

# The impact of the port on the accessibility of the water front

## Case study: Tartous port

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### ABSTRACT

The waterfront was linked to the port and the city through a strong historical relationship which it formed the focal point for urban activity, port's activity and functions, and for the integration between them. On the other hand, this relationship has various forms of connection, separation, and re-coexistence, which in turn revealed the collapse of the traditional spatial and social structures of the ports, their increasing consumption in the linear spaces of the waterfront, and the appearance of conflicts resulting from the increasing separation of the port from the city, which in turn affected the accessibility of the city's waterfront. The functions of the Syrian commercial ports on the eastern shore of the Mediterranean Sea (Tartus, Latakia) have gone through important stages of development that had repercussions on the waterfront of this ports cities. In the case of Tartous commercial, the impact of the port and the development of land transport services on the urban waterfront and its accessibility appeared.

**Keywords:** waterfront accessibility, Port land transport network, port functions

## I. INTRODUCTION

ports and transport networks literatures largely focus on technical (network and node performance) and/or institutional (transport actors and their strategies) issues. This focus is due to the traditional separation between urban geography and transport geography and the contemporary phenomenon of the separation of port -city where The interaction between the transportation system and the port is one of the most important and complex relationships between a port and its city. The port often affects the organization of land transport infrastructure and causes structural imbalances related to traffic problems. The presence of the port also contributes to the assembly and organization of the transport networks which feed it, and on the quality of the infrastructure and the land transport system affects the development of port activity.

This paper examines the interactions of the port and the waterfront at the level of the evolution impacts of ports functions transformations and the accessibility of the city's waterfront and contemporary trends in coordination between them.

## II. SEA PORT CITIES WATERFRONTS

Coastal cities are distinguished by their architectural and urban character, and may combine several urban activities that dominate and shape their urban landscape and make them differ from each other. Among the most important forms of them are the tourist coastal city, in which the natural landscape is invested to develop tourism, and the industrial and commercial coastal city, and the ports are considered places for the development of industry there and for its regional openness. [1]

### A. Urban characteristics of waterfronts

Waterfronts were affected by the basic forms of urban development of coastal cities, they can be summarized in three cases at the planning level:

- Development in line with the sea, where the city develops in line with the sea and moves towards the sea as a center of attraction. This type is found in flat sites that support the linear development of the city.
- Development perpendicular to the sea, which is the case in which the city develops vertically in relation to the land. This development takes place in sites with slopes or rugged terrain and at water outfalls in the sea. These sites allow a view of the sea due to the difference in levels therein.
- The third joint development, when the city develops simultaneously in line with the sea and perpendicular to it, and this depends on the diverse morphology of the land, between flat and sloping. [1]

Urban planning of waterfronts provides several functions, most important of them are:

- The port zones of the port as a multimodal platform for exchange between water and land. These transitional areas between water and land constitute places where military port activities, fishing, industry, trade, tourism and entertainment gather.
- -The marine station is a common component of the commercial, industrial, touristic and recreational ports. It is a facility that provides high-quality public space for the city, well served by road and railway networks.

- Marine parks translate into the landscape the competitive planning and social practices associated with marine promenades and support the vitality of the urban aspect.
- Places for tourism, sunbathing, and relaxation on the waterfront, allowing easy access to the sea and practicing other activities. [1]
- Its dual logic of attracting and repelling material flows, which directly affects the waterfront area and the redevelopment of its spaces[5].

waterfronts urban planning Organized operations also allow for breakthroughs in order to maintain the visual connection between the city and the sea to counter the influence of urban growth parallel to the sea, and to achieve physical connection through organizing roads and boulevards that usually lead to the organized places on the waterfront. In addition, public spaces oriented towards the sea are organized to create a sea view and to provide relaxation and sunbathing. [1]

for determining the spatial scope of the city's waterfront, it requires a complete morphological study, because it has variable relationships that changes with city changes located in. Although many researches has sought to establish foundations for the spatial definition of the waterfront, it remains insufficient. On the other hand, this research confirmed the presence some important variables in this field related to distance, arrival time, density, and connectivity. This was considered one of the most important foundations influencing the definition of the waterfront, and it changes from one case to another. [2]

### **B. Waterfront functions in port cities**

The literatures dealt with the concept of port cities from many aspects, showing its development and complicating. A port in the coastal city, make it different from any other city, because the city's growth depends on the port development and the economic income it generates. This growth is also linked to the roads and facilities that connect port with the city and affect the form and stages of urban communities development [3] . It also represents the dual features of ports and cities, their role is not limited to being connection points for transportation systems, but also a center for regional social and economic activities (1997 Hoyle). It combines three basic elements: [4]

- The port as a technical agency meets specific conditions regarding ship arrival, parking, and storage.
- Activities related to port function, industry and the coast.
- The city with its morphology, population and activities.

The relationships between these three elements are functional, spatial, human and variable, organizing themselves in space in an integrated and sometimes contradictory manner. Therefore, there is no specific definition of the port city, but according to Ducruet, it is still the focus of interest of researchers in various fields for two reasons:

- Its complex development mechanism linked to land and sea transportation and the settlement system on the one hand, and the needs of operators and obstacles of the local community on the other hand.

Therefore ports-cities waterfront is not recognized as a mono-functional site, but rather is defined by three basic urban features and the interrelationships between them, related to spatial formation, operation represented by urban transport and technical infrastructure, and the function associated with public space which able to meet the necessary conditions for necessary, optional and social activities. The quality of public space is determined by the availability of this three features on the site and the ability to meet the residents' demands. Therefore, the formation of the waterfront becomes the focus of the city's activity on it. Urban waterfronts can also be imagined as transitional areas between ports and urban areas as places of conflict and cooperation. [6]

### **C. waterfronts Aaccessibility**

Studies have shown the factors affecting the accessibility of waterfronts related to rivers and summarized them in several factors, the most important of which are:

1. **Visual communication:** The visual element is considered one of the main determinants of the waterfront, and it does not necessarily need all its components to be directly facing the water, but it is sufficient to look at the river (Breen, 1994), and the visual vision of the water element changes depending on the river sector and the urban sector adjacent to it.
2. **Moral communication:** The interaction and activity of the community on the water body is one of the important criteria defining the waterfront, and visual communication is not complete unless there is a meaning that encourages presence on the river, which is what was defined (Kloster, 1987) as moral-psychological communication. The historical connection to the river (although it was later cut off) is also considered an important moral foundation for determining the depth of the riverfront. It has been suggested that poor community awareness of the river and its importance may weaken moral communication, which has been called weak interpretive communication (Breen 1994). Moral communication is also weakened by the presence of physical obstacles (because they weaken physical and visual communication), which leads to weak mental communication. In turn, institutional obstacles and sometimes economic, political and security factors negatively affect moral communication. Also, the lack of homogeneity on the riverfront may make the community feel uncomfortable and lose its moral connection to it.
3. **Physical communication:** Physical communication remains the last important variable within the framework of the comprehensive concept of communication, because without visual or moral communication, physical communication will have no real meaning for society. Physical connectivity is

determined in different ways, but the higher the permeability of the interface, the greater the physical connectivity. Permeability means the number of entry points to the interface (one point for every 200 m). Permeability was considered strong with 3 entrances and weak with one entrance. [5]

Connectivity is the primary planning strategy used to evaluate the benefits of functional and structural connections in urban waterfront redevelopment projects, especially considering coastal access as a social demand and collective desire (Corbin 1990). [7]

Regarding the accessibility of waterfronts, there were various references and waterfront planning guides that dealt with the standard of connectivity in both its physical and visual parts, and showed the importance of sea vision (in Robert Samuel's hypothesis) in its impact on urban expansion in coastal areas and in its importance in coastal management. So there is a spatial relationship between visual accessibility and land use on the waterfront [8] Also added to the physical connection of the water body is the moral connection, that is, the interaction and activity of the community with the water. This is considered one of the important and defining criteria for the waterfront. Waterfront projects may include structures that may not be directly in front of the water, but have a visual or historical connection to it. [9]

### III. THE EFFECT OF THE PORT FUNCTION ON THE ACCESSIBILITY OF THE WATERFRONT

What is the role of the port in explaining the problem of access to the waterfront? The role of the port can be explained by the structural transformation of its functions, the change in its spatial connection to the waterfront, the expansion of the port's land transport network, and its intersection with the urban transport network.

#### A. Structural transformation of port functions

The port, as an interface between sea and land, the meeting point of intertwined land and sea transportation lines, and a place of multimodal convergence, constitutes a transit area and a sea gateway through which passengers and goods pass. Over time, the fundamental changes and the functions of seaports deepened. Over the past 50 years, major European seaports, in their traditional role (as places for transshipment and storage of goods), have been opened up to new functions. The same applies to industrial employment, which expanded rapidly after World War II. Some seaports have become true industrial complexes hosting a wide range of related industrial activities, but over time interest has focused on the logistical function of seaports. The access points formed by major seaports also have a number of possibilities related to value-added logistics services that integrate production and distribution chains. Therefore, modern seaports are no longer simple transshipment centres, but have become a link in a logistics system, noting that not all ports go through these different stages of development. We consider ports and port cities to be dynamic phenomena. The development of ports

has gone through several generations, each of which represents different spatial characteristics and a level of technical equipment. Table (1) shows the functional and spatial development of seaports and the spatial and functional links that connect their generations to the maritime and land aspects of pre-shipment or After [10]

TABLE I  
FUNCTIONAL AND SPATIAL DEVELOPMENT OF SEAPORTS[10]

Functional organization				
Port Generation	1G port	2G port	port 3G	4G port
Development period (Western European ports)	Before the 1960s	After the 1980s 2000	After the 1980s	2000
port functions	(1)Recharge (2)Storage (3) Trade	From (1) to (3)+(4)Industry	To (4) + (1) from Distribution (5)	To (5) + (1) from (6) Logistics control
Production type	Basic freight forwarding service Low added value	Shipping forwarding Shipping processing Bundled services Improve value added complementary service Low added value	Shipping routing/information Distribution of shipments Multiple service panel High added value (port direction)	Shipping flow/information on Shipping distribution/information Multiple service panel High added value (network direction) Channel management
Shipping type	Non-standardized merchandise	Unconsolidated cargo and dry/liquid bulk cargo	Bulk and consolidated cargo/containers	Miscellaneous goods/ Information containers
Port organization and strategy				
Port Authority tasks	Marine Services (1)	(1) + (2) Site development (land and infrastructure)	(1)+ (2) + (3) Marketing port activities Commercial	(1) to (3) + Network management Commercial
Position and strategy		Expansionism Transport node and industrial and commercial centre	orientation An integrated centre for logistics and transportation services	orientation An integrated centre and network for transportation, logistics and information

#### B. Changing spatial connection of the port to the waterfront

The structural transformations that seaports underwent with their port functions brought about a clear change in their traditional activities and contributed to changing their functional and spatial organization, as they continued to move along the waterfront in search of greater spaces and depths. It has become an essential component in understanding the development and classification of port cities, despite its many generations. The development of the port function of seaports has affected the surrounding urban environment and the city's waterfront according to several dimensions (spatial, economic, social, environmental, administrative) and at several levels (local, regional). One of the most important effects at the spatial level is related to the morphological development of ports and their role in shaping land uses on the waterfront and the city. This was expressed in several models, including the Bird and Hoyle models. The most important of these changes

on the waterfront were evident in the expansion and expansion of the port’s infrastructure, the increased need for railway and road networks with their complex levels, and the development of the port’s functional specialization. The relationship between the waterfront and the port has developed due to the transformation of its port function, which has led to the accumulation of shipping routes there with the development of technological technologies and the increase in customs restrictions. At the regional level, this effect appeared through increased competition for land in port cities due to their need to develop and expand transportation networks and achieve land access to these ports. With the development of information and communications technology, the spatial competition of ports has transformed into the competition of logistical chains related to transportation. As a result, the ports exceeded the administrative boundaries of the cities and became a carrier of commercial flows between other ports, which led to leaving negative environmental impacts on the port area, its urban neighborhood, and the waterfront (pollution, noise, congestion, visual effects...). Another pattern of effects also appears related to competition for port lands left on the waterfront, which embodied the final stage of the development of the port function and the migration of ports from the urban fabric away from the city’s waterfront, which paved the way for the process of urban renewal of the waterfront and the improvement of the port-city relationship. Ducret and Lee 2006 relied on a curve shown in Fig. 1 to describe the spatial and functional development of the port city: [11]

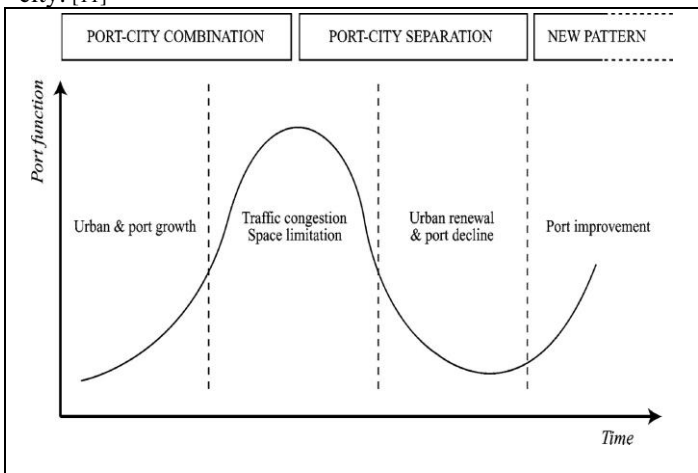


Fig. 2 Spatial and functional development of port cities (Ducrit and Lee 2006) [11]

**C. Expanding the port’s land transportation network**

The development of the container port system follows a pattern closely linked to that of the associated land services. It is believed that economies of scale associated with containers favor the concentration of a large volume of containers on a few central port platforms. This tendency towards concentration is the result of forces acting at the level of the three aspects of the triad represented by the maritime section, transit ports and routing to and from hinterland areas, even if it is the maritime component and the maritime sector that

seems to largely dictate the development of the other two components. To qualify for this status as a transshipment platform, ports adapt to structural changes in normal maritime transport by building huge container terminals capable of high throughput, which Hayuth explained in a five-stage theoretical model of container port system development in 1981. On land the enormous pressure that The development of the port hierarchy forces the collection and distribution networks in the transport chain to create land-based “hubs” (i.e. routes). This allows the expansion of the land transport network beyond seaports and thus reducing collection and distribution networks. Hence, the concentration of traffic on a few main hubs or high-speed intermodal corridors connecting seaports to major land platforms, is the most tangible outcome of this spatial and functional development. In this regard, the emergence of land hubs and corridors is essential to allow in the port system to avoid congestion of consolidation and distribution networks as well as shipping canters. Accessibility is generally defined as the ease with which activities can be accessed using a particular transportation system. Therefore, it is a tool that makes it possible to measure the quality of service between a specific place and a group of other places. In this regard accessibility is closely linked to the problem of mobility. [10] A fundamental distinction must be made at this point between “relative accessibility” and “global accessibility.” Relative accessibility describes the relationship or interconnection degree that exists between two nodes of a transportation system (a seaport and a central location, for example), while global accessibility defines the relationship or degree of interconnection that exists between a specific node (a seaport) and all other nodes that are part of the Spatial network. The first criterion will make it possible to evaluate land accessibility as a certain relationship between origin and destination by means of a link or transport corridor, while the second criterion will make it possible to measure the overall accessibility of the seaport. port land accessibility is no longer expressed simply in terms of proximity or distance, but also and increasingly in terms of transit time and reliability. The question of land access to seaports takes very different schemes depending on the cargo and mode of transport considered. It can be expressed in terms of a multi-level approach or say that the land service of seaports revolves around four interconnected layers Fig. 2:

- The first layer is specific to the facility, and the geographical location of the port is one of the basic pillars of port competitiveness in terms of access to land. Strategic location may mean the port's proximity to sea routes or to canters of production and consumption.
- The second layer is infrastructure and involves providing and operating the basic infrastructure for both the links and nodes of the transportation system.
- The third layer is the transport layer and covers all the physical aspects related to transport chains, such as the operation of transport services on the links and corridors between the port and other nodes of the transport system, and the operation of the recharge function available at the level of the different nodes of the transport system.

- The fourth layer is related to the logistics system, and to organizing transportation chains and integrating the transportation chain into the logistics chain (e.g. chain management). [10]

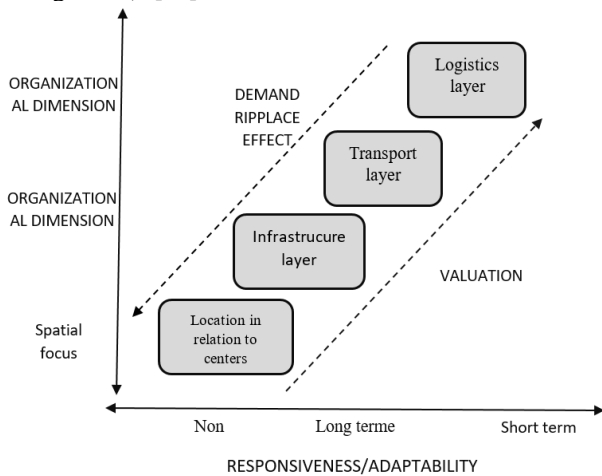


Fig. 2 Land service for sea ports [10]

In the figure shown above, the upward arrow indicates that each layer highlights the lower layers. On the other hand, the downward arrow represents the knock-on effect exerted by the upper layers on the lower layers on the demand side. In a market (demand-driven) environment, the infrastructure layer serves the transportation and logistics layers.

The first and second layers encourage a more spatial approach, while the upper layers give precedence to the functional approach. The more fundamental the layer the less responsive or adaptable (over time) to changes in market demand. Therefore, the design and construction of the main railway infrastructure (infrastructure layer) generally lasts several years, in addition to delays caused by lobby groups opposing the project or legal problems at the financial level of enterprises or construction companies.

The political aspect associated with the establishment of essential terrestrial infrastructures further complicates and prolongs the decision-making process. At the logistical level, freight forwarders and intermodal transport operators can respond almost instantly to market changes by working on the configuration of the transport chain, i.e. routing goods through the transport system.

It is important to understand the issue of land access to seaports that it is not an isolated phenomenon, but rather within a framework of relational schemes, there is a close relationship between the land service of ports on the one hand and maritime and land organization on the other hand.

Containerization and intermodal transportation were born in the 1950s due to the increasing demands placed on accessibility in terms of time. It caused a

real revolution and reshaped the modern maritime transport landscape and the competition of ports and land transport. Containerization, intermodal transport and the surrounding logistics system have led to the convergence of space and time and spatial and functional adaptations of port systems and land services. These modifications, in turn, modify the demand for accessibility and stimulate the search for effective technological and organizational innovations Fig .3 [10]

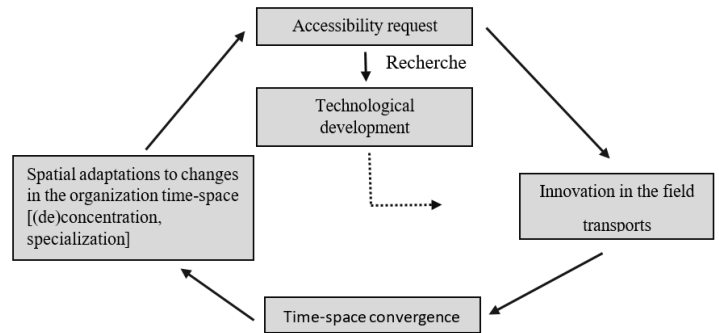


Fig. 3 Reorganization of space in response to changes in demand for accessibility [10]

#### D. Overlapping with the urban transportation network

Interactions between ports and their cities are subject to big and dynamic changes. It is no longer clear that well-functioning ports have a net positive impact on the port waterfront and city waterfront<sup>12</sup>. New areas of tension have appeared in the relationship between ports and cities as a result of conflicts with an environmental dimension, traffic congestion, pollution and other impacts resulting from port-related traffic which appear in the city waterfront<sup>12</sup>.

The transportation system related to ports is one of the factors related to the existence, operation and development of the port and one of the basic components of the functional and spatial structure of port cities<sup>2</sup>. Paradoxically, nothing divides urban space as much as the transportation network, therefore, port cities are often cut off from the water and from the port by a wide belt dedicated to road and railway transport. Therefore, cities often do not have opportunities to create attractive pedestrian access to the water or to form public spaces such as marine forums.

On the other hand, the road network and the railway network (to less extent) are used jointly by the city and the port. This fact sometimes leads to overlapping heavy traffic and passenger traffic on certain routes and other times to the formation of functional conflicts, or at least restrictions on traffic flow. Which makes it the duty of the authorities of both structures (port and city) in this case to take care of the formation of the appropriate route of the roads and their correct operation, as well as their joint financing <sup>2</sup>. The increase in freight flow in the urban transportation system forces the urban road system to deal with mixed passenger and freight transport movement with high density and general road congestion. where traffic on city-related roads includes

passenger transportation and freight traffic that supplies goods and serves companies operating in the city and its surrounding areas. while the movement of goods is generated by seaports existing in urban spaces [12].

From a port perspective, route congestion lead to increases travel times and fuel costs, reduces the reliability of commercial truck operations, increases the risk of missed schedules, and hinders the efficient use of port assets. From a city perspective, traffic congestion leads to reduced mobility of residents, loss of working time, and increased environmental costs, which have a negative impact on social luxury. Trucks dominate traffic in the hinterland of most ports, and their movement causes the majority of congestion in and around port areas and it causes the majority of external transportation-related costs[2].

Therefore, the common distinction between economic, environmental and social aspects is in the transport sector, Where the economic impacts are investigated through the benefits of transport user and transport operator and the changes in transport operating costs and travel times, While environmental impacts are related to environmental factors (transportation-related air pollution and thermal emissions), and the social dimension is mostly simplified to issues of transport congestion, traffic noise and related accidents[12]. As a result, the development of the functions provided by the seaport affects the urban transportation system, including the goods logistics system in this region [7]

#### IV. ACCESSIBILITY OF THE WATERFRONT WITHIN THE FRAMEWORK OF INTERNATIONAL GOOD PRACTICES

Strategies for the redevelopment of port-city connectivity areas were the focus of attention during working meetings organized by the European project partners on understanding the issues, constraints and challenges faced in port-city areas. The international symposium organized in Le Havre at the end of May 2007 was an opportunity to enrich the exchange of experiences in this field. Among the most important aspects that were emphasized to enhance accessibility to the waterfront in port cities are the following:

- Integrating places by respecting the accessibility of port areas, and paying attention to the accessibility of sites in the transitional interface between the port and the city.
- Integrating the urban dimension by treating the port as an urban space and also making it visible. [13]

In 2015, the Global Network of Coastal Cities (AIVP) issued a good practice guide that was concerned with generating new vocabulary and strategies that were not merely related to the urban re-appropriation of abandoned port areas, but also by maintaining the city's active port, it is no longer interruption, but diversity and integration. Therefore, the aim of the guide was to provide decision-makers and stakeholders with a tool to assist in decision-making in the face of the problems they are facing when it comes to translating this ambition in concrete terms with regard to “making the city with the port” by addressing many aspects, including those related to

addressing the transitional spaces between the port and the city. As well as addressing issues of bottlenecks, transportation and accessibility. [14]

#### V. THE IMPACT OF DEVELOPMENT OF THE PORT FUNCTION OF THE PORT OF TARTOUS ON THE CITY'S WATERFRONT:

This part reviews the applied case of the port of Tartous-Syria and its impact on the city's waterfront, through an analytical study of the chronological stages that the port function of the port of Tartous went through and monitoring its impact on the port's location and on the city's waterfront according to a set of indicators. The city of Tartous is the center of Tartous Governorate, which forms the southern part of the western seafront of Syria on the eastern coast of the Mediterranean Sea, Fig 4, with a 90-km-long beach from the Lebanese border in the south to Latakia Governorate in the north. It has a major seaport that is Syria's second gateway to Europe after the port of Latakia, and it is linked to other cities by an extensive network of highways. There are several islands in front of it, the most important of which is the inhabited island of Arwad (Arados). Fig 5



Fig 4 Location of the city of Tartous in relation to the Mediterranean Sea, noting the maritime transport lines on it [15]



Fig 5Location of the city of Tartous in relation to Syria Changes in the port function of Tartous can be monitored in several main stages that can be presented as follows:

##### A. Befor 1960:

Tartous is a historical city and seaport from the Phoenician era. It was composed of two land sections, represented by Tartous, and a sea section, represented by Arwad Island. [16] Until the late eighteenth century and the beginning of the nineteenth century, the city was inhabited only by a few families. It consisted of the old city dating back to the Crusader era and the old Roman port (Al-Sharmba), which was a small bay with a stone breakwater with a depth of 3-4 m. The function of the port at this stage before 1960 was the process of transporting goods and passengers locally from the port of Tartous to the island Arwad using handcrafted wooden boats on Arwad Island. [17] It is possible to explain the social role of the port at the level of labor and employment before 1960. There was a government office followed by a warehouse through which movement was supervised. In addition to a group of wooden boat owners (private ownership). As for the spatial impact of the port on the waterfront in this period, there was clear physical and visual accessibility to both the port and the waterfront, as there was visual and physical openness to the sea (the coastline). It can be summarized as follows:

There was a single dirt road connecting the port to the old city (currently Al-Mina Street). It is possible to physically reach the port for pedestrians or vehicles through it from the southern side, i.e. its connection point with the city (currently the southern gateway to the commercial port of Tartous). This road is parallel to the sandy coastline and seeing the sea is possible through it Fig 6 and there are no roads linking the old port at the entrance to the city. There is also no railway line linked to or reaching the port at this point in time. The port, from the beginning of the city's establishment, and until that date, there were no physical boundaries (walls) to the port, but rather it was open to the sea for the city's residents. The ancient city, surrounded by defensive walls, was in direct contact with the sea due to its high accessibility in the areas adjacent to it. The picnic area was on the coastline, starting from Nejme Square at the old city and towards the port to the north east of the port, there is a residential neighborhood made up of old Arab houses (Al-Baraniyah neighbourhood), and between it and the old city is the Mina neighbourhood, which was composed of buildings with heights not exceeding one or two floors at the time (according to the French plans estate drawn in that period) [18] This integrated configuration of the port and the city was surrounded by agricultural lands to the north and south.



Fig5 Aerial photograph of the city of Tartus 1923

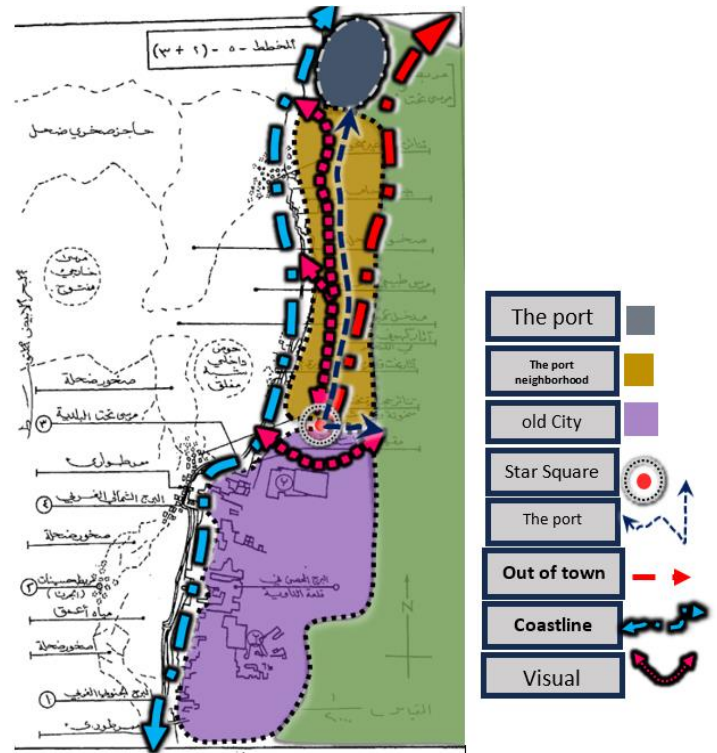


Fig 6 A diagram showing the relationship between the port and the city in the period extending from 1940-1960 AD - edited by the researcher

**B. After 1960 and the establishment of the modern commercial port:**

Work began to build the port of Tartous in 1960, and the basic phase of it was completed in 1966, and began investing in it on a limited basis during that period. [19] The port of Tartous, affiliated with the public sector, provided many port functions after 1960. The military function included the commercial function, as the port and its affiliated free zone provide 1996 provides all services necessary for loading, unloading and storage, and pays great attention to transit. It also provides services related to transporting passengers at the international level to and from Syria. It was limited to that until the year 2000, then it began to decline until it stopped in 2010. It also provides educational services (third sector), represented by At the Maritime Transport High School from 2014 until now [19], as well as the Maritime Transport Institute (higher education) from 1999 until it was discontinued and moved outside the port campus in 2019. The decline of these two functions affected the physical accessibility of the port's waterfront, and this was reflected in its image as performing only a commercial function, as it Access to it is restricted to authorized persons.

From a socio-economic perspective, it is important in Syrian foreign trade, which contributes a high percentage to the gross domestic product, and this means its contribution to the Syrian economy, as the transport sector is its main driver, as navigational traffic in Syrian ports contributes to transport by 76%, according to 2010 studies, in terms of exports. Surplus local production or by securing the goods requirements of the development process. [15] As well as transit trade, as the

productive capacity of the port of Tartous is the largest, benefiting from its proximity to the central road node in central Syria and the capital, Damascus. Because of its proximity to oil outfalls and production centers, it enjoys the closest distance to the central and southern regions of Syria, in addition to its proximity to Jordan and Lebanon, which makes it important for Arab transit. [15]

In terms of the change in the port's spatial size, it expanded to part of the waterfront of the city of Tartous, constituting 40% of it. The modern commercial port was built in place of the old port after the demolition and removal of the remaining Roman ruins in it. The port was constructed with a total area on land and sea of 3 million square meters according to the latest designs that serve ships in loading, unloading and storage. A network of railway lines was also implemented in the port, serving most of its parts and ensuring the transport of goods, in addition to land roads to and from all neighboring governorates and countries. [15] Since its establishment and entry into operation in 1960, the port's area has remained constant and has not changed until now.

**C . The spatial impact of the port on the waterfront during the period 1960 - 2003.**

The impact on roads, service relating to both the waterfront and port and accessibility:

A road was constructed that forms the entrance to the city and connects it directly to the international highway, so that the northern gate of the modern commercial port is located on it. It represents an extension of Al-Thawra Street to the north, whose construction was completed in 1960 and which served the port at times.

Customs Street was also constructed, which parallels the southern wall of the port on one side and its administrative activities on the other side, and the western entrance to the port is located on it.

- Establishing a single railway line that borders the port on its northern side, and five other branches branching out within its precincts that reach the main docks there. It was created in 1973 to connect to the phosphate dock in the port. (Note that the railway line passes through the city in the middle of it)

From the above, we find that the port is surrounded on its southern and northeastern sides by a network of modern roads and railways, which constitutes a clear physical separation of it from its urban neighborhood and the waterfront. This separation is exacerbated by the fact that the port is surrounded by high external walls accompanied by the imposition of customs restrictions, resulting in a lack of visual and physical accessibility to the waterfront in the port area.

The construction of the Corniche Marine Street after moving the fishing and picnic port to its current location south of the modern port, which led to the separation of the walls of the old city, surrounded by water, from the sea by a road no less than 15 meters wide. It also led to a change in the main point of contact between Arwad Island and the city of Tartous. According to the MAM study in 2008, it led to pressure on the city center, socially, touristically, recreationally, demographically, and traffic. [20]

Al-Najma Square, which was a public space in front of the city, was transformed into a roundabout for car traffic, where both Al-Mina Street and the Marine Corniche meet to connect to Al-Thawra Street.

The establishment of the port was accompanied by a number of uses. In 1965, a goods transport office was established (locally called the Al-Dour Office), which is located on the road that forms the entrance to the city and connects it to the international highway within the administrative boundaries of the city and not within the regulatory boundaries. It is approximately 3 km away from the port and constitutes a place to stay a stop for transit trucks. This was followed by the establishment of the free zone in 1996 on the northern wall of the port on the same road. All of this led to increased traffic pressure on the only ground-level road forming the entrance to the city, which includes both port and urban services.

- In addition to the expansion of the Al-Mina neighborhood and the Al-Baraniya neighborhood in the Customs Street area, where the administrative activities serving the port were distributed, changes occurred in the uses of lands and buildings due to the stability of employment, as many workers in the field of passenger transport between Tartous and Arwad and boat owners moved to the field of maritime transport and driving ships in the port modern Tartous, due to their experience in this field. Al-Mina Street took the status of central trade in the general organizational plan of the city of Tartous in 1964.



Fig 7 The impact of the port function on the marine internet after 1960 until 2003- edited by the researcher



productivity increased clearly between the years 2003-2011, with a private sector container terminal managing and operating the container system since 2009. [15] in addition to the issuance of Legislative Decree No. 55 in 2003, which allowed the reopening of private offices related to the port function, including leasing agencies, shipping agents, and freight forwarders, Customs clearance, agencies for employment and work on ships, in addition to the General Company for Shipping Agencies Shipco (Ship-co). Port-related operations are no longer limited to the public sector, but rather include the private sector, which now number more than 50 companies, concentrated in Tartous and some in Latakia and Damascus. This affected the Roads, services related to the waterfront, port and accessibility: in this period, as a result of the increased productivity of the port, Fig 8, a new road node was created that improves access to it between 2009 and 2015.

**D. The impact of the development of the port function on the waterfront from 2003 to 2019**



Fig 8 The impact of the development of the port function on the waterfront from 2003 to 2019 - prepared by the researcher.

It is “Al-Sheikh Saleh Al-Ali” traffic node project: The project aims to organize traffic at the northern entrance located next to the commercial port and the free zone. It is used by trucks that transport goods from and to the port, the free zone, and the role office, and connects it to the highway road (Homs-Latakia) to the rest of the regions and the Tourist cars as well, and it constitutes a connecting point

between the main streets of the city (Al-Thawra Street, Eastern Corniche, Al-Basil Street). [18]The traffic node based on three levels (ground level, tunnel, and bridge) was implemented by the General Company for Roads and Bridges, Lattakia Branch55.

Note that, in 2023 one of the directions was closed (towards Homs to serve the port only) and the direction of car’s road within the city was changed towards a single main street to reach the highway towards Latakia, and this period is outside the timeline limits of this research.

by the issuance of Legislative Decree Nu. 55 of 2003, changes occurred in the areas adjacent to the port related to urban regulations, especially regarding heights and uses, the lasts one of which, was the A0 status in 2019 for the main interface of “Al-Thawra” Str on the side extending towards the port, which allows the construction of office and commercial towers on both sides of “Al-Thawra” Str.

All this mad the area around the port and on the waterfront primarily administrative in nature, as there a high density of businesses related to the port (administrative and commercial), and suffers from traffic problems of high traffic density and pressure, especially with the lack of service parking in the area where commercial and professional buildings are mixed with residential, especially during port hours, it needs to be re-studied and rehabilitated. beside to a very high property price. The proposed port expansion will require increased services to serve this traffic.

• **The administrative and planning dimension.**

It is able to observe the port and its relationship with the waterfront within the framework of the general executive plan of Tartous city through its multiple publications between 1946 and 2016[21]

• In the 1946 plan, the general executive plan did not include a proposal related to the old port, but rather it showed “Al-Mina” and “Al-Thawra” Streets, which serve the port, and there is no railway line in this plan.

• The executive plan of 196460 did not note the existence of the port, knowing that the port existed four years before the issuance of this plan, but the “Marine Corniche Street” and “Arwad Port”, which existed due to the construction of the port, were noted.

• In the 1992 plan, a proposal for part of the node that constitutes the northern entrance is noted with the organization, but it was not invested until work on the road node began in 2015. Based on a request and funding from the Tartous’s port due to its increased productivity, and thus the case of the port of Tartous embodies a weakness in keeping up with the plans. Regulating the fundamental changes taking place on the waterfront, especially with regard to roads and accessibility.

The port’s relationship with waterfront planning within the framework of regional planning directions:

Within the framework of the planning directions for the Tartous region, a number of working papers and proposals

were presented regarding the executive plan of the city, which includes the port, are summarized as follows:

- Working to issue a decree that makes Tartous city a free zone, since its port is the most important.
- Expansion from the northern side to form residential suburbs in addition to providing other services related to the port [20]

#### • Tartous port in regional planning

##### A. The comprehensive national plan for tourism year 1974:

The study was made by The Ministry of Tourism with participation of a French work team in 1973. The study was at the regional-level, the aim was to develop the tourism sector on Syrian coast. The study area was limited to the coastal strip in Syria only, with a depth of 200-300 m. The tourism development strategy in Tartous city (which constitutes sector number seven of this study) included dividing this city into five sectors. The port and the city were considered a major urban sector surrounded by sectors for tourism growth, the first in the north and the second in the south, and the background of the region is designated for expansion. Adding a fifth sector with tourism capacity, which is “Arwad Island” [22].

##### B. The draft regional plan for the coastal region issued by the Regional Planning Authority in Syria year 2021:

In terms of multi-modal logistical and transport activities, the region is the only maritime port in Syrian Arab Republic and its coastal cities are logistical port cities that achieve trade exchange with surrounding and regional countries. It has a multi-modal logistical structure (sea, land, residential, air), and therefore the ports need Logistical and technical rehabilitation and raising the technological level to exploit it optimally (Tartus and Latakia, and in the port to be established in the “Hamidiya” region), and this applies to the main road traffic axis located in the coastal plain region and branching out from it is a group of axes linking with neighboring countries, where each axis must contain on a logistics area outside the region, it contains a dry border gate with neighboring countries. [23]

## CONCLUSIONS

Waterfronts represent the dual features of ports and cities and combine basic elements represented by the port and activities related to its functions, the coast, and the city with its morphology, population and activities, there is a spatial relationship between the visual accessibility of these Waterfronts and the use of land on them, also the material and the physical connection to the water body and the moral connection are considered important standards and defining

for them. On the other hand, the port has an impact on these waterfronts and contributes to the problem of access to them, and It manifests in several aspects.

The structural transformation of port functions has led to their spatial development and to the spatial and functional association, which linking their generations to the maritime and land aspects of pre- or post-shipping. The spatial association of ports with waterfronts has changed, as they continue to move along them in search of greater spaces and depths, Which affected the surrounding urban environment and the city’s waterfront, and the most important of these changes were manifests in the expansion of the port’s infrastructure and the increased need for railways and road networks with their levels complexity .With the expansion of the port's land transport network, the issue of land access to seaports is not considered an isolated phenomenon, but rather within the framework of relational schemes, there is a close relationship between the land service of ports on the one hand and organization maritime and land on the other hand.

The port-related transport system is an essential component of the functional and spatial structure of port cities and it divides their urban space, so cities often do not have opportunities to create attractive pedestrian access to the water or to form public spaces on it. Also, the joint use of the road network and the railway network by the city and the port leads to the overlapping of heavy traffic and passenger traffic and the formation of functional conflicts or restrictions on the flow of traffic therein. On the other hand, the strategies of global port states emphasize the importance of dealing with the port as an urban space, as well as making it visible, emphasizing the accessibility of waterfronts, and redeveloping the communication areas between them and the ports.

The function of the port before 1960 was summarized in the process of transporting goods and passengers locally from the port of Tartous to Arwad Island. The port was originally constructed and had no physical boundaries, but rather was open to the sea for residents. After 1960, with the construction of the commercial port, the port’s functions developed and included military, commercial, stevedoring, storage and transit services, in addition to educational services (secondary school and the Maritime Transport Institute), but the decline in educational services affected the physical accessibility of the port’s waterfront.

The area of the port (40% of the facade) has remained constant since its construction, but its direct impact on the accessibility of the waterfront has increased over time. Its being surrounded on three sides by a network of modernized roads and railways formed a clear physical separation of it from its urban neighborhood and the waterfront. This separation increased by surrounding it with high external walls, accompanied by the imposition of customs restrictions, which led to a lack of visual and physical access to the waterfront in the port area. The traffic pressure created by the port function on the waterfront appeared through the transformation of a public square (Najma Square) into a traffic circle in which the city's main streets (Mina Street and Marine Corniche) intersect to connect to the road that forms the

entrance to the city and connects it to the international highway. All of this led to increased traffic pressure on the only road to the city entrance, which includes both port and urban services. The spatial impact of the port and the increase in its productivity were also demonstrated through the establishment of a three-level traffic road node (Sheikh Saleh Al-Ali node) to improve accessibility to the port and organize traffic at the northern entrance to the city.

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