

Comparative Analysis of Public Space Among Mediterranean Port Cities Utilizing Remote Sensing and Street View

Valencia And Genova As Study Cases

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Abstract: Under the global theme of sustainable and resilient cities, new thinking about the development and design of Mediterranean port cities are expected. This paper shall discuss urban public space, especially the open space that determines the intrinsic characteristics of urban imagery, vitality and attraction. Valencia and Genova are selected and analyzed comparatively employing remote sensing satellite and street imagery. Firstly, urban physical form and spatial structure elements including public space, street-system, building blocks are extracted as analysis objects. Thus the analysis focuses on overall functional partition and transportation network, exploring the functional and spatial interrelation between port and city. Then extracted public spaces (landscape, theme parks, plazas, etc.) are analytically investigated with intra-urban networks and urban fabric. After the analytical and interpretive comparison under the theory of urban typology and scene perception, the results indicate that the public spaces enhance activity patterns of civil life and strengthen cities' identity. Whereas Valencia owns a higher level of vitality, the reasons owe to the following aspects:

- Multiple urban plan morphology, spatial profile, spatial interface, and spatial organization mode with strong accessibility;
- Diversified and people-oriented public space stimulates social and commercial activities;
- Local-famous buildings play the role of 'Catalysts', activating the city with creativity and resilience.

In conclusion, this paper strongly emphasizes the importance of the effective and rationalized organization of the public space in port cities. This comparative analysis of Mediterranean cities of Valencia and Genova can inspire the future urban design of port cities in a global context.

1. Introduction

1.1. *Port cities and development trends of sustainability and resilience*

Port cities play an important role in the development of social and economic development of the country from history to the present day. Port and city should be considered as a complex adaptive system (Gell-Mann, 1994). As hubs for import and export of materials, the port areas

drive regional investment and territorial development effectively, but also play decisive role in the urban development (Hoyle, 1989; Ducruet, 2007). Port activities have effect on the spatial differentiation and spatial structure of urban areas, as well as economic and social structure (Gleave, 1997; Yang, Zong, 2008; Meyer, 1999). A good relationship between port area and urban area should be a whole network, which incorporates differences and turns them into complementarity, then improve the dynamic of both areas (Debie, Raimbault, 2016; Hayuth, 1989). Thus this kind of particularity of port city leads to more attention on its relationship between port area and urban area from the current view of sustainability and resilience.

As the human activity node between terrestrial and marine ecosystems, port cities face great challenge to seek the equilibrium among the greatly complex subsystems than other type of cities (e.g. economic, environmental and social system and like that) under the trend of globalization of trade and climate change. The calling for sustainable and resilient development is the acknowledged solution to this point. This kind of evaluation to waterfront or port revitalization has been considered as urban development strategy for the government agent of urban planning (Girard, 2010; Schipper *et al.*, 2017), which are in harmony with the ecosystem and are robust or adaptable under climate change. More concerned issues are related to waterfront and port reform, as to trade off the impact between port area and urban area (Hoyle, 1989; Debie, Raimbault, 2016). However, globalization view of port city development is unfortunately and narrowly focused on trade and international transportation of port, which bring environmental and economic challenges to be integrated as urban area. Actually, this kind of port-view thinking restrict urban development into a limited view of the port economic mode. More attention shall be attracted to the redevelopment operation of city itself on port and waterfront. For instance, not only international trade, globalization actuate international tourism as an environment-friendly and economically-enhancing industry to sustainable development of city (Dwyer, 2015; Yudina *et al.*, 2016). Which shall be a promising strategy for urban revitalization, especially port city of diverse nature resource. In this paper, we pay more attention to urban open space design and its impact on livability, attraction and entertainment for residents and travelers.

1.2. *Urban public space and the its particularity for port city*

Scholars defined Urban public space from its space design, functions and social behaviours. Urban public space refers to the open collective space in between solid buildings. Public space is the space we share with strangers, people who are not our relatives, friends, or work associates (Walzer, 1986). It is the public space where citizens or tourists can develop various of activities for daily life or social communication needs, which contributes to improve leisure and quality of civil life (Lloyd, Auld, 2003). As Montgomery pointed out, "It is the public realm and associated semi-public spaces which provide the terrain for social interaction and a significant part of a city's transaction base, for example, the market square, the street vendor, the shop frontage and the sidewalk café". (Montgomery, 1997). In general, the characteristics of urban public space are opening, gathering and communicating. Urban public space is the essence of the real environment, the carrier of multi-cultural events and the source of unique charm of urban area. Under the circumstance of rapid development in cities, the public space plays a decisive role in political, social and cultural contexts. People rely on the public space for meeting, travelling, shopping, playing or relaxing. And the quality of public space construction directly affects the city's comprehensive competitiveness and public satisfaction. In modern urban planning, public space design have become a focus for sociologists, political scientists,

and architects, urban planners (Koohsari *et al.*, 2015; Girling, Helphand, 1996). Rob Krier, an influential urban planner and architect of the post modernism. He explained the designed urban space and the corresponding structures in the terms of topological and morphological elements, which impacts on the quality and relationship to urban activities (Krier, Rowe, 1979). Jan Gehl, who makes great contribution to the study of improving the quality of urban life, examines the relationship between patterns of space use, especially outdoor activities, and the spatial properties of the physical environment. Starting from the point of human dimension for his analysis, he measures the success of urban environment, by qualifying the levels of pedestrian flows, levels and length of stationary activity, including human contact and social interaction (Gehl, 2011). Good public space creates a platform for engagement and discussion, for planned and spontaneous encounters, and for learning of diverse attitudes and beliefs (Mehta, 2007). And there is also a growing belief that in modern societies and urban planning, good public space is required for the social and both physiological and psychological health (Mehta, 2014; Koohsari *et al.*, 2015; Wolch *et al.*, 2014). At the same time, responsible and meaningful public space can foster public life also as a means of alleviating urban malaise, so that to enhance the cities' vitality. According to the study of senior researches on urban public space, the essential qualities of high-quality public spaces of squares, parks, plazas, and waterfronts can be concluded as accessibility, inclusiveness, and pleasantness.

- Accessibility: easy and convenient access is the basic key element for increasing opportunities for people to participate in collective activities, because people plays the decisive role in the practical use of space. Accessibility also related to the terms of 'closed' or 'open'.
- Inclusiveness: it is also referred to flexibility, successful urban public space is an attractive platform, which provide a stage for people from different cultural groups to develop abundant kinds of activities. As these experiences are repeated, public space becomes a vessel to carry positive communal meanings.
- Pleasantness: high-quality public space is first reflected in the friendly scale, which plays an important role in creating a people-oriented environment. The quality is also reflected in the accessible landscape, ground covering materials, green plants (especially for sun shading), and the configuration of public service facilities. In a good public space, people feel comfortable and a sense of belonging.

To port city, the more concerned are about "blue space" redevelopment that is the most important advantage and complicated system for seaside cities. The waterfront reform and development is challenging and more controversial, involving community attitudes and environmental sensitivities, and influences transport evolution and urban change (Brand, 2007; Hoyle, 2000; Hoyle, 1999). However, successfully waterfront revitalization contributes greatly to urban "tourism planning" and enhances image of city (Gunn, 1977; Kostopoulou, 2013).

In this paper, we aim at analyzing the particularity of the urban public space to city image improvement and quality of urban life. Two Mediterranean port cities are compared to highlight the problematic relationship and redevelopment of space design. we collected data from GIS (Geographic information system) source and satellite imagery to compare the urban structures and relationship between port and urban area. More detailed investigation focused on space design with path analysis to understand the elements' organic combination and human behaviours. At last we pointed out the problematic space and proposed some suggestions for urban redevelopments.

2. Surveyed areas

The ports of Italy and Spain are important maritime transport nodes in the Mediterranean and an important channel for Mediterranean maritime trade. Valencia of Spain and Genova of Italy are selected as representative study cases and analyzed them comparatively under the theme of urban public spaces, which decide the vitality and attraction of the cities, applying the method of remote sensing satellite and street imagery.

2.1. *Genova*

Genova, located on the Gulf of Genoa in the Ligurian Sea, is the capital city of the Liguria Region. As the southern corner of the Milan-Turin-Genova industrial triangle of Northwest Italy, Genova has historically been one of the most important ports on the Mediterranean, it is currently one of the busiest ports in the Mediterranean Sea and twelfth-busiest in the European Union. The Genova city grows between the Ligurian Sea and the Apennine Mountains, which stretches transversally about 30 kilometers along the coast. The territory of Genoa is divided into five main zones: the center, the west, the east, the Polcevera and the Bisagno Valley (Wikipedia contributors, 2019). (The city of Genoa is subdivided into nine administrative districts officially).

The analysis of urban public space in this paper is target on its central area, including the historical center which was inscribed on the World Heritage List (UNESCO), especially aims at the old port area named Porto Antico. The old Porto Antico was under renewal plan in the 1990s. A thick barrier of offices and warehouses had been built in the 1800s, in addition the cement ribbon of viaduct highway was built in 1965, resulting in an insurmountable crack between the urban area and the port. In order to heal the separation, a series of plans were put forward. The Italian architect Renzo Piano made great contribution to this regeneration process, he put forward the importance of connecting historical center and the port area, also included a longer-term urban renewal plan, intended to return the area to the citizens of Genoa for them to enjoy. The plan has greatly enhanced the attractiveness of the city and injected new vitality into the old port and the whole city.

2.2. *Valencia*

On the east coast of Spain situated the third largest metropolitan city, Valencia, which is the capital city of the autonomous community. The port of Valencia is the fifth busiest container port in Europe and one of the busiest ports on the Mediterranean Sea, handling 20% of Spain's exports. The city of Valencia stands on the banks of the Turia River, located on the eastern coast of the Iberian Peninsula and the western part of the Mediterranean Sea (Wikipedia contributors, 2019).

The analysis of the public space in Valencia targets on the area centered in the historic center, which possesses ancient monuments and cultural attractions. Extended to X kilometers that include the attractive green belt passes through the city. Starting from middle 1990s, Valencia transformed from an industrial center to a newly cultural and economic center, and a charming tourism destination. A lot of historic landmarks were restored and renovated, at the same time, a series of open public space were arisen. The most influential one is the Turia Gardens. After severe flooding occurred in 1957, the Turia River was diverted in the 1960s (Plan Sur de Valencia), and the old and dry river bed has been turned

into a central green belt that allows cyclists and pedestrians to travel the city without the conflict with automobiles. During this path appears parks, art works, ponds, football pitches, and children's playground. Towards the eastern end lies the City of Arts and Sciences, which contains an opera house, a science museum, and an IMAX cinema, and a raised, axial walkway. This challenging architectural ensemble by Santiago Calatrava brings new focus to this previously incoherent and underdeveloped area, while linking the center city and the sea. With beautiful natural seascape, avant-garde modern architecture, and colorful open public spaces, Valencia now is a city with global mega events and cultural festivals. The city is highly dynamic and attractive.

3. Methodology

Rob Krier, known as one of the most influential urban planners and architects of the post modernism. In his book "Urban Space", he analyzed the typological and morphological elements of urban space, and he considered square and streets as basic elements of urban spaces. "In all probability the square was the first way man discovered of using urban space. It is produced by the grouping of houses around an open space. This arrangement afforded a high degree of control of the inner space, as well as facilitating a ready defense against external aggression by minimizing the external aggression by liable to attack" (Krier, Rowe, 1979). He also has considered three basic geometric shapes: square, circle, and triangle, these shapes are effected by angling, segmentation, addition, merging, overlapping or amalgamation of elements; and distortion (Krier, Rowe, 1979). This paper limits the research and observation of public open space to the study of urban squares which generate public use and active social communication to the greatest extent. The functions of squares lie in commercial activities, but above all is the activity of culture nature, such as administrative, church, activity center, leisure-oriented plazas, and children's play squares.

3.1. Remote Sensing and Spatial Statistical Analysis with GIS

Most space information can be interpreted and collected from WebMap like OpenStreetMap. However, the update of the information depends on the contribution of volunteer works and the information is almost delayed. therefore, we proposed to use Remote Sensing (RS) tool to update the all the located space and the corresponding information. The development of Earth Observing System greatly impuled a new and promising view of urban planing and urban design. The overlooking from satellites brings us a macroscopic, integrated systemic perception of the urban structure and the organization of urban space. In this paper, Google high resolution satellite images are employed to extract and update the public open space elements, urban buildings and transport networks *et al.* To compare the urban location and natural property of Valencia and Genova, we start at using SRTM terrain data to retrieve the 3D model of both cities and visualize though the hillshade as a grayscale 3D representation of the surface, which take the sun's relative position into account for shading the image. Spatial statistic is applied to the describe urban elements in terms of total number, area, shapes, type of plan, functions, accessibility, green plants distribution, and availability of service facilities in two cities. Based on the statistic analysis and element description for each city, it would indicate more definite relationship:

- between port area and urban area (port and waterfront development),
- between transport networks and open space (the accessibility to public open space), among open space elements (the spatial continuity of open space elements),
- perception through Street Views and Field Survey.

Surveying and observing pedestrians, travelers and residents, the Street Views provide a convenience and convenient manner to observe and describe human behaviours adapted to public space without enormous workload. The Google street views are implemented in human perspective, thus leading a vivid perception on plane composition, perceptible scale or volume of space and enclosure of surrounding buildings. In the open space, similarly, field investigation and observation on the human activities is necessary to validate the efficiency of the open space and reflect the interaction between human behaviour and space in a dynamic way rather than the static.

3.2. Selected Path Analysis

Joint with field investigation Street Views, more detailed analysis of public space focus on a selected path in both cities separately, particularly considering the historical elements and modern development elements. In the city of Genova, the old town area owns a series of streets and buildings that were included in UNESCO World Heritage Site List. Thus the selected path starts from the train station with a front square named Principe Square, where visitors always arrived in; then the path goes through the three historical streets (Street Balbi, Street Cairoli, and Street Garibaldi); after that the path reaches the historical center plaza, Ferrari Square; then it will arrive at the old port area named Port Antico, which has been regenerated in 1990s; finally, walking along the waterfront area, the destination will be the Galata Sea Museum. In the city of Valencia, the selected path starts from the center train station, then there will be the City Hall Square; thus the path will go across the ancient town area with meeting several open squares, such as the Virgin Square; then the path heading to the core green belt; walking along the green areas with various public space, including parks, fountains, playgrounds, children advantage park, and then arrives at the landmark building group, the Science and Art Center. Finally the path ends with the natural beach called the Cabanyal Beach.

4. Results

4.1. Comparison of Urban structural relationship and the spatial continuity of open spaces

According to the 3D model in figure 1, the mountainous terrain of Genova determines the challenging configuration of urban elements, particularly restricts the transportation efficiency. This intrinsic natural property causes the result of the higher density of buildings and road networks, leading the low ratio of public spaces. Whereas Valencia expands with no terrain barriers and has a relatively moderate urban building density and simultaneously confirms the spatial continuity of a lot of open space configuration. Besides, there exists a problematic relationship and interaction between coastline and urban system of Genova. The externality effect of port and the corresponding transport split the waterfront of old port and urban area. In figure 2a, the red line is the composite viaduct, railway and urban traffic. Even though the redevelopment of old port is implemented by government of the Genova, the revitalization is

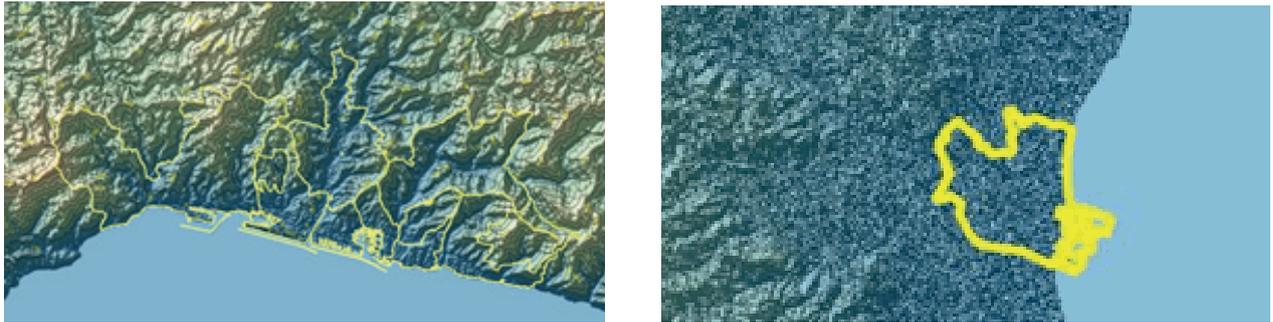


Figure 1. Urban terrain visualization in 3D model with DEM hillshade (a. The urban terrain of Genova; b. The urban terrain of Valencia).

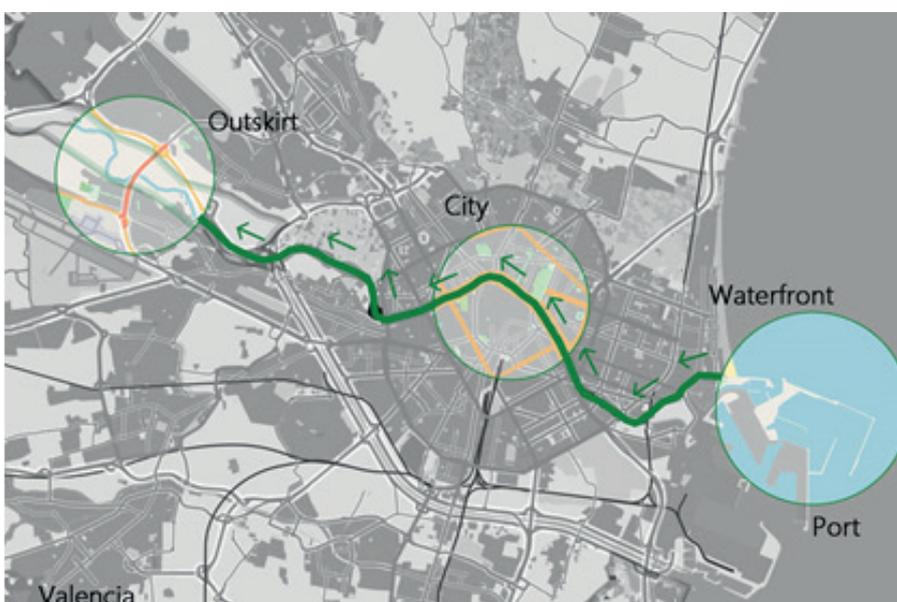


Figure 2. The relationship of public open waterfront, port and urban area (a. The relationship of public open waterfront, port in Genova and the urban area splitted by its transport; b. The relationship of public open waterfront, port in Valencia and the urban area).

not successful. Simultaneously, the chain of the open space starts from the center square is interrupted. During the city development processing, the natural relationship between the port area and the city has been broken by a progressive construction of physical barriers, from the warehouses that had been built in the 1800s, to the tough pylons holding up the cement ribbon highway which was built in the year of 1965, left the insurmountable gap between the city and the sea. Thanks to the regeneration project for the old Port Antico by Italian architect Renzo Piano, a series of plans to renovate several historic port buildings and build new structures, greatly enhanced the vitality of the port area. In Valencia, the dry river bed has been turned into a green belt with a series of various public spaces, the green belt connects the port area and the city effectively, greatly improved the space quality of the city. The Green space, the green line in figure 2b, relates to beach space, which is the most popular waterfront in Valencia. The waterfront transport line blocks the beautiful seascape. The natural relationship between port and city had, over time, been broken by the build-up of physical barriers. Furthermore, Valencia shows a lower density of buildings and road system, with much more green space and open public squares. Contrary to the insurmountable rift in Genova, a green belt with a series of open public space goes through the city, connecting the port and city effectively. The relationship between the port and city is close.

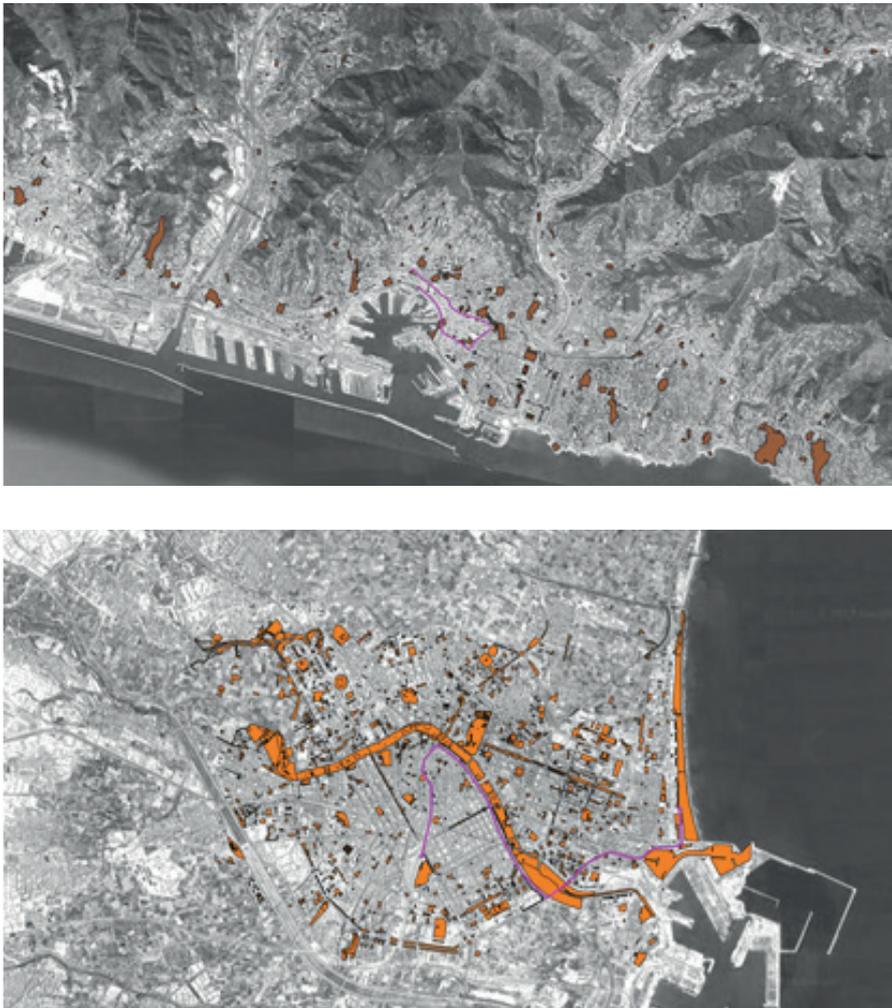


Figure 3. *Extracted public open spaces and selected path in purple (a. The spatial configuration of public open space in Genova and the purple selected path; b. The spatial configuration of public open space in Valencia and the purple selected path).*

All extracted public open spaces in both cities using the Remote Sensing and GIS are given in figure 3a and 3b, then we count the total number of the public space in both Genova and Valencia. In the center area of Genova, there are about 68 public space, including historical squares, open parks and waterfront plazas. In the city of Valencia, there are about 130 public space with both historical and modern ones.

4.2. Path analysis with Street Views and field investigation

The figure 4 lists the table 1 of each open space from train station to old port in Genova. From the selected path and the public space in which it is connected in series, the public space in the historical area of Genoa has good continuity, but some of the squares are greatly affected by traffic, especially the waterfront public space, by motor vehicles, Non-motorized parking takes up a large area, which greatly affects people's visual and spatial feelings. Due to the limited scale and less types of public space, the usage of the space is low with limited activities.

Table 1. The investigation of public open space along the selected path in Genova.

N	Name	Identity	Plan	Enclosure	Scale	Facility	Plants	Activities
1	Street Balbi	Historical street in the city center	Linear with 400m	On both sides are mostly 4-7 stores high	7m width	Commercial, museum, university, ancient palace	No space for plants	Walking, resting, cycling, bargaining, talking
2	Street Cairoli	Historical street in the city center	Linear with 180m	On both sides are mostly 3-7 stores high	8m width	Mainly Commercial, Library, small square	No space for plants	Walking, resting, cycling, bargaining, talking
3	Street Garibaldi	Historical street famous for ancient palaces	Linear with 250m	On both sides are mostly 4-5 stores high	7,5m width	Museum, palace, administrative offices, chamber	Palace gardens	Walking, visiting, communicating
4	Nerro's House	Historical integral park in hillside fields	Square	Roads on four sides	120m*110m	Museum, seats, viewing pavilion	Plenty plants and waterfall	Resting, Viewing, exercising
5	Park of Acquasola	Regeneration of a historical area	Rectangle	Roads on four sides	200m*90m	Children's playground, seats, fountain, entertainment facilities	Large amount of plants	Walking, cycling, playing, resting, talking
6	Ferrari Square	Historical and main square	Square	Historical buildings	75m* 75m	Gallery, museum, theater, palace, offices, fountain	No plants but water scape	Resting, talking, gathering, important events
7	Feste Square	Old port renewal, waterfront square	Irregular shape	Buildings with 3-4 stores, water, viaduct	300m length, 25m width	Bingo structure, Embriaco Bridge, seats, Aquarium, commercial	A small amount of trees	Waking, resting, viewing, big events
8	Neptune Boat	Waterfront space with iconic boat	Irregular shape	Parking square, viaduct, main road	150m length, 30m width	Floating museum, parking,	A small amount of trees	Waling, visiting
9	Galata Sea Museum	Waterfront space for leisure	Linear along the water	Viaduct, main road	200m lenth, 8m width	Wooden paving, seats, commercial, museum	A small amount of trees	Resting, walking, talking, viewing

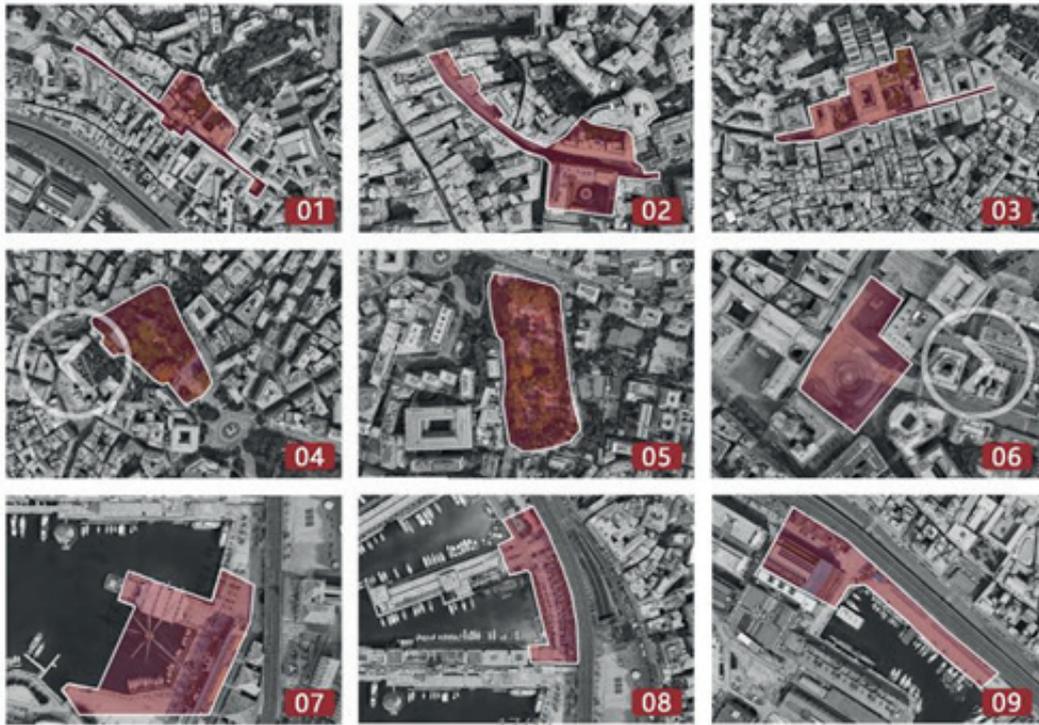


Figure 4. *The open space of selected path in Genova.*

As shown in figure 5 and table 2, the continuity of the public space, from the historic city to the modern linear park, is very strong. The linear green public space is unique for the fact that each section can be seen as a high-quality activity space. This makes it a perfect place to develop various activities, such as running, cycling, yoga, slacklining, sightseeing, viewing, skateboarding, playgrounds for children and more. So the usage ratio of the space is high, which enhance the city's vitality.

The city of Genova and Valencia have some similarities, both of them have a long-standing and splendid history. In the process of modern urban development, they have experienced the process of urban renewal. Genoa has transformed the old port area, and Valencia has transformed the old river bed. One of the development goals of the two cities is to create an attractive city of tourism. At present, both cities have certain attractiveness, and there is a certain gap in urban vitality. Valencia owns a higher level of vitality. it is the ideal choice for holding international events especially. Based on the above analysis, the part will summarize the reasons for the gap between the two cities' development and vitality.

- Different topography. Genoa's geographical location lies between the Ligurian Strait and the Apennines and runs along the coastline, thus determining its special mountainous terrain. This kind of topography with a high degree of difference poses a great challenge to the construction of the city. Due to the limitations of the terrain, Genoa's building density is also relatively high, and the compact architectural layout also limits the realization of public space. However, the topography of Valencia is mostly flat, in the plain area, and the development of the city gradually expands to the periphery with the old city as the core. Its overall building density is moderate, and it incorporates a wide variety of public spaces.
- Different urban structure. The city of Genova is developed along the coastline and the horizontal line of the mountain. The distribution of its public space is relatively frag-

Table 2. *The investigation of public open space along the selected path in Valencia.*

N	Name	Identity	Plan	Enclosure	Scale	Facility	Plants	Activities
1	City Hall Square	Historical square in old town	Triangle shape, two parts	Roads on three sides	180m length, 70m width	City hall, sculpture, fountain, seats, commercial	A small amount of trees	Resting, bargaining, talking
2	Queen's Square	Historical square in ancient city center	Rectangular shape	Historical buildings with 5-6 floors	150m length, 43m width	Valencia Cathedral, commercial parking, fountain	Some trees for shading	Gathering, resting, bargaining, talking,
3	Virgin Square	Historical square in ancient city center	Rectangular shape	Basilica, historical buildings with 3 or 7 stores.	50m length, 35m width	Valencia Cathedral, Basilica, commercial, fountain, seats	A green park besides the square.	Gathering, walking, resting, reading, talking, important events
4	Sea Bridge Square	Transforming of dry river bed	Rectangular shape	Roads and bridges, plants	360m length, 170m width	Pools, seats, pavilion, Fitness equipment	Plenty and various plants	Gathering, walking, resting, jogging, cycling, roller, exercising
5	Music Plaza	Transforming of dry river with modern architecture	Rectangular, symmetrical strictly	Roads and bridges, plants	500m length, 170m width	Pools, seats, pavilion,	Plenty and various plants	Gathering, Band show, walking, resting, jogging, cycling, skating, exercising
6	Gulliver Adventure Park	Transforming of dry river bed	Rectangular, two parts	Roads and bridges, plants	390m length, 170m width	Children playgrounds, slides, tower, rails, curved walls.	Plenty trees around the playground	Playing, sliding, climbing, skateboarding, resting, jogging, cycling
7	City of Arts and Sciences	Cultural complex with innovative architecture	Rectangular shape	Roads and bridges, green garden	500m length, 200m width	Shallow pools, Opera house, cinema, science museum, plants corridor	A small amount of trees, a green garden nearby	Gathering, walking, resting, jogging, cycling, boating, visiting
8	Veles e Vent	Modern and innovative architecture	Curved along water	Roads, water, green garden.	300m length, 120m width	Event center, fitness equipment, commercial	A green garden nearby	Gathering, talking, sailing training, viewing, resting
9	Cabanyal Beach	Natural beach area	Linear along the sea	Sea, roads	2.3km length	medical center, lifeguards, sun lounger showers, commercial	Liner green belts	Jogging, cycling, resting, enjoying sunshine, exercising

mented. It is not very orderly and lacks continuity. At the same time, it lacks large public space, and part of the port is used for ground parking lots. Rather than creating a fun space for citizen activities. The most important point is that many warehouses and buildings on the water's shore in the 19th century obscured the beautiful scenery of the port, and the elevated road built in 1965 severely separated the city from the port. Instead, Valencia effectively used the dry riverbed to create a series of public spaces for different functions, thus forming a continuous core public space system.

- Rich spatial types. The activities carried out by people represent the vitality of a city. A wide variety of public spaces means a rich variety of activities that give people more choices. Valencia has more types of public spaces, an adventure park for children to play, a skate park for young people, a public fitness area for all kinds of fitness equipment, run-

ning paths, riding paths, with ample kinds of plants and people-oriented scale. The scale can meet the needs of people of different ages to carry out a variety of activities.

- Iconic architecture. Important and unique architecture plays a role of catalytic in enhancing the attractiveness of the city: the significance of a building to a city can be a landmark or an imprint of a city. In the old port area of Genoa, a series of installations designed by Renzo Piano have played a significant role in improving the quality of the public spaces. The Valencia City of Science and Art, created by Calatrava, has a unique structure and shape, and a rich event space attracts people from all over the world to appreciate it.

5. Conclusions and Discussions

This paper comparatively and systematically analyzed two Mediterranean port cities, Genova and Valencia, combining the current prevailing technology (Remote sensing, GIS statistics and Street Views) to reveal the intrinsic relationship and controversial configuration of public open space and other urban space planning. Form the prospective of urban design, we investigate the public open space (avenues, squares, parks and waterfronts *et al.*) in the sight of space participants (pedestrians, residents, and travelers *et al.*). The perception of participants' vision in human-adaptive scale on surrounding space and elements directly indicates the actual design utility, which would improve urban imagery and increase vitality and attraction of city if the participants' feeling is more comfortable. The selected survey areas differentiate on geographic, historic and economic backgrounds, but the problematic urban design limits Genova's developments and construction of city imagery. For instance, the event of Genoa bridge collapse and the fact of decreasing population are problematic and reflective. Conversely, Valencia is the

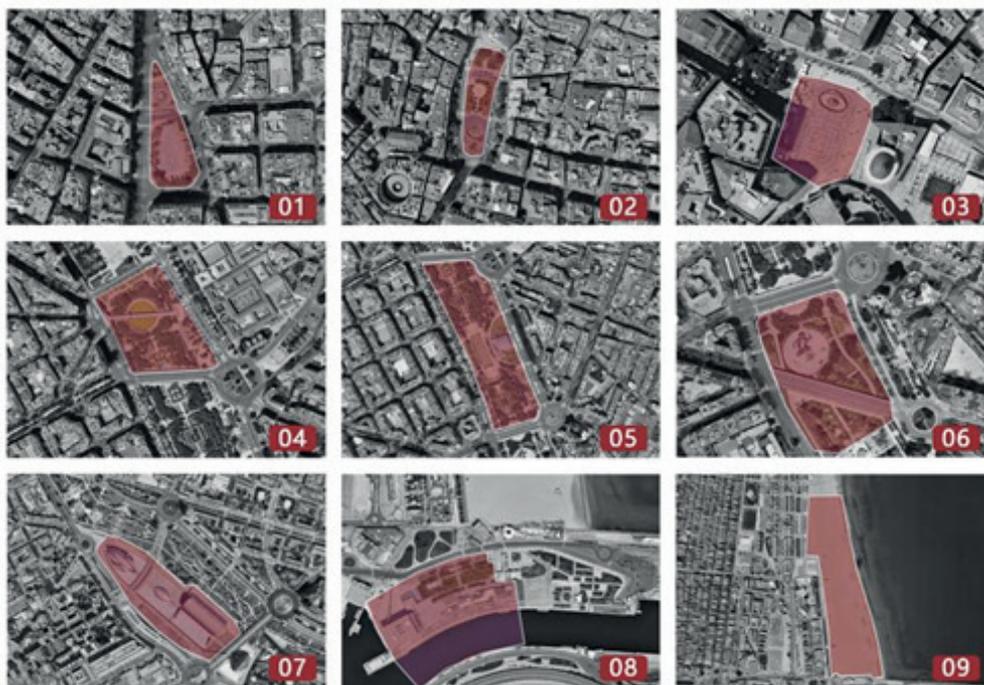


Figure 5. The open space of selected path in Valencia.

most attractive city that a considerable number of international conferences take place every year. More details are generalized as follows:

- The mountainous terrain of Genova restricts the transportation efficiency and spatially split the continuity of urban open space, which starts from station, by pass commercial pedestrian streets, squares and green space, ends at waterfront. The fact, however, the high and low levels of the building blocks, have great potential to develop seaview, enhancing the connection between coastline and inner urban area.
- Detailed analysis of public space focus on a selected path in Genova and Valencia separately. In each city, a path with nine important public space was extracted, from the historical center to the modern district, and reaches to the port area. Based on the theory of Jan Gehl, who measures the success of urban environment by qualifying the richness of activities, including human contact and social interaction. According to the field survey on both cities in the means of observations and recording human behaviors in the public space, space usage and human activities reflect the vitality and attractiveness of the city.

In general, the results indicate that the public spaces enhance activity patterns of civil life and strengthen cities' identity. But it still has a shortcoming, because the evaluation of the vitality of public space is only based on records and intuitionistic perception, mostly from visual feeling, but lacks quantitative statistical analysis and entranced survey.

5.1. Exploring the Possibility of Urban Renewal in Genova

In Genova, it is of the utmost importance to heal the fractures separating between the city and its harbor, from the thick barrier of offices and warehouse, to the lift pylons cement ribbon of

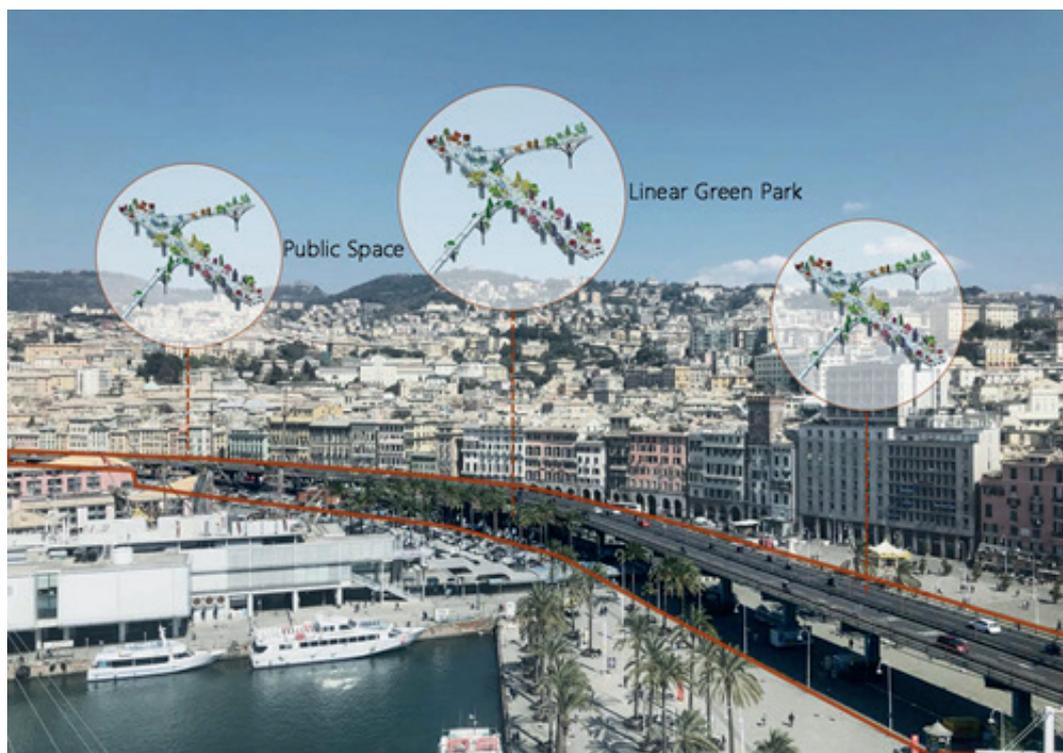


Figure 6. The high line park redevelopment for old port waterfront.

the high way, which forms a physical and visual barrier over the lively Genova waterfront. Considering about the lifted high way, the future design can take inspiration from the High Line Park of New York, which was built between 2006 and 2014 on a 1.2-mile long but abandoned elevated railway. This meaningful project transforms the negative fracture into a new lively public open space, with linear green space and leisure space, providing a new way of viewing the city, a connector to separated neighborhoods, and a distinctive asset to the city. A similar case that situated in South Korea is the regeneration project of 'Seoul Skygarden' designed by MVRDV (Netherlands). It is an abandoned railway transformation next to Seoul Central Station. The 17-metre high structure of the overpass becomes a unique public space nowadays, thanks to the ambition of making this place as green as possible, while introducing new leisure functions with adaptable approach. These extensions can inspire further additions to the area's greenery and public spaces as shown in figure 6. These successful cases can inspire further additions to the Genova's new greenery and public spaces creation. In the re-imagination of this high way as a unique opportunity, the green linear park will be transformed the concrete ribbon into an exceptional public open space.

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