TOURISMOS: AN INTERNATIONAL MULTIDISCIPLINARY JOURNAL OF TOURISM
Volume 11, Number 2, pp. 168-201
UDC: 338.48+640(050)

A MULTI-PORT CRUISE REGION: DYNAMICS AND HIERARCHIES IN THE MED

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The study generates knowledge on the patterns, structures, and geography of growth of the cruise port industry in the Mediterranean and its adjoining seas. The analysis of the passenger movements in the period 2005-2014, as provided by cruise port authorities, details the port hierarchy and reveals transformation of the region from a cluster of port destinations hosting a certain thousands of cruise passengers to a multi-port cruise region accommodating several millions of passenger movements. An adapted application of the 'multi-port region' concept, originally developed in cargo port studies extends research to intra-region dynamics and exposes previously unexplored imbalances that co-exist with the overall growth of a commonly seen and homogeneous single cruise region. The picture completes with the examination of the unbalanced trends in the major 20 cruise ports in the Med, and the levels of market concentration. The findings call for similar analyses, and not least comparisons, with other regions. With Asia appearing in the strategies of cruise lines as a deployment region and a source market, and the Med experiencing volatile trends, they are also practically helpful for those involved in the development and management of cruise ports.

Keywords: *Cruise ports; Mediterranean ports; multi-port region, intra-regional port dynamics*

1. INTRODUCTION

Cruise witnessed an uninterrupted growth over the last 30 years. In 2014 almost 22 million passengers enjoyed a cruise on one of the 296 cruise vessels calling at one or more cruise regions of the world (North America, Caribbean, South America, Mediterranean, North Europe, Australia, Asia, Africa). Ten years before the number of people that had embarked on a cruise were just 11,8 millions.

Cruise lines continue to respond to desires of their guests embracing innovation. They develop new ship designs, and offer diverse on-board amenities, facilities and services, as well as shore side activities. As a result, while the global financial crisis of 2008-09 had a major impact over maritime cargo shipping, cruise lines and ports continued experiencing steadily rising numbers of passengers. They did so, even when the Costa Concordia loss created the most sustained period of negative publicity for the industry.

The industry managed to 'cruise through the perfect storm' (Peisley, 2012), using an increasing number of ports of call and turnaround ports, aiming to provide excellent in-port and destination experiences and convenient departures from proximal embarkation cities. An industry that had focused on the United States and the Caribbean emerged into a global, highly efficient business. Cruise itineraries take place via the deployment of vessels in a specific geographic cruise region, or transferred between markets even within the same calendar year, with round the world cruises also in offer.

Within this ongoing globalization of the cruise industry, the region of the world that has grown faster during the first fifteen

years of the 21st century is the Mediterranean and its adjoining seas. This stands today as the second most popular cruise destination worldwide, enjoying substantial economic benefits. CLIA (2014), the association representing cruise lines, estimates that in 2013 the economic contribution of cruise to Europe, including spending at shipyards and the generation of over 339.000 jobs, stands at €39,4 billion.

The paper studies the structures of the growth of the cruise port industry in the Mediterranean and its adjoining seas in the last decade (2005-2014). It does so analyzing the passenger movements on 69 cruise ports, as provided by the entities operating the specific ports. The analysis focuses on the trends observed and concludes on the regional dynamics, i.e. growth variations, levels of market concentration, home-porting levels and seasonality.

The examination of the evolution path and port hierarchy illustrates the transformation of this port region from a group of cruise port destinations hosting a certain number of cruise passengers to a multi-port cruise region hosting several millions of passenger movements. The study then extends to intra-region dynamics. Comparing trends in the four distinctive port subsystems within what is commonly seen as a single cruise region, the study reveals the unexplored imbalances that co-exist with the overall growth. The picture completes with the examination of the trends in the major 20 cruise ports in the Med, and the levels of market concentration observed within the decade of under examination.

2. Why this study?

In practical terms, understanding these dynamics is important as ports continue to develop an interest in advancing their cruise activities, seeking association with the considerable financial contribution of cruise to the port cities or nearby touristic destinations. With the importance of societal integration of ports

rising (OECD, 2014) cruise is part of respective agendas of port managing organisations. In several parts of the world, ports move from multi-purpose terminals or temporary docking facilities to specialised terminals, in order to act as ports-of-call, and whenever possible as home-ports hosting the, financially profitable, departure and conclusion of a cruise. A growing interest by third parties, including cruise lines to invest in port facilities did follow. Besides, knowledge of the trends is a condition for understanding how to best address the various challenges (see: Pallis, 2015) and enable the growth of cruise activities to sustain.

In a different vein, the present work adds to the growing scholarly interest in further understanding the structures and implications of the tremendous growth of cruise activities, the sophistication and the geographical span of the sector in the last decade, having cruise ports as the unit of analysis.

With the sector combining the transportation and the tourism elements, scholarly attention had for long focused on cruise as a tourism industry segment. Mainstream literature studied extensively the economic impact of cruise tourism and calls (cf. Dwyer and Forsyth, 1996; 1998; Kester, 2002), or cruise ship passenger spending patterns (Douglas and Douglas, 2004; Seidl et al, 2006). They continue to do so by focusing on neglected issues such as the long-term impact of cruise tourism on the local community (Parola et al, 2014). The geography of cruise growth, and the managerial, economic and policy aspects that are associated with the maritime transportation elements have been comparatively neglected. In the last two decades, scholars studying the geography (Ng and Ducruet, 2014) and economies (Pallis et al, 2013) of shipping, ports, and maritime transportation systems developed multidisciplinary research streams, yet cruise and cruise port studies are relatively few.

This trend is reversing. Research is turning to additional themes (see contributions in: Pallis et al, 2014), acknowledging, explicitly or not, that certain gaps in literature persist (Papathanassis and

Beckmann, 2011). These include the industrial organization of cruises (Papatheodorou, 2006), the demand for cruise tourism (cf. Petrick and Li, 2006; Brida et al, 2013), the role of 'world of mouth' as cruise activities generator (Brida et al, 2012; 5et al, 2014). Eventually, the agenda expands to topics aiming to understand the structures and potential limitations of cruise market growth: the implications of economies of scale (Weaver, 2005; Andriotis & Agiomirgianakis, 2010), the geography of the world cruise market and the routing of cruise ships (Charlier and McCalla, 2006; Rodrigue and Notteboom, 2013), the supply of cruises in specific regions (cf. Wilkinson, 2006; Wood, 2000 on the Caribbean; Sun et al, 2014 on China), but still not the Med, and the intertwined theme of the 'carrying capacity' of a destination (Castillo-Manzano et al, 2014; Stefanidaki and Lekakou, 2014). An associated research question deserving attention refers to the patterns of growth and the evolving hierarchy of the port systems that serve this dynamic industry.

Cruise ports, which had seldom been the units of analysis in port studies, started receiving the deserved attention in the 2010s. In two earlier studies Marti (1990) had discussed the cruise port selection process and McCalla (1998) the service offerings and locational qualities of cruise ports, as did recently Vaggelas and Pallis (2010). With private actors interested in investing and operating cruise terminals, Wang et al (2014) examine how best to align the interests of investors and port authorities, whereas Lau et al (2014) discuss the institutional forces in place when selecting a site for a new cruise terminal. Given the interest of many cruise ports to attract home-porting activities, the conditions for such development are also attracting research interest (see: Lekakou et al, 2010; Bagis and Dooms, 2014). Esteve-Perez and Garcia-Sanchez (2015) search for the determinants of traffic registered by a cruise port, regionalization of related activities by coordinating cruise port operations and expanding their hinterland reach (Gui and Russo,

2011); with the latter study borrowing the regionalization concept applied earlier by Notteboom and Rodrigue (2005) in cargo ports.

Contributing to this discussion, the present work generates knowledge on the patterns, structures and geography of growth of the cruise port industry in the most dynamic port region of the 21st century. It turns conceptually to the more advanced cargo ports research, to borrow and develop an adjusted to the cruise world application of the 'multi-port region' concept. The latter was introduced by Notteboom (2010) and applied to cargo seaport markets such as Europe, Asia, and the Black Sea.

A distinct multi-port region in the cruise case is a region marked by the presence of distinctive subsystems identified on the basis of (i) the geographical communality of several cruise ports; (ii) a potential communality, or similarities of the features, of the cruise destinations served via these ports; (iii) the calling patterns of the cruise lines that induce a related coexistence of complementarity and competitive relationships among the ports concerned, given the fact cruise itineraries are planned including several ports rather than a single one (undeniably a different concept from the cargo application (introduced by Notteboom 2010; also: Grushevska and Notteboom, 2014) where the emphasis is on the fact that a certain hinterland is served by several gateway cargo-ports).

This conceptualisation facilitates the understanding of the development patterns in one of the commonly acknowledged eight cruise port regions around the globe. It does so revealing the characteristics, the evolution, and the structures of the distinctive sub-systems within the geographical area under examination. Along with the scholarly useful adaptation of the 'multi-port region' concept, the study allows comparisons with other regions, i.e. to what extend the cruise market is highly concentrated in terms of ports of call or home-ports, as happens in the North American where 10 departure ports account for 79% of the cruise passenger departures (Maritime Administration, 2011). With Asia appearing in the strategies of cruise lines, both as a deployment region and a

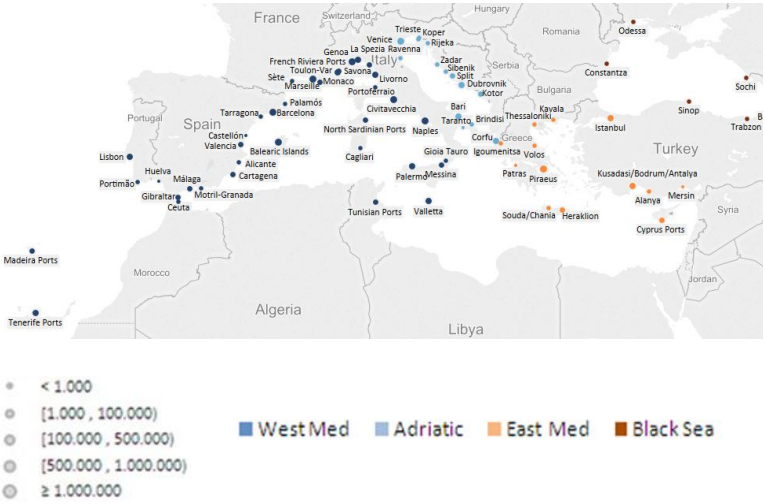
source market, and the Med experiencing volatility and lower growth that in the past, the analysis is particularly helpful for those involved in the making and development of cruise ports.

3. Trends in Cruise Ports in the Med

The study provides a statistical analysis of cruise passenger movements and cruise calls recorded in 69 cruise ports. Comparing to historical data provided by Market Watch (2015), the sample represents approximately 80% of the cruise passenger movements and cruise calls that take place in the region.

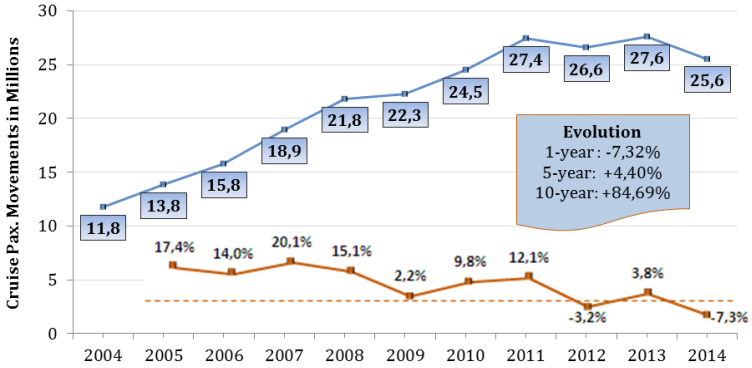
These ports are grouped in four distinctive multi-port regions, or sub-systems, West Med, Adriatic, East Med, and Black Sea. The cruise ports of each sub-system are illustrated at **Figure 1** (see Appendix I for the list of ports per region included in the sample).

Figure 1: Cruise Ports in the Med and the Black Sea per size & region



In total, 25,6 m. cruise passenger movements were registered in these ports in 2014 (**Figure 2**). This equals to an impressive 84,7%, or 11,8 m. passenger movements, growth since 2004.

Figure 2: Cruise Passenger Movements growth (2005-2014; n=69)



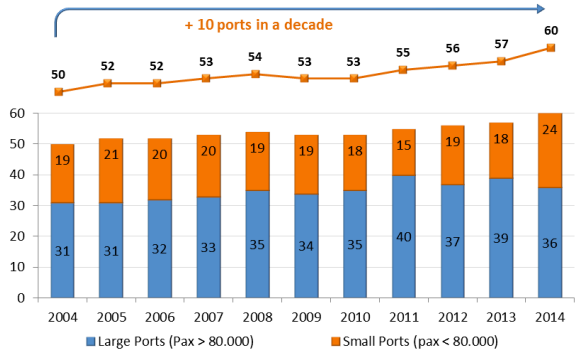
The scale of cruise passengers in these cruise ports exceeded 20 million movements every single year since 2008. This is the result of the deployment of 19,9% of the global cruise capacity in the Med, a share equalling to 35,7 millions of bed days (CLIA, 2014). The number of cruise calls in 2014 was just 13.366, standing 11,1% higher than the calls that had taken place a decade earlier. The comparative lower increase of calls indicative of the presence of economies of scale and the consequent increase in the size of cruise vessels deployed in the Mediterranean.

Splitting the decade in two halves, the picture is considerably different. The hosted in 2014 passenger movements stand just 4,4% more than those of 2010, as the notable growth observed in the early part of the decade. A year per year volatility is also observed in the most recent years. Comparing the total of passengers movements of 2014 represents a 7,3% decrease of passenger movements comparing to the ones that had happened in 2013. The variation is a positive one when comparing to the number of passenger movements that had taken place five years earlier.

The decline of 2014 is the outcome of the emphasis that cruise lines put to the growth of the Asian market, the comparatively slow growth of cruise activities around the globe the same year (as 2014 was the year with the slowest increase of cruising passengers number of the last 19 years) and not least due to the fact that regulatory changes obliged cruise lines to limit the presence of the biggest vessels in a major home-port, Venice. The challenge for Med ports, destinations and all stakeholders is to transform this drop to a temporary one by providing all those conditions for further growth.

The number of cruise ports in the Med and its adjoining seas region that recorded a cruise traffic of at least 10.000 passengers and 20 cruise calls in 2014 stands at 60 (**Figure 3**). Comparing to a decade before, when 10 ports less had surpassed this threshold, it is evident that more ports and destinations are hosting cruise activities as cruise lines seek ways to enrich the product they offer and attract further passengers. Of these 60 ports, 36 cruise ports hosted more than 80.000 passenger movements within a year, and might be classified as 'large' cruise ports; the respective number of 'large' ports was standing at 31 ports a decade ago.

Figure 3: Number of ports with significant cruise traffic since 2004



4. Intra-Region Comparisons

Four port subsystems, or 'multi-port cruise regions', are identified within the Mediterranean and its adjoining seas. These are West Med, Adriatic Sea, East Med, and Black Sea.

A total of 36 cruise ports are located in the West Med, which is the biggest of the four regions in terms of the share of cruise activities hosted. These ports hosted 17,85 millions cruise passenger movements in 2014, a share of 69,9% of the Mediterranean total. That is a 3,9% growth comparing to 2010, but a 4,8% decrease comparing to 2013. They also hosted 8.181 cruise calls, a 61,2% share of the respective total; a number 6,2% lower than that of 2013, or 4% comparing to the recorded calls in 2010. The 14 ports located in the East Med registered in 2014 3 million cruise passenger movements; a 15,8% decline comparing to 2013 and a drop of 2,6% comparing to 2010. The annual number of calls in these ports during 2014 (2.111) was 11,7% lower than those of the previous year, and 23,9% lower comparing to the calls that had taken place in 2010.

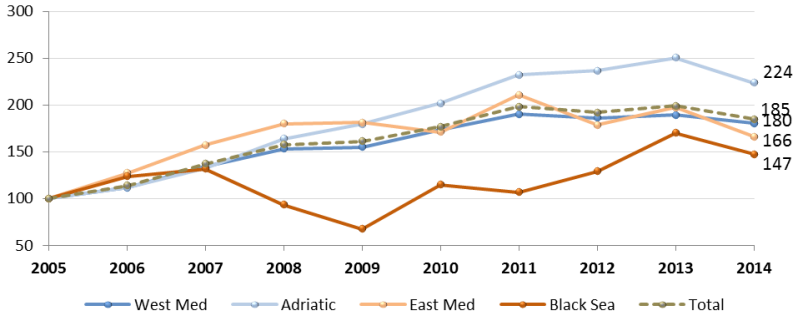
A total of 13 cruise ports in the Adriatic region accommodated in 2014 4,6 million passenger movements and 2.742 cruise calls. This represents a decrease of 10,6% in cruise passenger movements and 10,7% in cruise calls comparing to 2013. Comparing to 2010 the number of total cruise passenger movements increased by 10,8%, while the number of cruise calls decreased by 10,8%. The Black Sea is the smallest distinctive region as regards the magnitude of cruise activities. Comparing to the previous year, the six cruise ports in the region for which data are available hosted 13,5% passenger movements less and precisely the same number of cruise calls as in 2013. The total of cruise passenger movements and cruise calls registered in 2014 stand at 162.588 passengers and 332 calls respectively. Despite the cancellations resulted by the difficult political context that emerged in 2014 in Ukraine and the nearby

area, Black Sea ports recorded in 2014 28,2% more passenger movements and 32,8% more cruise calls comparing to 2010.

The growth indexes per region over the last decade (**Figure 4**) illustrate this each sub-system has its own dynamics, with the Adriatic Sea gaining shares at the expense of the other three regions.

In 2005 the Adriatic cruise ports hosted 14,7% of the traffic accommodated in the region, and in 2014 this share equaled to 17,8%. All other regions lost shares. The West Med traffic share lowered to 69,9% of the total from 71,5% and that of the East Med lowered in 2014 to 11,7% comparing to 12,95% in 2005. The distinctive performance of the Adriatic ports emerged in the most recent half of the decade. On the other hand, in the case of the East Med the growth of the first half of the decade has been followed by a minor decline in the second half of it; a development which is not irrelevant from the geopolitical turbulence that the region experiences within the latter period.

Figure 4: Cruise Passenger Movements Growth Indexes per subsystem (2005=100)



4.1 Home-porting

Beyond the different growth dynamics, the four regions differ as regards the extend that home-porting is taking place. Becoming a

home-port, the starting or/and ending point for a cruise itinerary, is a major strategic goal for a number of cruise ports. The increased cruise activity and the provision of additional port, port related services to the major lines and the visit of the port-city by a considerable number of cruise passengers that typically spend more time at the destination they embark, leads to increased revenues for the port authority, the terminal operator, if any, but also for the port-city.

Each cruising area has its home-ports, with the balance of traffic between the hosted home-porting and transit passenger movements varying from port to port. In Adriatic, home-porting takes place in 11 of the 14 ports and represents 39,4% of the total passenger movements. At the other end of the spectrum, Black Sea has only recently seen 4 ports in the region hosting any home-porting activity, with the latter standing at 18,1% of the total traffic in the Black Seas. In the East Med and West Med, the share of home-porting is 23,7% and 27,6% of the annual cruise traffic in the home-porting respective region. The Adriatic is a region that records more substantial traffic of this type than any of the others. In total, 29,2%, or 7,45 m. passenger movements - are 'home-porting' movements, with passengers departing or concluding a cruise in 44 different ports of the sample.

Table 1: Home-porting passenger movements per region (2014)

Region	Home-Porting passengers (1)	Cruise pax movements (2)	(1)/(2)	No of Ports
West Med	4.921.625	17.854.187	27,6%	23
Adriatic	1.796.741	4.554.958	39,4%	11
East Med	706.613	2.980.148	23,7%	6
Black Sea	27.727	162.588	17,1%	4
Total	**7.452.706**	**25.551.881**	**29,2%**	**44**

Overall, home-ports tend to be linked with specific source markets. This is due to proximity, access options, and not least preferences of cruise passengers to visit certain destinations. In the Mediterranean region, where multiple home-ports exist, Americans use extensively Barcelona in Spain, Venice and Civitavecchia, in Italy, British passengers depart from the UK (Southampton; Dover), but also from Spain (Malaga, Mallorca) and Malta, Germans depart from Hamburg, Kiel and all different places in the Mediterranean Sea, where other nationalities (i.e. Italians, Spanish, French) take advance of the presence of home-ports in their countries.

4.2 Shifting port hierarchies

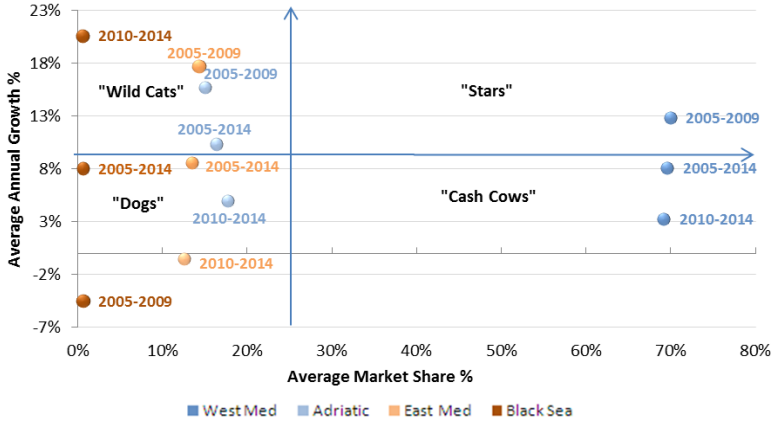
More details on the cruise traffic evolution are presented using the Boston Consulting (BC) matrix (see also: Notteboom, 1997 for methodology). In **Figure 5** the Med port sub-systems are presented for a 10-year period (2005-2014) according to their average market shares (on the horizontal axis) and the average growth rates (on the vertical axis). Analysis extends to include the way that each region performed in the different halves of the decade.

Evidently, the West-Med region is located in the quadrant of "cash cows" with a moderate growth rates and significant market shares, as following a 'star performance' during the first half of the decade when it combined above average growth rates with increased market shares, it moved a 'cash cow' performance during 2010-2014.

The other three cruise port systems behaved also quite volatile in terms of growth rates, portraying the different developments of the last decade. For the Adriatic port-region, the outcome of the last decade is its positioning at the "wild cats" quadrant of the matrix, which refers to above average growth rates. This is the result of the cruise activities growth during the period 2010-2014, as the region had not developed with such dynamism during 2005-2009. The

movements in the region are quite substantial and will clearly affect the dynamics of cruise activities in the Adriatic; the construction of new terminals (i.e. Brindisi) the development of new cruise ports (i.e. Bar, Montenegro) and the concessioning of a marque port, Dubrovnik, work in favour of positive trends in coming years. Nonetheless, these trends will be undoubtedly substantially affected by the regulatory developments in Venice, in particular the extent that social pressures will limit or not the size of vessels visiting or home-porting at the particular port.

Figure 5: BC matrix – 4 cruise port regions



In the East Med case the situation is contrasting, thus the 'dog' status in the matrix. In this port region, the deterioration of the political climate has a major effect. With cruise lines organising itineraries, rather than single port visits, the Arab Spring, and later the geopolitical instability in some of the regions resulted in a marginal decrease of cruise activities. As a result the region that had demonstrated the biggest growth of all during 2005-2009 (almost 18%) has moved to the 'dogs' quadrant, when the overall picture of the decade is concerned. Today private investors (i.e. Global ports)

expanding their investments, and regulatory alternations (i.e. liberalization of cabotage in Greece since 2012) counterpart geopolitical difficulties in the South part of the region, thus it remains to be seen which of these factors will determine the position of the region in the near future.

The Black Sea region ends at the same quadrant precisely because of the very different reasons: a remarkable performance since 2010 replaced a negative performance during the first half of the decade. The crucial year is the running one; in 2015 the region will realize whether the decline brought the crisis in Ukraine and Crimea to the East Black Sea system in 2014 has a lasting effect or not.

For the first part of the decade under examination (2005-2009), the 'stand alone' West Med region was established at the 'stars' quadrant given the combination of an above the average market share along with the an above the average growth. The region did not maintained the status of "stars" as the period 2010-2014; as other subsystems grew at a faster pace the West Med moved to the 'cash cow' quadrant of the matrix. Developments in this system are also notable. Regulatory drivers led the major port of the Med, Barcelona to disinvest from terminal operations, with several cruise terminals in the ports operated today by companies having major cruise corporation as key stakeholders, Lisbon completed in 2014 a concession for a new cruise terminal to a company involving a major cruise company (RCCL); with all of these making future dynamics worth to be monitored.

The 'net shift' analysis results in Figure 5 provide more insights on the throughput dynamics per region that took place per year. Mathematically the net shift analysis mirrors the entire passenger movements that a port has actually lost or won from competing ports in the same range with the anticipated growth rate (see: Grushevska and Notteboom, 2014). The sum of all shift-effects equals to zero. The time intervals with considerable net volume

shifts refer to a high degree of competition and dynamics within the cruise port system.

The succeeding formulas were used to calculate the shift effects between (inter) and within (intra) the different multi-port gateway regions:

$$VOLSHFT_{total} = \frac{\sum_{i=1}^{n}|SHFT_{ij}|}{2} = VOLSHFT_{intra} + VOLSHFT_{inter}$$

$$VOLSHFT_{inter} = \sum_{j=1}^{m}\left(\frac{\sum_{i=1}^{r} SHFT_{ij}}{2}\right)$$

$$VOLSHFT_{intra} = \sum VOLSHFT_{intraj}$$

$$VOLSHFT_{intraj} = \frac{\sum_{i=1}^{r}|SHFT_{ij}| - \sum_{i=1}^{r}|SHFT_{ij}|}{2}$$

whereas:

$VOLSHFT_{intra}$ is the net volume of PAX shifted between ports of group j, $VOLSHFT_{inter}$ the net volume of TEU shifted between ports situated in different port groups,

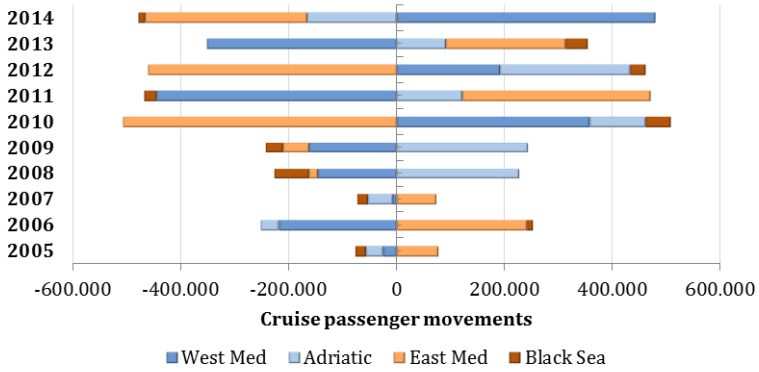
$VOLSHFT_{total}$ the total net volume of TEU shifted between cruise ports in the system,

r is the number of ports in group j,

n = number of ports in the port system, and

m = number of port groups in the port system.

Figure 6: Shift analysis for the Mediterranean cruise port system



The net volume shifts reveal the remarkable fluctuation of cruise activities in the East Med since 2010. The decade had started quite differently though, with East Med being the leader region, with an active growth bettering all for the first three years. It is the Adriatic that led growth next. This cruise multi-port region demonstrated a stable growth in all subsequent years until 2014, when it underperformed. The latter is attributed to the limitations posed via legislations restricting the size of the cruise ships visiting this marquee port. This led to the restructuring of the deployment partners in those itineraries including a major port of the region, in turn limiting passenger movements.

The West Med is the second multi-port region that demonstrated a significant volatility the second half of the decade. During these years the region seemed to mirror trends in the East Med. The annual shift suggests that growing annual trends in one of these two regions took place to a great extent at the expense of the other, yet this lasted only one year, as the reverse trend was observed the year that followed. The decade had started completely differently though, with West Med ports being the consistently underperforming ones throughout first years of the decade. The size

of the fourth region, Black Sea, is comparatively small, nonetheless it is evident that the most dynamic years were the most recent ones.

The observed dynamism and the remarkable shifting of shares between regions generate the need to analyze the trends of cruise activities in individual ports. This analysis facilitates understanding whether the volatility has taken place because of volatile performance, stagnation, or remarkable growth of others.

4.3 Seasonality by region

The seasonality trends observed in each of the four distinctive regions follow in certain respects dissimilar distributions (**Table 2**). In West Med the cruise traffic is distributed more balanced throughout the year. Cruise activities during the winter months correspond to a 10,3% share of the total cruise passenger movements in the region. In the other three regions cruise traffic is concentrated mostly during the second half of the year, in particular the period commencing in June and ending in November. The Adriatic and East Med follow the same distribution patterns as regards calls per trimester. That said, in absolute numbers the passenger movements in the Adriatic during the winter time (Dec-Feb) are minimal (18.146) and the ones that take place in East Med few.

Table 2: Trimester Shares of Cruise Traffic within the MedCruise Regions

Region	Total Passengers				Total Calls			
	Mar-May	Jun-Aug	Sept-Nov	Dec-Feb	Mar-May	Jun-Aug	Sept-Nov	Dec-Feb
West Med	23,88%	32,40%	33,39%	10,33%	27,12%	28,69%	35,45%	8,75%
Adriatic	20,60%	44,46%	34,54%	0,41%	20,65%	43,53%	32,18%	3,64%
East Med	19,07%	41,88%	36,23%	2,83%	20,99%	37,80%	37,94%	3,27%
Black Sea	10,25%	35,50%	47,71%	6,55%	12,35%	41,57%	42,47%	3,61%
Total	22,62%	35,74%	34,03%	7,61%	24,30%	33,81%	35,30%	6,59%

5. Trends in the 20-major ports

The list of the 20 major ports of the sample includes 13 ports located in the West Med, with Barcelona and Civitavecchia (Rome) being the major ports of all 69 ports. Four ports located in the Adriatic and three ports in the East Med. These ports hosted in 2014 (**Table 3**) 79% of the total passenger movements (20.2 million), and 66,4% of the cruise calls (8.876). The concentration is even higher when reference is on home-porting. The 20 major ports hosted 94% of the passengers (dis)embarking a cruise at a specific port. Venice, Genoa, Savona are the ports that record the higher ratio of home-porting/total cruise passenger movements, with the average of the latter ratio standing at 0,347.

The impact of the increase of cruise vessels is also quite remarkable, implying changing operations and the need for a different type of port infrastructures and coordination with destination. Each cruise call in one of the 19 major ports for which such data are available results, on average, at the disembarkation/embarkation of 2.314 passengers. Ten years before, each call had resulted, on average, precisely 1.000 passengers less, i.e. 1.314 passengers/call (8.207 cruise calls; 10,785 m. passenger movements).

Table 3. 20 Major Ports in the Med (passenger movements; 2014)

Port	Region	Home-Porting passengers (1)	Cruise pax movements (2)	(1) / (2)	Cruise Calls
Barcelona	West Med	1.222.487	2.364.292	0,52	767
Civitavecchia	West Med	730.938	2.140.039	0,34	833
Venice	Adriatic	1.509.097	1.733.839	0,87	488
Balearic Islands	West Med	606.549	1.587.064	0,38	678
Marseille	West Med	506.412	1.311.284	0,39	497
Naples	West Med	99.423	1.113.762	0,09	399
Piraeus	East Med	256.196	1.055.556	0,24	606

Savona	West Med	668.473	1.018.794	0,66	279
Dubrovnik	Adriatic	24.790	844.410	0,03	577
Tenerife Ports	West Med	n.a	840.268	n.a.	513
Genoa	West Med	571.463	824.109	0,69	209
Kusadasi/Bodrum/Antalya	East Med	201.142	761.912	0,26	605
Corfu	Adriatic	71.881	672.368	0,11	395
Livorno	West Med	2.088	626.356	0,00	341
French Riviera Ports	West Med	34.791	595.685	0,06	369
Istanbul	East Med	148.297	589.353	0,25	331
Bari	Adriatic	152.056	561.602	0,27	147
Palermo	West Med	65.935	531.712	0,12	221
Valletta	West Med	93.581	517.594	0,18	302
Lisbon	West Med	41.465	500.872	0,08	319
Total		**20.190.871**	**7.007.064**	**0,347**	**8.876**
% of Total		**79,0%**	**94,0%**		**66,4%**

The positioning of these ports in the BC matrix provides information as regards the changing structures of the cruise port hierarchy within the Med (**Figure 7**). Civitavecchia, Venice and Piraeus were the 'Stars" of the last decade, as they recorded above average annual growth while having above average market shares. Six more ports, Palermo, the operated by Global Ports Holding Kusadasi/Budrum/Antalya, Marseille, Istanbul, Genoa and Corfu are positioning at the "wild cats" quadrant of the matrix, which refers to above average growth rates. As regards the other 11 ports that recorded the last decade below average annual growth, Barcelona, Balearic Islands and Naples are the three ones that stand at the 'Cash cows' quadrant given the substantial, above average market shares they maintain.

The six ports that had an above average market share in the 2005 continue to do so in 2014. However, the comparison of the respective BC matrixes with reference to the first and the second half of the last decade illustrate the changing hierarchies (**Figure 8** and **Figure 9**). Barcelona was at the 'Stars' quadrant during the first half of the period, but slower growth during the second half lead to the 'Cash Cows' one. Piraeus owes much of its 'Star' positioning to

the remarkable growth of 2005-9, when it recorded the best growth of all major ports; on the other hand, Piraeus and Naples record a stagnated cruise traffic when the focus is on the 2010-14 period. Balearic islands owe their success to the 2010-14 period when they stand among the 'Stars' – as did Civitavecchia and Venice in both sub periods under examination.

Figure 7: BC matrix of 20 major cruise ports (2005-2014)

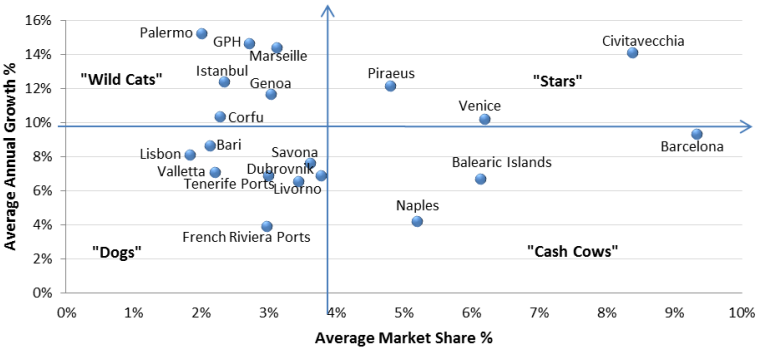
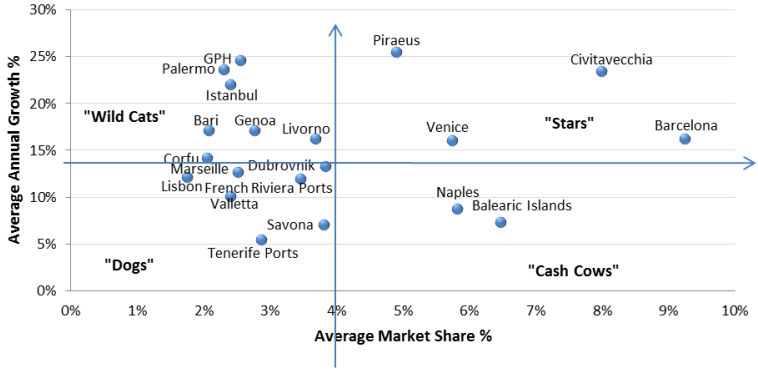


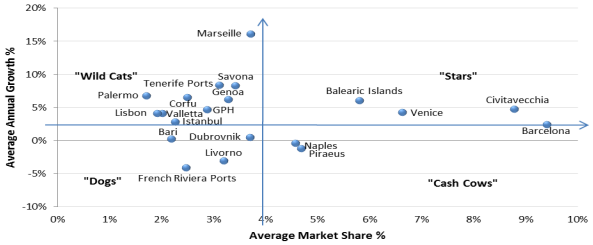
Figure 8: BC matrix of 20 major cruise ports (2005-2009)



Looking at the 14 major ports that follow in terms of market shares, the comparison reveals additional features of the on-going chancing hierarchy. Marseille, Tenerife ports, Savona, Corfu, Lisbon and Valletta are the six cruise ports demonstrated above average growth during the most recent years (2010-14), whereas in the first part of the decade they had all recorded below average growth. As a result, Corfu has already moved to the 'Wild Cats' quadrant when the overall decade is considered. Istanbul, Bari, and Livorno had recorded an above average growth in the first half of the decade performed worse than the average in the second half of it. As a result, at the matrix referring to the performance of the decade only Istanbul retains the "Wild Cats' status that all these three ports had gained in the 2005-9 matrix.

The comparison of the two different periods of the decade produces an additional finding. All 20 major ports recorded a growth in the first part of the decade; the average growth was at just over 15%, with the port growing at the slowest pace being Tenerife ports that grew by 5,1%. In the second half of the decade, four ports, Naples, Piraeus, Livorno, and French Riviera ports saw the number of passengers declining, whereas the average growth of the major ports over this five-years period standing at less than 5%.

Figure 9: BC matrix of 20 major cruise ports (2010-2014)



5. Market Concentration

The application of the Hirschman-Herfindahl index (HHI) and the Gini coefficient enable to analyse the concentration patterns of the cruise port system in the Med and its adjoining seas, a port system marked by the presence of a certain number of providers.

Given the number of firms in a market and their respective market shares, HHI measures the size of firms, in relation to an industry and the amount of competition among them. In the case of Med cruise ports this index consists of the sum of squared market shares of the 50 largest ports (or summed over all the ports of the sample if there are fewer than 50). The result is proportional to the average market share, weighted by market share. As such, it can range from 0 to 1, moving from a huge number of very small firms to a single monopolistic provider of services. Increases in the HHI generally indicate a decrease in competition and an increase of market power. A HHI index below 0,01 indicates a highly competitive index, below 0,15 indicates an unconcentrated index, between 0,15 to 0,25 indicates moderate concentration, whereas above 0,25 indicates high concentration.

The index with reference to the aggregate market as well as the regional ones is detailed in **Table 4**. When the total of the ports in Mediterranean and its adjoining seas are under examination, HHI suggests that neither the market is concentrated (HHI=0,043) nor the level of concentration has changed the last decade.

Table 4: Herfindahl-Hirschman Index per region; Cruise Passenger Movements (2005-14)

HHI Index	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Total	0,043	0,044	0,043	0,043	0,043	0,043	0,044	0,042	0,043	0,043
West Med	0,066	0,068	0,069	0,068	0,066	0,065	0,070	0,066	0,069	0,066
Adriatic	0,264	0,261	0,242	0,240	0,253	0,246	0,226	0,218	0,216	0,223
East Med	0,195	0,214	0,215	0,226	0,234	0,238	0,244	0,243	0,235	0,241
Black Sea	0,646	0,590	0,552	0,305	0,255	0,338	0,396	0,342	0,341	0,264

Focusing on the extent of market concentration in each of the multi-port regions, this is not always the case. The West Med region is unconcentrated (HHI=0,066) but the picture is different in the other regions. The Adriatic is a moderately concentrated market (HHI=0,223), with this concentration declining the last five years. The East Med is another moderately concentrated market (HHI=0,241), with this concentration sustaining over time. The Black Sea on the other hand has been a highly concentrated market (HHI=0,264), with the levels of concentration declining overtime, and the region heading to a moderately concentrated market status.

Another method to assess port concentration consists in applying the Gini coefficient, a widely used index that measures percent departure from a perfectly uniform distribution. If all ports in a port system are equal of size, the Gini coefficient will equal zero. In case one port accounts for the total volume of passenger movements (full concentration) the Gini coefficient equals to 1. Applied to the examination of port markets concentration for just more than a quarter of a century (Hayuth, 1988; Kuby and Reid, 1992; Notteboom 1997; Notteboom 2006; Parola and Veenstra, 2007) the Gini coefficient is calculated as:

$G_j = 0.5 \sum_{i=1}^{n} |Xi - Yi|$ and 0<Gj<1

where Gj is the Gini coefficient for the cruise port system (or port region) j, Xi is the cumulative percentage of the number of ports up to the ith cruise port, Yi is the cumulative percentage of the market shares of all ports up to the ith cruise port and n is the number of ports in the port system (or port region) j.

Table 5 represents the concentration results for the Med cruise port system. The value of the Gini coefficient for all ports indicate an unevenly distributed system, which nonetheless has remained rather at the same level of concentration with minor fluctuations; a very modest trend towards a less evenly distributed system indicated in the last years. Table 5 also reveals that concentration in the case of the 20 major cruise ports is lower than that of the total of the Med, yet it remains stable over time.

Table 5: Gini Coefficient

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
All ports	0,640	0,645	0,644	0,650	0,652	0,648	0,653	0,646	0,654	0,661
20 major ports	0,251	0,245	0,253	0,239	0,250	0,273	0,276	0,263	0,285	0,277

In graphical terms, the Gini coefficient is equal to the ratio of the area between the Lorenz curve and a diagonal line, relative to the maximum possible area (the entire right triangle formed by the bottom and right axes and a diagonal linking the top right corner to the bottom left corner). If all the ports in a port system are equal of size, the Gini coefficient will equal zero and the Lorenz curve would coincide with the diagonal of equal distribution. In case one port accounts for the total volume of containers (full concentration), the Gini coefficient equals unity, which coincides with the whole area under the diagonal of equal distribution.

Figure 10: Cruise passenger movements - Lorenz curve 2014 (all ports)

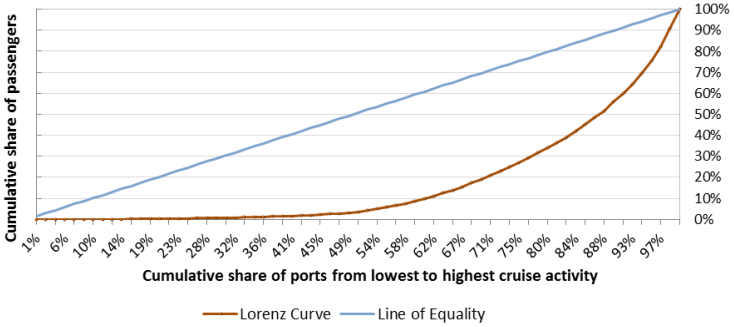
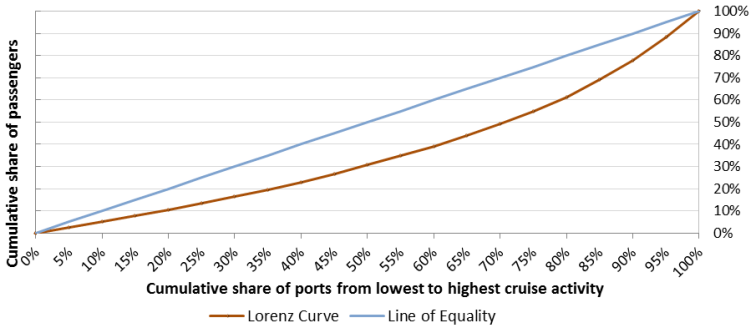


Figure 11: Cruise passenger movements - Lorenz curve 2014 (20 major ports)



6. Conclusions

The study provided evidence of the patterns, structures, and geography of the growth of the cruise port industry in the Mediterranean and its adjoining seas since 2005. Analysing passenger movements in 69 cruise ports it revealed that the most dynamic picture of the first half of the decade has given place to a slower pace of growth and volatility of cruise activities. In certain

ports this has been translated to stagnation of cruise passengers numbers. One needs to recall that the second half of the decade was a period that the global economy experienced the 2008 financial crisis, and the African Med faced turbulent political conditions, and the European Med difficult economic and social conditions. The next decade, or so, will be the period to determine whether this is a temporary phenomenon, that one should normally expect to emerge following an unprecedented and sustainable growth in the last fifteen years, or this is the indication of a maturing phase of cruise activities where moderate levels of growth will take place. With the Med have been the most dynamic cruise region of all, the coming year(s) will also reveal whether this slowing growth is a trend with reference to the specific region alone, or to the global cruise industry. At the same time the analysis confirmed that the region has seen the expansion of the numbers and ports involved in the hosting of cruise passenger traffic.

The study also demonstrated that the transformation of the region under examination from a cluster of port destinations hosting a certain thousands of cruise passengers to a multi-port cruise region accommodating several millions of passenger movements, is associated with a dynamic cruise port hierarchy that is underway. The trends in the major 20 cruise ports in the Med suggest that these ports maintain substantial shares of the total cruise traffic and even bigger ones in the case of the total home-porting activities, however, the growth rates of different ports have been quite diverge. During the second half of the decade, the growth has been less remarkable than in the first half of it.

The examination of the intra-region dynamics revealed some unexplored imbalances between the four 'multi-port' cruise regions of the Med (West Med, East Med, Adriatic, Black Sea). Contrasting the commonly endorsed concept that this should be seen as a 'single cruise region' that stands as the second major cruise region, the examination of the dynamics of (and within) each region is worthy.

Finally, the study provided an analysis of the levels of market concentration based on Gini coefficient and the HHI, concluding that in most cases, and in almost all regions, the cruise port market is not concentrated at all. Even in those cases that moderate levels of concentration appear, this is declining or at least not increasing.

With this analysis focusing on cruise passenger movements and only occasionally including additional dimensions - the most profound being the cruise vessel - the expansion of the analysis to include intelligence on cruise calls would further our knowledge on the precise nature of cruise activities evolution in the Med and its adjoining seas. Similar would be the benefits of studies that would examine the linkage of cruise growth with additional parameters, such as the cruise port governance practices endorsed, the marketing practices followed, the operational (i.e. berthing allocation; security, etc..) and the other practices (i.e. collaboration with local authorities, destinations, strategic partnerships with other ports etc.) applied.

The findings, and the enduring growth of cruise around the globe (the number of passengers taking a cruise per year increased every year the last two decades) call for similar analyses, and not least comparisons, with other cruise regions around the globe. With Asia appearing in the strategies of cruise lines as a deployment region and a source market, and the Med experiencing volatile trends, additional studies would reveal (dis)milarities in the process of globalization that the cruise industry experiences, whereas they will also be practically helpful for those involved in the making or the development, governance, marketing, and operating cruise ports.

Acknowledgements

The study has benefited by the database of cruise passenger movements and cruise calls recorded by cruise ports and are collected by MedCruise, the association representing cruise ports in the Med and its adjoining seas.

Appendix I. Cruise Ports in the Med and its adjoining seas included in the analysis

West Med	Alicante	Balearic Islands	Barcelona	Cagliari
	Cartagena	Castellón	Ceuta	Civitavecchia
	French Riviera Ports	Genoa	Gibraltar	Gioia Tauro
	Huelva	La Spezia	Lisbon	Livorno
	Madeira Ports	Málaga	Marseille	Messina
	Monaco	Motril-Granada	Naples	North Sardinian Ports
	Palamós	Palermo	Portimao	Portoferraio
	Savona	Sète	Tarragona	Tenerife Ports
	Toulon-Var Provence	Tunisian Ports	Valencia	Valletta
Adriatic	Bari	Brindisi	Corfu	Dubrovnik
	Koper	Kotor	Ravenna	Rijeka
	Sibenik	Split	Taranto	Trieste
	Venice	Zadar		
East Med	Alanya	Cyprus Ports	Heraklion	Igoumenitsa
	Istanbul	Kavala	Kusadasi/Bodrum/ Antalya	Mersin
	Patras	Piraeus	Souda/Chania	Thessaloniki
	Volos			
Black Sea	Batumi	Constantza	Odessa	Sinop
	Sochi	Trabzon		

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