The Port of Piraeus: Industrial Zone or Urban Continuity

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Abstract

In addition to the important role of the ports in maritime industries, these transportation centers have received new attention towards development of the hinterland. Particularly, the ports could capture a greater share of added value by favoring the development of their surrounding in order to accommodate not only the full complement of services required for the maintenance and repair, but also the assembly units and freight distribution hubs. Thus, the subject of this paper deals with the topic of harbors and their intersection with the urban core of the city they territorially belong. In a narrow sense, this paper aims at evaluating current conditions for integrated spatial and transport development, considering the ports and the inland railway connection. The case study for this research is the port of Piraeus and its relation to the surrounding urban pattern. The main reason behind choosing Piraeus is the integral connection of the port city to the Greek capital, as well as recent transformation of the harbor in the international context. Considering the external interferences to induce the mass-transit freight and passenger transportation, neither the port city of Piraeus nor Athens is prepared for the urban transformation according to the principles of transport-oriented development (TOD). Hence, the central focus of the paper deals with the thorough analysis of the present spatial problems, possibilities and values in the Piraeus port and its direct surrounding, which further supports intervention on the nodal level. Research methodology consists of several steps. Firstly, since this paper is part of an extensive research project investigating the potentials of Athens agglomeration in terms of future spatial and infrastructural development, the data based on the field research will be analyzed. Secondly, the overview of existing documents (primary and secondary sources) on both spatial and transport development in the city of Athens will be critically analyzed. The paper concludes with the critical overview of the present state regarding TOD in the port of Piraeus (i.e. Rotterdam of the south), as well as basic recommendations for its future development, mainly aiming to respond to a dynamic of self-organizing governance in forging a new conceptual basis for long-term strategic partnership.

Key words: Spatial development, port development, railway transport, sustainable land use, Piraeus

1. Introduction

Ever since the permanent settlements became developed, the water proximity has been the key factor for economic and spatial decisions, survival and sustainability. However, city and water coherency arose many questions in different spatial related disciplines. Due to the urban growth, cities are facing new challenges, especially regarding the rational use of resources like accessibility to water and developable land.

The port city of Piraeus, located within Athens urban area, has almost a 2,500-year history and great archeological, strategic and commercial importance not only in Greece but also within Europe. Despite the multilateral importance of Piraeus, there is a lack of connection for reliable passenger and freight transportation to the city of Athens and the other main urban centers in Greece. Hence, in a narrow sense, the focus of the research is on spatial analysis necessary for the urban areas redesign, while having in mind the port-city interface by the railway and its integration into urban pattern. In broader terms, the research also contributes
to the socio-spatial analysis of the development of the city of Athens, which is nowadays faced with great challenges, i.e. further development of the eastern part of Athens due to its proximity to airport, and, on the other side, further decline of the western part of the city mainly consisting of brownfield areas. The analysis is mostly based on the following two research questions: How can the port mass transit indoctrinate the urban redevelopment of the port-hinterland? This leads to the next question: Is the city prepared for the rapid upcoming transit-oriented development and to what extent?

The paper is structured in the following way; after brief introductory remarks on the importance of integration of spatial and transport development in Piraeus, some external experiences on the topic are provided. For this purpose, the features of the most important transportation nodes across Europe are indicated. This is followed by the assessment of the Piraeus as a port of transnational, national and, finally, importance within Athens agglomeration. The next chapter deals with the elaboration of the present spatial conditions of Piraeus and environment within it is embedded. The parameters for such an analysis are: position of the port within the broader urban context of the city of Piraeus; communication network in the vicinity of the port; and, land use patterns, both current and future (according to the main planning documents). The paper ends with some general conclusions, as well as the basic guidelines for future integration of spatial and transport aspects within the urban milieu.

2. The port development in Europe: some experiences

This chapter deals with the current trends and potential challenges in port development across Europe. More precisely, the examples of port development in the Netherlands, Sweden, Spain and Germany are briefly explained.

Remarkably, Dutch approach of port development includes the legal and formal possibilities for various governing bodies (i.e., municipalities, regions and provinces) playing active roles in defining the policy context of inland ports. In other words, besides the Port Authority, municipality and province governmental bodies all have a seat on the planning committee for any issue ranging from long-range plan, terminal development to environmental and safety-related plans. To investigate the current trends in Dutch port cities, the paper focuses on the ports of Alphen aan den Rijn, Dordrecht and Rotterdam.

The port of Alphen aan den Rijn has been developed on the urban fringe, and this resulted to re-thinking of the inland port towards integration to the city center by developing a residential and leisure area. However, the port consists of container terminals, which are important for good distribution but are causing conflicts with the residents mainly because of the noise pollution. The analyses indicate that the conflict stems from disregarding noise nuisance in city plan on residential level as well as container terminal development. According to Witte et al. (2014), a strong infrastructural focus on accessibility and modal shift is combined with notions on the economic potentials and the sustainability agenda, while specific attention to quality of life in the direct surroundings is absent, and the local spatial planning problem underrepresented.

Dordrecht is also another Dutch port in a longstanding relation with good transportation network, which needs to accommodate increasing freight traffic flows coming from Rotterdam and going to the hinterland. The port is functioning in a wide range from local to the international level. However, this hub function deals with efficiently accommodating heavy industrial activity within a densely populated urban setting. No spatial conflicts could be identified from deductive analysis because land use claims and terminal plan-making are in accordance and since it is highly developed port with good accessibility, capacity, and level of service (Witte et al. 2014). Although a lack of physical space for further development is a continuous threat, there is a comprehensive policy attention to address this problem.

Besides dealing with land use compatibility, the above-mentioned ports in addition to the Port of Rotterdam concern about inland transport as well. This is due to road congestion in this
area. Currently, the ports of North-West Europe are very reliant on road transport for inland transport services. However these ports are well connected to the Dutch railroad system, yet the statistics in 2008 showed around 57% of container throughput at Rotterdam was carried by road transport, 30% by inland waterways and 12.7% by railroad. The wider comparison in 2010, as shown below, led to heightened concerns in Rotterdam about both congestion in the short term and sustainability in the longer term (OECD, 2010).

Apart from inland ports, the port of Rotterdam only generates very significant volumes of inland transport. Therefore, the port authorities are aiming to implement a modal shift from roads to waterway and railroads by 2035. Therefore, the Authority is now firmly focused on increasing the shares on inland transport by inland waterways and rail transport. As it is shown below, the target shares for 2035 are: inland waterway 45%; road 35%; and rail 20%.

Several major European rail projects are underway in this region that can be expected to have very significant impacts on capacity, travel time and more reliability on inland connections between the Port of Rotterdam and European hinterland. However, there are still some challenges to confront for increasing rail’s modal share of the port. For instance, difficulties in scheduling and trains speed issues; requiring investments especially in marshaling yards; and increasing demand and congestion on mixed rail passenger/freight lines.

The railroad, called Betuweroute, starts from the Port of Rotterdam and ends at the German border. At present, the line is handling around 200 – 300 trains (only freight) per week. The capacity is expected to be around 200 trains per day by now. In the long term, further serious challenges will be freight capacity problems on this line by 2030. Therefore, the Port
Authority solution to this potential problem is to increase the rail’s market share as port volumes increase. Meanwhile they run into difficulties and physical constraints in longer term.

Port of Gothenburg (Göteborg) has developed an intensive network of railway shuttle in its hinterland in the last decade. Currently, the system consists of rail shuttle trains to more than twenty different dry ports, i.e. inland intermodal terminal directly connected by rail or road to a seaport and operating as a center for the transshipment of sea cargo to inland destination. Those are spread throughout the whole Scandinavia and are offered by 10 different railway operators.

However, the shortest distance by train is about 10 km within Gothenburg, which serves as a stuffing and stripping terminal. This system handles about 55 per cent of all containers to and from the Port of Gothenburg. The current rail shuttle system decreases transport costs by about 6 million EUR annually and it also relieves the streets of Gothenburg as well as decreasing CO\textsuperscript{2} emissions by about 42,000 tons every year (Wilmsmeier, et al. 2011).

Situated along the North East coast of Spain, the port of Barcelona serves Catalonia as well as the South of France. Generating almost 19% of the GDP of Spain shows the importance of the port to the economic growth of the region. Connecting the port to the well-organized transportation system is a reason for high freight volume in this port. However, the dominant transport mode in the hinterland is truck transport, railroad play as the second important mode that connects Barcelona with the hinterland. With rail sidings on the container terminal, the port of Barcelona is connected to the four rail corridors.

In order to increase the connectivity of the port to hinterland, the authority of Barcelona (Autoridad Portuaria de Barcelona, APB) developed its hinterland network with terminals and also developed rail shuttles to other regions outside the traditional hinterland of Barcelona, like Lyon. By connecting the port of Barcelona to other regions by railroad, the port could be able to compete with other ports that are closer to a specific hinterland region. Formerly, Lyon was mainly served by Marseille, Antwerp and Le Havre.

Although Barcelona is located 300 km further away from Lyon compared to Marseille, APB truly believes cargo still can be attracted by a reliable railroad connection. All the hinterland activities in Barcelona’s case are the result of the modal shift from road to rail. Despite the decrease in container volume, rail transport increased between 2007 and 2009 (Van den Berg 2011). Studying hinterland network in Barcelona, one might consider Zaragoza terminal as the central node. Due to its location, Zaragoza soon became the economic center and logistic hub of Barcelona, Madrid, Bilbao and Valencia.

![Figure 3: The hinterland network of Barcelona (Source: Van den Berg, et al. 2011)](image_url)
Port of Hamburg is well established among the North Sea ports. Owing to its geographical location, Hamburg is a natural interface between East and West Europe. Furthermore, the city is well positioned for the fast developing Europe – Far East trades. According to the estimations, in 2015 the Port of Hamburg will have annual turnover of 18 million TEU (twenty-foot equivalent units). Therefore, in order to cope with the future challenges in the container market, the Port of Hamburg continuously update and improve its ‘Port Development Plan’, within which development potential for the future extensions of the terminals is analyzed every five years. Additionally, hinterland connections and services are also considered due to Hamburg’s role not only as a major container port but also a logistic hub. Here, priorities are given to the improvement of the rail connections, the necessary depth and maritime access, and the extension of road links. For the Port of Hamburg rail transport is the most important hinterland transportation mode. Nearly 30% of all container hinterland traffic is transported by rail. In long-distance traffic, this share is even 70% (ISL 2007). Within the City of Hamburg the Port Railway is responsible for the railway infrastructure. A modernization and development program has been set up to achieve the required capacity demand from 200 trains per day to 500 trains per day in 2015.

3. Strategic position of the Piraeus port within European, national and city context

3.1 Greece within transnational transportation network

Nowadays, Greece is considered as one of the most important strategic transportation nodes in the European continent. It is significant due to two main reasons. Firstly, since Greece is the most southern European state, the strengthening of its strategic position should contribute to the balanced development between the north and south of Europe, further territorial cohesion and socio-economic competitiveness. Secondly, Greece has the potential for the development of numerous intermodal transportation nodes. More precisely, the benefit of investment in the Greek railway transportation network certainly has the positive effect on the improvement of passengers and freight capacities of other transport modes, mainly maritime transportation. For example, the freight traffic of the Piraeus, the port of Athens, is 1,4 million TEU per year, which makes this harbor known as “Rotterdam of the south”. In addition to this, Piraeus is the largest European port in terms of passengers transport with 20 million passengers per year.

The simplified version of the TEN-T (Trans-European Transport Network) was formulated in 2011 and this is known as TEN-T Core Network Corridors. It includes 11 relevant European corridors and the corridor no. 4 known as Orient/East Med(iterranean) connects Hamburg (D), i.e. Rostock (D) and Athens (with a possible lengthening to Lefkosia, Cyprus), while the second route ends in Burgas (BG). This corridor is one of the longest northwest-south eastern axes. More precisely, it connects central Europe with the maritime interfaces of the North, Baltic, Black and Mediterranean seas. Main goal of the corridor development is concerned with the optimization of the ports use, as well as the rail development along the north-south line from Budapest until Athens (EC 2011). Freight and passengers transportation in terms of both railway and waterway (maritime and inland ports) transport modes is indicated in the figure 3.1.

More precisely, this corridor connects the port of Piraeus to the German ports of Bremen, Hamburg and Rostock. Apart from passenger transportation, the Orient/East Med corridor (for freight) includes a long north-south eastern corridor that will connect central Europe to the maritime interface of the North, Baltic, Black and Mediterranean seas. Along projects 7 and 22, and integrating ERTMS corridor E and rail freight corridor 7, it will foster the development of those ports as major multimodal logistic platforms and will improve the multimodal connections of major economic centers in Central Europe to the coastlines (EC 2011).

Since the financial crisis reached its peak in Greece in 2011, all the international routes through the Greek railway network have been suspended. Although even before the
economic crisis, there was just one long-distance railway link from Athens to Sofia via Thessaloniki, which is no longer functioning. However, Athens-Thessaloniki railway connection has been experiencing fundamental improvements and redevelopments due to European Unions TEN-T program. Therefore, new international railway links from Thessaloniki are expected to connect the internal railway network to the transit European railway network (EC 2011).

Figure 4: Freight and passengers railway and waterway transport along the Hamburg-Athens corridor
(Source: ETH documentation)

The Commission is already granting EU support for a study that will analyze traffic flows and potential development of a rail link that will connect Budapest with Bucharest and Athens via Timisoara, Vidin-Calafat and Thessaloniki. The link is not fully operational at the current time. Thus, the support is directly needed for creating the right preconditions for development along this line, preparing investments in the oncoming multi-annual financial framework. Although there are numerous missing links in this corridor, especially between Hungary, Bulgaria, Romania, and Greece, the first priority of this project is to make sure that a comprehensive cross-border traffic management system on rail and inland waterways is implemented on many sections (EC 2011).

Finally, the strategic location of the Piraeus port city is not only of European, but also of worldwide importance. Recently, Chinese governmental company named COSCO is investing in the port of Piraeus and leasing two-third of cargo handling capacity in order to
provide a stable European market for Chinese exported products. However, neither the port city of Piraeus nor Athens is prepared for the urban transformation according to the principles of transport-oriented development (TOD).

3.2 National efforts for maritime transportation development

Despite the great potential of maritime transport, the Greek ports do not benefit the all load capacities. One reason for this barrier for optimization of the ports is lack of well-connected hinterland transport system. However due to the development of the international airport in Athens, there is still an enormous volume of passenger and cargo frequency, connecting the ports to international destinations. Based on Eurostat 2011, the port of Piraeus supports about 21 million passenger per year, which are mostly international and local visitors to the southern islands. Considering only the passenger transport, the port of Piraeus requires to become an intermodal transport node to be able to sustain this amount mobility. Moreover by loading 1.4 million TEUs per year, the port of Piraeus is the busiest container port in the region. The port of Thessaloniki is the second busiest container port of the country, by the far number of annual containers transport (0.2 million TEUs). The port of Heraklion, in Crete Island, is the second passenger port in terms of transportation annual frequency after the port of Piraeus. Additionally the ports of Patras and Volos are the third and fourth important passenger ports respectively. Figure 5 illustrates these five important ports by their transportation frequency and geographical positions.

![Figure 5: Annual frequency of four top busiest ports in Greece](Source: Authors based on Eurostat statistics 2011)

3.3. Athens and its metropolitan competitiveness

Considering the city as one of the most strategic water gateways in Europe, people are not as mobile as expected as well as goods. Currently, most of the inland freight transportation is designed for motorways both in local and transnational scale. From strategic perspective, single-modal transportation systems are not capable to compete in economic growth, especially the ones operating in an oil-dependent mode. Therefore the city of Athens requires enhancing the multi-modal transportation system including a resilient railway infrastructure in order to be able to compete as a European metropolitan region.
Amongst Mediterranean cities, Athens had for many decades the lowest indicators of competitiveness due to a variety of factors relevant to its introverted economic traits, long lasting environmental problems and outdated infrastructure (Chorianopoulos et al. 2010). However, the 2004 Olympic games was the core of this competitiveness trend during the last decade, which influenced the metropolitan sprawl mostly towards the east. Access to the suitable agricultural land in eastern part of Athens is arguable as a warning for better controlling development eastwards of the Athenian conurbation. Concentrating more on competitiveness aspect of the 2004 Olympic games resulted to large-scale land use changes and replacing the proper agricultural lands to infrastructural uses such as the international airport and Olympic venues. The availability of high-quality agricultural lands in Mesogia area supports this argumentation for better controlling of future urban growth in eastern part.

Since Europe has been always considered as one of the most promising trade markets for China, Chinese government tends to expand the collaboration with Greece, considering Athens as a distribution channel to the vast European market, and invests its capital in sectors such as final product assembling, transport, logistics and supply chain. Thus the city should expect a huge migration from suburban areas to Athens, seeking new opportunities.

3.3.1 Urban railway transportation

Currently, city is serving public mobility mainly by bus system and metro lines. There are also some limited sub-urban trams connections from Athens downtown (Syntagma square) to the southern coastal area in three lines continue up along the seaside zone. Suburban railway also connects the main railway station to the port of Piraeus. Another suburban railway line supports the connection between Athens International Airport and Kiato through Ska Station. However, the suburban railway network with low passenger frequency, bad conditions, and small capacity are not well functioning. Along with this, the peripheral location of the main railway city station demonstrates the inattention of the public authorities to the railway sector. From a spatial planning perspective, there is a considerable development disparity between the east and west sides of the city in many respects. Since the current location of the railway station is in the border of this segregation (east vs. west), the local government plan to redevelop the station might be impulsive for spatial cohesion. From spatial planning perspective, the City of Athens should consider decentralization/poly-centralization, as does the region and the country. Generally, railway systems reinforce and usually accelerate decentralization trends. By improving accessibility to different parts of a region, extensive railway networks highly encourage suburbanization. If decentralization is intended, proactive planning of and around stations has to be addressed. While railways contribute to suburban growth, they can also support more efficiently organized development within existing built-up areas (inner-development process, brownfield development, and urban regeneration).

Figure 6: The port of Piraeus in Athens metropolitan context and transportation connections
(Source: Authors)
3.3.2 Organization of urban public spaces

Comprising around one third of the total population of the country, Athens metropolitan area dominates the Greek urban network. Similar to Spanish and Portuguese cities, the socio-economic structures of Greek cities in the post-war period of urbanization were not based on manufacturing. In contrast to this, urbanization triggered industrialization, by creating economies of scale. Nevertheless, the following de-industrialization/distribution wave did not occur in such cities, unlike in Northern Europe since the 1970s (Chorianopoulos et al. 2010). Taking Athens as an example of such structure, the city kept absorbing population and, as a result, faced the unplanned mode of expansion up till now.

The municipality of Athens entrusted a study for the urban renewal project of the Central Business District of Athens (CBD Athens) in 1989, the so-called "Commercial Triangle" to the Urban Planning Research Centre of the National Technical University of Athens. After detailed land use analysis, these projects introduced by decrees the relevant regulations on land use and other parameters of urban development (The ENVIBASE-Project 1998).

Based on this study, the environmental crises have already hit the city. Athens is at the top of the list of polluted European capitals, and social problems accumulate and become more visible with the wave of immigrants from the non EU-countries. Moreover, environmental and social tensions are reflected in land uses. The bipolarity between central and residential areas is a field of conflict: centers of activity (supermarkets, music-halls, night clubs) often penetrate into residential areas; motor vehicle garages and warehouses often co-exist with housing areas; noisy activities produce linear centers which are contributing significantly to the traffic congestion of the main roads of the city, etc. This repulsive aspect of the city makes some neighborhoods unlivable and the inhabitants are leaving them (The ENVIBASE-Project 1998).

4. Piraeus: a hot-spot for integrated spatial and transport development

According to the 2011 census, Piraeus had a population of 163,688 people within its administrative limits. It is the fourth largest municipality in Greece. Regional unit (agglomeration) of Piraeus has a total population of 448,997.

Although the Greek port of Piraeus is already a destination for some Asian and African ships and has an annual 20,100 (2011) thousands of tones maritime transport (Eurostat 2011), it still has a great potential to reinforce its situation as an alternative southern gate to Europe for transshipment. Meanwhile a key concern here is to enhance the inland transportation functionality to transfer the imported goods to the northern parts of the country and Europe.

The port of Piraeus is functioning as one of the twenty busiest European container ports. It is also the busiest passenger port in Europe. Considering the spatial structure of the port city, the passenger terminal, cargo terminal, and fishery and craft harbors stand relatively close to each other in Piraeus urban business district. Therefore the port could play a multifaceted role as an urban/trade center not only in local scale but also regional and trans-regional. However, currently it seems the port city is the place where institutional and governmental conflicts are happening.

Therefore, there is a need to re-think of the port city in this new context. In a narrow sense, the city is missing a balanced plan considering future infrastructural transformation. According to the port system development literature, the port needs greater expansion for facilities at seaports and in the hinterland by the growth in cargo volume. Subsequently, inland ports receive a great attention for accessibility, as the cornerstone of distribution system.
Similar to the Zaragoza station in Barcelona’s metropolitan region, it seems the most sustainable situation is to adapt the Larisis station as the main railway node supporting passenger and cargo distribution coming from Piraeus to the national and European destinations. With respect to this possible solution, a strong connection between the city of Piraeus and the station of Larisis is required.

Introducing more long-distance railway connections in Athens area to Peloponnese region and to the north towards Thessaloniki might positively influence international visitors volume as well as providing better accessibility for domestic commute. Concluded from current situation in Athens, the city is short in any national transportation mode other than motorways. This issue will jeopardize not only tourism, as the second important industry in the region, but also urban growth. As mentioned in ‘Athens metropolitan competitiveness’ section, the planned urban decentralization mostly happens around regional railway stations as the main hub. Apparently, the Athens metropolitan area is suffering from great centralization due to lacking these stations with function of urban hubs.

Unlike the most European cities, the main railway station in Athens (Larisis Station) is not located in the city center, where the main business district is positioned and all the urban activities occur. Based on our evaluation of the current situation in Athens, the Larisis station is on the urban fringe, surrounded by low-income housing. The city tends to grow towards the international airport in the east part of metropolitan area, and most of the urban development is happening in the east part of the city.
The Hellenic railway company (OSE) is planning to construct a high-rise station building over 10 track lines in Larisis with major purpose of commerce and offices. Still, the city of Athens authority has not invested or planned for investing on this station and its interrelation to the city center. The major concern would be how to connect a station with 20’000 k passenger per year (Piraeus) to the Larisis station with a weak transport distribution system even in local scale (urban connectivity).

5. Concluding remarks

As the most important engine of the economic growth, Greek ports are capable of benefiting from a great geographical location. The port of Piraeus, as the busiest port of the country, has the opportunity to weight infrastructural changes on the highest development priority and improve the city’s position in the territorial competitive setting by reduction of ‘saving time’. However, the better transportation connection from other parts of European territory to this port provides a better market, therefore results greater geographic influence area and opportunities. Derived from the deductive analysis, it is anticipated that the country will face a great number of passenger and freight trains in the main urban nodes in a short time. Considering the significant port development and the TEN-T Mediterranean corridor, the city of Athens plays a double important role. Increasing the mobility might be a threat or an opportunity for the city of Athens at the same time.

The case study analysis, i.e the evaluation of the current conditions in the port of Piraeus lead to the following guidelines for the future integration of both transport and spatial development, everything according to TOD principles:

- Passenger port should be placed at the center of the port complex, rather on its periphery. Also, its connection to the railway station will connect an entire regional transportation to the surrounding community;
- Port position should foster the creation of activity center in its surrounding;
- Activities should include engaging of public spaces for various events such as concerts, exhibitions, markets, etc. bringing the vitality to the area and stimulate economic development of the entire areas;
- Pedestrian connections and continuous street-front experiences should improve the sense of place;
- Architectural design of the commercial facilities in the port surrounding should highlight the attractive landmarks and gateways.

Considering the abovementioned strategies, we believe the city will better adopt the oncoming transformation. However, dealing with inappropriate uses alongside this corridor and in railway stations’ adjacent neighborhood will be a new concern that will show up especially in local scale. The central hypothesis for strengthening this connection is to shape a dual-center for Attica. From transportation planning perspective, the next step is albeit to differentiate the railway passenger transport from cargo, which is also important from city planning viewpoint. The last but not the least future topics in this area, is to reinforce the east-west connection in the city of Athens to avoid more construction in the eastern agricultural lands.
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