884, on a company belonging to the Count of Foz. Joined the Ministry of Public Works, Trade and Industry in 1878. Whilst a public officer, worked at: - Beira Alta Railways, in 1879; - Guarda and Braga Public Works division, in 1881; - South and Southeast Railways Direction, starting in 1883; - Resumed its post at the South and Southeast Railways Direction, after his experience on the private sector; - Appointed, on 13.10.1886, to a fieldtrip (that lasted until 1888) we're he was ordered to: travel to Belgium, to the testing and reception of circulating material, ordered to Société Anonyme de Construction de Morlanwelz; inspect ironworks ordered to Minho Railway; complete the collection of teaching material to the discipline of Chemist Technology of the *Instituto Industrial e Comercial de Lisboa*; conduct studies on the necessary machinery to the *Escola Industrial de Guimarães*; - In 1888 visited the Metalworking Professional School in Friville-Escarbolin, having to report on its structure and organization; - In 1889, traveled to France and England to contact with machinery and material supplies to Guimarães School; traveled to Hannover, to inspect materials, carriages and wagons to be acquired by the South and Southeast Railways; tested the ironworks to the bridges over the rivers Mira and Cávado; - In 1901, is ordered to another fieldtrip to France, England, Germany and Belgium, in order to study their technical education systems' evolution. Appointed Inspector of the Industrial and Commercial Elementary Education Board, in 1892. (held office until 1926). Directed the work of the delegation that represented Portugal in the Universal Exhibition of 1900, in Paris. Also in 1900, is attached to the General Direction of Trade and Industry, where he made a thorough project of buildings to industrial schools. Between 1924 and 1929, belonged to the Superior Counsel on Public Works	
Sources	AHMOP – Employees Personal File LISBOA, Maria Helena (2002). "Os engenheiros em Lisboa. Urbanismo e Arquitectura (1850-1930)". In Cidade de Lisboa; Lisboa: Livros Horizonte, p. 255	
Observations		

Name	Cabral, Henrique Neves	
Dates		
Place of Birth		
Parentage		
Education	Graduated in Civil Engineering by the IST – Instituto Superior Técnico.	
Career	Joined the Ministry of Public Works, Trade and Industry, being appointed to the South and Southeast Railways, in the Traction and Material Service. By 1919 is promoted to chief of the metalwork's section. From 30.08.1927 onwards works as engineer in the Lisbon's Port Administration	
Sources	AHMOP - Employees Personal File Biblioteca Nacional de Portugal - Porbase	
Observations	Published: Estudos de exploração portuária / Henrique das Neves Cabral, in 1955 Problemas de exploração portuária, in 1961 Breves notas sobre o problema dos contentores / Henrique das Neves Cabral, in 1964	

Name	Esteves, Raul Augusto	
Dates	08.18.1878	
Place of Birth	Lisbon	
Parentage	Augusto Sotero Esteves (Army General)	
Education	Preparatory course at the Polytechnic School in Lisbon. Graduated 1st of his class on the general course of the Army School. Graduated in Military Engineering, in 1903, from the Army School.	
Career	1905-1909: Teacher of the construction elementary course, at the Army School; 1910 – Appointed to the Army's reorganization committee; 1911 – Became an associate inspector of the military service on the railways; 1915 – Still an associate inspector on railways, was appointed Commander of the Firemen of the Railways; 1916 – Director of the Preparatory school to non-commissioned officers; 1917 – Dispatched to France, in the Portuguese Expeditionary Group, where, as commander of the Railways Firemen Regiment, fought in the 1st World War, being stationed in Flandres; From 1920 onwards was appointed Director and President of the Board of the *Companhia dos Caminhos de Ferro Portugueses*; Director of the South and Southeast Railway Company	
Sources	AHMOP - Employees Personal File "General Raúl Esteves". *Gazeta dos Caminhos de Ferro*; 16.07.1955 "Parte Oficial". *Gazeta dos Caminhos de Ferro*; 01.10.1951 "Recortes sem comentários: General Raúl Esteves". *Gazeta dos Caminhos de Ferro*; 01.09.1955 "General Raúl Esteves". Gazeta dos Caminhos de Ferro; 16.08.1955	
Observations	From 1942 onwards: collaborated with the *Gazeta dos Caminhos de Ferro*; Published several works, namely "*O Problema Nacional dos Caminhos de Ferro*"	

Name	Leitão, Joaquim Faustino de Poças	
Dates		
Place of Birth		
Parentage		
Career	01.10.1876: Joins the Ministry of Public Works, Trade and Industry, being allotted to the studies on the Douro Railways; 4.05.1883: Transferred, on a limitless leave, to the General Board of Beja's Disctrict; 8.09.1883: Appointed to the construction of the Algarve's Railway; 10.11.1886: New limitless leave, to join the studies of the Beira Baixa Railway; Returns to his post in 31.10.1890 but leaves again, on 16.11.1895, with a limitless leave, to work on the Africa's Luanda to Ambaca Railroad. Between 1896 and 1904 he continues his work, back and forth, between Portugal and Angola. In 1905 he is appointed Director of the Luanda to Ambaca Railroad, which he maintained until 26.01.1910, when he disposed of his office. By 1911 he is deemed unfit for duty by a medical board and ask for his retirement but, by 24.03.1920 he was deemed fit for duty.	
Sources	AHMOP – Employees Personal File	
Observations		

Name	Lopes, Pedro Ignacio	
Dates	13.01.1840/22.12.1900	
Place of Birth	Lisbon	
Parentage		
Education	Finished his preparatory course in 1855. Enrolled in the University (presumably Coimbra), graduating in Mathematics and achieving a baccalaureate in Philosophy. Was a scholar, paid by the State, to attend the École des Ponts et Chaussées, from which he returns in 1864	
Career	In 1864 enters the *Companhia Real dos Caminhos de Ferro Portugueses*, under the scope of the Engineer Francisco Maria de Sousa Brandão. Whilst there, he was in charged with: - Studying the route to the railway between Coimbra and Covilhã (which would be, later on, called *Ramal da Lousã*); - Analysing the route defined to the Beira Alta Railway Line; - Executing the necessary works of the Mondego River Bay enhancement and the stream regularization, between 1869 and 1871; - Defining the route of the North Railway Line, between Vila Nova de Gaia and Campanhã, having been in charge of the crossing of the Douro River by the D. Maria Pia Bridge; - Building the Cáceres Branch, in 1879. Still in this company he made the project and budget to the Beira Baixa Railway Line, in 1883. Between 1885 and 1890 he was the director of the *Companhia Real dos Caminhos de Ferro Portugueses*. Joins the Ministry of Public Works, Trade and Industry in 1890 where he was appointed Inspector and also in charge of projects, such as the inspection on the banks of the Mondego River, the review of the roads classification system, of elaborating a regulation to the surveillance, conservation and testing of metallic bridges, besides his work at the South and Southeast Railway Line where he defined, for instance, the location of Olhão's Railway Station.	
Sources	AHMOP – Employees Personal File *Gazeta dos Caminhos de Ferro*: March 15th 1888; March 16th 1902; February 16th 1903; October 16th 1956.	
Observations	Decorated with the Grand Cross of the *Ordem de Sant'Iago da Espada*, because of the project of D. Maria Pia Bridge. Decorated with a commendation of the *Ordem de Carlos III* and of the *Ordem de Isabel a Católica*, as well as a decoration of the *Imperial Ordem da Rosa*, for his work as the Director of the *Companhia Real dos Caminhos de Ferro Portugueses*. Contributor to the *Gazeta dos Caminhos de Ferro de Portugal e Hespanha (1888-1898)* and to its subsequent *Gazeta dos Caminhos de Ferro (1899-1971)*.	

Name	Magalhães, Francisco Perfeito de	
Dates		
Place of Birth		
Parentage		
Education	Baccalaureate in Mathematics, at the University of Coimbra, in 1867; Graduated in Civil Engineering by the Army School.	
Career	Works in Guimarães Municipality, on the Technical Service, being appointed in 10.11.1871 but just for a short term since in 05.12.1871 he is named District Engineer, in Vila Real. Enters the Ministry of Public Works, Trade and Industry in September 5th 1872 and was charged, together with the Engineer Bernardo d'Aguilar Tripeira Cardozo, to do the studies to the 4th section of the Douro Railway. In 1874 is appointed as an attaché to the Kingdom's Telegraphs and Lighthouses Direction. Afterwards he is charged with studying the railway line between Pombal and S.Martinho but, by 1880, he is transferred to the Direction of Inspection of the *Caminhos de ferro do Leste e Norte*. In September 1883 he temporarily leaves the Ministry and becomes in charge of the technical direction of the construction works of the 11th section of the Douro Railway Line. 19.03.1886: named inspection director of the studies to the Beira Baixa railway line and the Covilhã branch. In 1889 he represents Portugal in the Railway Congress held in Paris and, in 1896 he is named a delegate, representing the government, to the joint commission (State and *Companhia Real dos Caminhos de Ferro Portugueses*), to develop a settlement draft between the two parties, concerning the construction and the liquidation of the interest rate guarantees, followed by his appointment to the studies of the frontier crossing points of railways with Spain, still in 1896. Is appointed, in 1897, construction director of the Luanda to Ambaca and Malange railway line, but it is a brief passage, of less than a year. It is in 1902 that he is appointed associate director of the South and Southeast railway line. Also in 1902 he is appointed as a member of the State Railways Board of Directors. In 29.12.1910 he is suspended from duty as a chief engineer, without salary and he concludes by asking his retirement in 21.04.1911.	
Sources	AHMOP – Employees Personal File	
Observations	Received a commendation, by the King, on September 1st 1894, for his diligence and zeal on the job. - Was proposed to serve as an associate teacher of the 15th and 16th disciplines of the Army School, in 1892.	

Name	Mendes, Arthur Augusto	
Dates		
Place of Birth		
Parentage		
Education	Graduated in Civil Engineering by the Army School in 1888	
Career	Firstly, in 1889, was appointed to the 1st divion of the Public Works Direction in Viana do Castelo that occupied themselves with roads, hydraulics and public buildings. In 1900 he attends the Unversal Exhibition that took place in Paris After a brief passage as chief of a section of Coimbra's Public Works Direction, he is specifically appointed to elaborate the studies and the construction of the railway line between Faro and Vila Real de Santo António, work that granted him a special commendation on 08.05.1906. On August 5th 1909 he is named to secure lead the section of route and works due to the passing of the engineer in charge: Augusto Victor Sequeira. By 1912, on May 14th, he is appointed as the interim director of the South and Southeast Railway, due to the exoneration of the Chief Engineer António Lourenço Sequeira, being definitively named on May 11th 1914.	
Sources	AHMOP – Employees Personal File	
Observations		

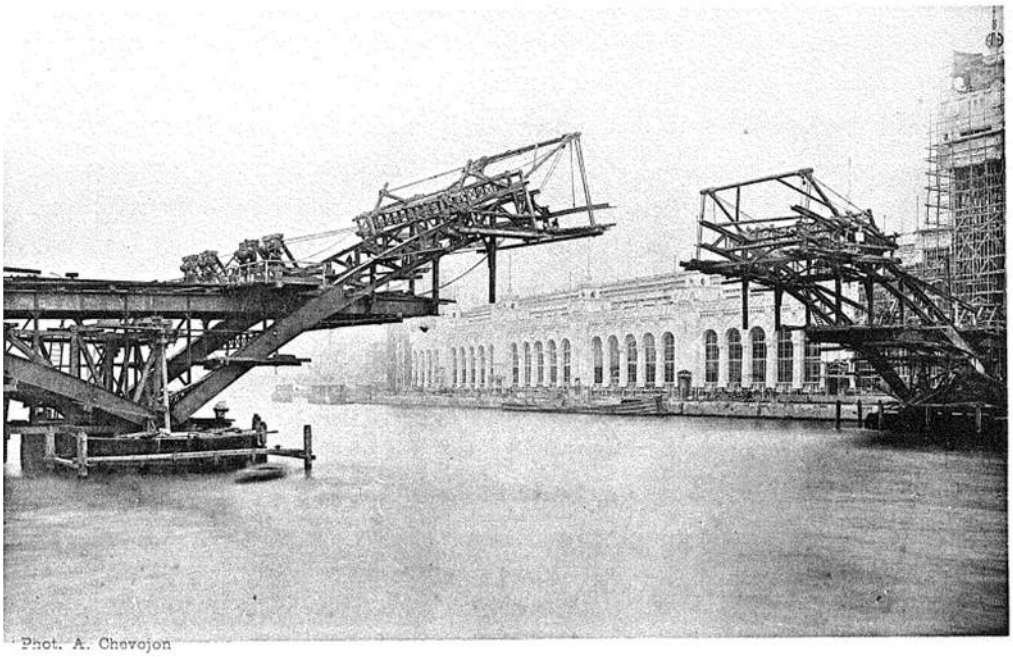
Name	Mota, Diniz Moreira da	
Dates	02.03.1860/29.08.1914	
Place of Birth	Pico da Pedra (Azores Islands)	
Parentage	António Augusto da Mota Frazão (Professor and Dean of Ponta Delgada's National Lyceum)	
Education	Preparatory Courses in Coimbra. In 1881 he finishes the 4th year of Mathematics in the University of Coimbra. In 1883 he graduates in Civil Engineering in the Army School.	
Career	Worked as a project designer while attending his entrance on the public sector. Joins the Ministry of Public Works, Trade and Industry in October 4th 1884, being appointed to substitute the engineer in charge, up to that point, of the construction works on the Algarve Railway Line: the Engineer António José Arroyo. By 1885 he is transferred to the *Companhia Nacional de Caminhos de Ferro*, and works on the exploitation of the Tua railway line, where he remained until 1892. Nevertheless, between 1886 and 1889, he took several fieldtrips to France, Belgium and Germany. In 1892 he returns to the Azores Islands as an Inspector of the Azorean Industrial Circumscription, office he held until 1894. After his passage through the government he resumes his work as an engineer attaché to the District's Public Works Direction [Azorean Islands]. In 1897 he became in charge of the construction of the Ponta Delgada's Port pier. In September 30th 1898 he is appointed interim director of the Ponta Delgada's Autonomous District Public Works Direction, office that, after definitive nomination (in 1911), he will held until his death.	
Sources	Mónica, Maria Filomena (coord.) (2005). Dicionário Biográfico Parlamentar (1834-1910), volume II. Lisboa: Assembleia da República. Mota, António Augusto Riley da (1950). Diniz Moreira da Mota (Engenheiro). Ponta Delgada: Oficina de Artes Gráficas	
Observations	Deputy of the Portuguese Parliament between 1892 and 1894. Temporary Science Teacher on Ponta Delgada's National Lyceum, on 1901 and between 1903 and 1905.	

Name	Parreira, Antonio Conceição	
Dates		
Place of Birth		
Parentage		
Education	Presupposed to have made his studies at a military school: Lisbon Polytechnic School or the Army School	
Career	On June 21st 1886 this Lieutenant Engineer from the Ministry of War is transferred to the Ministry of Public Works, Trade and Industry and his immediately appointed as the Section leader of Faro's Public Works Direction. By December 30th 1886 he is transferred again, this time to the 2nd hydraulics circumscription (comprising Vouga, Mondego and Liz Rivers). In 1890, transferred again, but to the 2nd section of construction, on January 21st. Nevertheless, it was a too brief nomination, since he is again transferred, 10 days after, to the 3rd hydraulics circumscription of Lisbon. In 1891 he is summoned by the Ministry of War to take part in drilling exercises but by July 1st he returns to the 3rd circumscription and, after a year, he became Chief of the 4th section of the 3rd circumscription of Santarém, while in 1893 he is transferred to Setúbal. July 23rd 1896, the Ministry of the Navy and Overseas requires him to join the temporary commission to help the Engineer Adolpho Ferreira de Loureiro with the studies to the betterment of the Lourenço Marques Port; commission of which he returned in July 6th 1897. On August 24th he requires to be placed on the Fiscal Direction of the Construction and exploitation of Lisbon's Port, to which he is transferred on August 31st. January 23rd 1898 he is appointed, by requisition of the South and Southeast Railways Board, to be responsible to elaborate the project to the railway section between Portimão and Lagos. By 1900 he moves to Angra do Heroismo, in the Azores Islands, on August 13th but, in December, he's back to Lisbon to work on the 4th zone of the construction services, belonging to Lisbon's Public Works district. Was appointed director of Beja's Public Works in October 12th 1903 but, being always summoned to several commissions, whether from the Public Works Ministry or the Ministry of War, he petitioned to be exonerated from this post and was transferred, on July 20th 1906 to the Direction of Agricultural Hydraulics. By 1907 he became in charge of the Service of Roads Conservation, in Lisbon's District and but leaves this post the following year, being commended by his work. In May 24th 1913 he is appointed the Director of Agricultural Hydraulics	
Sources	AHMOP – Employees Personal File	
Observations		

Name	Silva, Plínio Octavio de Santana e	
Dates	--.--.1890/07.06.1948	
Place of Birth	Lisbon	
Parentage		
Education		
Career	Military, captain and engineer, he was hired, in 1922, to serve as Director of the South and Southeast Railway Line	
Sources	AHMOP – Employees Personal File *Gazeta dos Caminhos de Ferro*: June 16th 1948	
Observations	Was incorporated in the *Corpo Expedicionário Português*, fighting in the 1st World War	

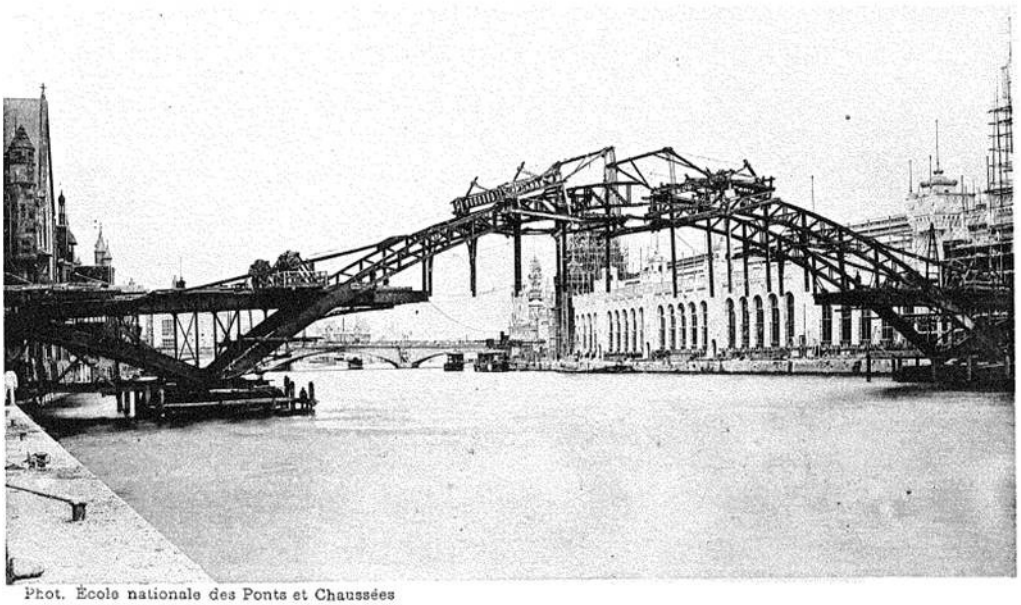
Name	Teixeira, Augusto Cesar Justino	
Dates	10.04.1835/02.02.1923	
Place of Birth		
Parentage		
Education		
Career	1800: Made the project of the Alfândega Branch, in Oporto. Appointed by the State, on April 1st 1884, to a committee in charge of inspecting the Tua railway line. By 1888 he was Director of the *Caminhos de Ferro do Minho e Douro*. In late 1901 was named, auxiliated by the Engineers Eduardo Magalhães Braga and Perfeito de Magalhães, in charge of studying the route of the railway line between Estremoz and Vila Viçosa. By 1902, already appointed Director of the South and Southeast Railway Line Director, took part of a committee chosen to solve the problem concerning the passage of the railway through Faro. Therefore they studied the alterations made by the *Conselho Superior de Obras Públicas*, in the route between Faro and Vila Real de Santo António. In 1903 he is again summoned to a committee, this time to address the location of Olhão's Railway Station. In this year he leaves the Direction of the South and Southeast Railway Line, remaining as a Board Member of the Administration Board of the *Caminhos de Ferro do Estado* and inspector in the construction of railway lines.	
Sources	AHMOP – Employees Personal File *Gazeta dos Caminhos de Ferro*	
Observations	Contributor to the *Gazeta dos Caminhos de Ferro de Portugal e Hespanha (1888-1898)* and to its subsequent *Gazeta dos Caminhos de Ferro (1899-1971)*.	

Name	Trigueiros, João Pedro Tavares	
Dates	08.10.1831/27.02.1902	
Place of Birth	Oliveira do Hospital	
Parentage		
Education		
Career	One of the responsible for designing the Plan of a Complementary Network South of the Tagus River, in 1898. Between 1876 and 1898 he was appointed as Administrator of the South Railway Network, Inspector of the Corps of Public Works Engineers and member of the *Conselho Superior de Obras Públicas e Minas*, member of the Administration Board of the *Caminhos de ferro do Estado*. His most notable and recognized work concerns the planning of the South Line, most specifically between Faro and Olhão	
Sources	*Gazeta dos Caminhos de Ferro*: March 1st 1902; March 16th 1902; December 16th 1902	
Observations	Contributor to the *Gazeta dos Caminhos de Ferro (1899-1971)*. Member of the Portuguese Civil Engineers Association. Decorated with the Commend and Grand Cross of the *Ordem Militar de Avis* and he was armed Official and Knight of the same order. When he left the Direction of the South Line, he received an homage made by the workers of the railway line.	



Phot. A. Chevojon

PASSERELLE SUR LA SEINE ENTRE LES PONTS DE L'ALMA ET D'IÉNA
Montage des arcs centraux



Phot. École nationale des Ponts et Chaussées

PASSERELLE SUR LA SEINE ENTRE LES PONTS DE L'ALMA ET D'IÉNA
Montage des arcs centraux

INTRODUCTION

The Projet Tutoré is intended to be a fieldwork project, of practical characteristics and to be carried out by a workgroup within the colleagues of the Master Erasmus Mundus TPTI.

Emulating a working environment, where one has to adapt itself to new realities, new people, and different cultures, this project has, in a secluded and protected net, that the Master Erasmus Mundus secures, allowed us to explore new ways of understanding and creating a common framework where we could experiment and cement the concepts and values that we had been receiving during our academic path.

Being the second edition of this collaborative project, we've been quite grateful by having a basis on each to work upon. To our group it was assigned the project about bridges and their engineers, that already been initiated by a fellow group of the Master Erasmus Mundus, of the 5th edition. On knowing that, I could not but remember and make a parallel between both projects.

Having a common ground point enabled us to focus on the materialization of our project, instead of having to designing it from scratch, since we knew, from the start, what was expected of us: continuing the website http://ouvresdegenie.wordpress.com. On the other hand, such a work topic is malleable, adjustable and could be worked from several angles of approach, in any and about any location.

The interest in projects of this nature is the possibility to question preconceptions and the possibility to plan and redo your work, according to the needs of the group or to enhance your project and its contents.

This report is structured in two main parts. Firstly, I will focus on the methodology, objectives, constraints and the working dynamics within the group, showing how the group, as a collective, as organized itself as well as my individual contribution to the ensemble. Secondly, a synthesis of the work that has been done is presented, alongside my personal considerations on the topic.

THE WORK

The “Oeuvres du Génie” Project had Alexandre Ramos as our tutor, a Master Erasmus Mundus TPTI alumni that guided us and bestowed us advice on how to carry out our project.

From the beginning, by the structure defined by the Master’s coordination, we’ve settled our work frame with our tutor that comprised weekly gatherings, via web conference, and as if it was a professional project, a summary report of each gathering.

On our first gathering the challenge was posed:

1. Analyse the already existing site;
2. Establish our own criteria to select two bridges, in each country, as our research and object of analysis;
3. Devise our own work schedule and our individual assignments: who does what, when and where.

In order to accomplish what had been assigned to the group, we’ve defined a strategic approach that, in our point of view, would help stir up the debate and, at the same time, would give us a base on which to build upon. Therefore, we’ve settled a deadline to have an individual critical analysis on the website, as well as our own proposition of criteria to choose our case studies. That being done, we would have a group meeting, without our tutor, in order to debate and define our common criteria.

This first exercise allowed us to understand the working rhythms and dynamics of each individual, as well as to ascertain if there were severe gaps in our common understanding of industrial heritage and conservation criteria. Moreover, it would be useful to see the skills and strong points of each member of the group, in order to have an even and efficient distribution of responsibilities and assignments.

Having the guidelines provided by the tutor, all the members of the group had to make a critical analysis on the website and present their own personal approach to which should be the criteria to choose the case studies.

Beforehand, I've decided to analyse the international charts that emphasize the concepts of heritage's valorisation and conservation all over the world: The Venice Chart, The Burra Chart; as well as those specifically concerning industrial heritage: The Nizhny Tagil Chart and the ICOMOS-TICCIH Joint Principles for the conservation of sites, constructions and landscapes. In addition, I've also consulted the UNESCO's criteria to the classification of world heritage.

The UNESCO's criteria are:

1 - to represent a masterpiece of human creative genius;

2 - to exhibit an important interchange of human values, over a span of time or within a cultural area of the world, on developments in architecture or technology, monumental arts, town-planning or landscape design;

3 - to bear a unique or at least exceptional testimony to a cultural tradition or to a civilization which is living or which has disappeared;

4 - to be an outstanding example of a type of building, architectural or technological ensemble or landscape which illustrates (a) significant stage(s) in human history;

5 - to be an outstanding example of a traditional human settlement, land-use, or sea-use which is representative of a culture (or cultures), or human interaction with the environment especially when it has become vulnerable under the impact of irreversible change;

6 - to be directly or tangibly associated with events or living traditions, with ideas, or with beliefs, with artistic and literary works of outstanding universal significance. (The Committee considers that this criterion should preferably be used in conjunction with other criteria);

7 - to contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance;

8 - to be outstanding examples representing major stages of earth's history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features;

9 - to be outstanding examples representing significant on-going ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals;

10 - to contain the most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation.

The universal standard of a heritage object or site is that it has to be kept in its original location and that embodies a characteristic or a specific way of acting of a given community (see article 1 of the Venice chart, for instance).

On the other hand, the Dublin Principles and the Nizhny Chart state the specific characteristics of what can be considered industrial heritage (See point 6, article 3 of the Nizhny Chart). Besides that, the concept of communication and diffusion as a mean of protection is also highlighted.

Bearing these concepts in mind I was able to develop a proposal of criteria for choosing our case studies:

1 – Building materials: only choose bridges built in metal and connected to the railways, in order to keep the website's coherence, maintaining the same choices that the last group had made;

2 – Landscape and setting : to choose a bridge set in an urban area and another one on a rural area, in order to be able to analyse the differences amongst two different landscapes the changes that have taken place ;

3 – Chronology: to choose bridges of different stages, to have a representative sample of the building techniques;

4 – Different types of bridges: applying the same logic that of the number 3;

5 – Symbolic value and/or meaning to the community.

Nevertheless, the group has reached a decision and chose the following criteria: existing bibliography, type of bridge, its use, impact on the landscape, heritage value.

We've also made a critical analysis of the website, from a user point of view, which acted as the base to the changes that we made in the website, whose report I transcribe.

CONSIDERATIONS SUR LE SITE:
WWW.OUVRESDEGENIE.WORDPRESS.COM

« Les considérations faites sur le site internet du projet œuvres de génie à étais pensée du point de vue d'un quelque utilisateur qu'à fait une recherche sur ponts, et ont regardé la capacité de navigabilité dans le site et aussi la façon de comprendre les contenus.

De cette point de vue, n'est pas clair qui est le public de le site, parce que il n y a pas une explication cohérent et succincte de le but et son contexte, exception fait pour le petit texte introductoire dans la page de accueil. Aussi, n'est pas clair que le thème sont les ponts ferroviaires métalliques et le menu ne le dit pas.

Les contenus sont partagés dans les plusieurs menus, et n'est pas facile de comprendre sa relation avec le thème principal. Qu'est que se veule ? Si est une site web sur les œuvres de génie et les merveilles de l'ingénierie, mais pas seulement pont, ça besoin d'être très explicite et le site va à fonctionner comme un recueil en actualisation permanent. Si, d'autre côte, le thème est seulement les ponts, ça besoin de changer les menus et son organisation, jusque comme la page de accueil.

De la même façon, ont besoin de regarder qui est le public de ce site. C'est-à-dire, si sont des connaisseurs de le histoire des techniques et de le patrimoine industrielle, la organisation, le langage et les contenus sont très différents d'un projet de valorisation et diffusion pour le grand publique, que la majorité ne connais pas des termes techniques de l'ingénierie.

Les contenus révèlent le travail de recherche qu'étais fait et la fiche d'inventaire c'est bien structuré mais, le glossaire est insuffisant.

Le model de site c'est très discret et fonctionnelle, pour la navigabilité et ça lecture et compréhension est facile, dans le point de vue esthétique, sans pollution visuelle et la plateforme choisi c'est facile de travailler et de faire des changements sans perdre d'information.

Plus encore, c'est important et nécessaire faire l'étiquetage des contenus, avec des « tags », une bonne façon de faire des recherches dans le site.

Aspects positifs	Aspects négatives
Esthétique du site	But sont pas explicit
lecture	Absence des critères
Fiche d'inventaire	Distribution du menu et des contenus
Plateforme	Seulement en français
Possibilité d'inclusion des applicatifs	Absence des « tags »
	Glossaire insuffisant

In the first semester we have divided the work by types of things to do: everybody helped and pitched in to choose the case studies, providing a working hypothesis, such as these, that I've provided.

PASSERELLE DEBILLY	
Location:	Quai de New-York/Quai Branly, 75007 Paris. Coordinates: 48° 51' 45.00" N 2° 17' 49.00" E
Measurements	**TOTAL LENGTH**:120 m **USABLE WIDTH**:8 m
Responsible	Jean Résal (engineer) Amédée Alby (engineer) André-Louis Lion (engineer) Daydé & Pillé (constructor)
Type	Half-through arch bridge
Use	Footbridge
Material	Steel
Chronology	1899-1900
Surroundings	Urban, within the scope of the Eiffel Tower. Although it was constructed to the universal exhibition and is, currently within that area, the bridge has been moved, which, by itself, is an extremely complex engineering process.
Symbolism	Part of the 1900's Universal Exhibition, in Paris
Description	Metal footbridge with three spans on piers. Central span comprising an arch with intermediate deck of 75 m. End spans of 22.50 m comprising two half-arches. In order to accommodate visitor traffic to the 1900 World's Fair across the Seine, the General Commissioner of the Exposition, Alfred Picard, approved the construction of a provisional footbridge opposite the Avenue Albert de Mun, to join the Army and Navy Halls to the exhibit recreating old Paris. Its architect, Jean Résal, also designed the Pont Alexandre III and the Viaduc d'Austerlitz. The Debilly footbridge had, as well, a succession of provisional names. It was initially called passerelle de l'Exposition Militaire or passerelle de Magdebourg, only later passerelle Debilly, after General Jean Louis Debilly of the French First Empire who was killed in the Battle of Jena in 1806.

	The bridge became a permanent fixture from its original provisional status under the management of the City of Paris in 1906 after it was relocated opposite to the rue de la Manutention. The footbridge is built on a metallic framework resting on two stone piers at the riverbanks, and decorated with dark green ceramic tiles arranged in a fashion that suggests the impression of waves. Along with the Eiffel Tower, this is the second metallic structure that stands as an attestation to the engineering achievements of its epoch. Nevertheless, in 1941, the Debilly footbridge was threatened with disappearance when the president of the architectural society characterized it as a forgotten accessory of a past event. Fortunately, as a contemporary of the Pont Alexandre III and the Austerlitz Viaduct, the Passerelle Debilly was eventually included in the supplementary registry of historical monuments in 1966. The bridge was repainted in 1991 and its cladding resurfaced with hard tropical wood in 1997 **Curiosities:** In 1989, a German diplomat working for the Secret Service of the Democratic Republic of Germany was found dead on this footbridge, several days after the Fall of the Berlin Wall. As it turned out, the footbridge was used as a secret gathering place for the secret service agents of East Germany during the Cold War. It is certainly one of the reasons that pushed Brian De Palma to shoot a scene of his thriller Femme Fatale on that footbridge in 2002.
	Dantin, C. *Passerelle sur la Seine entre le Pont de l'Alma et le Pont d'Iéna*, dans "Génie Civil", 26 mai 1900, n. 937 Dantin, C. *Passerelle sur la Seine entre le Pont de l'Alma et le Pont d'Iéna*, dans "Génie Civil", 2 juin 1900, n. 938 Gaillard, Marc *Quais et Ponts de Paris*, Martelle Editions, Amiens (France), ISBN 2878900577, 1996; pp. 169 Lambert, Guy *Les Ponts de Paris* (1ère édition), Action artisique de la ville de Paris, Paris (France), ISBN 2913246052, 1999; pp. 223 Montens, Serge *Les plus beaux ponts de France*,Bonneton, Paris (France), ISBN 2862532754, 2001; pp. 115 Méhue, Pierre *Deux siècles de passerelles métalliques*, dans "Bulletin ouvrages métalliques", 2002, n. 2
	Base Merimée: http://www.culture.gouv.fr/public/mistral/merimee_fr?ACTION=CHERCHER&FIELD_1=REF&VALUE_1=PA00088794 Structurae: http://en.structurae.de/structures/data/index.cfm?ID=s0000231 Cnum: http://cnum.cnam.fr/CGI/fpage.cgi?4XAE69.1/487/100/522/215/521 ; http://cnum.cnam.fr/PDF/cnum_4XAE69.1.pdf Planète TP: http://www.planete-tp.com/article.php3?id_article=101 Blog Ponts de Paris: http://blogpontsdeparis.blogspot.fr/2011/06/la-passerelle-debilly-du-provisoire.html

After having chosen our case studies, the tasks were divided in the following manner: 1 person in charge of taking photos of both bridges, 2 people in charge of securing the bibliography and pass it to the redactors, 2 colleagues in charge of redacting the text with all the information gathered, 1 person in charge of listing all useful links that could be uploaded to the website, 2 people in charge of content insertion online and necessary translations and text revision. This lead to some delays since the working structure was too interdependent.

Therefore, as a group, and reassessing our working methodology, we've divided the work load differently: two groups of 2 colleagues, each in charge of collecting all data and writing the contents for each bridge, 1 person in charge of all the website's updates, image rendering and text revision.

In fact, with this new working methodology, we've recovered from the delays that had occurred in the first semester and develop all the work that was demanded of us.

Personally, I've been in charge with the website's management and uploading. Besides the necessary work to correspond to the demands of feeding the website with new materials, and thanks to our change of methodology in due time, there was the opportunity and spare time to address some of its features that weren't as user friendly as they could be.

Hence, we've been able to simplify the main menu and the lateral ones, giving the website a more "clean look" and, consequently, eliminating redundancies on menus or content, such as the case of the menu "ouvrages", which was a redundancy of the content available on the menu "pays". Also, in an attempt to render the site more noticeable, we've been able to tag all pages, defining the keywords for each section.

It is of the utmost importance to highlight the fact that this project was viewed, by all the members as a "work in progress", that is to say, a project that we had inherited from our colleagues, managed it to the best of our abilities and hope that the future colleagues will develop it even further.

SYNTHESIS AND CONCLUSIONS

It is of the utmost importance to highlight the fact that this project was viewed, by all the members as a “work in progress”, that is to say, a project that we had inherited from our colleagues, managed it to the best of our abilities and hope that the future colleagues will develop it even further.

In my personal experience it was a gratifying experience, where each and every single one of us has been able to contribute to the group, taking advantage of our personal skills and assets.

The fact of having to work together during a year and an half has bestowed us the ability to become a tight group that has established a base of trust, of mutual respect and of dialogue that, alongside the capability to overcome setbacks and delays, definitely made of us what I consider to be the principal goal of this project and of the Master Erasmus Mundus TPTI: truly a high standard researchers and team players, on the field of industrial heritage, able to take full advantage of the different backgrounds and our multiculturalism.

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