SYNTACTIC COMPARISON OF CYPRUS PORT CITIES:

Famagusta and Limassol

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Abstract

Water was an important natural resource in the growth of early settlements and it offered many advantages for cities in time. As the availability of water affected the location and the size of the older settlements, the waterfront settlements had always different characteristics throughout the world.

The existence of water has also played an important role for "defensibility" and "marketing". Ports, which are gateway to the outside world of the cities located on the waterfront, are the dominant factors in defence, economic activity and cultural exchange. Cyprus, in the middle of Eastern Mediterranean, is an island whose economy laid on sea trade since Prehistoric times.

As this research suggests that spatial pattern of port cities are interrelated with socio-economic, political and socio-cultural parameters; the aim of the study is to reveal the spatial pattern characteristics of Cyprus port cities by analysing the physical layout and syntactic characteristics. Through the prior analyses of Famagusta and Limassol port cities, it is observed that they present different spatial expansions and port city characteristics related both with the location of the port and different development dynamics on two sides of the island.

Within this context, this paper deals with the comparative analysis of two major port cities of Cyprus Island: Famagusta and Limassol through diachronic settlement layouts. Spatial pattern analysis of the cities is examined by highlighting the port-city interrelationship through the measurements of the physical and visual accessibility regarding the street layout, public open spaces and the coastline. The interactions of the cities with their ports and coastlines focusing on 19th century in comparison to present day are discussed.

Keywords: Waterfront, Cyprus port cities, Spatial Pattern, Public Space, Accessibility.

Theme: Historical Evolution of Built Form

Introduction

Waterfront, as the intersection point of land and sea, was the starting point of human settlements. For the coastal settlements, the existence of water has played an important role for both defensibility and marketing which caused the emergence of port-city notion. Especially for the walled cities, the defensive function of ports was more dominant as they were integrated with the city walls. However, their defensive function disappeared through time as the cities mostly expanded outside the walls.

On the other hand, ports are the dominant factors in economic activity and cultural exchange. The typical port city was the outlet of exports from its hinterland. Its economy depended on intermediation between the producers of inland and consumers across the sea; its primary population was composed of merchants (Keyder, et al., 1994).

It's possible to evaluate the port cities in the historical chronology regarding their development process in terms of port city interrelationship. As Hoyle (1998) stated; in theoretical terms, several distinct phases may be recognised in the physical development of port cities (Figure 1):

STAGE		SYMBOL	PERIOD	CHARACTERISTICS
1	PRIMITIVE PORT / CITY		Ancient / medieval to 19th century	Close spatial and functional association between city and port
II	EXPANDING PORT / CITY		19th-early 20th century	Rapid commercial / industrial growth forces port to develop city confines, with linear quays and break-bulk industries
ш	MODERN INDUSTRIAL PORT / CITY		mid-20th century	Industrial growth (especially oil refining) and introduction of containers / ro-ro require seperation / space
IV	RETREAT FROM THE WATERFRONT		1960 s - 1980 s	Changes in maritime technology induce growth of seperate maritime industrial development areas
V	REDEVELOPMENT OF THE WATERFRONT		1970 s - 1990 s	Large-scale modern port consumes large areas of land/ water space; urban renewal original core

Figure 1 Stages in the evolution of port-city inter-relationships (Hoyle, 1998; 1988)

According to Hoyle's primitive port city diagram; ports were integral parts of the city up to the 19th century. Thus, there was a close spatial and functional association between city and port. On the other hand, the period between the second half of the 19th century and early 20th century was marked by rapid commercial and industrial developments.

The spatial and functional developments of ports cities are even more remarkable at Eastern Mediterranean region which has always been one of the most important and crowded centre of the world, and thus the place of maritime commerce in every period of history. Port cities in the region have always been developed and transformed through the interaction of different economical, technological, political and social forces. Thus, spatial pattern of port cities is also interrelated with socio-economic, political and socio-cultural parameters.

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As this research is a part of an ongoing PhD thesis, which is mainly concerned with six Eastern Mediterranean port cities with diachronic settlement layouts from 19th century to nowadays, it deals only with two port cities of Cyprus. The selection of Eastern Mediterranean port cities for the comparative analysis is associated with the centrality of Cyprus and their prominence in the region's history. These cities are assumed to have a common historical and cultural background; whereas they have been expected to have various spatial configurations on their urban patterns. Within this context, this study focuses on Cyprus port cities, as the centre of the entire analysis, by analysing Famagusta and Limassol through their physical layouts and syntactic characteristics.

As the study suggests that these cities present different port city characteristics considering the different development dynamics on two sides of the island, the paper aims to reveal the spatial layouts and the interaction of the cities with their coastlines focusing on 19th century in comparison to present

Cyprus Port Cities

Situated at the maritime crossroads of the eastern Mediterranean basin, Cyprus has many invaders, settlers and immigrants that have come to the island over the centuries. As Uluca and Akın (2008) stated "Cyprus, in the middle of Eastern Mediterranean, is an island whose economy laid on sea trade since Prehistoric times. Its ports, with changing significances through history were the main scenes of its past". By the effect of this economical importance, the physical and spatial structure of the island has changed through its long history according to different periods and administrations. Especially the division of the island in 1974, which has continued to this day, had many effects on the physical development of the settlements. As a result of these socio-cultural, economic and political effects; Cyprus port cities have different development dynamics on two sides of the island.

Famagusta and Limassol port cities are two major port cities of Cyprus; Famagusta is located in the northern part of the island whereas Limassol is at the southern part (Figure 2). Although these cities have a common historical and social background, they differ in terms of settlement patterns that result in the differentiation of physical layout of the cities. Before the division of the island, these ports had different roles in terms of maritime commerce; however, in present day they are the major ports of their own side. Independently of this background, these cities have also different spatial expansion characteristics related with the location of port and the coastline.



Figure 2 Famagusta and Limassol port cities

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• Famagusta

Famagusta city was the largest trade port of the island for many centuries (Perbellini, 2011). As Gunnis (1973) stated; after the fall of Acre in 1291, King Henry II of Cyprus offered it as an asylum to the many Christian refugees from that city, and Famagusta rapidly became one of the richest and the most important cities in the Levant. The city was regarded as the principal mart of the Mediterranean and en ever-increasing stream of wealth flowed into the city. As Uluca & Akın (2008) mentioned; port of Famagusta had supplied the best anchorage possibilities in the island throughout its history, because of its natural protection and was "favoured as a centre for commercial trade with all important eastern Mediterranean ports." (Doratli, 2011; p. 65).

Famagusta port consists of an old port and a new port. Because of its location, the old port is also known as inner port and located mainly along the city walls. In present condition, it comprises the old warehouses and a shipyard which also serves for fishing boats. On the other hand, the new port, which is also known as outer port, was constructed after 1960 with the aim of expanding the old port.

In terms of spatial characteristics, Famagusta can be evaluated in two parts: the old city centre which is known as the walled city and the newly developing areas outside the walls. The urban pattern of the walled city of Famagusta is mainly composed of a main square; narrow organic street network; a great variety of monumental buildings; one or two storey courtyard houses and the storage buildings (Doratli, 2011). Changing socio-economic structure of the city, around 19th century, accelerated its expansion towards outside the city walls. In recent years, because of the militarily controlled areas, closed Varosha region (south-east neighbouring region) and the establishment of the Eastern Mediterranean University, the city developed towards the north-west direction.

• Limassol

Limassol is the second largest city and the largest port in Cyprus which is also one of the busiest ports of the Mediterranean transit trade. The settling down of merchants in Cyprus in the 13th century led to the financial welfare of Limassol too. Like in Famagusta case, Limassol port had become a refuge for the pirates who were travelling around the countries of the Eastern Mediterranean. The port then became an important centre of transportation and commerce, resulted in the financial and cultural development of the city.

Limassol also has two ports; the old and the new port. Limassol old port, which currently is being used primarily by the fishermen, used to be main port of the city until the delivery of the new port. The New Port, constructed in 1973, is a major container transhipment centre in the Eastern Mediterranean and one of the most dynamic ports in terms of commerce and passenger traffic. After the division of the island, Limassol port became Cyprus' major seaport, replacing Famagusta because of the changed political situation.

The city has an old part which is the historical city centre located around the medieval Byzantine castle and the old port. The old city has a radial development characteristic with an organic pattern and comprises recreational functions including cafes, bars, restaurants etc. in present day. In recent years, the city has extended along the coast, from the west on the east almost on 15 km, encouraging coastal walkway through the promenade. The coastline is emphasised by a series of mixed-use buildings. Most of the hotels, restaurants, shops, and places of entertainment in general, are located in this area.

The methodology of analysis

The methodology that is used in the study is composed of the spatial and syntactic analyses through two eras; 19th century and the current situation. For execution of syntactic analyses, University of Michigan's Syntax 2D software is used. As the space syntax method generates different spatial arrangements for defining the structural environment; line analysis and isovist analysis are used in order to reveal the transformation of spatial layout showing the physical and visual accessibility of the port area.

Line analysis method is used to obtain the "most integrated axes" (which is introduced by Hillier and Hanson), of the port cities in two periods; 19th century and the present day. As the network of streets is the mean to get to the spaces, the goal is to see the accessibility and permeability of the port area, within the entire city, in terms of pedestrian movement. Therefore, the most integrated axes in the network are interpreted in terms of their connection to the port area. For the line analysis, radius is specified as 1000m and the centre is located on the port area where land meets water. Although this distance exceeds the expected walking distance, it helped especially in Famagusta to perceive both the inside and outside of the city walls. In order to understand whether the accessibility of the port area is changeable through time, line analyses are especially interpreted through integration n levels to understand the pedestrian movement within the whole system.

On the other hand, isovist analysis is used as it provides "a clear representation of the strategic views from (or of) a given location" (Turner and Penn, 1999). Thus, it is applied in order to perceive the visual connection of the port area, where span size is determined as 12x12m due to the two way street width and the limitations of the software. As an isovist is the area in a spatial environment directly visible from a location within the space (Turner et al, 2001), it is expected to help to understand the relation of the port with the city through public distance of interaction.

In order to measure the visual access, isovists are taken from the strategic points leading to port areas. Therefore, three nodes were selected for each case: the main public square, the main recreational area along the coastline and the port structure. Considering the continuous existence of public spaces within different periods, public squares are tools for highlighting the pedestrian movement both in 19th century and the present day. The coastline, as it emphasises the land-water relationship, is the other strategic point of view that is expected to show the way of interaction of the city with the port area.

Syntactic Analyses

The line analysis maps of two cities (Figure 3 and 4) show that the mean integration n values of both cities increases more than double from 19th century to present day. According to the 19th century analysis; Famagusta, surrounded by city walls, has more axial lines (222) comparing to Limassol (165) due to the denser housing structure. It can be seen in the present day analysis that, Famagusta has still more axial lines (456) than Limassol (374) due to the different spatial transformation of the cities through the specified period. In Famagusta case, city's organic structure becomes denser with more streets surrounding the new urban blocks and new streets appear outside the city walls as a result of the spatial expansion. However, Limassol has a regular and linear spatial development with longer streets.

The most integrated axes are almost same in both periods of Famagusta where the mean integration n level is 2,180x10⁸ for 19th century and 5,104x10⁸ for present day. As the expansion of the city towards outside the walls accelerated in 19th century, two of most integrated axes are located at the city's main land gate in 19th century map (Figure 3). Although these integrated axes are not the same for two periods, the most integrated axes are also located on the main pedestrian street, which connects the inside and outside of the walled city, through the main land gate in present condition (Figure 4). Additionally, indicating the city's expansion in further years, one of the integrated axes is located at the outside of the walled city which is oriented towards the old port.

On the other hand; the axes with high integration values in Limassol, are mostly located parallel to the coastline in both periods with a mean integration n figures of 4,1159x10⁸ for 19th century and 1,2268x10⁹ for present day. In 19th century map; the most integrated axis, intersecting with the other most integrated, axis which extends perpendicularly to the coastline, have a secondary degree of integration in the present day map. The most integrated axis in the present map is located in the old city along the educational, commercial and religious buildings. The area that includes the one of the most integrated axes also serves as a public open space, the promenade. Again similarly for both periods, the central axes seem to have a high integration level in Limassol. The global integration in Limassol shows that city expands from the old centre towards north-east. The main activity node including a series of mixed-used buildings is located parallel to the most integrated street.



Figure 3 Line and Grid Analysis of Famagusta and Limassol for 19th century

According to the distribution of the global integration shown in Figure 3, the main recreational area, with the surrounding roads connecting it to the main square and the port, are more permeable comparing to the entire city in Famagusta. This result matches with the spatial layout of the city because, in this period, the port area has three sea gates opening to this recreational area.

In Limassol, the distribution of the global integration in 19th century shows that; the coastline and the inner parts of the city seem to be most integrated areas comparing to the port area while the areas across the river are more segregated areas. According to the present day analysis; the main public open space – the promenade together with the main street seems to have higher integration levels within the layout.



Figure 4 Line and Grid Analysis of Famagusta and Limassol for present day

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The isovists taken from specified three points present a higher degree of visual access in 19th century comparing to the present day in Famagusta. Although the isovist perimeter changes from 50461.7865 (19th century) to 63389.7885 (present day) in the port area, the isovist area drops three times in the present situation (Figure 3-4). The isovist in the 19th century gives more visual field penetrating from the city walls through the sea gates, while the isovist field comprises only the port area itself in the present day map. On the other hand, the isovist field dominates the recreational area, which has the highest value in the distribution of global integration, by spreading through the openings towards the port and the road axes in 19th century. In the isovist analysis of present day, it's clearly seen that, the city walls of Famagusta block the visual connection of the public recreational areas with the dock area emphasising the defensibility and resulting in the segregation of the city from the water. When the main square of the city is compared in terms of isovist field regarding two periods; it is seen that, the changing spatial layout of the city interrupts the visual connection of the area and the port. The main square, with higher values of isovist area and perimeter, has a strong visibility dominating the surrounding context in 19th century (Figure 3-4).

In Limassol case, both area and perimeter values of increase in present day isovist analysis (Figure 3-4). The port area in 19th century seems more like an open field integrated with the organic pattern. However it gives higher visual degree, in the present day, with a long linear field penetrating into the recreational area. The dock area is also used as public recreational area which provides a high visual connection between the port and the water. The isovist values of the recreational area drops in the present condition due to the increased housing on the coastline. Despite this, the recreational area has a strong visual access along the coastline in both periods comparing to Famagusta. One of the most important differences in the present day while it seems to be blocked in the 19th century map. On the other hand, the isovist taken from the public square shows that, both the area and the perimeter increases in the present day analysis. Beside covering and accessing more area, the square also has a visual connection towards the coastline and the port area.

Conclusion and Discussion

The spatial and syntactic analyses show the association between port and city, which brought the idea of the "port city", changes through time related to the cities' different development dynamics. Through the analysis of Famagusta and Limassol port cities, it is observed that the division of the island affected both of the port cities economically but in different ways. Limassol, as being one of the busiest ports of the Mediterranean, has reflected port city characteristics while Famagusta faced with the difficulties of limited sea trade activities.

It is also emphasised by the results of the analyses that the physical structure of city affects the integration levels in terms of physical and visual accessibility. This is one of the reasons that these cities have different spatial expansion characteristics focusing on the location of port and the coastline features. As a newer settlement with longer axial lines in a grid layout, Limassol presents higher integration values compared to the older organic pattern of Famagusta. On the other hand, the city walls affected Famagusta in a negative way in terms of integration with the water edge and thus the port area is not integrated with the city's daily life. However, regular and linear spatial layout of Limassol emphasizes the coastline which results in the close spatial association between city and port. As it is verified especially with isovist values; the coastline transformation of Limassol indicates the aim of attracting more people as most daily activities occur along the coastline.

The results of analyses also show that Famagusta and Limassol reflect different visual connection levels through the interaction with the coastline. The recreational area in Limassol, located between the coastline and the main street, has a strong visual access dominating the surrounding environment. However in Famagusta, the walls block the visual connection of the public recreational area and serve as a boundary between the docks and the area as a result of the closed sea gates. Although the limited visual accessibility of Famagusta causes the segregation of city from the water, it also emphasizes the defensive function of the city walls.

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References

- Turner, Alasdair, and Alan Penn. 1999. "Making isovists syntactic: isovist integration analysis." In 2nd International Symposium on Space Syntax.
- Turner, Alasdair, Alan Penn, M. Doxa, and D. O'Sullivan. 2001. "From isovists to visibility graphs: a methodology for the analysis of architectural space." *Environment and Planning B: Planning and Design* 28: 103-121.
- Hillier, Bill, and Julienne Hanson. 1984. *The Social Logic of Space*. Cambridge University Press, Cambridge.
- Hillier, Bill, Alan Penn, Julienne Hanson, T. Grajewski, and J. Xu. 1993. "Natural Movement: or Configuration and Attraction in Urban Pedestrian Movement." *Environment & Planning B: Planning & Design* 20: 29-66.
- Hoyle, Brian S. 1998. "Cities and Ports: Concepts and Issues." Vegueta 3: 263-278.
- Keyder, Çağlar, Donald Quataert, and Eyüp Özveren. 1994. *Doğu Akdeniz'de Liman Kentleri* 1800-1914. İstanbul: Tarih Vakfı Yurt Yayınları.
- Uluca, Ege, and Nur Akın. 2008. "Gazimağusa Limanı: 13. yüzyıldan 20. yüzyıla bir Akdeniz liman ının gelişimi." *itüdergisi/a - mimarlık, planlama, tasarım* 7 :62-73.
- Perbellini, Gianni. 2011. "The Walled city of Famagusta." in *Famagusta in Cyprus*, edited by Gianni Perbellini, 30-59.
- Doratlı, Naciye. 2011. "The fortified city of Famagusta, then and now." In *Famagusta in Cyprus*, edited by Gianni Perbellini, 60-93.
- Gunnis, Rupert. 1973. *Historic Cyprus*. K. Rüstem & Bro. Edition.