

Port-city dipole as a complex technical management issue: the case of Piraeus

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Abstract:

This study focuses on the examination of the city-port relationship from an urban planning perspective, exploring whether it can be a harmonious or a rivalry relationship and whether it can contribute to the creation of local development and national development in general. Another vital dimension considered in this study is the technical and environmental aspects that play a pivotal role in shaping the dynamics between these two entities. A port city refers to a coastal city within the boundaries of which urban and port activities are developed and carried out. Although the complexity of city port dichotomy is not captured by this definition, as it is a powerful dipole, consisting of two interdependent spatial elements, the city and the port. The strong interaction between the two creates strong spatial links that form a relationship of major importance, which has drawn considerable research attention from various fields, with urban planners in particular keenly interested in this unique category of cities.

Background:

Since ancient times, port cities have been economic and commercial centers, having developed a great commercial and economic activity based on maritime trade. This economic power enabled them to deal effectively with crises. In addition to the physical capital that port cities attract, they also attract intangible capital, such as cultural exchange, language, religion, customs and know-how, thanks to their commercial activities.

As part of the city, ports make an important contribution to the city's economy and national development through an appropriate regulatory framework. Their naturally fortified areas give them a comparative advantage in terms of access from the sea, facilitating transport and promoting development and communication, thus compensating for the losses caused by the lack of an integrated road network in the hinterland. The city and the port come together with absolute precision to form a solid and unified whole, but also a self-contained environment of interdependencies, interactions and interrelationships between them. This process of assembly is essentially the genesis of the first city ports.

Materials and Methods:

This study examines the relationship between city and port, focusing on the case of Piraeus. The study is enriched by a comprehensive bibliography that primarily aids in establishing the theoretical framework that underpins the subsequent analysis of collected research data, and developing diverse methodological models, with a predominant focus on qualitative methods. It uses a multifaceted qualitative approach to analyze historical and contemporary data, international trends, and the potential for future development. The study analyses the current situation by involving a roundtable discussion with representatives from key organizations in Piraeus, yielding insights into factors affecting the city-port relationship. Also, a planning framework is created, including the construction and evaluation of future scenarios and the formulation of a Spatial Decision Making System.

Conclusion:

This study, based on literature and qualitative data analysis, aims to document the hypothesis that urban regeneration is positively dependent on the commercial and tourism activities created by the ports, focusing on the port and the city of Piraeus. The main conclusion drawn is that investments in ports in urban regeneration and infrastructure can be a driving force for growth and pillars of support for the city's economy and society while contributing to the development of new infrastructure.

Key Word: City, Port, Piraeus, Economic Growth, Infrastructure

I. Introduction

The primary aim of this study is to explore and analyze the city-port dichotomy, focusing on historical insights, significant European city-ports examples and the specific Greek example. To accomplish this goal, it is necessary to identify the challenges and shortcomings of the city-port system within international, European and Greek contexts. Therefore the study includes extensive analysis of the evolution of city-port bipoles, the redevelopment of port cities and the redefining of the city-port relationship, based on analytical bibliography research. After examining the relationship between port cities and the networks formed by their interaction across various European examples, the study focuses on the specific case of the city and port of Piraeus. The study is enriched by a comprehensive bibliography on the case of Piraeus, highlighting several aspects of the city-port dipole.

The development of commercial activity in the port area not only strengthens the port itself, but also leads to urban regeneration in the surrounding towns. As a result, cities use the commercial activities of ports to develop commercial and craft activities at the level of residential units. This leads to the creation of organized commercial facilities and infrastructure. This process favors the development of port services, trade, administrative centers and neighborhoods, transforming these areas into centres of wealth and prosperity.

II. Materials and Methods

This study aims to comprehend, analyze and identify the relations between the elements of city and port. By examining the quite critical example of Piraeus, the study contributes to a deeper understanding and explanation of the port-city relationship, while also providing guidance for future development endeavors.

In this context, the study employs a particular and multifaceted methodological approach to meet the predetermined objectives outlined in the preceding chapter. Initially, a general and extensive analysis of ports, their relationship with the city and international trends in relation to the Greek area is carried out based on international literature. The study then focuses on the case Piraeus's port and city. For this purpose, an investigation and analysis of the historical context, development patterns and redevelopment efforts is carried out in order to conceptually redefine the relationship between "City-Port". Furthermore, the study examines and records the international port trends within the context of Greek reality.

The second part of the study involves an analysis of the current situation regarding the port and the city, coupled with the mapping of the development potentials in the Piraeus area, through participatory processes such as roundtable discussion. It also includes the creation of a planning framework that encompasses the construction and evaluation of future scenarios and the formulation of a Spatial Decision Making System.

The methodological approach is mainly qualitative and is structured with particular dynamism, with emphasis on both historical and contemporary data analysis and recording, including future implications. Planning is carried out utilizing various criteria and perspectives, enhancing the study process and the resultant outcomes. This multifaceted approach strengthens the process of the study itself and the produced results. Moreover, it is crucial for the methodology employed in a scientific text to reflect a global character, combining various processes to achieve a more precise analysis of the individual issues and research questions.

In terms of research methodology, the roundtable method, involving three representatives of decision makers for the city and port of Piraeus in a roundtable discussion was used. The three representatives responded to a series of questions in order to further investigate and verify the factors that affect the relationship between the city and the port of Piraeus, causing either development disturbances or development prospects.

Through the qualitative analysis, 15 questions were answered by the selected organizations, leading to important findings and conclusions related to the topic under study.

Furthermore, it is worth mentioning that the steps of the methodology can be replicated in other regions, resulting in more comprehensive findings and conclusions about cities, ports, the relationship between them and the future prospects. This possibility arises from the structure of the methodology which consists of discrete steps in the preparation and progress of the study, extending its relevance beyond the defined objectives.

The conclusions that will emerge from the Spatial Decision Making System will contribute generating additional findings that will become part of the overall study conclusions. These conclusions essentially document

how the relationship between the port and the city of Piraeus can evolve into a balanced and mutually beneficial one.

In conclusion, the completion of this study is framed by an extensive bibliography, which will essentially contribute to the examination of concept delineation issues and to the establishment of a theoretical framework used to analyze the data collected during the research.

III. Discussion

The historical evolution of the city-port bipoles:

From ancient times to the present day, trade has been the most important factor in the organization and development of ports (Fujita & Mori, 1996). Therefore, due to the combination of two factors: a) the necessity for safe and sustainable ship approach and docking and b) the efficient spatial layout, including shipbuilding activities, ports have basically emerged over time as favorable fortification areas such as natural bays and river deltas. This approach ensures the fulfillment of maritime connectivity needs (e.g., trade, transport, sea access) and compensates for any deficiencies in the road transport network.

It is important to note that the development of commercial activity associated to the port also contributes to the urban upgrading of cities adjacent to ports (Chen & Lam, 2018). Consequently, cities tend to expand towards ports and build on its commercial dimensions, while promoting and defining activities (trade/industry) in distinct regions. Essentially, the port becomes the official visual representation of the city. (Benevolo, 1997, p. 81).

Also, a class-based social displacement or movement takes place, as self-contained commercial functions and market activities schematically force the more powerful and wealthy social groups to relocate around the port. As an example, the qualitative social status, prestige and economic influence of a family was reflected by their consumption of imported goods (Norcliffe, 1996).

It is also worth noting that this social movement toward the port attracted various other trades (e.g. craftsmen of related trades such as blacksmiths, carpenters, dockers, builders, etc.), whose interest was tied to the ever-increasing commercial activity of the port, which was a key pole of employment/recovery.

Also, crucial was the harbor's role in providing security to the inhabitants against external threats, like piracy. In such cases security was achieved through the fortification of the city. (Braudel, Aymard, & Coarelli, 1990, p. 157). However, the act of fortifying the city led to the isolation of its inhabitants, gradually affecting their mental framework of values and functioning, resulting in introversion. The walls of a city served as the entry point for both people and goods, resulting to tax collection practices. This fortification on the city limits also highlighted its military prowess and its status as a maritime centre/base, but also defined the spatial area where specific laws were upheld, ensuring civil rights and equality for its residents. Gradually, due to changing of social perceptions, the equilibrium was overturned and the relationship and the dichotomy of the city-manor were redefined, since fortifications were no longer meaningful or the walls were no longer the key urban characteristic of a city (Pinol, 2000, pp. 21-24).

Redevelopment of port cities:

Regarding port redevelopments, it is mentioned that the extensive urban vacancies created in port cities are undergoing regeneration and restoration by introducing new uses, like recreation, culture and tourism (Mould, 2014). These uses were consistent with business innovations and profitable activities, leading to increased job opportunities. Also, the city now is extending toward the waterfront, further integrating these new uses with existing residential infrastructure.

Concerning the transformation of port cities toward the sea and the key role of the water element in relation to the city, it is worth noting that these redevelopments provide a significant advantage to the city, compared to competing port cities and mainland cities, as they establish a highly recognizable destination. As a result, the city is particularly attractive for the movement and establishment of commercial activities of particular importance (e.g. complex systems of multinational companies, banking institutions, businesses and offices) (Gospodini & Beriatos, 2006, pp. 71-72).

Crucial to these developments is the impact of globalization and economic imperatives. In this context, cities become ideal locations for the (re)establishment of developed 'industries' but also areas characterized by significantly easy capital mobility. In terms of meeting the related infrastructure and housing needs of these business ventures, large buildings and complexes are emerging, adding further complexity to the urban

morphology. The ultimate purpose of the above aim to attract international economic investments and businesses of various sectors in order to make the city fully worthy of its position in the global market (Debie & Raimbault, 2016).

Finally, through regeneration and the implemented interventions, a global network of idyllic cities with significantly upgraded port infrastructure and utilization of the water element is being created. These cities fully align with the needs and objectives of the global economy. Cities now exhibit relative homogeneity in terms of water and waterfront management, applying different landmarks and/or uses to different landmarks as appropriate) (Norcliffe, 1996).

In general, coastal frontage redevelopments have mobilized residents, businesses and central or local government (Bassett, Griffiths, & Smith, 2002). However, in some cases, sudden and out of touch changes with the environment have caught the city and its residents unprepared. Adapting to the new conditions and using the port areas can be challenging, because people tend to prefer the familiar city districts, streets and places. The environmental footprint of the way in which people use space is significant. The design of technical infrastructure plays a crucial role as urban planning can potentially lead to environmental degradation. A proper connection between the coastline and the city center is essential for proper integration.

From the outset, an organic relationship develops between the two parts of the city-port bipole, creating a self-contained environment. The city relies on the port and the port depends on the city. This pattern describes how the first port cities were founded in antiquity by the great cultures of the eastern Mediterranean (Phoenicians, Mesopotamians, Greeks, Egyptians). In order to facilitate trade and maritime transport, which was clearly easier than land transport, coastal cities were developed, and trade relations were established between them. Over time, as trade and shipping prospered and the quest for new markets and goods continued, these civilizations established colonies in the western Mediterranean, passing through Italy, which marked the imaginary border between east and west (Braudel, Aymard, & Coarelli, 1990, p. 18).

Throughout the historical progression, the development of the two components of the city-port dipole was simultaneous, with the port influencing urban architecture. In particular, the layout of the road accesses followed the port's inherent physiognomy, while the urban layout (housing, facilities and infrastructure) was affected by the curvature of the port arc. This design provided visual connections from the urban "inside" to the waterfront, distributing visual perspectives toward the water and shaping services, functional opportunities, and the overall character of the area facing the sea. The harbour front becomes an expression of the official image of the city, as many of the large administrative buildings were also located there (Benevolo, 1997, p. 81).

The wealthy classes concentrated near the port in order to be close to the markets, to control and have direct access to the supply of goods. (Norcliffe, 1996). Close to the port, but also in the towers and the enclosure of the walls, there was a demand for the employment of craftsmen, such as blacksmiths, carpenters, dockers, builders, artists, etc. These groups settled in low-cost and more deprived areas than those of the nobility. The most favoured were the petty traders who settled at crossroads of major roads, rivers and harbours, i.e. in the most favourable areas and made their products available there. Markets and small craft centers were thus created and many services were provided at the same time. As a result, the character of the towns gradually changed from rural to commercial and productive.

The exploration of interfaces between the city and the water element can only be considered a new process for urban planning reflection. The history of the city and urban planning includes significant segments dedicated to the planning and development of waterfront areas. The timelessness of trade and other maritime activities gave these zones a multifunctional character. The formation of urban public spaces near the water is due to the water element which has been an attraction and a place for culture and economy to flourish over time (Huang, Chen, Kao, & Chen, 2011).

Redefining the city-port relationship:

By examining the historical evolution of the city-port relationship and studying successful European city-port models, it becomes evident that the various spatial dynamics inherent in port cities and their interaction with the port are directly shaped by changes in the economy and production (Lee, Song, & Ducruet, 2008).

Between the city and the port, spatial transition zones exist and are ripe for exploitation. These transition areas may encompass urban voids, transport networks or pre-existing port facilities, such as piers, where port activities may still exist or coexist (Daamen & Vries, 2013).

The utilization of depreciated and abandoned old port facilities and their integration through redevelopment into the functions of the urban environment has been a decisive factor in the evolution of port cities and their transformation into centers of prosperity, well-being and development. This process facilitates the reconnection of port with cities extended toward the waterfront through cultural regeneration on their coastal fronts, thus forming a leisure environment and an attraction for tourism and business interests, such as clusters of businesses that are identical to port activities.

The majority of these businesses are established in the intermediate transition zones, often located in the area between the city and the port. These zones, characterized by spatial concentration, gradually form a strongly competitive business environment (Dooms, van der Lugt, & de Langen, 2013). The close spatial proximity of these firms to the port's business functions contributes to the development of business synergies. This process is one of the most essential factors contributing to the restoration of the city-port relationship. Motivated by the competitive environment of the area, it attracts many businesses that may not be related to port activities but remain relevant to the city's labor market.

The review of the city-port relationship through different time periods and through exemplary European city-ports models has contributed to a more complete understanding of the spatial transformations that have taken place over time in port cities. Also, the review provides an understanding of how these transitions have influenced and shaped both parties and the relationship between them. Taking the prominent example of the Port of Rotterdam into consideration, it is concluded that in its early stages of evolution, the issues related to the port development primarily manifested on a spatial and geographical scale. These developments were tangible outcomes influenced by concurrent international trends and influences of the era. An illustrative historical example is the Second World War, during which ports essentially gave birth to cities. In contrast, during the early 20th century, the relationship between port and city was gradually deteriorated, leading to the eventual detachment from each other. This disconnect persisted throughout the latter half of the century, resulting in these two entities functioning as distinct and separate entities (Jacobs, Ducruet, & de Langen, 2010).

The necessity imposed by the transport industry, particularly the movement of containers (logistics), was the reason for the city's ties with the port to be severed. In some cases, behaviors were adapted to the requirements of this new mode of transport operation, which later transformed ports into centers of administration and decision-making. Globalization led to the total extinction of those that couldn't survive the competition.

Cities' interest in coastal areas intensifies according to the degree of technological modernisation of ports. The greater the degree of technological modernisation, the stronger the interest of cities in coastal areas. This situation replaces the previous scenario in which the city's economic status was closely tied to the port. By the end of the 20th century, traditional port activities had undergone significant modernization, resulting in increased productivity through new packaging methods, the development of administrative and logistical services and the introduction of information systems.

The reconnection between city and port has been achieved through urban renewal, where the city successfully transformed industrial areas into attractive destinations. Thus, it is found that coastal front redevelopments are driving forces for a more comprehensive urban development (Hein, 2016).

The freedom of movement in the redeveloped spaces along the coastal fronts creates a bridge of communication between the city and the port. This, by acting as a recreational space for different population groups and stimulating the multifunctionality of these areas, enlivens previously deserted port zones (Nebot, Roja-Jimenez, Pie Ninot, & Perea-Medina, 2017). Interventions in the hearts of historic centers serve as a link connecting the city to the port. Widened roads and streets concentrate and channel traffic from the sea fronts to city centers, promoting harmonious transitions. Interventions and new uses implemented at port level, such as maritime museums, aquariums, combined with a strong maritime presence (ships, sailing boats, etc.) give cities a strong maritime character.

On the opposite side of the extraordinary benefits and overdevelopment resulting from the implementation of redevelopment, interventions and changes of uses in port cities, there is the risk of underdevelopment in the rest of the port area and the city. This can lead to degradation, as all urban developments and new uses, modern commercial business activities, warehouses, loading and unloading areas, transport points, high-rise office and business complexes, giant commercial complexes, interconnection with public transport (trains, buses, etc.), and the development of the port and its surroundings. etc.) are concentrated on the other side of the city and the port. A typical example of the intensity of the differences due to overdevelopment in one part

and degradation in another is seen in the Asian and African port cities (Singapore, Shanghai, Cape Town, Dubai, etc.) with the presence of luxurious and monumental tourist cities next to poor neighborhoods and suburbs. These differences arise partly due to the different policies of these countries and partly due to the marginalization of traditional traditions.

A turning point in the redefinition of city-port relations for many European port cities was the period of the upgrading of the seafront, creating a new, unified spatial framework for urban functions. However, it can be observed that the redevelopments managed to maintain the city's balance and the new urban fabric smoothly integrated into existing structures, ensuring that no resident relocations occurred in the name of 'upgrading' the areas.

The implementation of simple interventions with a simple design gives new purposes for both the port and the city, enhancing the quality of their image and their relationship. The sea front is tasked with connecting these two elements while still meeting necessary requirements. Creating a 'multifunctional city', which can accommodate multiple activities and different populations, through the rehabilitation of its urban image, the promotion of modern landmarks and the use of a new architectural vocabulary, constitutes the development catalyst for 21st century port cities. Cities and ports are closely linked in multiple dimensions (Lugo, Alariste-Contreras, & Pumain, 2020).

Norcliffe, in a concise review of the relations between ports and cities, identifies as a key element of social diversity in the structure and form of the urban segment, the very close coexistence of two extreme economic, and consequently social groups, which are continually generated and dependent on port activity: a 'merchant' class on the one hand, and a working class on the other. This contrast is particularly pronounced in the urban fabric and planning of Piraeus, as its initial establishment and creation (see early 19th century) served as a catalyst for progress, stability and urban advancement for all social classes (Norcliffe, 1996).

The case Piraeus port and city

Piraeus is the sixth most important European port, in terms of measured passenger traffic, showing the third highest growth rate (+5.5% compared to the period 2013-2014) (Eurostat, 2016 report, 2014 data). In addition, the broader Piraeus port area holds around the 16th spot in terms of cargo handling ranking among European port, with an annual growth rate of approximately 9.5% (Eurostat, 2016 report, 2014 data).

The city-port relationship has evolved through six stages: from antiquity to the 19th century, a narrow relationship; the Industrial Revolution era (early 19th century) marked expansion with steam technology; between the two world wars, industrial modernization began; two decades post-World War II, containerization emerged; the 1980s brought coastal front regeneration; and from 1990 onward, the city-port relationship evolved in a global mega-network of combined transport (Hoyle&Pinder, 1992).

Since the 1960s, Piraeus has experienced rapid growth in Greek merchant shipping centered in the port. The significant increase in port's traffic is a sign of developments that brought prosperity to the city, as numerous important infrastructure projects were planned and important shipping companies were established around the port (Kotzamanis, 1997; Bournova, 2016).

The intersection point of the city and the port, located at the boundary of the port and the city, is undeniably influenced by the presence and operation of the port, a relationship dating back to the existence of ports and cities. . The theoretical research on the waterfront, however, is relatively recent, spanning only seventy years. This delay can be related with the end of the Second World War.

The transformation in the shipping and port industry was rapid. A tenfold increase in cargo volume on early 1960s led to the need to develop specialized infrastructure and masterplans for ports and waterfronts. Notably, urban planning, architecture, and spatial planning have played minimal roles in studying the interface zone, with geography, economics, and shipping dominating the literature. Key milestones include James Bird's 'Anyportmodel' (1963) and Yehuda Hayuth's coining of the term 'port-city interface' in 1982. The influence of post-Fordism on economics since 1970 and correspondingly of postmodernism and neoliberalism on culture is obvious. This period marked the beginning of discussions on the city's retreat from the waterfront and its potential recovery.

Over time, the once symbiotic relationship between the city and the port, has become increasingly detached, leading to their independence as separate entities.

The governance of the port grid and strategic planning falls under the responsibility of the Piraeus Port Authority, which shapes the development strategy and the interaction between the port and the urban fabric. The dichotomy of Piraeus extends to western and eastern parts of the city and even the prefecture. Western areas like Drapetsona, Keratsini, and Perama face unique challenges, stemming from the 'Plan of the Major Port,' which aimed to integrate diverse coastal zones into a unified commercial port area, including shipbuilding and repair zones.

The refugee settlements of Drapetsona and Keratsini, along with the industrial zone, from the 1930s onward, were definitively cut off from the sea. Perama's shipbuilding activity in the 1920s led to its creation as a municipality. Today, it faces severe issues due to its port section's heavy functions, resulting in frequent industrial accidents and environmental pollution. The port of Piraeus is emerging as a significant contributor to air pollution, as it consistently records the highest average annual concentration of PM10, compared to any measuring station in Attica region. As a result, the municipality has been in a very intense dispute with the Piraeus Port Authority for the last 40 years, as pollution of both the aquatic and terrestrial environment, pose a huge risk to workers and residents.

The urban front of the port is currently dominated by commercial and port-related activities, agencies, ticket offices, shipping company offices, etc. with aging landmarks (the HSP building, the Church of St. Nicholas, the Church of St. Spyridon, the Chamber of Commerce and Industry, the Piraeus Tower, the Piraeus Passenger Station of the Piraeus Port Authority, the Wheat Silo, warehouses, the conveyor belt, etc.) offering potential for redevelopment.

The Central Port well-connected with a Fixed Rail Link, is an ideal environment for a public function for culture, administration, recreation, or education. However, the decision hinges on whether it serves Piraeus or the wider metropolitan area.

For the coastal shipping segment, things do not seem to be so difficult. However, there are other operational factors that pose risks to the abuse of the free port area, like taxis, cars not boarding a ship but leaving a friend, or using the area as a bypass, further deteriorating traffic.

It is expected that some of the existing environmental problems of great importance, such as water pollution, the degradation of the port area and its removal from the wet element in general, will be solved by the technical projects related to the reconfiguration and optimal interaction between the city and the port of Piraeus. The water character of the city will be re-emphasised as unused building infrastructure is demolished, restoring the city's true visual access and connection to the sea. The urban void is exploited through environmentally friendly business innovations related to leisure, culture and tourism. The water element is considered and treated as an integrated element, where the waterfront is defined as an integrated area in need of intervention. Essentially, the main regeneration projects referred to in the previous chapters involve design interventions, where the space identified for reuse is mainly concerned with combining both the natural environment and the newly built infrastructure.

In 1955, the first major redevelopment of the port began, where the technological developments in maritime transport and the unitisation of cargo played an important role. Within the framework of this plan and until 1982, Pier III of the Central Harbour, Agios Nikolaos Passenger Terminal, Drapetsona Pier, Pier for Petroleum and Related Chemical Products and the first container crane were constructed. In addition, the project of constructing new pier in the area of New Ikoniou was initiated, as well as the construction of the new container terminal. At the beginning of the 1980s, the port policy changed radically, following the international trends: an attempt was made to address the expansion and modernization of the port in relation to the life and problems of the neighboring urban environment.

The decade between 1982 and 1992 witnessed the implementation of two five-year development programs. During this time, a second large quay was constructed at the South Ikonio Container Terminal, with the aim of relocating cargo operations and relieving the Central Port. In 1996, the Central Port of Piraeus was effectively transformed into an exclusively passenger port. The construction of the Peripheral Avenue, which is intended to interconnect the port with the North-South National Road Axis, to relieve congestion in the central areas and establish a direct connection between the passenger port and SEMPO. In the same direction, the Piraeus Regulatory Plan (PRP) of 1983 was established, including measures to deal with the traffic and environmental

problems arising from the port city neighborhood. According to the PRS, for the first time the archaeological monuments participate in shaping the urban environment.

The dichotomy of the city of Piraeus, which has given rise to two distinct urban environments, extends beyond the city level, encompassing Western and Eastern Piraeus at the prefecture level. The municipalities of Drapetsona, Keratsini and Perama, situated in the western part, warrant special attention as they represent the most vulnerable segment of the coastal zone. The problematic history of the 'western zone' essentially began with the initial agreement and the subsequent approval of the 'Grand Port Plan,' which outlined the gradual and phased integration and organic incorporation of all the coastal areas of Drapetsona, Keratsini, Ikonio, Perama, and Salamina into a single and unified commercial port zone, inclusive of the shipbuilding zone. A unique circumstance can be observed in Perama, where shipbuilding activities gave rise to a settlement in the 1920s, eventually evolving into a municipality. Today, Perama faces the most severe challenges of all, as the port section corresponding to it hosts the most intensive port operations within the entire transit segment of the port.

The investment in Piraeus port

In August 2016, a significant shift occurred with the transfer of the majority shareholding to Cosco Hong Kong Group Limited. This marked the following key events:

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- Enhanced national credibility, becoming a benchmark in the continued efforts of the nation to increase its attractiveness to international investment markets within a secure and attractive business environment.
 - Transformation of Piraeus into both an international freight hub and a global center for leisure services, particularly cruises, in the Mediterranean and worldwide.
 - Enhancement of employment opportunities, both in terms of quantity and quality, through the successful execution of strategic investment projects by Piraeus Port Authority S.A.
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In 2016, a new cruise ship berth in Agios Nikolaos Central Port of Piraeus was completed on schedule, enhancing services for cruise ships, especially newer vessels. Infrastructure projects, including the New Petroleum Products Pier (NPP) and a Photovoltaic Park, were also finalized, leading to Piraeus Port Authority S.A. earning recognition as an "ECOPORT" by the European Ports Union.

In October 2017, a 37.5 million euro Investment Programme was approved, aligning with the investment planning of Piraeus Port Authority S.A. and China Cosco Shipping Corporation Limited. The aim of the above is for the Port of Piraeus to strengthen its role as a freight hub, a shipbuilding repair facility and a international cruise service provider.

More specifically, the investment-related activities include the following:

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- Cruise: infrastructure improvement projects involving the construction of 6 new berthing facilities capable of accommodating the largest international cruise ships,
 - Shipbuilding Zone: infrastructure improvement projects, through the supply of the necessary technical equipment and the construction of new facilities and infrastructure
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- Logistics centre: construction of new and state-of-the-art facilities, covering an area of 120 hectares, interconnected with the port through an underground road.
 - Car terminal: upgrading works.
 - Numerous upgrading and maintenance projects of port facilities and infrastructure
 - Supply of the necessary technical equipment and technical means.
 - Projects for the construction of a new oil terminal.
 - Projects to improve and enhance Pier I of the Container Terminal.
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In more detail, the concession fee, set at 3.5% of the annual turnover, witnessed a substantial increase in container handling at Pier II, with numbers rising significantly from 665,000 TEUs in 2009 to 2.89 million TEUs in 2014 . Also, the restructuring of Pier II took place and container handling was significantly improved. Similarly, Pier III was upgraded and the available port capacity was increased. Projections indicate that by 2025, the total capacity and throughput for Piers II/III will surpass six million TEUs, starting from 3,000,000 TEUs in 2015.

Concerning Pier I, a diversification of its role is envisioned, targeting primarily smaller customers, with an estimated throughput of approximately 440,000 TEUs in 2025.

It's worth noting that the ongoing port restructuring has yielded a notable advantage. Despite the economic downturn impacting imported vehicle cargo at the terminal (the "car terminal"), there has been a shift in focus and a significant increase in transshipment cargo. This shift is partially attributed to Piraeus' competitive position, attractive pricing, and cost-effective service policies.

Planned Investments in Piraeus

In terms of development strategies, an in-depth evaluation is conducted on the scheduled investments for the city and port of Piraeus, with a particular focus on the Integrated Spatial Investment of the city of Piraeus and the PPA Master Plan.

● Integrated Spatial Investment

The ISI Strategy of the City of Piraeus outlines the following Strategic Objectives:

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- Strategic Objective 1: "Enhancing development dynamics, improving the appeal and competitiveness of the City of Piraeus. Leveraging comparative advantages and fostering new business opportunities.
 - Strategic Objective 2: "Upgrading and revitalizing the urban environment of the City of Piraeus, promoting tourism and culture's potential. Sustainably managing and guiding tourism and cultural activities within the city".
 - Strategic Objective 3: "Strengthening social cohesion, ensuring citizens' access to high quality social inclusion services and promoting employment and entrepreneurship".
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Effectively promoting and supporting the existing informal maritime cluster, an integral component of Blue Economy, can yield substantial and measurable outcomes. By linking research and entrepreneurship, integrating innovative technologies into the local business circuit and optimizing results, businesses can interconnect and transform the informal cluster into a systematic structure with the necessary mechanisms to enhance competitiveness. This involves training and nurturing new entrepreneurs and businesses, maturing and practically applying entrepreneurial and scientific ideas, and aligning them with market demands and product requirements.

Actions and projects that will contribute to the Strategic Objective 1:

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- "Demonstration and excellence challenge actions that enhance, guide and diffuse the dissemination, acceptance and testing of innovations in a real environment (Livinglabs, Testbeds and FieldLabs) in the PSI Sectors".
 - "Creation and support of Knowledge Innovation Communities (KICs) with a focus on the Piraeus Region: leveraging the comparative advantages of the Piraeus Economy and Society".
 - "Supporting the adaptation of business models and enhancing the extroversion and competitiveness of SMEs in Piraeus through the utilization of ICT systems and applications".
 - 'Development of competences and innovative business solutions for SMEs, with emphasis on the 'focus areas' of the Attica Regional Smart Specialization Strategy'.
 - 'Pilot Network of Strategic Innovation and Business Formations of Horizontal/Vertical Partnerships, especially in the sectors of the Blue Economy'.
 - "Support for the incubation and establishment of start-ups, transfer of know-how, access to common tools and networking for the formulation and promotion of collective innovations with a focus on the applications of "smart cities" (Livinglabs, Testbeds and FieldLabs) in smart and green city technologies, blue economy, Cultural and Creative Activities (CCAs), Tourism, as well as Social Innovation".
 - "Creation and support of "VentureLabs" to attract, disperse and support microfinance to promote and finance innovations in particular in the fields of the blue economy, ICT, innovation, cultural activities

(CCAs) and tourism, as well as to ensure (at subsequent stages) the market launch of corresponding products, technologies, services, etc."

- "Pilot Actions to support the establishment of new enterprises in the market by providing integrated tools and services to cover the range of their preparation and start-up needs and to support outward-looking Strategic Plans".
 - "Improving the capacity of SMEs to develop in new foreign markets, with priority in the strategic sectors of the Blue Economy, Tourism and Culture".
 - "Establishment and operation of the Piraeus Business Support Centre (PBSC)".
 - "Strengthening of productive and related activities of high added value of individual or cluster enterprises in search of opportunities in new foreign markets, with priority in the sectors of the Piraeus City Council".
 - "Mechanisms and Tools for Strengthening the Extroversion Capabilities and Supporting the Opportunities for Piraeus Enterprises to Locate in New Markets".
 - "Establishment of new businesses at corporate or individual level, especially in the sectors of the Attica Piraeus Region".
 - "Supporting the adaptability of Piraeus businesses and their employees in the framework of Specific Improvement Strategies/ Demonstration of Sustainable Competitive Advantages, in particular in the sectors of the Piraeus Region".
-

Such an approach has the potential to establish the conditions for the optimal utilization of the port's investment, aligning it with the city's interests and yielding benefits for both. When coupled with the crucial transportation infrastructure, including the metro and tram, and improvements in the urban environment, these synergies can foster an attractive business environment. This attractiveness extends to new investment, with companies seeking expansion. This opportunity, if exploited, will not only have an impact on the city of Piraeus, but will also strengthen the neighboring regions, especially those associated with the cluster, and set the stage for innovative restructuring in complementary sectors such as shipbuilding and the supply chain.

At the same time, particular importance is attached to promoting the city, as a global and attractive tourist destination, with distinctive characteristics, while also leveraging its added values (Strategic Objective 2).

The ISI strategy of the Municipality of Piraeus and the interventions it envisions in the city are key initiatives for creating the necessary conditions to stimulate tourism. Actions aiming at promoting and enhancing Piraeus' tourism offerings can yield results when integrated with comprehensive efforts for urban, economic, and social revitalization of the city. Improving urban mobility, upgrading public space and enhancing greenery can contribute to creating conditions that enable access to and promotion of the city's tourism assets. The combination of these, along with other interventions - such as appropriate signposting - within a tourist route linking the cruise area with the archaeological and cultural sites, as well as the coastal front, is expected to attract visitors, providing multiple benefits for commercial and business activities, as well as enhancing the quality of life of residents.

The ISI projects expected to improve the quality of life in the city through the urban area upgrade are as follows:

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- "Enhancing the Energy Efficiency of Municipal and other Prominent High Visibility Buildings in the City of Piraeus".
 - "Pilot Mechanism for Information, Prevention, Management and Awareness of Climate Risks in the Urban Environment of Piraeus".
 - "Strategy for Reducing Waste Generation and Preventive Measures in the Municipality of Piraeus, along with Awareness Raising Actions".
 - "Integrated Kitchen Biowaste Management by Large Producers (brown bins and mechanical composters)".
 - "Utilization and Digital - Interactive Promotion of the Historical Archives of the Cultural Bodies of the City of Piraeus in a unified and modern Cultural, Creative and Educational Product".
 - "Redevelopment of Karpathos Square and Dilaveri Coast.
 - "Smart Neighborhoods in Piraeus (Technological micro-infrastructures and smart city applications at social and urban micro-scale)".

● **Master plan of the Piraeus Port Authority**

In order to achieve the development of the port, certain design principles should be adhered as discussed below:

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- The implementation of the port's vision should be carried out in modern terms of economic, development, spatial, traffic, energy and environmental sustainability. These considerations should address the infrastructure requirements essential for its proper functioning.
 - To meet the needs of the port and its users, the utilization of modern planning tools is essential. This encompasses technical infrastructure, new technologies, energy saving, environmental management, promotion, and communication strategies.
 - The integration of the port into the neighboring spatial unit and its service through this unit must ensure a functional and efficient interface.
-

The environmental management system applied by PPA S.A. in all its activities has been certified since 2004 according to the European system of the European Sea Ports Organization (ESPO). The Port of Piraeus has demonstrated its environmental commitment to environmental sustainability. Since 2011, it has been a recognized member of the Ecoports Network, a network of European ports that have been assessed for their environmental performance. Based on the aforementioned assessments, the Port of Piraeus has formulated and executed a specific environmental policy. It is engaged in an ongoing process of registering environmental aspects associated with its port operations and strives to continually enhance its environmental performance in compliance with European and international standards.

At international level, Piraeus ranks as the fourth-largest Mediterranean port in terms of handling of Container Cargo (C/C) handling, despite the fact that Greek ports as a whole handle a small percentage of C/C compared to Italian and Spanish ports. Also, the port of Piraeus owes a substantial part of its C/C handling to transit cargo, because of its strategically advantageous location for transshipment operations, serving numerous high volume trade routes, like Mediterranean / Far East - Japan, North America / Mediterranean - Middle East, etc.

Piraeus serves as the gateway to Southeast Europe and, within a combined transport framework, has the capacity to serve countries in the Balkan Peninsula such as North Macedonia, Bulgaria, Serbia, Romania. There is a potential for expansion into other countries in the region, like Hungary, Slovakia etc. Considering the growth potential of PPA S.A., the following development targets could be set for PPA's activities for 2030:

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- Container to 10m TEUs (up from 4m in 2016).
 - Ro-Ro to 770,000 movements (up from 362,000 in 2016).
 - New Warehouses 53,000 sqm (up from 13,000 sqm in 2016).
-

Ship repair has experienced a significant decline between 2008 and 2017. For this reason, the revival of ship repair holds significant importance in PPA's strategy, as it is expected to positively impact both the economy of Piraeus and Greece as a whole in the following ways:

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- Strengthening the ship repair activity and increasing its turnover.
 - Expanding the workforce with skilled employees, with a parallel reduction in informal labor.
 - Increasing tax revenues for the Greek State, encompassing income tax and employer's contributions, among others.
-

Based on the Master Plan, the planned development distinguishes and serves the following strategic pillars (DomosFeron, 2018):

- Primary importance in terms of Mediterranean cruise.
 - Gateway from the south for trade between Europe and China.
 - Transport hub serving passengers throughout Greece.
 - Shipbuilding and repair center of the Eastern Mediterranean.
-

In fact, for the successful implementation of the planning objectives, the PPA has already initiated new projects and further development of existing infrastructure. These investment projects hold a significant place within the new PPA Master Plan , which spans over 35 years with 5-year investment renewal periods. The following investments are currently underway:

Some of the aforementioned investments have already been executed, particularly those related to shipyard infrastructure, studies and equipment supply, totaling EUR 68 million.

If implemented, the above investments will contribute to the economic development of the port and to the stimulation of the local economy by attracting an increased volume of passengers to Piraeus. The improved infrastructure and services to both domestic and international tourists will have positive impacts on the economic, social and cultural levels. Consequently, these benefits will directly impact the national economy, as Piraeus is now becoming an internationally recognized tourist destination. The PPA's objectives for Greece's long-term development can be summarized in three main points:

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- (a) Transforming Greece into the Southeast gateway (passenger home port, O&D trading) and transit hub of Europe (passenger transit, cargo transshipment) for the Chinese market. This will further promote and strengthen Piraeus vision of becoming a truly "international" city that attracts companies, tourists and consumers from all over the world.
 - (b) Reviving the ever-shrinking shipbuilding industry, which is crucial for boosting the local economy and reducing unemployment. This action will also contribute to improving the quality of life of local residents by transitioning to more environmentally friendly investments.
 - (c) Strengthening the local economy through the multiplier effect of planned investments. Piraeus' vision is to become a truly global player and the focal point of tourism, industry and maritime activities in Southern Europe. All the actions outlined in the masterplan will elevate the prospects for local investment, strengthen the local economy, reduce unemployment while increasing well-paid jobs and make Piraeus a more appealing city. The fundamental aspect of this investment is to create a city that is welcoming to residents, visitors and entrepreneurs, combining smart technology, sustainable growth and development initiatives that benefit the local economy and society productively.
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IV. Results

Roundtable Research Method:

In order to assess the advantages and disadvantages of the projects expected to be implemented to improve the interaction between the port and the city of Piraeus, numerous qualitative data were collected through an unstructured interview survey. Thus, a roundtable discussion was organized and responses were collected on the topic studied, the relationship between the city and the port of Piraeus. The responses were obtained by involving three representatives of decision makers for the city and port of Piraeus, Hellenic Chamber of Commerce and Industry, PCP and PPA SA. The questions of the roundtable discussion are presented in Table no1.

The answers given by the roundtable participants were categorized and summarized, highlighting the actual state of the interaction of the port-city dipole. The responses laid a fertile foundation for drawing valuable conclusions and focusing on optimizing the decisions expected to be made in the near future regarding the completion of the ISI and PPA masterplan projects.

Table no1: Roundtable Questions

Q1: Which governance and management model is considered capable of leading to the restoration of the city-port relationship and the development of both parties?
Q2: How can the development of the commercial - tourist part of the port contribute to the sustainability of the local community?
Q3: How can urban planning be affected by the operation of the port?
Q4: Can the innovative solutions can contribute to strengthening the city-port relationship?
Q5: Can the port services can be interconnected with city services in the context of the meeting and optimising the needs of passengers, customers?
Q6: What conditions should do you think a sustainable relationship between city and port should contain?
Q7: What is the healthiest way the functioning of a decision-making system between the stakeholders and the managers of the City and Port relationship?
Q8: Now that the global liberalization of international trade and the explosive growth of Asian markets have caused the expansion of scale in the seaport sector and at the same time have increased the competition between ports aiming at. How do you think the city can positively influence the upgrading of the port?
Q9: To what extent does the city's economy depend on the port? Do you consider it necessary to transfer port activities to new facilities in order to restore the relationship between the city and the port?
Q10: What are the areas that the port should look for to better serve its port functions and how is it considered that this process is feasible to enhance the local economy?
Q11: How can the urban coast of Piraeus benefit from the international networking of the port?
Q12: Can the harbour's privatisation lead to its isolation from the city or can it be a productive factor in strengthening the relationship between the city and the harbour and if and if so, in what way?
Q13: How can the upgrading urban functions can serve part of the port functions?
Q14: How can the participation of local private enterprises in sea-oriented and land-oriented port operations be strengthened?
Q15: Regarding the change in the status of the use of spaces attributed to the city that are not linked to the port, but substitute urban functions linked to the port, do you think it is possible to contribute positively to improving the relationship?

- Representative of CICP

The PPA acts as the managing authority of the Port of Piraeus and as a provider of integrated port services within the Port of Piraeus. The State supervises all activities within the Port of Piraeus, as well as all activities within the land and sea areas of the Port of Piraeus, in accordance with the provisions of the Concession Agreement and applicable legislation.

The role of the ports has transformed from entry/exit points and contact points with the liquid element to dynamic multi-dimensional centers capable of demonstrating significant transport/business capacity. The modern port is a triumph of logistics, a provider of multiple and large-scale services, a powerful part of the supply chain and a carrier of the global production-consumption network. Piraeus has already implemented an "Operational Development Programme" for the period 2018-2024, which provides for the development and prescribes the relevant developments for innovation in entrepreneurship based on the blue economy.

The port is primarily linked to the city it surrounds and acts as a driving force for its development. It is an integral part of the social and economic life of the city. It goes hand in hand with it and is a strong comparative advantage for the local economy. The port of Piraeus must be a port of significant size and international recognition and competitiveness. Therefore, current port policies should demonstrate activities to support and maintain social cohesion, aiming at sustainability and sustainable development for the wider country. The most successful global cities are usually coastal cities and include within them key port operators/heavy entities. The activities that develop within it, even if they have to be relocated to new facilities, always in the context of a well-functioning port industry, contribute to the development of trade and the export of local products.

Through the international networking of the port, a range of information/information and opportunities arise, e.g. on issues related to the city-port interaction itself, but also methodologies for the exchange of "best available techniques" or for the implementation of strategic policies to address issues and major issues arising from this dynamic city-port interaction, making the port the most modern port in South-East Europe and the Mediterranean. Balanced city-port living is a key issue, which addresses both parts of this respectively, essentially solutions, activities and design of projects/actions that touch this approach. Therefore, at the administrative level, a commensurate share of the actions and activities attributed to this framework must be undertaken in order to achieve a genuine, sincere and performative relationship/interaction between the two.

Its proposals relate to increasing exports in terms of supplying ships serving international routes, but also to strengthening, promoting, and exploiting cruise shipping by further simplifying customs clearance/export procedures, consulting and updating customs legislation and resolving supply chain issues. At the same time, proposals have been envisaged both for industrial restructuring, the promotion of manufacturing through the relevant maritime cluster - Maritime Hellas, and for the restart of the Shipyards (while adding further value to the shipbuilding and repair units), with the overall aim of making Piraeus the most important maritime centre in the Mediterranean. Ports and cities are involved in regular competitions at a strategic level on effective control, management, and effective spatial supervision. Therefore, the pressing issue automatically arises to jointly redefine both the contested spatial uses within the urban urban urban fabric of the city/port and to successfully meet/serve the needs/desires of both the city and the port.

- Representative of PPA

As a private company, PPA SA can cooperate to improve conditions, provided that it is not dependent on the intervention of political parties. It is PPA's duty to become the most important port in the Eastern Mediterranean. In the shipping sector, it should become a port with modern services for passengers, tourists and shipping companies. In the container sector, it is already one of the leading ports abroad. All its uses, with a social face, should become profitable and provide high quality services.

A city next to a port must first of all be favoured in terms of human resources, the city must give its citizens the opportunity to work in the port area to avoid unemployment. In terms of development the PPA is possible to benefit the city on the commercial side if the cargo is managed by the port and doesn't leave it. This could be an opportunity for some businesses and professionals to be benefited. The economic and social dependence of the city on the port, according to the PPA representative, is in the range of 30-40%.

The port area is zoned and PPA is interested in what can be done within the port area. The port of Piraeus is suffocating, there is no space in many places, the urban fabric is too close to the city.

A few years ago, there was an ambitious plan to create a cluster of ports in Attica through the prospect of COSCO's proposal to the Greek state for the acquisition of terminals such as Lavrio, Rafina or Elefsina, which would lead to the decongestion of the port of Piraeus. It should be noted that it will not be necessary to carry out urban planning interventions to fulfil the functions of the port if some companies transfer their operations to other ports.

The "bet" of Piraeus is to gain growth in tourism. Unfortunately, these days, when a tourist arrives, is guided around Athens, visiting Acropolis and other places, but not Piraeus. Several disadvantages of the city, like the suffocation in the summer periods, the uncontrolled parking, the garbage, prevent visiting some of Piraeus' historical places, like the historic Zeus Harbour, the Archaeological Museum, the whole coastal area, the Naval Cadet School, Pasmali, Mikrolimano, Aetonia Gate and others.

The management focuses on the development of all the activities that the port currently has, as well as on adopting new ones. In terms of container growth, the port has risen to very high positions and will continue to rise. This fact does not mean that the cargoes are related to the Greek market. It related only to the transshipments that take place. Only 10% of the cargo handled is related to the Greek market, the rest comes and goes either by ship, lorry or train. Another way to reduce congestion is to develop the railways.

Piraeus has the very big advantage of being the first major port after Suez. The cruise industry is affected by the geopolitical situation at the moment, presenting a decline. Piraeus has the advantage of Acropolis, but this advantage is not sufficient. As the development of other ports for cruises takes place at the same time, it is important to put Piraeus as a stopover for other itineraries already planned. The cruise industry is a sector of interest, and the administration wants to set up a passenger terminal there, something like a new shopping center. The master plan's purpose is not only to meet the needs of the port policy, but also to include some investments that are mandatory to be made in the next four to five years, which are foreseen in the concession contract from the Greek government to PPA.

A major cruise port expansion project is imminent, which has been strongly opposed by the local community as they argue that this will lead to a huge suburban degradation. Thousands of passengers will be brought, and the city of Piraeus does not have the capacity to serve them. Thus, the citizens believe that this will result in an increase in bus traffic and degradation of the areas, making the daily life of citizens more difficult. On the other hand, the analysis shows that it will bring new jobs and increase revenues. It is of utmost importance that this investment is conducted in synergy with the city.

In order to achieve a genuine and effective relationship and interaction between the port and the city, an appropriate part of the actions and activities attributed to this framework must be carried out at the administrative level.

- Representative of PCP

The cooperation and the development of synergies between the port and business community can bring significant added value to businesses from the operation of the port. Also, it should be noted that there is a need for greater integration and synergies between the port operations and the local economy, with the footnote that Piraeus is already saturated in terms of urban planning and any additional burden from the possible construction of a cruise terminal will lead to further degradation. It is important to study the points of friction between the two sides. Once these have been identified, they can be discussed, and measures can be implemented to reduce their negative impact. For example, it would be beneficial for the city to work with the port to meet its rapidly growing needs. However, the port must take into account the fact that there are limits to what the city can bear.

Port services should be linked to city services in the context of meeting and optimizing the needs of passengers, customers and services that can be provided by city businesses if an appropriate supply and demand analysis is carried out. In terms of transport, there has been a proposal for the construction of an underwater tunnel so that buses can travel from one side of the port to the other underwater, so that they can exit onto the ring road and into Athens.

The interdependence between the port and the city is obvious. The benefit to the city could be greater, and the city could incorporate the port's plans into its own development plans, so that there is greater synergy and support in the actions of both parties.

Before the coast can benefit, an analysis of the impact of the port's investment initiatives is needed. Environmental impact, urbanisation and transport have not been studied thoroughly for the benefit of both sides, with the aim of upgrading the city as a whole to cope with the growing demands of the port. Synergies will emerge from an integrated demand-supply analysis of services. The role of Chambers of Commerce is key. It is important that the Chambers of Commerce take on the role of highlighting cooperation on a professional and economic level. The overall planning of the redevelopment or development of the areas around the port, which connect the city with the port and also provide an outlet for productive activities, is a topical issue. As an example, he cited the fertilizer area, which is an important area both in terms of its size and its potential for mutual unloading between the city and the port.

In overall terms, it was argued that it is possible to establish a memorandum of understanding in order to lay the foundations for a smooth relationship between a port and its city. The PPA, as a private company, can engage in a partnership that has the potential to improve conditions. Cooperation between ports and businesses, along with the development of synergies can bring significant added value to businesses. It is important to link the development of the port with the development of the city and to avoid over-concentration of activities in the port. It should also be noted that the more dynamic a port is (or has been historically), the greater the need for broader interventions, such as spatial restructuring and development of derelict areas, and for overall urban upgrading programs. The port's Master Plan is expected to have a targeted policy to strengthen the city-port relationship.

It is important for the port to be a "point of contact" for the maritime and commercial world of businesses, citizens, users, and residents of the city. The port closely aligns with the city and has a specific economic role. Port policies should include activities to support and maintain social cohesion and sustainability. In addition, successful port management is considered essential both for the local scale and for society in general. It is therefore noted that the port is now a suitable location for new investment and entrepreneurship, towards further wider development and the creation of new/upgraded infrastructure and jobs. It is important to achieve a balanced coexistence of both industry and the urban fabric which will be able to protect and further promote port development and entrepreneurship, as well as provide economic vitality to cities.

The optimal enhancement of the interaction and the maximization of the positive relationship between the port and the city of Piraeus revolve around four pillars, financial aspect, urban redevelopment, infrastructure improvement and social cohesion. The present study focuses on the following two actions, which are expected to have the maximum impact on the four pillars, the Integrated Spatial Investment (ISI) and the master plan of the Piraeus Port Authority. The following analysis, part of which was based on the literature study, covers the four scenarios of the implementation or not of the above actions, individually, jointly and the scenario of not implementing either of them. All scenarios are evaluated according to sixteen criteria resulting from the aforementioned four pillars, as presented in Table no.2.

- The Scenarios

The complexity of urban formations underlines the need for holistic and multi-faceted planning, not based on one-size-fits-all solutions. As mentioned above, four different future conditions result from the implementation or non-implementation of the ISI and PPA plans for the port and city of Piraeus.

The four scenarios are as follows: The "No" scenario, where no new interventions or policies are implemented and the status quo which is reflected in Table no1 and roundtable discussion continues; the "ISI" scenario, where only the Spatial Investment, with its strengths and limitations, is implemented; the "PPA Master Plan" scenario, with its respective strengths and weaknesses; and the combined scenario, where both development processes are implemented.

In the second scenario, "ISI" scenario, the emphasis is placed on the integrated development of all the spatial units of Piraeus, depending on the comparative advantages of each area and the available resources that can be exploited for this purpose. This scenario promotes the strengthening of the centrality of Piraeus, the strengthening of social cohesion, the enhancement of the natural environment of the area and the creation of new business and tourism poles. The completion of the ISI interventions will ensure the social cohesion of Piraeus. The municipal administration will have full knowledge of the citizens' needs, while there will be systematic identification of vulnerable groups so that the necessary actions can be planned. The new welfare and education structures will ensure equal opportunities for all citizens, while social inclusion actions will eliminate social exclusion of the weak. The new conditions in the field of entrepreneurship and employment will also contribute to this. The reorganization of sectors such as land and sea transport and port services will create new permanent jobs for the city's inhabitants. In addition, the creation of the Entrepreneurship Point in the city will create new opportunities for residents to set up their own businesses. It is worth mentioning that the use of broadband networks and the use of smart city principles will further empower local businesses with new resources which in turn will lead to increased employment and possibly increased labour productivity. The future image of Piraeus will be clearly improved in terms of the quality of life for residents and visitors alike. A wide network of soft

roads will connect the residential areas with green areas, public transport stops, as well as with the urban center, the port, the sea front and sports and educational facilities. The residents of Piraeus will have reclaimed public space, limiting the use of private cars, which used to consume their time and be a burden on their health. The targeted redevelopment of spaces and areas and their alignment with the principles of sustainable mobility will make the city of Piraeus an attraction for home ownership.

In addition, the tourist image of Piraeus will be different after the completion of ISI's interventions. Upgrading Piraeus always means upgrading the most important sea gateway to Attica. This condition, combined with the development of the transport network, means a strengthening of tourist flows at regional level. The strengthening of tourism and its combination with Attica's timeless cultural product will boost the flourishing of modern cultural creation and areas where creative activities are concentrated. This development will also be important for the city's residents, however, as it will be based on sustainable forms and respect cultural identity, the social fabric and the natural environment. The development of the mass transport network will reinforce the existing role of Piraeus as the center of the Regional Unit, but will also link the western districts with it. This development creates the conditions for stimulating the commercial market and strengthening its hyper-local character, while at the same time it will make the city of Piraeus as a center for administrative services and other hyper-local uses (e.g. Health - Hospitals) more accessible and affordable.

In the third scenario, the "PPA Master Plan" scenario, emphasis is placed on the commercial and business development of the port of Piraeus, aiming at upgrading infrastructure and services, the inflow of new capital, the enhancement of productive capacities and the fight against unemployment. The implementation of the Development Programme will create multiple benefits both for the residents of the Municipality of Piraeus (and the entire regional city) and for the national economy (and Greece in general). Firstly, through the significant investment in fixed capital, the city of Piraeus will gain significant added value both in economic and social terms. New jobs will be created, demand in the residential, retail and office market will be boosted. The change in the appearance of Piraeus through the combined projects that will be implemented will enhance the city's role as a hub of entry to the Mediterranean, with the direct consequence of boosting tourist flows through cruises and increasing the average stay of tourists in the city. Most importantly for the city of Piraeus, it is proposed that these important investments (which cumulatively can further significantly enhance both the image and the innovation of the city) be maintained in their entirety.

Successful commercial development will create benefits for the local economy while at the same time creating a positive climate for increased investment in Greece. The multiplier effect of the PPA's activity on the local economy may completely change the landscape of the local economy: e.g. in Singapore, the development of cruise tourism has increased the turnover of the local economy by a factor of 70-160 times the port's revenue. Analogously, an increase of 50-60 times the port revenue in the PPA from similar activities would lead to the creation of thousands of new jobs over the next 30 years. Finally, it should be noted that the importance of the implementation of the PPA Master Plan is of hyper-local importance and has a direct impact for the entire country as it will provide additional fiscal resources on the one hand, and on the other hand, it will significantly strengthen the labour market through new jobs and thus benefit the Gross Domestic Product.

In conclusion, both the Piraeus ISI and the PPA's Master Plan will lead to the economic and business development of the city of Piraeus, making it a direct competitor of the major European port cities, as well as the largest sea gateway to Greece, the Mediterranean and the Balkans. The implementation of the ISI is accompanied by measures to improve the urban environment and strengthen social cohesion through actions to support the weaker social groups. On the other hand, the implementation of the PPA masterplan, as a private initiative, aims at modernizing the port's infrastructure, facilities and services, with a particular emphasis on commercial and economic results. The implementation of the master plan will, of course, as mentioned above, contribute to improving the quality of life of the inhabitants and the environment, but this will be an indirect result and not a direct objective of the project.

According to the German Nature and Biodiversity Conservation Union (NABU), the increase in pollution in ports is due to exhaust gases from cruise ships, which are 3,500 times more polluting than oil, but unlike cars and lorries, there is no exhaust gas treatment. These figures show the need to adopt measures and policies to reduce emissions from cruise ships, as well as from coastal or commercial vessels entering ports, which have a significant impact on local health.

It is noteworthy that PPA, in collaboration with the University of Piraeus and Cardiff University (UK), conducts an annual marine environmental quality monitoring program. Water and sediment samples are taken and analyzed for microbiological, physical and chemical factors twice a year throughout the port area under PPA's jurisdiction. In addition, as part of the implementation of the Central Port dredging project, a special technical study has been carried out to ensure the rational management of dredged material.

The success of the attempted changes promoted through the above scenarios for a balanced development of the relationship between the city and the port of Piraeus, with the citizen at the centre, depends directly on the existence of a strong commitment from all those involved and involved in the various stages of its implementation and monitoring.

The evaluation process is an important part of a land-use planning study, as a comparison is made between the alternatives based on evaluation criteria and the best alternative scenario is assigned to achieve the objective. Based on the literature, the impacts of the four scenarios were qualitatively assessed in the pillars of economy, infrastructure, social cohesion and urban regeneration. The evaluation was carried out according to the data presented so far in the study and the data obtained from the unstructured roundtable method. The assessment is presented in Table no.2 at scale and expanded in more detail to 16 criteria that will affect the project.

The economic criteria are economic development, incentives for investment in the area and entrepreneurship. In terms of social impact, the criteria are social cohesion, creation of new jobs, improvement of the quality of life of local residents, more efficient and fuller use of existing human resources and integration into the local community. The criteria for urban regeneration are the sustainability of the proposed new spatial pattern, the role of the Municipality of Piraeus, the enhancement of the city and the port, the strengthening of local identity and the attraction of visitors. The criteria relating to infrastructure concern its improvement, the promotion of sustainable mobility and its cost.

The comparison of the alternative scenarios and the calculation of their performance against the evaluation criteria is conducted using a qualitative performance scale, which ranks the performance of each scenario on each criterion as "Poor" (indicator 1), "Moderate" (indicator 2) and "Good" (indicator 3), where S1 is the no scenario, S2 is the ISI scenario, S3 is the PPA master plan scenario and C4 is the combined scenario.

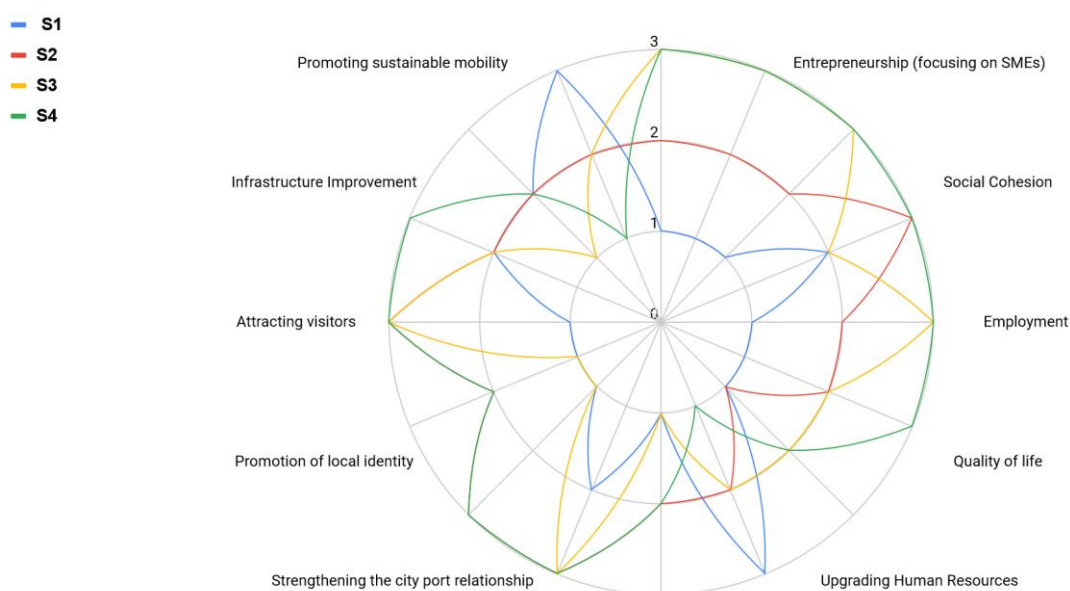
Considering the advantages and disadvantages of each scenario, as well as the opportunities and risks created by the external environment at each time, the trends for each scenario and the best scenario for the study area among all others were identified. According to the above illustration, the optimal or "good" solution (indicator 3) is represented by the outer circle. It is obvious that S1 only touches the outer circle at 2 of its 16 points, S2 at 4 of its 16 points, S3 at 6 of its 16 points and finally C4 at 10 of its 16 points.

Therefore, according to the diagram, the best scenario is the Combined Scenario, i.e. scenario number 4 (S4), as it performs "well" on 3 out of 3 criteria of the economic group, 3 out of 5 criteria of the social group, 3 out of 5 criteria of the urban group and 1 out of 3 criteria of the infrastructure group.

Table no2: Evaluation Criteria of the different scenarios.

		Evaluation Criteria	Scenarios			
			S1	S2	S3	S4
Financial	K1	Economic Development	1	2	3	3
	K2	Incentives for investment	1	2	3	3
	K3	Entrepreneurship (focusing on SMEs)	1	2	3	3
Social	K4	Social Cohesion	2	3	2	3
	K5	Employment	1	2	3	3
	K6	Quality of life	1	2	2	3
	K7	Upgrading Human Resources	1	1	2	2
	K8	Integration into the local community	3	2	2	1
Urban	K9	Sustainable spatial pattern	1	2	1	2
	K10	Role of Piraeus (scope as a metropolitan centre)	2	3	3	3
	K11	Strengthening the city port relationship	1	3	1	3
	K12	Promotion of local identity	1	2	1	2
	K13	Attracting visitors	1	3	3	3
Infrastructure	K14	Infrastructure Improvement	2	2	2	3
	K15	Promoting sustainable mobility	2	2	1	2
	K16	Infrastructure Costs (construction and maintenance)	3	2	2	1

Graph no1: Evaluation Criteria of the different scenarios.



V. Conclusions

The study initially reviewed the historical relationship between ports and cities, emphasizing trade as a key driver of port development. It highlighted that urban regeneration often depends on the commercial activities generated by ports. Obsolete port facilities can be repurposed to enhance the urban environment, fostering the prosperity and development of port cities.

International trends in maritime transport and European policies were discussed, considering the importance of Greek ports in the context of international transport networks. Western Greek ports were analyzed, highlighting their potential and challenges.

An essential conclusion drawn from the study of the ports is that ports are engines of growth and pillars of support for an economy. Therefore, a comprehensive approach and overall design are envisioned to maximize their multimodal functionalities and potentials. Furthermore, it can be concluded that offering value-added port services significantly enhances their economic aspects, enhancing their appeal to investors and customers. These factors highlight the vital role of ports in the national economy. It should be noted that port services and activities now take place in a significantly transformed and modernized multidimensional environment where new infrastructures and innovative solutions have turned ports into complex, multi-level business areas, serving both goods and passenger traffic.

Regarding Greek ports, they need a comprehensive update to address economic challenges, competitiveness, transparency, environmental factors, community involvement, and investment attraction. Their development potential depends on serving both maritime transport demand and the hinterland, emphasizing enhanced transport infrastructure to support economic growth, innovation, and local employment opportunities. Transport networks and infrastructure play a crucial role in supporting economic activities and promoting local development.

The ISI strategy of Municipality of Piraeus aims to boost tourism by improving urban mobility, enhancing public spaces, and increasing green areas. This will help establish Piraeus as a tourist destination, fostering economic growth and supporting creative entrepreneurship. The "Strategy for Blue Growth" in Piraeus seeks to develop synergies within the Blue Economy, but there's concern that cultural and tourism projects might lead to social segregation. To prevent this, it's proposed to mix social groups across the Piraeus area instead of organizing them based on proximity to the port.

The main conclusion for avoiding segregation during the implementation of the redevelopments leads to the following proposals: a) promoting the cooperation of many actors for planning, b) developing scenarios that will enhance the role of the city, respecting its identity and strengthening its relationship with the port and c) creating observation tools for the changes in the Municipality of Piraeus.

Subsequently, in order to implement the above proposals, an unstructured survey in the form of a roundtable was conducted with three representatives of stakeholders (PCP, PPA and CICP), involved in decision-

making of Piraeus. This research highlighted several key conclusions. First, fostering cooperation between the port and businesses, along with developing synergies, can significantly enhance business value. Second, there is a critical need to link port development with city development while avoiding an overconcentration of activities in the port area. Also, collaboration between the city and the port can address the city's growing needs and attract new investments.

Additionally, the analysis of different scenarios for implementing ISI investments and the PPA master plan for Piraeus indicates that these initiatives will lead to substantial economic and financial development, positioning Piraeus as a major competitor among European cities with ports and solidifying its role as a prominent maritime gateway for Greece, the Mediterranean, and the Balkans.

The implementation of the ISI entails measures geared toward enhancing the urban landscape and promoting social unity by providing assistance to disadvantaged social segments. Conversely, the execution of the PPA masterplan, being a privately driven endeavor, seeks to modernize the port's infrastructure, amenities, and services, with a specific focus on commercial and economic outcomes. While this initiative will indirectly contribute to enhancing the residents' quality of life and the environment, its primary aim lies in bolstering commercial and economic performance.

After evaluating the aforementioned scenarios, it becomes evident that both investments, ISI and Master Plan should be implemented in a combined manner. This approach, despite its associated high costs and potential challenges in terms of social acceptance, emerges as the most comprehensive and advantageous solution. The Combined Scenario not only addresses a wide range of objectives but also sets the municipality on a path towards a more promising future. It promises significant economic benefits and the potential for robust social development, making it the most favorable choice among the given scenarios.

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