

## The Companhia dos Canaes d’Azambuja: Shortening distances, avoiding difficulties. Portugal, 1840s\*

## La Companhia dos Canaes d’Azambuja: acortar distancias, evitar dificultades. Portugal, década de 1840

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**Abstract:** In 1844, a group of Portuguese capitalists created the Companhia dos Canaes da Azambuja, with the purpose to build the Azambuja Ditch, navigable all year round, and improve its drainage capacity during the periodic flooding of the Tagus River. The works, which were never completed, were financed by an innovative partnership between the government and the Companhia's shareholders, and technical assistance by Italian experts. This paper, mainly based on archival documentation and the press, analyses the establishment of the Companhia, the contract signed with the Portuguese government and the role played by Italian legal experts and engineers.

**Keywords:** inland navigation; public-private partnership; law; Azambuja; Portugal.

**Resumen:** En 1844, un grupo de capitalistas portugueses constituyó la Companhia dos Canaes da Azambuja, creada para recalificar la Acequia de Azambuja, haciéndola navegable todo el año y mejorando su capacidad de desagüe de las periódicas crecidas del río Tajo. Las obras, que nunca llegaron a completarse, fueron financiadas por una innovadora asociación entre el gobierno y los accionistas de la Companhia, y asistidas técnicamente por expertos italianos. Este trabajo, basado principalmente en documentación de archivo y prensa, analizará la creación de la Companhia, el contrato firmado con el gobierno portugués y el papel desempeñado por los juristas e ingenieros italianos.

**Palabras clave:** navegación interior; asociación público-privada; derecho; Azambuja; Portugal.

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## INTRODUCTION

Artificial canals were constructed for drainage and irrigation purposes. From the sixteenth century onwards, they have taken a significant role complementing natural waterways, connecting places and people, and “favouring a closer connection between the city and the countryside” (Mumford, 1963). They were particularly important before the growth of rail and road networks. In many countries, they continue to be an economical alternative for the transport of certain cargoes and are used for recreational and touristic purposes.

In Portugal, the morphology of the territory and the configuration of the hydrographic network provided almost 900 km of navigable rivers, which, together with the lack of financial funds, did not favour the construction of artificial navigable canals that occurred in France, England, and the Netherlands (Gaspar, 1970: 156; Matos, 1980: 298). During the nineteenth century some ambitious projects emerged in Portugal, but only the canalisation of the so called *Vala da Azambuja* (Azambuja Ditch, hereafter *Vala*), was partially implemented. This project aimed to ensure the drainage of neighbouring agricultural land, improve public health, and to eliminate the marshes created by the Tagus floods.

Various issues made this project special. It was an alternative route that circumvented navigational difficulties in the Middle Tagus, and it involved several distinguished members of Portuguese political and economic spheres. Their decision to set up the Companhia dos Canaes d'Azambuja offered the Portuguese state an innovative financial model and promoted the circulation of expertise. The board of directors was certainly inspired by the Lombardy's canal system, the *Navigli*, considering that it sought in Northern Italy the skills in Hydraulics that Portugal lacked. It was also a matter of scientific and affective connection, inherited from the late eighteenth century when Rodrigo de Sousa Coutinho (1755-1812) occupied the position of ambassador in Turin and studied in detail that complex system of canals, considering its replication in Portugal (Brandão and Malaspina, 2022: 168).

Despite its long history, dating back to the thirteenth century, when it was opened to drain the fertile plains on both banks of the Tagus, the story of the *Vala da Azambuja* is still not well known. Archival and bibliographic sources are scarce, despite its clear representation in several nineteenth century maps. This is probably a consequence its limited regional impact and of its failure as a large-scale navigation project. However, some authors such as Guerra (1861) and Matos (1980) have devoted their attention to the subject. Additionally, the remaining palatial building constructed by the defunct Companhia, as well as the *Vala* itself, should arouse cultural and touristic interest (Machado, 2021; Marques, 2018; Soares, 2020).

This paper analyses the establishment of the Companhia dos Canaes d'Azambuja in 1844 and the implementation of its navigation project, through an interdisciplinary perspective, including History, Law, Economics, and Hydraulics. The creation of the Companhia is studied within the context of nineteenth-century Portugal, especially within the modifications in the Portuguese transportation system. We shall see how the Companhia fell victim to the circumstances of a politically unstable era, and above all, by the competition of the railway between Lisbon and Santarém, which diverted the expected transit of passengers and goods from the *Vala*. Moreover, this article highlights the productive synergy created between the Portuguese government, private entrepreneurs, and Italian technicians in an effort of canalisation and regulation of the *Vala* to facilitate river connections between Lisbon and different ports along the Tagus. Expectedly, the project would eliminate the difficulties created by the sandbanks on the riverbed, which prevented the passage of larger boats. The canalisation of

the *Vala* illustrates the intertwining between experts and the concretization of a public work that would have served transport, agriculture, and industry.

## 1. NAVIGATION ON THE TAGUS AND THE *VALA DA AZAMBUJA*

The construction of the *Vala da Azambuja* responded initially to the need for an efficient drainage and irrigation of the alluvial plains on the right bank of the Middle Tagus<sup>1</sup>. The works to make it suitable for navigation must be seen in the context of navigation on the Tagus itself.

The Tagus is the largest watercourse of the Iberian Peninsula. It rises in central Spain and empties into the Atlantic Ocean in Lisbon, Portugal, flowing through valleys set in crystalline and metamorphic rocks of the Central-Iberian Zone. Downstream from Tancos (Abrantes), about 150 km from its oceanic mouth, it flows over vast alluvial plains (the *lezírias*), and it loses speed. The riverbed is carpeted with shifting sands that flow with the current, forming banks and shallows that make navigation difficult. The most problematic spot was at Valada, the upper tidal limit of the river, where the navigable channel silted up with each tide and becomes a difficult obstacle to overcome. Silva (1897: 46) described this situation as follows:

[Between Santarém and Valada] the water splits into two or three branches, each with a maximum depth of 0.5 m, so the larger boats only sail from Lisbon to Valada, where cargoes are transferred to small flat-bottomed boats, which upriver must often assemble in fleets of ten and twelve vessels. The crews dig the riverbed, and after a painful work that the current undoes at every moment, they drag the boats almost on their backs one by one, taking a day to cover less than a mile.

As a rain-fed river, the Tagus flow is irregular throughout the year. Low flow periods alternate with episodes of over-flooding, which sometimes devastate the region. When the river level drops, stagnant waters are left behind, a fertile ground for breeding mosquitoes. During the reign of king Denis (1261-1325) several projects were carried out on the *lezírias* to

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<sup>1</sup> Given its morphological characteristics and the tidal influence, it is consensual to consider three distinct zones in the Portuguese course of the Tagus: Upper Tagus, from the Spanish border to Tancos, about 80 km; Middle Tagus, from Tancos to the mouth of the Azambuja ditch, about 70 km; and, Lower Tagus, or Maritime Tagus, the remaining course until the oceanic mouth, about 65 km.

drain water after periods of rain and floods to protect agriculture (Eça et al., 1883: 118). On the right bank of the Tagus, the most important channel of this system was the Azambuja ditch (figure 1). Running parallel to the Tagus in an extension of about 25 km, it overlaps partially with Maior River. It flows into the Tagus about 5 km southwest of Azambuja. Soon it began to be used for navigation, ensuring the transit of agricultural products towards Lisbon.



**Figure 1. Detail of the Vala da Azambuja. Tile panel at the railway station, painted by C. A. Moutinho, Fábrica de Loiça de Sacavém (Sacavem Pottery Factory), 1935**

Source: Authors' photograph, 2021

Making the Tagus navigable from Madrid (Toledo) to Lisbon was an old ambition, dating back to the sixteenth century, during the period of the Philippine domination of Portugal. At the time, the king commissioned the Italian engineer Giovanni Battista Antonelli (1527-1588) to carry out a survey of the river in its full extension. He proposed several works to regulate the riverbed and the construction of towpaths (Cámara Muñoz, 2004:

163-218; Soromenho, 2004: 263-280). According to Antonelli, once the work was completed the journey from Toledo to Lisbon in the Winter would take only three days (Quevedo, 2007: 129).

These works were later resumed by the Italian experts Luigi Carducci and Giulio Martelli, together with the Spanish lawyer Eugenio Salcedo. They surveyed and documented in detail the course of the Tagus between Toledo and Alcântara (Guerra, 1861: 8; Requeña, 2020: 14). However, the Restoration Wars (1640-1668) and the changes in Portuguese politics led to the suspension of these projects.

Some decades later, the prime minister of king Joseph, the Marquis of Pombal (1699-1782) determined that the Azambuja channel was to be improved. The Portuguese physicist and member of the British Royal Society Bento de Moura Portugal (1702-1766) was part of the project, carrying out several studies on the Tagus and suggesting the construction of a large dam in Vila Velha de Ródão (in the High Tagus), where the river valley was narrower, to avoid the flooding of the *lezírias* and the formation of marshes. Regarding the marshes in the surroundings of Azambuja, he said that they had a good flow through the ditch, but the ditch itself needed urgent de-silting and widening works (Portugal, 1821: 1-69).

In 1788 the Jesuit scholar Estêvão Cabral (1734-1811) was commissioned by the government to study the causes the Tagus floods and to propose solutions to resolve them. He was a follower of the theories of Domenico Guglielmini (1655-1710), author of the treatise *Della natura de' fiumi* (On the nature of rivers), whose principles he applied to the Tagus to understand the phenomena of erosion/deposition. Cabral travelled along the riverbanks and concluded that the difficulties of draining rainwater and flooding were mainly due to the fields bordering the Tagus being lower than the river during high tides. As the river level dropped, the fields drained into ineffective ditches, that were often clogged with aquatic plants (Cabral, 1790: 189-190).

Downstream from Abrantes, where the Tagus sprawls across the plains, the works carried out on behalf of the government were limited to cleaning ditches, planting trees in the banks, and building dikes to protect agricultural lands.

In July 1828, the Portuguese and the Spanish governments signed an agreement on free movement on the Tagus between Aranjuez and the river mouth<sup>2</sup>. In ten articles, both countries declared free navigation for the

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<sup>2</sup> Arquivo Nacional Torre do Tombo, *Tratados*, box 2, n.º 4, Protocolo em dez artigos..., 1829.

transport of passengers and goods. What is more, a 25-year privilege of exclusivity was given to the company of the Spanish brigadier and businessman Francisco Javier de Cabanes (1781-1834) to conduct the works to make the river navigable (Cabanes, 1829). Meanwhile, other proposals appeared; Portuguese colonel Júlio Guerra (1801-1869), in charge of the Tagus works from 1852 onwards, summarized them in an 1861 report titled *Estudos Chorographicos...*

In 1835, further consideration was given to the need to improve the communication network as a fundamental aspect for the development of agriculture, commerce, and industry. A special commission was created in the *Ministério do Reino* (Ministry of the Kingdom) to propose a plan of roads, bridges, canals, and ports (decree of March 16, 1835). Proposals from any national or foreign companies could be acknowledged. What is more, the Government, by charter of December 19, 1834, could provide a support up to 10% of the capital to the formation of companies of public interest those purposes.

Responding to the public tender opened by the Portuguese government on December 4, 1843, Spanish businessman Manoel Bermudez Castro (1811-1870) proposed the creation of a steam navigation company to operate in the Tagus from Lisbon to the border. He offered to carry out all the works necessary to render the river navigable in exchange for a thirty-year privilege of exclusivity (Castro, 1845: 5). Aires de Sá Nogueira, as a representative of a company of Portuguese capitalists, also presented a proposal to establish steam navigation on the Tagus from Vila Nova da Rainha, where the Companhia de Navegação do Tejo e Sado por Barcos a Vapor<sup>3</sup> concession ended, up to the border in Alcântara, with adapted steamships and towing systems<sup>4</sup>.

Both projects, clearly monopolistic, were intensely discussed. A general feeling of rejection of the Spanish proposal was noted, especially by Portuguese general Sá da Bandeira (1795-1876), who believed that the idea would thwart the construction of a railway along the Tagus to Santarém and from there to the border. None of the projects materialized. The difficulties of canalising the river were enormous – as was later confirmed by engineer Almeida de Eça (1825-1906), superintendent of the Tagus (Eça et al., 1883: 83) – and consequently the whole enterprise would hardly

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<sup>3</sup> A steamboat company, established in Lisbon in 1838, to provide navigation services in the Tagus and Sado rivers.

<sup>4</sup> *Revista Universal Lisbonense*, n.º 38 (March 12, 1846): 445.

be profitable. The matter was forgotten until 1849, when the government of Queen Mary II created a special committee to superintend the execution of works on the Tagus (decree of July 9), to propose a canal in the river between Valada and Abrantes, to clean up the riverbed, and to build tow-paths where needed (Guerra, 1861: 13).

The *Vala da Azambuja* was once again at the centre of attentions. Local landowners, farmers, and aediles from the counties of Azambuja, Cartaxo and Santarém petitioned the government to resume the works, which had been abruptly stopped in 1823, and asked for permission to take out a loan for cleaning and restoring the ditch<sup>5</sup>. They argued that the project would benefit navigation, agriculture, and public health, avoiding the stagnation of the retained waters with the consequent spread of “putrid miasmas that infect the air and become a vehicle of disease and death”<sup>6</sup>.

At the request of the governor of Santarém, the Ministry of the Kingdom charged lieutenant and engineer Francisco Sousa Pegado (1798-1868) with the task of surveying the region and planning works to improve the *Vala*. The study was completed in 1836 and it was used by the aforementioned municipalities to support the application for a loan of up to 200 *contos de réis*<sup>7</sup> to finance the works, which should be entrusted to a company or a private individual under the supervision of the local authorities<sup>8</sup>.

Meanwhile, the government ordered new studies to improve the navigability up to the *Vala*, which were carried out by military engineers. They verified the existence of navigation problems due to silting and the formation of sandbars near the mouth of the ditch and recommended the opening of a new canal at the place of Chichareira, flowing into the Tagus, south of Corte de Cavalos, circumventing the curves of the last natural section of the channel, cleaning the margins, and reducing the width of the *Vala*<sup>9</sup> (figure 2).

<sup>5</sup> Arquivo Histórico Parlamentar, *Opinion* 099, March 4, 1835, pack 19, chap. 3.

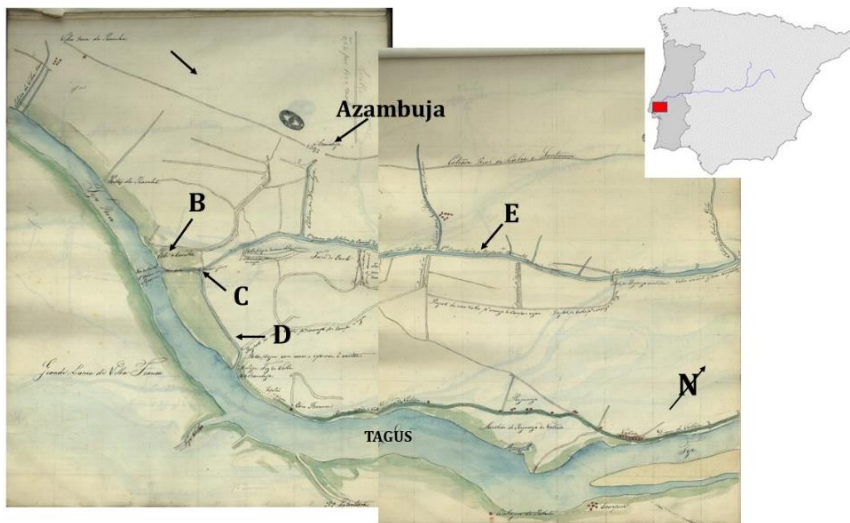
<sup>6</sup> *Revista Universal Lisbonense*, n.º 21 (November 13, 1845): 241.

<sup>7</sup> *Conto de réis*, an old monetary unit equal to 1 million réis.

<sup>8</sup> Arquivo Histórico Parlamentar, bill 58-IV-2º, 1839, Copy of meeting minute, November 5, 1836, book 3265.

<sup>9</sup> Acervo das Obras Públicas, Transportes e Comunicações (Lisbon), *Processos de Obras Públicas, Memória da Vala d’Azambuja*, May 18, 1839, MR 32, p. 499 and ff.





**Figure 2. Section of Júlio Guerra's map of the Tagus (c. 1853). A – Azambuja; B – New canal at Corte de Cavalos; C – Chichareira; D – Old natural channel, closed and abandoned; E – Azambuja Ditch. Watercolour on paper**

Source: Arquivo Nacional Torre do Tombo, *Coleção Cartográfica*, n.º 81, PT/TT/CRT-08

Bearing in mind the expectations of the local populations and the new elements gathered, the government, by decree of July 30, 1839, approved the loan to the three municipalities (Azambuja, Cartaxo and Santarém), pending parliamentary approval. Nevertheless, the works were not initiated, because there was no one interested in taking charge of them!

In the meantime, Domingos de Sousa Holstein, the marquis of Faial (1818-1864), was committed to make the *Vala da Azambuja* freely navigable. To this end, he had hired, at his own expenses, two renowned Dutch hydraulic engineers Jacob and Joan Orttts to inspect the site and suggest the necessary works (Palmela, 1844, vol. 3: 173). Their opinion was not much different from the suggestions of the Portuguese military engineers. They gave priority to the opening of a new canal and mouth (which would shorten the trip by a fifth), and to the implementation of a system of sluice gates.

Meanwhile, the loan was debated in parliament. The discussion in the Chamber of Peers focused on the form and conditions of hiring the contractor of the works. Sá da Bandeira emphasized the urgency of the works

and the relevance of the canal to shorten distances and time, and to avoid the Tagus' sandbanks upstream Valada, presenting it as a part of the navigation route from Lisbon to Madrid<sup>10</sup>. Luís Mouzinho de Albuquerque (1792-1846), member of parliament and inspector of public works, and Pedro de Sousa Holstein, the Duke of Palmela (1781-1850) advocated that the task should be entrusted to a private company<sup>11</sup>. The bill was approved on May 1, 1843.

Although not publicly acknowledged, the possibility of this canal to become an alternative to the stretch of the Tagus upstream of Valada and to capture much of the freight traffic between the various Tagus' ports and Lisbon<sup>12</sup> (together with the yield guaranteed by the state) could make the enterprise profitable. However, despite the initiative of the marquis of Faial, and the announcement that the government was willing to allocate up to 50 *contos* per year to "aquatic communications" (decree of March 11, 1843), the formation of a company to undertake the task was not yet a certainty.

## 2. THE COMPANY: FINANCING, SUSTAINABILITY AND COMMITMENTS

On February 12th, 1844, with the support of Faial and the key patronage of his father the Duke of Palmela, a group of capitalists assembled to create the Companhia dos Canaes d'Azambuja (hereafter Companhia). The shareholders, including queen Mary II and her husband, king Ferdinand, were mostly acquaintances of the duke of Palmela. Appointed directors, besides Faial, were Félix Pereira de Magalhães (1794-1878), a member of the Chamber of Peers, and António Cabral de Sá Nogueira (1799-1879), a member of parliament.

The Companhia was established for as long as the privilege, navigation rights, and other advantages granted by the concession contract lasted. Its purpose was to channel the water system that flowed into the Tagus, through the *Vala da Azambuja*, to improve navigation, agriculture, and sanitation of the adjacent fields. The initial share capital amounted to 240 *contos*, divided in 1,600 shares of 0.15 *contos* each. At least 600 shares had to be subscribed to create the firm<sup>13</sup>. After the subscription,  $\frac{2}{3}$  of the face value of the shares should be paid in the first two years and the rest in

<sup>10</sup> *Diario da Camara dos Pares*, n.º 60 (April 12, 1843): 275.

<sup>11</sup> *Diario da Camara dos Pares*, n.º 60 (April 12, 1843): 271.

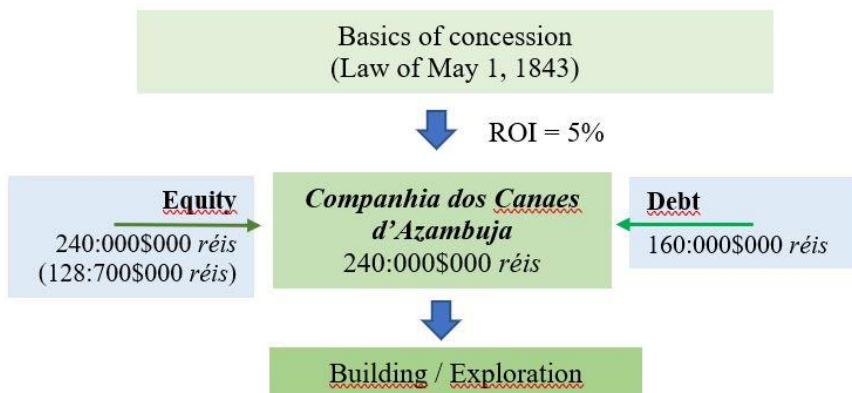
<sup>12</sup> About river ports and circulation of goods in the Tagus, see Gaspar, 1970.

<sup>13</sup> Later, this amount proved to be insufficient, compelling the administration of the company to take out a loan, a situation already anticipated in the statutes.

the third year, if necessary<sup>14</sup>. As soon as the shares were paid for, their holders were entitled to an annual interest of 5%, paid at the beginning of each semester. This privilege could not be traded, but it could be transmitted by inheritance or dowry. Upon liquidation of the society, the rights, if any, would be proportional to the shares held by the shareholders.

Usually, the execution of public works was hired to private contractors or to companies constituted for specific purposes, because it was simpler and more economical (Matos, 1980: 178 and 187). However, the contract signed on March 23, 1844, between the government and the Company for the improvement of the Azambuja Ditch took a different outline.

Considering the state of the art of current financial theory, as well as theories on public administration, this contract was a financial innovation because it configured a kind of an early public-private partnership (PPP)<sup>15</sup> between the State and the private sector trough a project finance model (Silvestre, 2010: 77), as illustrated in figure 3.



**Figure 3. Financing model of the Companhia dos Canaes d’Azambuja**  
Source: Authors’ elaboration

<sup>14</sup> For further details, see: Companhia..., 1844: 28-38.

<sup>15</sup> A PPP is a form of carrying out specific public projects of great scope without any initial public investment. This allows the achievement of synergies with the private sector (Cordeiro, 2010: 56). It allows the mobilisation of funds for a project, through private investors, within a predetermined time horizon, usually the duration of the project. A company is created to oversee the conception, construction, and management of the project. The reimbursement of the financing is guaranteed by the public work itself, by a yield guaranteed by the state, and by the cash flows of the operation, after maintenance and structural expenses.

Although private involvement in the construction of major public works has been around for centuries<sup>16</sup>, it was during the last quarter of the twentieth century that the (innovative) model of PPPs developed and thrived. Within this model, private investors financed the construction of infrastructures (for which the public treasury had no financial resources), through the collection of fees from users and rents from the state. The canalisation of the *Vala da Azambuja* was fully financed by private capital, paid over forty years, with a fixed yield of 5% guaranteed by the state. To begin the construction immediately, the *Companhia* was authorised to borrow up to 160 *contos*. Capital and interest were guaranteed by its shares and future income of the operation.

As we mentioned early, the general terms of the contract to make the Azambuja Ditch navigable were stipulated in the law enacted on May 1, 1843. The contract consisted of seven articles<sup>17</sup>. In its first article, it authorised the Government to contract with a private entity – individual or a firm – the works to make the Azambuja Ditch navigable all year round. It referred the benefits of the concession and the stipulations of the law of July 30, 1839, and it imposed a land tax on the municipalities of Santarém, Cartaxo, and Azambuja, to be applied to the works related to the canalisation of the ditch. Moreover, it stipulated a fixed price policy, illustrating social justice concerns by not allowing aggressive commercial policies with companies that were already in operation in contiguous territories. It guaranteed a minimum yield of 5% as well as the use of the ruined Convent of Virtudes near Azambuja. Finally, it was stipulated that the contract had a duration of forty years.

Article 3 authorised the government to offer a guarantee to a loan of up to 160 *contos*, hired by the contractor to finance the immediate start of the works. It also allowed the mortgage, in favour of the financiers, of all or part of the income and interests, to which the concessionaire was entitled. Article 5 exempted from customs duties all necessary equipment for the execution of the construction and the cleaning of the canal, provided it passed through the port of Lisbon. Furthermore, the *Companhia* could also use the wood of local state forests of Azambuja and Virtudes, and sell any material taken from the works.

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<sup>16</sup> See for example the construction of the *Canal du Midi* in France, financed by Pierre-Paul Riquet (1604?-1680) or the Suez Canal undertaken by Ferdinand Lesseps (1805-1894).

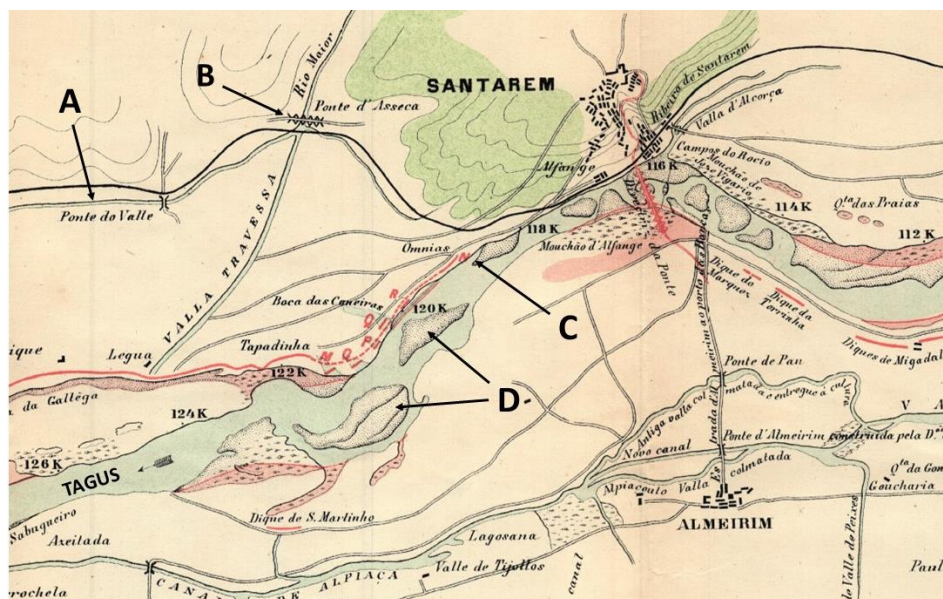
<sup>17</sup> *Diário do Governo*, n.º 262 (November 5, 1844): 259-260.

The terms of the contract signed between the government, the marquis of Faial and others for the “lateral canalisation of the Tagus” from Azambuja to Onias (Omnias in ancient toponymy), located on the riverbank south of the urban core of Santarém, and further works and services were signed in Lisbon on March 23, 1844. Queen Mary II granted permission to improve the *Vala* on April 25, 1844 (Companhia..., 1844: 3-4). The contract was confirmed by the law of November 30, 1844, following an intense parliamentary debate. The structure of the contracts replicated and detailed the general terms stipulated in 1843. The object of the contract was clearly defined, as well as the work plans, the typology of the vessels that should be able to navigate the canal, and the benefits of the works on the adjacent lands.

The second and third articles granted the Company a few privileges to fulfil the obligations of the contract, including the transferral to its domain and possession the channels, creeks, ditches, their banks, and waters, with all the rights that the state had over them.

Bearing in the mind the specificity of the work, the investment in capital goods (CapEx) was considered under three main topics: opening of canals, construction of sluice gates, piers, and towpaths, and repair of bridges damaged by the works and navigational material.

The canalisation works followed the Ortts' initial plan were detailed in the first article of the contract. They consisted in the opening of a new mouth and a new junction canal between the Tagus and the existing *Vala*; the opening of a new canal in the existing ditch of Azambuja, towards Rio Maior from Ponte da Asseca; the opening of a new communication canal with the Tagus from Asseca to a point on the riverbank in Onias, just after the north end of the Valada dike, a section that would guarantee the viability and sustainability of the project as a whole. The work plans also included floodgates, sluices, and dams, with the purpose of regulating the entry of the Tagus in the canal (figure 4).



**Figure 4. Section of Eça’s map of the Tagus, showing some of the large Tagus’ sandbanks and Ponte da Asseca, the starting point of the new canal to Onias, where communication with the Tagus was supposed to be established. A - Azambuja Ditch; B – Ponte da Asseca; C - Onias; D – Sandbanks**

Source: Eça, 1877

Regarding supporting structures, the Company was also in charge of building, improving, or maintaining the piers on the banks of the channel to guarantee its proper use. It was also responsible for repairing and replacing any bridge damaged by the works, building or improving drinking troughs for animals, and other works necessary for the drying and irrigation of the fields. Those who could benefit from these improvements could be called to share its costs, something that was never accomplished. The Company also had the obligation to build towpaths on the banks of the canal, free and suitable for towing, so that all boats could navigate it.

On the third clause, regarding navigation, the contract stipulated the establishment of a daily roundtrip passenger route, between the downstream mouth, through Ponte da Asseca to the upstream mouth, in covered steamboats or pulled by animals in the towpaths. The canal should be navigable by frigates of 60 *moios*<sup>18</sup> to Cabeço do Guião, close to Cartaxo, and

<sup>18</sup> *Moio*, an old Portuguese measure for solids and liquids, that represents about 790 l.

from there to the new mouth of the canal in Onias by “flat boats of the largest capacity that currently travel up the Tagus to Abrantes” (Article 1, § 4). All the works should be completed within five years, under penalty of cancelling all the benefits.

To compensate for such expenses, the government granted the Companhia the concession of the Vala, with all the rights that the state held over it, for a period of forty years. These rights included revenues from the navigation and transport rights in the channels, from water provided for irrigation, from the operation of quays, and from rights of way over bridges.

For the public contribution to the financing of the works, a territorial contribution was launched in the municipalities of Santarém, Cartaxo, and Azambuja. Its expected annual revenue was estimated at 8.176 *contos* (laws of May 1, 1843, and March 23, 1844, article 4). Its purpose was to contribute to the reimbursement of the shareholders' investment on the project. This responsibility was passed to the Public Credit Council (created by decree of May 16, 1832, to manage and collect the financial resources to pay of interest and amortization of the consolidated debt of the nation). The Public Credit Council delivered to the Company fixed income public debt securities (the so-called *inscriptions*) of 5%, subject only to taxation of the tenth, amounting to 181.7 *contos* with an annual net interest of 8.176 *contos* [ $(181.7 \times 0.05 \times (1-0.1))$ ]. These *inscriptions* could be negotiated by the Company freely. In exchange, the government delivered to Public Credit Council the territorial contribution charged to those three municipalities.

Articles 4 (§3 and §4) and 5 of the law of March 23, 1844, stipulate a financial balance clause, guaranteeing a 5% minimum return on capital to be amortised (ROI). If, at the end of contract (after forty years), the Company had received more than the capital spent, the surplus would be delivered to the state; in the opposite case, the government would compensate the Company for any shortfalls that might have occurred. Therefore, the financial risk was primarily guaranteed by the Treasury.

The participation of the private sector in financing the project consisted in the effective subscription of the share capital of the Company. This amounted to just over half of the subscribed capital at the time the deed creating the Company was signed, on December 2, 1844, with 128.7 *contos* (53.63% of the capital). The government subscribed 10% of the capital (as per law of December 19, 1834, article 7, §2), which corresponded to 160 shares or 24 *contos*. The state was the largest shareholder of the Company.



As mentioned before, the Company's original administration was authorised to borrow up to 160 *contos*, at an interest of 5% or 6%. The Company could offer as collateral the rights from the concession contract. The calculation of the overall value of the investment (CapEx) was included in article 18 of the association's agreement.

The use of the canal and its towpaths was public, provided that the Company's regulations were respected and upon payment of the predetermined fees (article 6, §1). The revenues from the operation were expected to pay the maintenance and subsistence. The consisted of operational income (Article 3, §3), which included the navigation and transport rights in the canal, determined by the distances travelled, weight, and type of loads transported (figure 5); irrigation revenue (*idem*, §4), originating from the water made available for irrigation of crop fields; and rights of use of quays and rights of way over the bridges (*idem*, §6), according to the type of cart and the number and type of beasts.



**Figure 5. Document attesting the passage of the boat of master José dos Reis, dated from April 22nd, 1852, carrying 186 quintaes (about 18,600 kg) of wood from Azambuja's pine forest**

Source: Navy Historical Archive, *Documentação Avulsa*, box 115.



The parliamentary discussion of the contract was vivid. The Peer Vi-larinho de São Romão (1785-1863) criticised the project severely, as far as its relevance and the solutions proposed by the Orttts were concerned, even though he praised Faial “for having employed a large amount of his capital in carrying out work that could be of great national interest (...) solely out of patriotism”<sup>19</sup> (Brandão and Malaspina, 2022: 176).

### 3. ÁVILA’S SUCCESSFUL SEARCH FOR ITALIAN EXPERTS

After the contract between the Portuguese government and the Companhia was signed, the next step was to find skilled engineers and lawyers who could contribute to the construction of the hydraulic works and their future management.

In April 1844, engineers Mouzinho de Albuquerque and Pedro Peze-rat (1801-1872) were hired (although the latter was released shortly af-terwards), under the understanding that the Company could count with the collaboration of the Orttts. Even though a contract was drafted, the Dutch government did not allow them to return to Portugal, as they were working in other projects in the Netherlands (Omboni, 1845: 347; Matos, 1980: 307). Mouzinho de Albuquerque suggested hiring French or Italian hydraulic engineers. To that end he wrote a full memorandum on the channel to be given to the technicians to be hired<sup>20</sup>. Hiring Portuguese experts was not considered, because at that time most Portuguese engi-neers trained at the Army School of Lisbon or in the Polytechnic Schools of Lisbon and Oporto were devoted to military applications or other en-gineering works and not in hydraulics, which required specific skills (Matos, 2009: 178-179).

In May 1845, the government commissioned former minister António José d’Ávila (1807-1881) to go abroad and look for experts (*Mi-lano e l’Europa...*, 1994: 234-235; Sardica, 2005: 258). Ávila went first to France and then to northwest Italy, a region historically known for canalising water for both navigation and agriculture. In Novara, in the northeast of Piemonte, he met Giacomo Giovanetti (1787-1849), a law-yer and an expert on water law. The geographical context where Gio-vanetti exercised his profession was the basis for his experience in a sec-

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<sup>19</sup> *Revista Universal Lisbonense* n.º 18 (November 21, 1844): 207.

<sup>20</sup> *Diario do Governo*, n.º 83 (April 8, 1859): 466.

tor that was difficult and extremely technical, but also indispensable, especially for the Savoy lands of the Po River valley, and its related water laws.

The management of water resources, the problems concerning the passage of water onto the lands of others, the organisation of the network of canals and the creation of consortia of irrigation water users were fundamental issues for towns and provinces where almost everything depended on agriculture and industry. Being a lawyer in nineteenth-century Savoy, and especially in Novara, meant responding in the first place to the needs of the emerging middle class and to new entrepreneurs, and knowing how to dialogue with a society in constant transformation and in search of new stimuli, particularly those of a commercial nature. The agricultural entrepreneurs were businessmen just like merchants, considering that the management of an entire irrigated estate was very complex. A great number of practical skills was needed, but farmers also needed legal experts who were able to resolve issues related to the withdrawal, displacement, and return of water to different terrains. For lawyers, it was a matter of regulation, preventing disputes, or defending their clients in the complicated question of rights of way and water concessions. The problem was by no means simple because, depending on irrigation, land could yield double or even triple (Morreale, 2000: 54).

Giovanetti succeeded in translating his professional experience into law and distinguished himself for his fundamental contribution to articles on water in the Savoy Civil Code of 1837 (Dezza, 2013: 1006-1007). In 1844, at the request of the Inspector General of the French Ministry of Agriculture, Marie-Joseph de Mornay (1804-1868), he wrote *Du régime des eaux* in which he proposed a draft law on irrigation in France. Giovanetti also distinguished in the memorandum sent to the Tsar of Russia in the 1840s on the cultivation of rice and the management of water resources, especially in Crimea (Moscati, 1993: 259; Malaspina, 2020: 101). With such an international profile and experience, Ávila considered Giovanetti the most suitable person to draft the regulations for the canal to be built in Portugal, parallel to the Tagus (Ávila, 1848: 82; Malaspina, 2020: 141).

From Novara, Ávila went to Milan and in a letter to his close friend Rodrigo da Fonseca (1797-1858), one of the most influential politicians of Portuguese Liberalism, he confided that he had met an engineer with “the reputation of being one of the best” (Sardica, 2005: 258). Ávila was talking about Giulio Sarti (1792-1866), a Milanese engineer, who had built the railway between Milan and Monza in the 1840s (Omboni, 1845: 347; Betri, 1998: 103; Bigatti, 2000: 83).

On July 28, 1845, in an agreement signed in the office of Milan notary Giuseppe Alberti Ávila, as representative of the Companhia dos Canaes d'Azambuja, hired Giulio Sarti to build a canal parallel to the Tagus River, establishing the terms, form and content of the collaboration<sup>21</sup>.

Sarti was asked to take over the works for the new opening of the *Vala da Azambuja* and to modernise its canalization (Betri, 1998: 103; Bigatti, 2000: 83), as agreed in the contract between the Companhia and the Portuguese government<sup>22</sup>.

In retrospect, the Portuguese government commissioned one of the most experienced hydraulic engineers in Northern Italy, Giulio Sarti, to design the system of artificial canals in Azambuja. But Giovanetti wrote a memorandum to Ávila on the regulation of a canal to be built parallel to the Tagus River, on December 14, 1845. It is divided in thirty articles, to which were attached *l'Estratto del manoscritto del cav. Giovanetti che ha servito per la compilazione del Codice civile albertino nella parte che concerne le acque* (Extract from the manuscript of Sir G. Giovanetti, which served for the compilation of the Albertine Civil Code, in the part concerning waters) and *Del catasto in relazione alle acque alle imposte dirette alla legge ipotecaria ed alle imposte indirette* (Of the land registry in relation to waters, to direct taxes to mortgage law and to indirect taxes)<sup>23</sup>.

From the analysis of the sources, it emerges that the canal for which Giovanetti had been asked to give advice was that that Sarti had been appointed to build, according to the agreement. On several occasions the lawyer did not hesitate to provide more general dispositions, leaving the decision to the “engineer in charge” of construction. Throughout his life, Giovanetti was asked to write memorandums and opinions, especially on the legislation of water and its use in agriculture and manufacturing. In the Portuguese case, however, navigability was the primary focus of the canal. Giovanetti was called to “harmonise” the interests of navigation with those of agriculture<sup>24</sup>.

To regulate the canal and its management, he prepared a strict protocol about the leasing and alienation of water usages and above all on deviation outlets. It provided details on the control of the water intakes

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<sup>21</sup> Archivio di Stato di Milan (Milan), *ultimi versamenti*, 697.

<sup>22</sup> Archivio di Stato di Milano (Milan), *ultimi versamenti*, 697.

<sup>23</sup> Archivio di Stato di Novara (Novara), *Archivio Giovanetti*, 3, 7/4 and 7/5.

<sup>24</sup> Archivio di Stato di Novara (Novara), *Archivio Giovanetti*, 3, 7/3.

and outlets that should be carried out by experts. They would have to “keep watch” so that the quantity of water was not altered “to the benefit of the private individual”. In the event of contamination, fines ought to be established. Point 4 stated that “in all relations between the canal and users of its water, the interest of navigation must always be considered as prevalent and supreme”, therefore any type of concession should not “harm navigation”<sup>25</sup>.

To this end, Giovanetti suggested the installation of hydrometers to guarantee that the quantity of water was sufficient for navigation. If “the water drops below the established point, it is permissible for the keepers to proceed with the closure of the extraction outlets”. These extraction outlets should be closed in an orderly manner in relation to the water-course and, if “they are in the same situation, one on the right and the other on the left of the Canal, that on the right must be closed first”<sup>26</sup>.

In the last section of the memorandum, he analyses the “pathological” issue: how to discourage abuses, by implementing a monetary penalty as. Giovanetti writes: “However, since sometimes the perpetrator of the prejudicial fact might be a good-for-nothing, punishment by imprisonment may be needed if he is unable to pay the fine”. However, he also proposes another solution which, according to him, is not “sufficient, nor effective nor expeditious”, namely converting the prison sentence into workdays “as many as are equivalent to the fine”<sup>27</sup>.

In his memorandum, Giovanetti specifically states that he has “laid out” his studies and experience of over thirty years. Indeed, while reading the manuscript pages, one is fascinated by Giovanetti’s technical competence in the field of hydraulics and water canalisation. One sees that his legal practice, his deep commitment, and the conscientiousness that he invested in every case had a “scientific” return on his training: he was aware that legal questions could be surpassed by examining the original difficulties. To write a memorandum on water in a civil case, he unquestionably had to be prepared, from a hydraulic and hydrogeological point of view, regarding all the regulations and other technical issues. These skills found their way into the Albertine Code and subsequently converged in his consultancy to the Russian, French and Portuguese Governments.

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<sup>25</sup> Archivio di Stato di Novara (Novara), *Archivio Giovanetti*, 3, 7/3.

<sup>26</sup> Archivio di Stato di Novara (Novara), *Archivio Giovanetti*, 3, 7/3.

<sup>27</sup> Archivio di Stato di Novara (Novara), *Archivio Giovanetti*, 3, 7/3.

Giovanetti concluded by saying that he had not been able to “formulate a full regulation, but I have indicated the elements of it. You cannot formulate a regulation (unless) you are on the spot, and know the laws of the country, but I think that the indications I have given him could be of some use to the perspicacity of the ‘Comandante’ d’Ávila”<sup>28</sup>.

#### 4. SUCCESSES AND SETBACKS

“(…) *un’opera idraulica grandiosa* (…)” [a grandiose hydraulic work]. With these words, the Italian press reported on Sarti’s hiring and the task he was asked to do in Portugal<sup>29</sup>; a challenge to which he promised to devote “with soul and body”<sup>30</sup>, as he wrote to one of his countrymen aboard the steamer that took him from Lisbon to the mouth of the *Vala*.

When Sarti arrived in Portugal in October 1845, the canalisation of the *Vala da Azambuja* was already quite developed. Since April of the previous year Mouzinho de Albuquerque was continuing the survey initiated by the Ortts and was acquiring equipment. While Ávila was looking for a hydraulic engineer, a steam dredger was purchased in England, and the convent of Virtudes<sup>31</sup> was demolished to make way for future use of the ashlar stones in the works of the canal. In addition, hundreds of trees were cut down in the Azambuja and Virtudes pine forests. The lands that would be traversed by the canal or affected by the works were purchased or expropriated.

Sarti immediately started to work together with Alexandre Moscheni, his draughtsman. He decided to continue the works in progress if the weather permitted. He ordered the purchase of the necessary machinery and tools to begin a new plan in the following Spring. This plan was divided into three stages: conclusion of the connection of the *Vala da Azambuja* to the Tagus; ditto, regarding that from Asseca to the Tagus in Onias; from there to Rio Maior. From day one, he had to overcome various obstacles, arising either from the scarcity of materials or from the complexity

<sup>28</sup> Archivio di Stato di Novara (Novara), *Archivio Giovanetti*, 3, 7/3. The Portuguese government expressed its gratitude for the rigorous professionalism shown by Giovanetti, awarding him the Royal Military Order of Our Lord Jesus Christ, a nomination that still survives.

<sup>29</sup> *Annali Universali di Statistica*, vol. 85 (july-septembre 1845): 310.

<sup>30</sup> Il caffè Pedrocchi. Foglio settimanale, n.º 28-29 (1846-1848): 225.

<sup>31</sup> The sale of the monastery of Virtudes had been suspended in extremis by the Chamber of Deputies, so that the Company could dispose of it. *Diário do Governo*, n.º 56 (March 8, 1843): 415.

of the task. He faced a paradoxical situation of having to conciliate the creation of favourable conditions for an easy navigation with the drainage of the waters that soaked the *lezíria* and, simultaneously, its irrigation in the dry season. Problems that never got a satisfactory solution as pointed out by Brandão and Malaspina (2022: 185).

To make the canal navigable throughout even for larger boats, it was necessary to have an adequate water level along the entire route, which could be controlled with a system of locks at the extreme points of the canal, as proposed by the Ortts and by lieutenant Pegado. The system should allow the regulation of the flow of the Tagus entering the canal at the mouth and in Onias (the new connection point with the Tagus). Another system of locks or sluiceways would allow the control of the entry of water from neighbouring lands and the transferral of excess water for irrigation. These were situations that would motivate several disagreements between the Companhia, the State engineers, and some landowners – something that Sarti devalued, arguing that it was something he had gotten used to in the works he directed in Italy<sup>32</sup>.

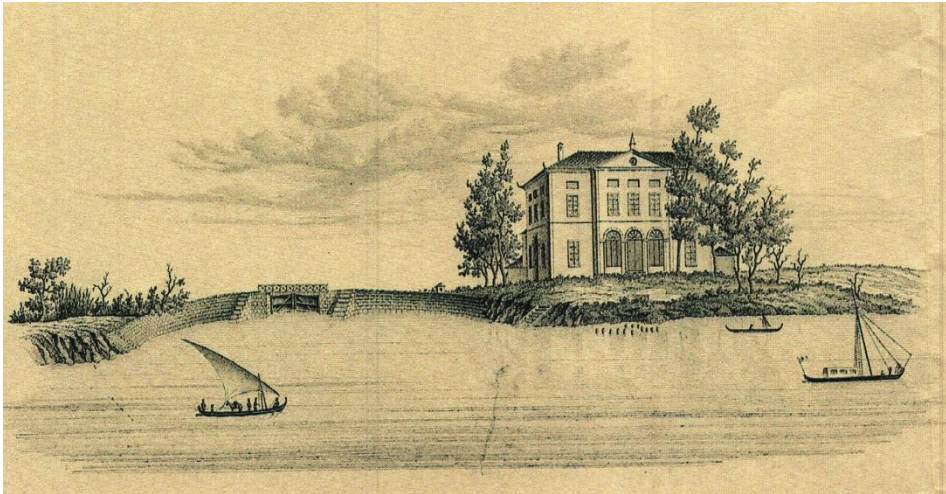
A troubled time would come with the uprising of Maria da Fonte, which emerged in the north of the country during the spring of 1846. The conflict escalated in October to a disastrous civil war that went on until July 1847. The war and its aftermath brought countless difficulties to the Companhia, the direst being the embargo on the opening of the Onias canal, decreed in May 1846 by the administrator of the county of Santarém, when the works had just begun close to Ponte da Asseca. This new canal was essential to make the *Vala da Azambuja* an alternative to the navigation on the Tagus, by avoiding the sandbanks that clogged the river's course upstream of Valada.

Despite these problems, the improvement of the canal from Corte de Cavalos to Asseca continued, under the guidance of Giulio Sarti. The sluice gate proposed by the Ortts was built, using the ashlar stones brought from the old Convent of Virtudes (figure 6). A wooden removable bridge was built to allow the movement of farmers and cattle between the banks of the canal. The spillway that blocked the water flow into the old natural channel was also constructed<sup>33</sup>.

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<sup>32</sup> *Diário do Governo*, n.º 83 (April 8, 1859): 467.

<sup>33</sup> Due to alleged operational errors and negligence, this structure collapsed a few times after the inauguration of the new canal (*Revista Universal Lisbonense*, n.º 7 (July 18, 1848: 396). According with Júlio Guerra (1861: 47), it should not have been rebuilt immediately. Recently, archaeologists from the municipality of Azambuja identified the ruins of a spillway at



**Figure 6. The floodgate at the mouth of the *Vala da Azambuja*, and, on the right side, the *Palace*, used by passengers in transit.**

Source: Guerra, 1861.

The Italian expert also directed the construction of a building of clear Palladian inspiration, typical of the late seventeenth century, to be used as trading post, reception, and accommodation for passengers in transit between the Tagus and the destinations served by the *Vala* (Machado: 2021, 43; Marques, 2018: 69; Soares, 2020: 30). Located near the mouth of the canal and known as the *Palácio das Obras Novas* (New Works Palace), its main facade faced the Tagus and the *Vala*, where a pier was built. It was a two-storey building, the ground floor having a room for passengers and luggage and other divisions for services. The upper floor was intended for “distinguished passengers” and the Company’s directors and engineers<sup>34</sup>.

Next to the *Palace* facilities were built for the Company’s personnel, workshops for the maintenance of boats, and stables for the animals used in the towing, which had long disappeared.

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this location, although it is not clear whether from the original built by Giulio Sarti or from a later construction (personal information by Nuno Nobre, 2022).

<sup>34</sup> Responding to criticisms about the *Palace* – which was, according with Soares (2020: 27), an official imposition – Pereira de Magalhães explained that it had had no impact on the Company’s finances. The ashlar masonry had come from the old convent of Virtudes and the bricks had been made on-site; moreover, the work had been carried out in periods when it was impossible work on the dam because of the tides (*Diário do Governo*, n.º 83 (April 8, 1859): 467).

That beautiful house built on damp and unsafe land, soon was filled with cracks, and covered in slime, which, with other service deficiencies, led to the abandonment of the waterway and the complete victory of the railway (Câncio, 1947: 54).

The section of the canal in Corte de Cavalos (figure 7) was officially inaugurated on March 28, 1848, in an atmosphere of great joy. Giulio Sarti operated the system of valves and sluice gates, a magnificent work never seen in Portugal. Faial and his entourage boarded a gondola pulled by animals along the towpath, for a short trip up the canal and back.

The event had some echo in the press such as the *Revista Universal Lisbonense*, which emphasised the government's attention to the works carried out thanks to the perseverance of the marquis of Faial. The invitation to the population to wait for the conclusion of works with "prudence" was an obvious but veiled allusion to growing protests of landowners, farmers, and the municipalities themselves, who claimed that the improvements were ineffective and far from the goals touted by their promoters<sup>35</sup>.



**Figure 7. View of the Corte de Cavalos section of the Vala da Azambuja and, in the opposite bank, the ruins of the Palace**

Source: Photograph by Guilherme Machado, 2021, with permission of the Azambuja Municipal Museum.

<sup>35</sup> *Revista Universal Lisbonense*, n.º 7 (March 20, 1848): 204.



Without the presence of Sarti, who had left the Companhia after the inauguration, a new section of the canal was opened in 1852, up to Ponte da Asseca. Larger boats were able to navigate the canal to about half the way of the canal. This did not prevent the High Council of Public Works from suggesting to the government, one year later, the cancellation of the contract and compensation for the capital spent or its renegotiation (bearing in mind the complaints and information gathered by the state inspectors)<sup>36</sup>.

Colonel Júlio Guerra, who inspected the Vala in 1853, was very critic of the situation of the works, which, moreover, did not contribute to solve the problem of the floods in the Tagus (which occurred again in 1855 and 1856). In his opinion, the lock chamber was small and, as a result, the water rose to greater heights than the Tagus itself. The flow was so strong that it prevented boats from entering or leaving the canal. The bridges over the *Vala* were covered in water, as well as the towpaths, and the Companhia's gondola was prevented from sailing. Even the *Palace* was flooded. A scenario that would be different if the bridges had flood gates to allow the boats to pass and if the transport on the canal was done by small steamboats (Guerra, 1861: 46).

(...) when it will be comfortable go through the Vala to Ponte da Asseca, avoiding the dangers that are felt in the great winters on the roads from Carregado to Santarém, that's when the boats cannot navigate there; When, in times of flood, the fields of Azambuja needed to take advantage of the ditches already opened for their drainage, with a spillway built in a convenient place, it is when they stay flooded and impossible to cultivate until the beginning of the next summer... (Guerra, 1861: 47).

By May 1854, the Company's assets were valued at 218 *contos*<sup>37</sup>, about 90.8% of the total amount contracted. A substantial part of works was yet to be completed, fostering conflict between the government and the Company, which was already the target of many complaints from local population. Regardless, the government backed the Company. It did not cancel the contract and it some amounts in arrears. In this line of thought, the Council of Public Works suggested:

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<sup>36</sup> Acervo das Obras Públicas, Transportes e Comunicações (Lisbon), *Pareceres do Conselho Superior de Obras Públicas*, 1853, 9 December, fs. 122-123.

<sup>37</sup> *Diário do Governo*, n.º 114 (May 16, 1854): 102.

(...) having the Company struggled with serious difficulties arising from its inexperience, as well as from other circumstances beyond its management, and having its efforts become useful with public advantage, and of public advantage (...) it is advisable to help it and to reach an agreement that, without being harmful to the state, lifts the Company from the disadvantageous position in which it finds itself<sup>38</sup>.

However, the main problem was the development of the railway connections and particularly the arrival of the train to Virtudes in 1857, to Asseca one year later, and to Santarém in 1861 (the Eastern Line, that would make the connection from Lisbon to Spain). The Tagus River steamer company requested the government to suspend in permanence the daily trips to the mouth of the *Vala da Azambuja*, that had been regularly maintained since 1848, as they were no longer economically viable. The request was accepted by the Ministry of Public Works<sup>39</sup>. It was the end of the marquis of Faial's dream. The *Vala*'s usefulness was nullified. Consequently, its maintenance decreased and the *Vala* progressively deteriorated until it was completely abandoned. Some years after, Júlio Guerra (1861: 109) realised that the train "absorb[ed] part of the products that could be transported along the river", which was a permanent problem for the Companhia in the future. In other words, the operational cash flow was insufficient to keep the company operating on a day-to-day basis.

## FINAL REMARKS

The works of the *Vala da Azambuja* were carried out towards the mid-nineteenth century to improve its navigability all year round and to help solve the problem of the Tagus floods, to benefit agriculture. However, the main goal of the Companhia dos Canaes d'Azambuja, entity created for that purpose in 1844, was to provide an alternative waterway, to overcome difficulties caused by the Tagus sandbanks – a situation which worsened during the dry months. This canal was expected to be part of the Lisbon-Madrid river route, a project that was debated for about 200 years, and that had known different versions without any materialization.

<sup>38</sup> Acervo das Obras Públicas, Transportes e Comunicações (Lisbon), *Pareceres do Conselho Superior de Obras Públicas*, 1856, 26 March, f. 125.

<sup>39</sup> *Diário do Governo*, n.º 189 (August 13, 1857): 1077.

The construction of the *Vala* was for that time a large-scale project, technically supported in a close collaboration with foreign experts such as the hydraulic engineer Giulio Sarti and the lawyer Giacomo Giovanetti. The archival documentation and the press of that time show Sarti's activities and involvement in the work; as for the influence of Giovanetti's memorandum, there is still some research to be done, as the operation of the Company most likely affected the implementation of the regulation.

The financing of the Companhia was based on an innovative model, later used by public administrations: a public-private partnership. It was intended to reduce the role of the state in economic life, limiting its role to regulatory authority. However, the commitment of the entrepreneurs, with their capital to start the works, does not seem to have been enough. Contrarily to what was intended, the financial risk of the project was assumed primarily by the Portuguese Treasury.

After an initial period in which the canal appeared to be a success, as reported by the *Revista Universal Lisbonense* in January 1851 (a rise in the transportation of passengers by steamship from Lisbon to Azambuja was noted: 3,022 in 1848 to 19,852 in 1849), the Company was faced with multiple constraints, accusations of non-fulfilment of contract and mismanagement, and a government-mandated financial audit since 1847. In the meantime, boatmen complained that some boats did not fit in the lock gate at the mouth of the canal, while others complained about fares, and the way boats were checked for the payment of transit fees. Farmers complained that the canal did not drain floodwaters, while others complained about the lack of water for their cattle. To make matters worse, the Government never reversed the embargo decreed in 1846 by the City Council of Santarém, which prevented the extension of the canal to Onias, which could have made the project viable and sustainable.

Unable to compete with the railway, the canal became useless. Pressed by conflicts and by progressive decapitalisation, the Company was forced to request the termination of the contract and progressively went bankrupt<sup>40</sup>.

Nevertheless, the project to make the *Vala* navigable all year long and in its entire course, to rebuild and enlarge the mouth lock, and to increase the canal depth would again be considered by the admiral and hydrographic engineer Augusto Neuparth (1859-1925). Besides admitting the

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<sup>40</sup> The declaration of bankruptcy must have been requested at the Company's General Assembly of September 4, 1886, as the press later mentioned the existence of a liquidation commission (*Diário do Governo*, n.º 200 (September 4, 1886): 2451.

coexistence of the canal with the railway, Neuparth (1922: 7) also suggested a connection with the Tagus in Onias, allowing the passage of large barges, which required only 4 feet of depth, and could carry more than 200 tons. A plan that would not be executed.

Among the works that can be carried out to ensure the navigability of the river, from the Azambuja channel to Santarém, those that affect the channel are preferable; rebuilding and expanding the old lock at its entrance, widening, and deepening it, as well as the Asseca ditch, connecting it with Onias, where it will enter the Tagus (Neuparth, 1922: 7)

The *Vala da Azambuja* remains, to this day, indifferent to the vicissitudes of time, continuing to serve its original purposes: drainage and irrigation of the *lezírias*. However, it has an enormous potential for leisure and fluvial tourism – in the ditch itself and on the Tagus River – also recovering the tradition of regattas, experienced since the first decades of the twentieth century. Such activities could occur around to a properly restored *Palace*, as a central structure for interpreting the region and welcoming visitors.

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