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The geography of cruises: Itineraries, not destinations

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A B S T R A C T

The cruise industry is a highly concentrated business in terms of players and markets. Vessel deployment strategies and itinerary design by cruise operators are primordial and are affected by market and operational considerations. This paper focuses on capacity deployment and itineraries in two major cruise markets: the Caribbean and the Mediterranean. We argue that the cruise industry sells itineraries, not destinations, implying a level of flexibility in the selection of ports of call, but still bound to important operational considerations. The paper also reveals that the two cruise markets are not functioning independently but are interconnected in an operational manner, particularly through the repositioning of vessel units to cope with variations in seasonal demand among the regional markets.

Introduction

The modern cruise industry emerged in the late 1960s and soon developed into a mass market using large vessels and adding more revenue-generating passenger services onboard. It has become a salient symbol of the globalization of the tourism industry in terms of its market coverage, its practices (e.g. customer service) and the mobility of its assets (e.g. Chin, 2008; Weaver, 2005a; Wood, 2000). Still, the geography of cruises remains an under-researched academic field in maritime and tourism studies. In the past few decades, the industry has attracted a few researchers from various fields investigating the complexity of its operational and commercial dynamics. Dowling (2006) probably offers the most comprehensive overview of academic work related to the cruise industry: the edited volume covers nearly forty contributions dealing with topics such as the geography and seasonality of the world cruise market (Charlier & McCalla, 2006), the industrial organization of cruises (Papatheodorou, 2006), the demand for cruise tourism (see e.g. Petrick & Li, 2006), the supply of cruises in specific regions (see e.g. Wilkinson, 2006; Wood, 2000 on the Caribbean) and other economic, social and environmental dimensions of the cruise market.

Dwyer and Forsyth (1996, 1998) and Dwyer, Douglas, and Livaic (2004) analyzed the economic significance of cruise tourism and cruise ship calls, while Doublas and Douglas (2004) unraveled cruise ship passenger spending patterns. Key operational research topics include the optimal routing of cruise ships (see e.g. Hersh & Ladany, 1989), the cruise ship port selection process (Marti, 1990) and the optimal cruise-liner passenger cabin pricing policy (Ladany & Arbel, 1991). The service offerings and locational qualities of cruise ports have also received attention in the literature. For example, McCalla (1998) examined the specific site and situation requirements of cruise ports, while Vaggelas and Pallis (2010) identified and classified the different services provided by 20 European passenger ports. Gui and Russo (2011) introduced an analytic framework that connects the global structure of cruise value chains to the regional articulation of land-based cruise services.

Building further upon the existing literature, this paper focuses on capacity deployment and itineraries in two major cruise markets: the Caribbean and the Mediterranean. We argue that the cruise industry sells itineraries, not destinations, implying a level of flexibility in the selection of ports of call, but still bound to important operational considerations such as sailing vs. port time. If this holds true, then a geographical perspective of the cruise network structure is particularly revealing of its operational characteristics. In spite of assertions that the floating assets of the cruise industry have a wide array of options (e.g. Patullo, 1996; Woods, 2004), operational and commercial considerations impose the careful design of itineraries that are offered to customers. The paper also underlines that the two cruise markets are not functioning independently but are interconnected in an operational manner, particularly through the repositioning of vessel units to cope with variations in seasonal demand. Next to analyzing itineraries and capacity deployment strategies, the paper proposes a classification of cruise ports based on the role they serve within their regions.

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Based upon the analysis of extensive cruise industry datasets[2] related to ports and itineraries the paper is structured as follows. In the first two parts we discuss the growth of the cruise industry and present key characteristics and recent developments in the cruise business. The third part provides a conceptual framework on ship scheduling by incorporating the specific realities in the cruise business, and offers an analysis of existing itineraries in the Caribbean and the Mediterranean cruise markets, the interlinkages between these markets (e.g. ship repositioning) and port of call considerations. We conclude the paper by highlighting the specific nature of ship scheduling and itinerary design in the cruise industry.

The origins and growth of the cruise industry

The era of the trans-Atlantic liners

From the mid-19th century liner services supported long distance passenger transportation between continents, particularly between Europe and North America. The need to accommodate a large number of passengers of different socioeconomic status for at least a week led to the emergence of specific ship designs radically different from cargo ships where speed and comfort (at least for the elite) were paramount. The emergence of the cruise industry can be traced to the demise of the ocean liner in the 1960s as it was replaced by fast jet services for which it could not compete. The last liners became the first cruise ships as it took more than a decade to see the complete demise of liner services with the final realization that long distance travel was now to be assumed by air transport and also considering the 30 years lifespan of a liner. The availability of a fleet of liners which utility was no longer commercially justifiable incited their reconversion to form the first fleet of cruise ships.

For instance, one of the last purposely designed liners, the SS France, operating between 1961 and 1974, was mainly used for the conventional transatlantic service between Le Havre and New York. With rising oil prices and more efficient jet liners, including the Boeing 747 (introduced in 1970), the liner was no longer able to effectively compete over the transatlantic route. While a jet plane could link Paris or London to New York in about 8 h, it took about 4 days for a liner to cross the Atlantic, excluding a train segment between London and Southampton (or Paris and Le Havre). Unable to generate enough revenue to justify its operating costs the SS France was mothballed in 1974 and purchased by the Norwegian Cruise Line (renamed the SS Norway). Its final commercial years between 1980 and 2003 were spent as a cruise ship. However, liners were not particularly suitable to the requirements of the emerging cruise industry. For instance, since many liners were designed to operate on the North Atlantic throughout the year for scheduled passenger services, their outdoor amenities such as boardwalks and swimming pools were limited. Additionally, they were built for speed (which was their trademark) with the related high levels of fuel consumption.

The emergence and massification of the modern Cruise industry

The emergence of the modern cruise industry began in the late 1960s and early 1970s with the founding of Norwegian Cruise Line (1966), Royal Caribbean International (1968) and Carnival Cruise Lines (1972), which have remained since the largest cruise lines (Garin, 2005). The early goal of the cruise industry was to develop a mass market since cruising was until then an activity for the elite. Economies of scale through larger ships able to accommodate more customers have created additional opportunities for onboard sources of revenue (Weaver, 2005b). The first dedicated cruise ships began to appear in the 1970s and could carry about 1000 passengers. By the 1980s, economies of scale were further expanded with cruise ships that could carry more than 2000 passengers. The current large cruise ships have a capacity of about 6000 passengers, but the bulk of cruise ships are within a 3000 to 4000 passengers range. The market for the cruise industry was by then established and recognized as a full-fledged touristic alternative directly competing with well-known resorts areas such as Las Vegas or Orlando.

The Caribbean remains the key cruise market, but its dominance is being slowly eroded by the Mediterranean market which offers a complementarity with its winter focused season. Furthermore, strong niche markets have developed focusing on, for instance, history (Hanseatic cities in northern Europe) or natural amenities (Alaska). Since the cruise industry is a relatively small segment of the touristic sector, it has so far been very successful at finding customers to fill ever larger ships. The cruise product has become diversified to attract new customers and to respond to the wide array of customer groups. In view of fulfilling the desires of its guests, the cruise industry has innovated through the development of new destinations, new ship designs, new and diverse onboard amenities, facilities and services, plus wide-ranging shoreside activities. Most cruise ship operators work around specific cruise themes and voyage lengths can vary to meet the changing vacation patterns of customers. The rising affluence and aging of the global population, the growing popularity of exotic and resort destinations and a growing diversity in the touristic sector have all contributed to the success of the cruise industry.

Market dynamics in the cruise industry

A growing customer base

The global cruise industry carried about 20.1 million passengers in 2012, up from 7.2 million in 2000 (Cruise Lines International Association, 2011). Since 1990, over 154 million passengers have taken a two or more days cruise. Of this number, over 68% of the total passengers have been generated in the past 10 years and nearly 40% in the past five years. The global growth rate of the cruise industry has been enduring and stable, at around seven percent per year in spite of economic cycles of growth and recession. The financial crisis of 2008–2009 has not impacted the demand for cruises in a discernible manner. The size of the global cruise industry is relatively small compared with the tourism industry. For instance, about 37 million people visited Las Vegas in 2010, while the global cruise industry carried about 18 million passengers. There is little evidence about the market potential of the cruise industry or when a saturation point could be reached.

Since the cruise industry is a relatively small, but fast growing segment of the travel industry, it has so far been very successful at finding customers to fill ever larger ships. Its highest level of market penetration is in North America with about three percent of the population taking a cruise each year (Fig. 1). This includes people who may take more than one cruise in a year so actual figures are actually lower.

The dominant source market for cruises remains North America with a penetration level of around three percent, but there is a gradually changing customer base toward developing countries,

[2] The two main datasets used include a dataset collected by the US Department of Transportation, Maritime Administration (MARAD) that collects the characteristics of all cruise ships calling an American port and a commercial dataset maintained by Cruise Market Watch that tracks 90% of the world's cruise ships and include their ports of call and passenger statistics.

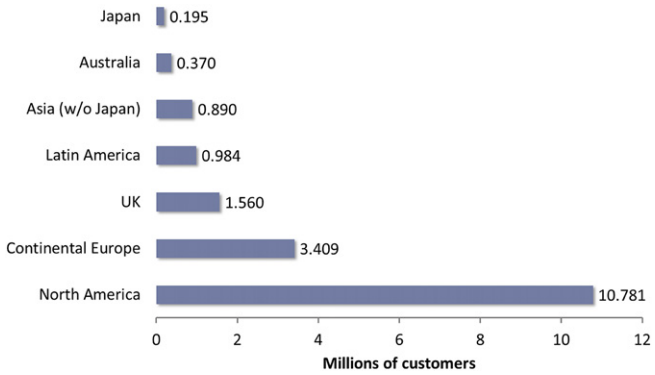

Fig. 1. Cruise source markets, 2010. Source: adapted from Cruise Lines International Association (CLIA)

particularly Latin America. Countries that have a maritime tradition tend to have a higher share of the population taking cruises. Penetration levels in Asia remain problematic (0.1–0.2%) as a cruise is generally not perceived to be an accepted mean of vacationing. Still some initiatives are being developed such as the plan of Princess Cruises to deploy the Sun Princess with a capacity of about 2000 passengers in Japan starting in April 2013 and targeted specifically at Japanese vacationers. The company expects to carry about 18,000 passengers annually on the Japan-based cruises.

The Florida-Caribbean Cruise Association (2010) reported that the annual occupancy percentage even exceeded 104% in 2009 showing an industry where demand continues to outstrip supply, even in the harshest economic environments. Occupancy figures must however be treated with caution as what is considered normal capacity on a cruise ship is based on two passengers per stateroom (100% occupancy). Since many staterooms can accommodate three to four passengers, occupancy rates are generally well above 100% (Fig. 2). The most prevalent occupancy level is around 110% and levels below 100% are rarely seen. This underlines that the industry has been so far fundamentally supply based; the ships are built and the customers are found to fill them through various marketing and discounting strategies.

The possibility for cruise ship operators to successfully follow a supply push strategy makes the cruise industry quite different from other shipping markets, such as container shipping. Hence, in most shipping markets the shipping activity is a clear derived activity of trade and demand is rather price inelastic. Demand in

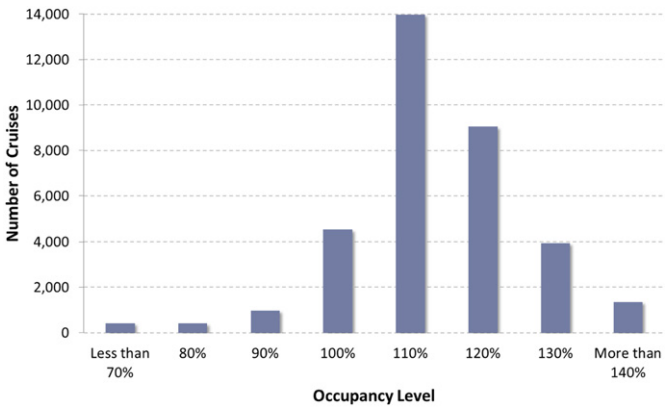

Fig. 2. Occupancy level of North American Cruises, 2004–2011. Source: own compilation from US Department of Transportation, Maritime Administration. Based on a dataset of all the registered cruises calling an American port between January 2004 and December 2011. This involves 34,663 individual cruises.

the cruise business is 'created' through pricing and branding/marketing. Cruise operators are challenged to develop competitive cruise packages which involve a high-quality stay onboard, an array of shore-based activities offering access to a variety of cultures and sites and easy transfers to/from the vessel.

Market drivers

The market drivers of the cruise industry are similar to those that have fostered the growth of tourism after World War II, particularly the rising affluence of the global population and the growing popularity of exotic and resort destinations. The general aging of the population is also a factor in favor of cruises as the main market remains older adults, albeit customers are getting significantly younger. While in 1995 the average age of a cruiser was about 65 years, this figure dropped to 45 years by 2006 (Cruise Lines International Association, 2011). Cruisers have a specific profile (Florida-Caribbean Cruise Association, 2010). They often cruise as part of their vacation mix and plan their cruise trip on average five to six months in advance. Word of mouth referrals are important in choosing a cruise trip, next to more common sources such as cruise websites and travel agents. About three-quarters of all cruise passengers book at least some of their cruises through travel agents.

What is novel with cruising is that the ship represents in itself the destination, essentially acting as a floating resort (or a theme park) with all the related facilities (bars, restaurants, theaters, casinos, swimming pools, etc.). This permitted cruise lines to develop a captive market within their ships as well as for shore-based activities (e.g. excursions or facilities entirely owned by subsidiaries of the cruise line). While many cruise lines offer basic low cost cruise packages to attract large flows of passengers, they are also seeking ways for big-spending customers to spend even more by offering a more exclusive experience, for example, by offering first class accommodation with amenities including luxury pool decks, butler service, luxury spa treatments and higher quality meals. Such strategies have led to the reintroduction of class or 'ship within a ship' systems, which were very typical of the trans-Atlantic cruise liner era of the early twentieth century. The price differential between a standard stateroom and a premium-priced luxury suite arrangement can be as high as a factor five. Some cruise operators go very far in developing new entertainment concepts onboard of their vessels, including surf pools, planetariums, on-deck movie screens, golf simulators, water parks, demonstration kitchens, multi-room villas with private pools and in-suite Jacuzzis, ice-skating rinks, rock-climbing walls, bungee trampolines, etc. Onboard services typically account between 20 and 30% of the total cruise line revenues and substantial efforts have been made to capture additional revenue (Weaver, 2005b). The average customer spends about $1700 for their cruise, including ship and off-ship expenses for goods and services. The majority of these expenses are captured within the cruise ship as passengers spend on average $100 per port of call, which typically involve three to four ports on a typical seven day cruise.

The 'class' system onboard of a fair amount of cruise ships combined with the emergence of a separate market segment of luxury cruises using vessels offering premium-priced suites only (e.g. the cruise ships operated by Silversea Cruises) show that the cruise market cannot be narrowed down to a low cost commodity market. Increased competition has not lead to a unilateral focus on costs and price cuts, but instead initiated differentiation strategies aimed at generating value by offering a higher-priced premium customer experience. The findings of Weaver (2005a) regarding the limits to the McDonaldization thesis in the cruise industry also point in this direction.

Market size and seasonality

The Caribbean has been the dominant deployment market of the cruise industry since its inception, but the Mediterranean cruise market has grown substantially in recent years (Fig. 3). Both markets offer a variety of cultures in close proximity and are thus ideally suited. The Caribbean and the Mediterranean are regional and complementary markets accounting for more than 70% of the global capacity of the cruising industry (measured in bed-days). They are complementary in the sense that the Caribbean is dominantly serviced during the winter while the Mediterranean experiences a summer peak season (Fig. 4). Seasonality thus plays a key role in the cruise industry (Charlier, 1999; Charlier & McCalla, 2006) and is observed both in terms of the regions of embarkation and of destination. North America remains the dominant region of embarkation throughout the year with Europe claiming a 40–50% share during the summer season. They are both perennial markets since they are serviced year-round. Alaska and the Northeast Atlantic (New England/Atlantic Canada) and Australia/New Zealand are examples of strictly seasonal markets that are only serviced during their summer months.

A closer look at the North American market reveals more specific seasonality patterns (Fig. 5). First, the number of monthly passengers is fairly stable throughout the year in markets serviced by North American ports with passengers between 800,000 and one million per month and a December/January peak season. Cruise lines are attempting to optimize the utilization of their assets year round by repositioning to take advantage of the seasonality of cruise markets. The Caribbean market and its sub-regions obviously dominate to account for more than 90% of the passengers during the high winter season and around 55% of the passengers during the low summer season. The seasonality of Alaska, Bermuda and Canada/New England is also evident. An unexpected pattern is the lack of seasonality for the Bahamas, the second largest market. This is mainly the outcome of the strategies of the main cruise lines who have built private ports reserved for their exclusive use, such CocoCay (Royal Caribbean), Half Moon Cay (Holland), Castaway Cay (Disney), Princess Cay (Princess) and Great Stirrup Cay (Norwegian). These private facilities are all within one cruise day from the home ports of Florida, offering the option of short three to four days cruises to a quiet and safe destination. This represents a mass market that remains constantly serviced by large ships since it is the least expensive to service from southern Florida's ports of call. This concept has been expanded to more remote locations such as Mahogany Bay in Honduras (Carnival) or Puerto Costa Maya (Royal Caribbean) in Mexico.

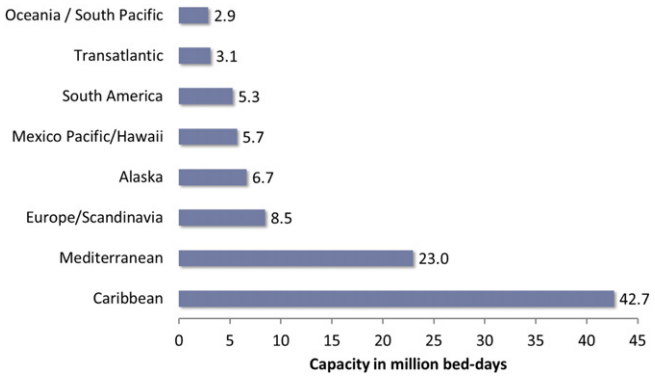

Fig. 3. Deployment of the global cruise fleet, 2011. Source: adapted from Cruise Lines International Association (CLIA).

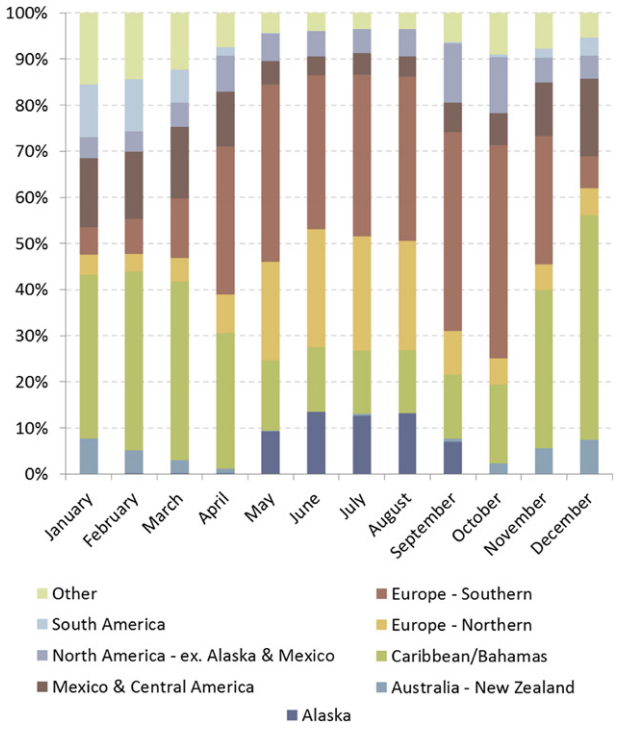

Fig. 4. Share of monthly cruise passengers by region of destination, 2012. Source: own compilation based on Cruise Market Watch. Based on the tracking of the schedules of a sample of 194 cruise ships accounting for about 85% of the global cruise capacity. Other regions relate to Africa, Asia, the Middle East and the South Pacific.

Ownership structure

The cruise industry has a very high level of ownership concentration, since the four largest cruise companies account for 96% of the market as measured by the number of passengers (Carnival Lines, Royal Caribbean, Norwegian Cruise Line and MSC Cruises; Table 1). High levels of horizontal integration are also observed

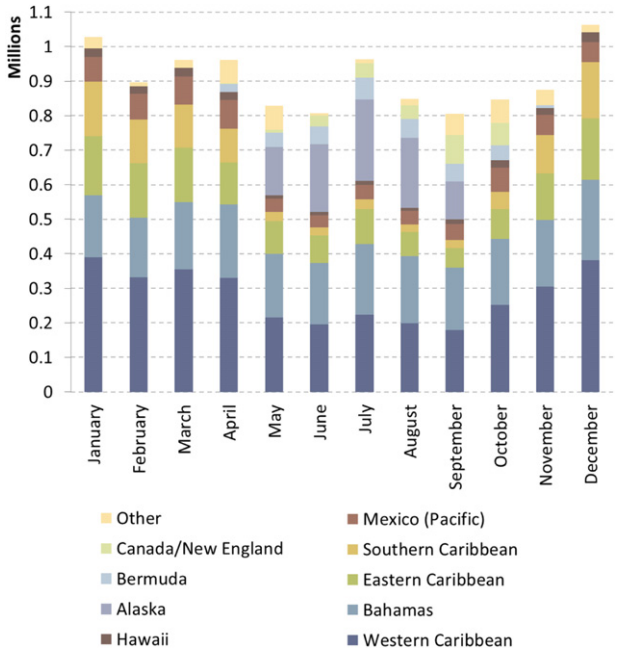

Fig. 5. Number of monthly North American cruise passengers by destination, 2011. Source: own compilation based on US Department of Transportation, Maritime Administration.

Table 1
Market share of main cruise lines, 2011.

Carnival Cruise lines (49.2%)	Royal Caribbean lines (23.8%)	Others (27.0%)
Carnival (21.1%)	Royal Caribbean (17.0%)	Norwegian (7.1%)
Costa Cruises (7.2%)	Celebrity (4.7%)	MSC Cruises (5.8%)
Princess (6.4%)	Other (2.1%)	Disney (2.9%)
AIDA (4.4%)		Star Cruises (1.8%)
Holland America (3.7%)		Other (9.4%)
Other (6.4%)		

Source: Cruise Market Watch.

since most cruise companies have acquired parent companies but kept their individual names for the purpose of product differentiation. For instance, Royal Caribbean Cruises, which is the world's second largest cruise company behind Carnival Lines, accounts for 24% of the global market serviced under six different brands such as Celebrity Cruises (which caters to higher end customers) and Azamara Club Cruises (smaller ships servicing more exotic destinations with shore stay options). The cruise industry thus presents an illusion of diversity with the bulk of the market firmly in the hands of large players.

This level of ownership concentration is reflective of the growing level of capital intensiveness of the industry as each new cruise ship class comes with better amenities. The construction of cruise ships tends to take place in cycles where several ships are ordered and enter the market within a short time frame. A ship of the latest Oasis class, which is able to carry more than 6000 passengers and weights 220,000 gross tons, costs about 1.24 billion dollars and can take four years to be delivered. Examples of the costs of large ships on order are included in Table 2. While Korean, Japanese and Chinese shipyards dominate the global shipbuilding market for container ships, bulk carriers and tankers, the cruise industry orders most of the new cruise ships at European shipyards. Leading shipyards in the field include Fincantieri with large shipyards mainly situated in Italy, STX Europe which owns and operates 15 shipyards of which the largest are found in Saint-Nazaire in France and Turku in Finland, and the Meyer Werft in Papenburg (Germany). These shipbuilders have been able to remain competitive given their extensive experience and know how on the construction and design of sophisticated cruise vessels. Larger ships command higher booking prices since they offer more amenities, but current trends indicate that the cruise industry has no ships larger than the Oasis class in its order books. Optimal economies of scale may have been reached, which could leave additional opportunities for new entrants to exploit niche markets.

Table 2
Sample of large cruise vessels on order as of 2012.

Ship's name	Cruise line operator	Gross tonnage	Capacity (passengers)	Price (million USD)
Utopia	Utopia Cruise Res.	105,000	2013	1100
Royal Princess	Princess Cruises	139,000	3600	735
Norwegian Breakaway and Norwegian Getaway	NCL	143,500	4000	840
MSC Divina	MSC Cruises	140,000	3502	742
Celebrity Reflection	Celebrity Cruises	122,000	2850	768
Costa Fascinosa	Costa Crociere	114,500	3012	726
Project 'Sunshine'	RCCL	158,000	4100	1030

Source: own compilation based on data of the Austrian Marine Equipment Manufacturers, Communication No. 76, 1 June 2012.

Network configuration and ports of call in the cruise industry

Itineraries, not destinations

The cruise industry sells itineraries, not destinations, underlining the core importance in the selection of a sequence of ports of call. Cruise operators are challenged to develop competitive cruise packages but at the same time they have to optimize the deployment of their cruise ship fleet in view of minimizing operating costs and/or maximizing revenue per passenger slot. As such, vessel deployment strategies and itinerary design are affected by market circumstances and requirements such as the seasonality in demand, the optimal duration of a cruise vacation, the balance between sailing time and shore time, the existence of 'must see' destinations and overall guest satisfaction. At the same time, pure operational considerations are taken into account such as the berthing capacity of and nautical accessibility in ports, the distance between ports of call (cruise ships can cover 200 nautical miles per night) and the synchronization with (international) air transfers.

Before a cruise ship operator can start with the actual design of a cruise service itinerary, the targeted market must be analyzed. The analysis should include elements related to the supply and demand of the targeted cruise region. Key considerations on the supply side include vessel capacity deployment and utilization by competing cruise ship operators, vessel size distribution, the configuration of existing cruise services, the existing market structure (how many players, and who is offering which itineraries) and the port call patterns of existing cruise services. On the demand side, cruise ship operators typically focus on disposable incomes and the demographics of the customer base, potential revenue generation, seasonality, brand positioning (exotic ports of call for premium services) and guest satisfaction (customer oriented industry). The ultimate goal of the market analysis is not only to see whether demand for a new cruise service can indeed be 'created', but also to estimate the volatility and seasonality of such demand. These factors will eventually affect the earning potential of the new service.

Once the market potential for a new service has been determined, the service planners need to take decisions on several interrelated core design variables. A standard cruise itinerary is a loop beginning and ending at a hub port (also called a turn port) and typically lasting seven days with three to five ports of call depending on their respective proximity (Fig. 6). Cruises of 10–21 days are also offered but they tend to have lower profit margins as customers are inclined to spend less as the cruise progresses.

The distribution of cruises by number of days shows very specific characteristics of cruise itineraries. The share of cruise

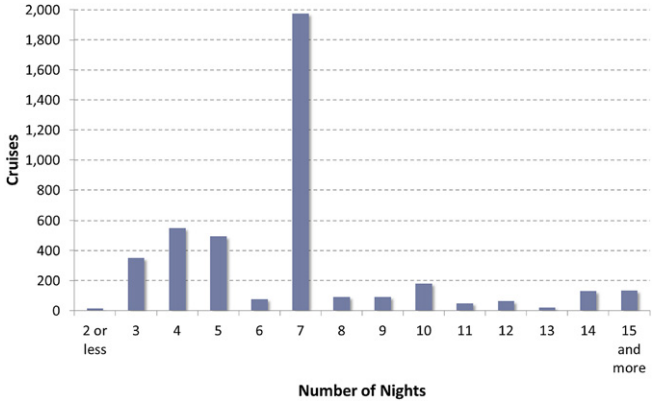

Fig. 6. Duration of North American cruises (in nights), 2011. Source: own compilation based on US Department of Transportation, Maritime Administration.

lasting seven days is dominant (47%) with other prevalent durations in the range of three to five days. This illustrates a scheduling issue for cruise lines as they maximize their asset utilization through a continuous turn of cruise ships. For instance, a ship typically finishes a weekly cruise on a Saturday morning and begins a new one on the evening of the same day. The design variables within this time frame mainly concern the number and order of port calls, the synchronization with the (international) air transfers at the turn ports, vessel speed and vessel size. In cruising, the choice of vessel speed is less affected by bunker costs and capacity considerations, but mainly guided by the targeted round voyage time.

Cruise ships tend to have a low draft since they do not carry cargo; they are more volume than weight. This confers the advantage of being able to access a large number of ports and therefore multiplying itinerary options since the setting of a pure cruise port leans on criteria that are different from commercial ports. Cruise ports tend to be located close to either city centers (cultural and commercial amenities) or to natural amenities (e.g. a protected beach). These sites do not have on average very deep drafts and dredging would be socially or environmentally unacceptable. For instance, ships of the Oasis class, which as of 2012 accounted for the largest cruise ships in service, have a draft of 31 feet. Comparatively, a containership of 2500 twenty-foot equivalent units requires a draft of 33 feet, while a sovereign class containership of 8400 twenty-foot equivalent units requires a draft of 46 feet. Draft issues that have plagued container ports are a much more marginal issue for cruises. Additionally, cruise ships have the option to anchor and use tendering services. Adding port calls can generate additional revenue (through a higher willingness to pay for the customer) if these additional calls offer exceptional value in terms of historical setting or scenery. Santorini in Greece is a typical example of a 'must' cruise port of call in the Aegean Sea. These destinations underline that the concept of itineraries is still bounded in the concept of place and that itineraries can be more effectively sold if they include some specific destinations.

Environmental considerations play a role, particularly when calling at ports. Large differences in CO_2 emissions can be observed between individual cruise ships (Howitt, Revol, Smith, & Rodger, 2010). Vestlandsforsking (2011) came to an emissions range from 93 to 615 kg of CO_2 per passenger-day, or from 199 to 1314 g CO_2 per passenger-km, depending on the size, the age and the ship's capacity configuration (i.e. high end luxury cruise ships vs. 'mass' cruise ships). The largest ships show the lowest CO_2 output partly because of the high occupancy rate in number of beds per surface unit and their relative young age. Cold ironing or shoreside power facilities are being installed in a number of urban cruise terminals in view of reducing the environmental impact of docked ships. In 2001, the port of Juneau in Alaska was the first in the world to offer shoreside power for cruise vessels. Seattle followed with two installations in 2005 and 2006. In 2009, Port Metro Vancouver also introduced a system to connect ships to the power grid so they can turn off their engines while docked. It is estimated that for an average cruise ship some 17,000 L of fuel can be saved in a 10 h docking period. In October 2010, San Francisco became the first port in California to offer clean shore power for cruise ships. Los Angeles, San Diego and Long Beach now offer similar facilities. Also in Europe, a number of ports have taken initiatives in this area (e.g. Gothenburg, Venice, Barcelona, La Spezia, Civitavecchia, and Hamburg).

Providing the necessary on-shore power capacity can be quite challenging as a city's power grid should be able to bear the electrical load of cold ironing cruise ships. A ship's energy consumption when at berth (also called the 'hotel load') can reach 13–14 MW while a large city such as San Francisco consumes about 900 MW. For a local power grid, such as for a small Caribbean island, this load could be prohibitive. Obstacles to a further large-scale adoption of cold ironing include the costs related to constructing shore power facilities and to retro-fitting existing ships (typically around $500,000 per cruise vessel), the cost of shore power and the absence of international standards for shore power systems. Very strict environmental regulations for cruise ships and terminals in urban areas can give incentives to cruise ship operators to call at or develop cruise terminals in less urban and less populated areas, implying longer land transfers for passengers when visiting historical cities and sites.

Itinerary types

The number and order of port calls, the total two-way sailing distance and the vessel speed are the main determinants of the total vessel roundtrip time. When delays along the route and in ports give rise to schedule reliability problems, cruise ship operators often decide to catch up lost time by increasing the sailing speed at night. Schedule reliability is of utmost importance to cruise passengers, particularly when a tight synchronization exists between their arrival at the hub port and the departure of their international flights. Cruise ship operators can insert time buffers in the cruise liner service to reduce the risks of delays. Based on the above considerations, three main types of itineraries can be found; perennial, seasonal and repositioning.

In *perennial itineraries* the region covered by the itinerary is serviced throughout the year as the demand remains resilient, which is associated with stable (subtropical) weather conditions as well as stable itineraries. There may be significant seasonal variations in the number of ships deployed but the market remains serviced throughout the year. The Caribbean is the foremost perennial cruise market (summer low season), but the Mediterranean is also serviced year-round with a winter low season. Weather is the dominant factor explaining *seasonal itineraries*, implying that some regions have a market potential only during a specific period or season. This is particularly the case for Baltic, Norwegian, Alaskan and New England cruises that are serviced during summer months. Inversely, South American and Australian itineraries are serviced during the winter months.

Because of the seasonality of the cruise industry the *repositioning itineraries* between seasonal or perennial markets are required. Cruise companies are increasingly using this opportunity to offer customers lower cost cruises for the inconvenience of having to book air travel arrangements for the return trip since the beginning and ending ports of call are not the same. This mainly takes place across the Atlantic as ships move from the winter Caribbean peak season to the summer Mediterranean peak season (and vice-versa). The beginning and the end of the Alaska season are also combined with a Hawaiian cruise as ships get repositioned. Barcelona and Dubai are emerging repositioning hubs since the Mediterranean and the Indian Ocean are growing faster than the conventional Caribbean market. For example, in the northern hemisphere Winter of 2011 Royal Caribbean Cruises deployed its 42 ships as follows: 23 ships in the Caribbean, only three ships in the Mediterranean, nine ships in South America, four ships in Asia/Australia, and the remainder in other smaller markets. In the summer of 2011, only eight ships were deployed in the Caribbean while 21 vessels sailed in the Mediterranean, five ships in Alaska, four ships in the Baltic and the remainder in other markets (Tercek, 2011)

Stability vs. Variation in the Itineraries of a Cruise Vessel

The cruise industry generally follows a differentiated concept when deploying ships on specific routes or itineraries. Large

differences can be observed between smaller niche product vessels and the very large cruise vessels. Fig. 7 provides an example of the deployment of the Silver Wind, a vessel of Silversea Cruises, during one year from April 2012 to April 2013. The vessel is rather compact with a length overall of 157 m and a beam of 21.5 m. It can accommodate only 296 guests in very luxurious conditions. An analysis of the itinerary data leads to two conclusions. First, the focus is on the deployment of one single ship by connecting a series of individual cruises, each with a round voyage time of between seven and 18 days. Second, a single cruise ship is rarely ever deployed on the same rotation for more than one cruise. In general, the ship continuously changes rotation by moving from one region to another depending on weather conditions and peak season considerations. Thus, not only rotations change but also the continents where these rotations take place. This demonstrates how these cruise ships are repositioned over long distances through repositioning cruises.

The flexible routing of the Silversea Cruises ships is in sharp contrast with the practices for the deployment of many much larger cruise vessels. Table 3 provides an example of the deployment of the Freedom of the Seas and the Allure of the Seas, the workhorses of Royal Caribbean Cruises. The Freedom of the Seas has a maximum capacity of 4370 passengers and operates on only two itineraries (of seven nights each) in the Caribbean throughout the year. The vessel uses a fixed base port, i.e. Port Canaveral, and is not repositioned to other cruise regions. Also the Allure of the Seas, the largest cruise ship afloat with a maximum capacity of 6360 passengers, offers only two itineraries in the Caribbean during the year centered on hub port Fort Lauderdale.

Another example is the MSC Fantasia with a capacity of 3900 passengers; MSC Cruises deploys the vessel on a fixed itinerary of seven days between Genoa, Naples, Palermo, La Goulette, Barcelona, Marseille and back to Genoa. Passengers can start their cruise in all ports of call, except for La Goulette, since all ports are within the European Union. The MSC Melody, the oldest ship in the fleet of MSC Cruises built in 1982 (1064 passengers) sails between Genoa, Rome (Civitavecchia), Alexandria, Limassol, Katakolon and back to Genoa throughout the season. Also, other ships in the fleet of MSC Cruises are sailing according to one or only a few itineraries throughout the year.

In summary, the itineraries of larger vessels (mass cruise tourism) tend to be more stable than for smaller niche vessels. However, the stability in the sailing schedule of ships is not only linked to vessel size, but also to the strategies of the cruise operators in terms of cruise offer, branding, targeted customer base, pricing, and cost and technical considerations related to the vessel operations. The schedules are very tight for all ship sizes as the end of one cruise and the start of the next cruise are mostly scheduled on the same day in a specific hub port (arrival in the morning and departure in the afternoon). Such tight schedules challenge the cruise operator to strive for efficient passenger and cabin logistics as well as stores (food and beverages) and leave no room for schedule integrity problems.

The Caribbean and the Mediterranean: a perennial complementarity

The global cruise port system

The global cruise port system is characterized by a high level of regional concentration as well as a clustering of port visits. Fig. 8 illustrates the global distribution of cruise port visits based upon the published itineraries of about 85% of the global cruise capacity. The observed destination patterns are clearly underlining the prominence of port visits around the Caribbean and the Mediterranean in line with the operational characteristics of seven days cruises calling three to five ports. Other clusters of significant activity concern the US Northeast and Atlantic Canada, Alaska, Hawaii, Hanseatic ports and the coast of Norway. Limited cruise activity takes place in East and Southeast Asia in spite of the significant economic development processes that occurred in the region in recent decades. Therefore, the geography of cruise and commercial ports is completely different in terms of the dominant ports and the regions being serviced.

A cruise involves two travel segments, the first being travel to the hub port (with a return trip) and the second is the cruise itself. It is therefore important that the hub port is accessible to a large customer market such as by a well-connected airport, with significant airlift capacity and which represents in itself a touristic destination. This is the case for Miami, Fort Lauderdale and San Juan

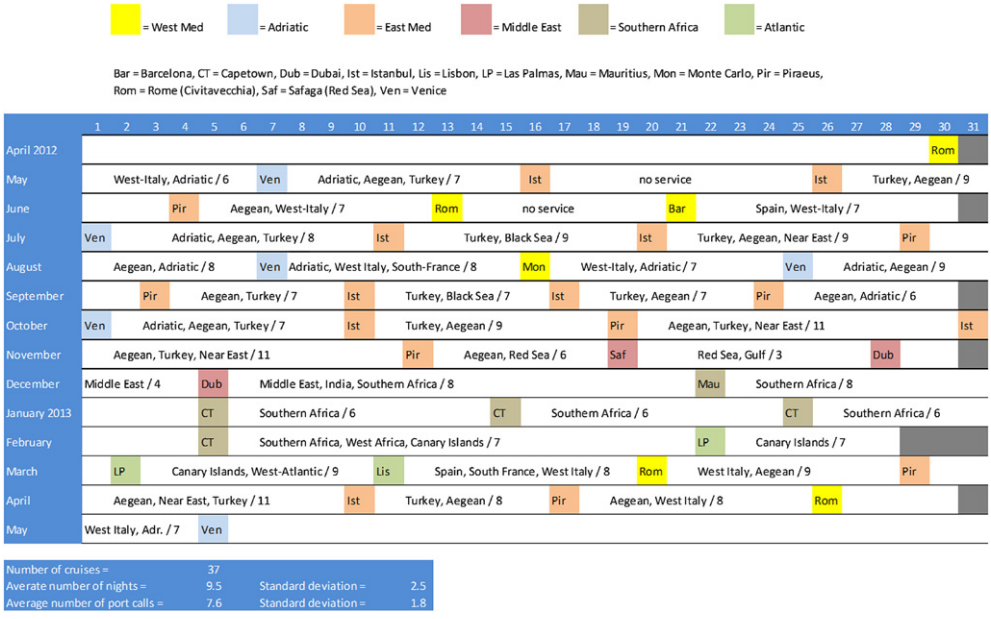

Fig. 7. The deployment of the Silver Wind (Silversea Cruises) between May 2012 and May 2013 (number of port calls per itinerary indicated after "/").

Table 3
The deployment of the Freedom of the Seas and the Allure of the Seas (Royal Caribbean Cruises) between April 2012 and April 2013.

Period	Nights	Ports of call and order of calls	Region
Freedom of the Seas – Royal Caribbean Cruises			
Apr 29–May 6, 2012	7	Port Canaveral – Labadee – Falmouth – Grand Cayman – Cozumel – Port Canaveral	Caribbean
May 6–13	7	Port Canaveral – Cococay – Saint Thomas – Saint Maarten (Phillipsburg) – Port Canaveral	Caribbean
May 13–20	7	Port Canaveral – Labadee – Falmouth – Grand Cayman – Cozumel – Port Canaveral	Caribbean
May 20–27	7	Port Canaveral – Cococay – Saint Thomas – Saint Maarten (Phillipsburg) – Port Canaveral	Caribbean
..... *same two cruises repeated all year round*			
Apr 7–14, 2013	7	Port Canaveral – Cococay – Saint Thomas – Saint Maarten (Phillipsburg) – Port Canaveral	Caribbean
Apr 28–May 5, 2013	7	Port Canaveral – Labadee – Falmouth – Grand Cayman – Cozumel – Port Canaveral	Caribbean
Allure of the Seas – Royal Caribbean Cruises			
Apr 29–May 6	7	Fort Lauderdale – Nassau – Saint Thomas – Saint Maarten (Phillipsburg) – Fort Lauderdale	Caribbean
May 6–13	7	Fort Lauderdale – Labadee Falmouth – Cozumel – Fort Lauderdale	Caribbean
May 13–20	7	Fort Lauderdale – Nassau – Saint Thomas – Saint Maarten (Phillipsburg) – Fort Lauderdale	Caribbean
May 20–27	7	Fort Lauderdale – Labadee – Falmouth – Cozumel – Fort Lauderdale	Caribbean
..... *same two cruises repeated all year round*			
Apr 7–14, 2013	7	Fort Lauderdale – Labadee – Falmouth – Cozumel – Fort Lauderdale	Caribbean
Apr 14–21, 2013	7	Fort Lauderdale – Nassau – Saint Thomas – Saint Maarten (Phillipsburg) – Fort Lauderdale	Caribbean

that are respectively well connected airports and act as hub ports for Caribbean itineraries. Barcelona and Civitavecchia are major hub ports for the Mediterranean which are well serviced by air transportation. Poorly connected airports are commonly associated with higher airfares, which impair the competitiveness of the city for mass tourism. There are a number of customer benefits linked to having more cruise embarkation points available such as drive-to convenience (particularly in North America) and fewer airport hassles. More "close to home" ports also increase the likelihood of cruising, the reason why cruise line will call ports along the American Gulf Coast and Eastern Seaboard such as Tampa, Galveston, Baltimore and New Orleans.

Caribbean itineraries

The Caribbean is the world's largest cruise market, representing over 40% of the annual cruise supply with a significant impact on local economies. Cruise-related expenditures are responsible for 56,000 jobs throughout the Caribbean that paid USD 720 million in wage income to residents (Florida-Caribbean Cruise Association, 2010). The Caribbean acts an ideal cruising destination for the following reasons. First, the Caribbean is mostly a chain of islands in close proximity implying short cruising distances between ports of call. The climate is subtropical with limited temperature fluctuations, albeit the hurricane season (August to October) can create some disruptions. There is a variety of landscapes ranging from rain forests to semi-arid conditions as well as the presence of coral and volcanic islands. Second, the region has a long history associated with European colonialism and accounts for the oldest settlements in the Americas. African, Hispanic, English, French and Dutch influences are prevalent, conferring a diversified cultural landscape that often changes completely from one island to the other. Therefore, the cruise industry is able to offer to its customers a variety of cultural experiences in close proximity. Third, being adjacent to the United States offers a large market of potential tourists able to afford cruise packages without having to travel far to start a cruising itinerary.

Most Caribbean cruises begin (and end) from the Miami, Fort Lauderdale or Port Canaveral cruise ports cluster that act as the main hub ports (Fig. 9). All are near major airports well connected to the rest of the United States and are major touristic destinations in their own right. New York is also a significant hub port, but its distance limits its Caribbean ports of call options. Itineraries using San Juan, Puerto Rico as a hub port have the advantage of being able to effectively cover the southern Caribbean, the furthest from the United States.

The typical itinerary is about seven nights of duration, which enables to cover a sub-region of the Caribbean comprising of three or four ports of call (Fig. 10). Cruise ships commonly arrive at the port of call early in the morning and leave in the evening,

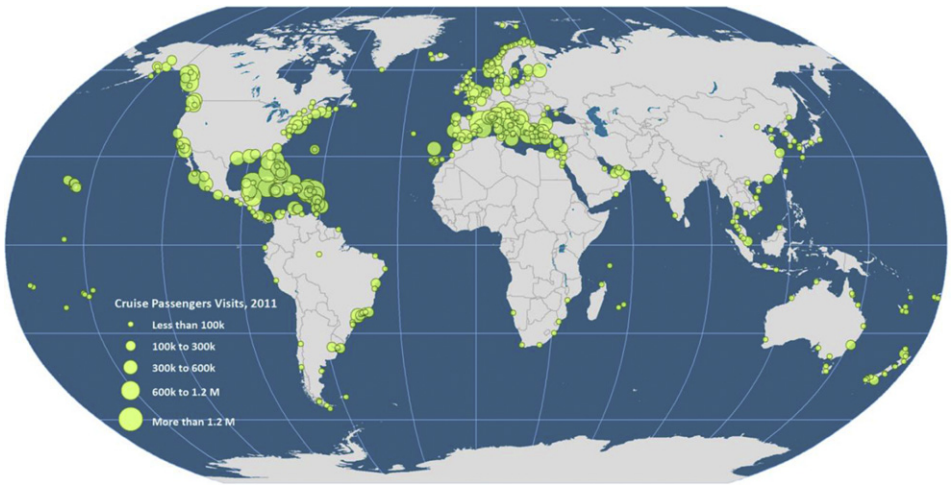

Fig. 8. The global cruise port system, 2011. Source: own compilation based on data by Cruise Market Watch.

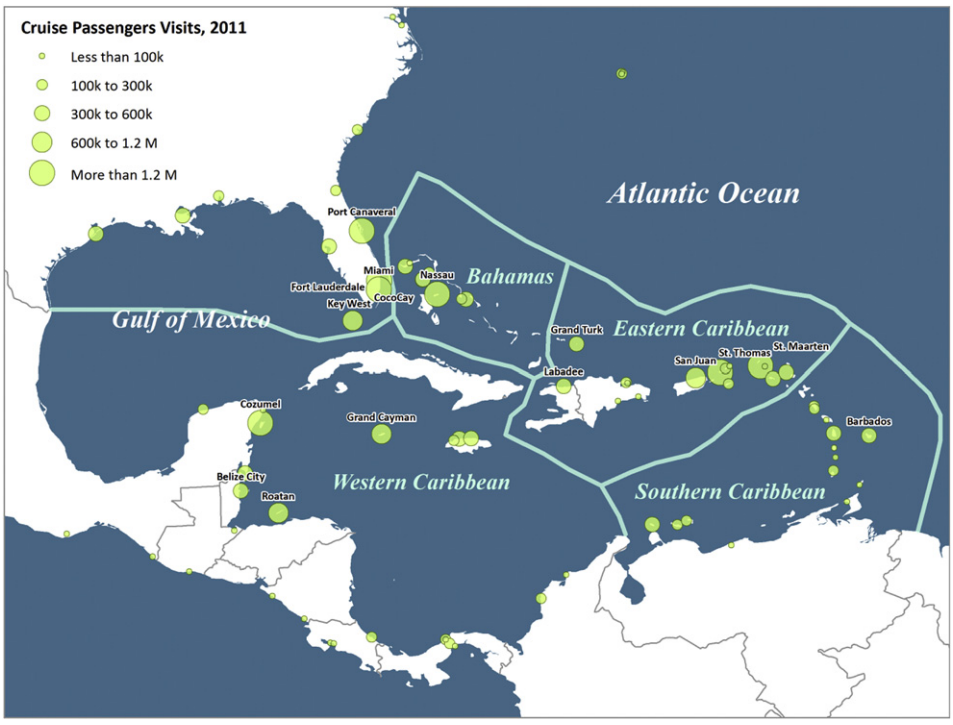

Fig. 9. Cruise passengers visits, Caribbean, 2011. Source: Data from Cruise Market Watch.

using the night to sail to the next port of call. Ships are constantly moving between ports of call and shore leaves are of low duration; 4.3 h on average in the Caribbean. To take advantage of a location that does not have sufficient infrastructure to accommodate cruise operations, several cruise companies developed private cruise terminals, including related private touristic amenities (beaches, craft markets, restaurants, etc.). A salient example is Labadee in Haiti, which is privately owned by Royal Caribbean Cruises. The facility is an enclave protected by private security forces and acts as a port of call for most of the company's Western Caribbean itineraries since the nearby Windward Passage is the main gateway to the region. Such privately owned ports of call also provide additional opportunities for revenue capture.

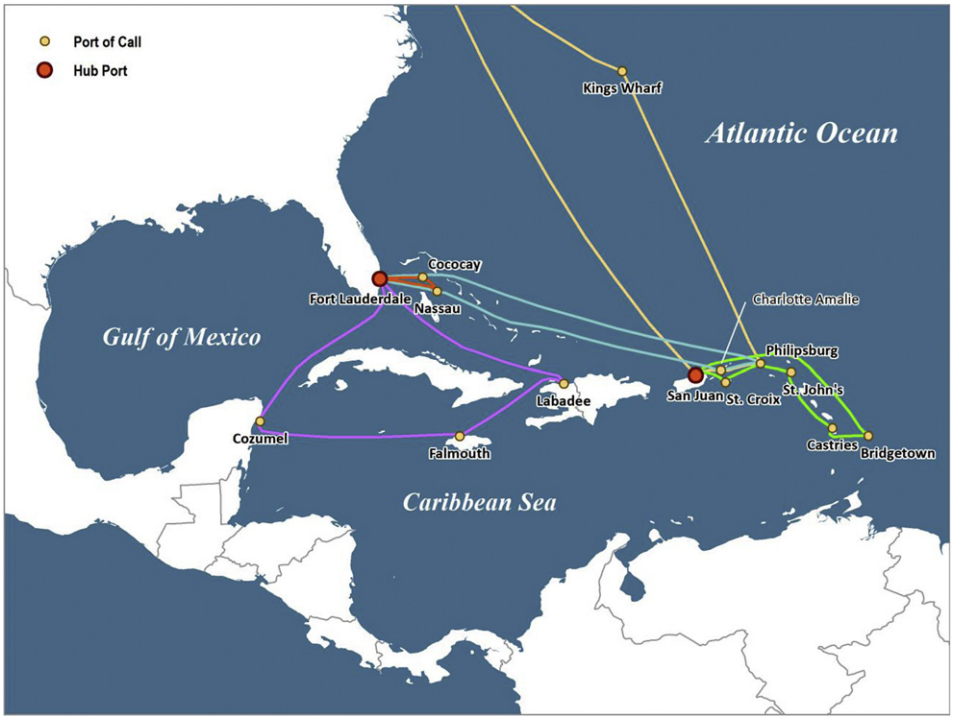

Fig. 10. Selected cruise itineraries, Caribbean. Source: Itineraries from Royal Caribbean Cruises. Note: Paths are approximate.

Mediterranean itineraries

The Mediterranean is the world's second largest cruise market, representing over 23% of the annual cruise capacity. It can be broken down into four regions (Fig. 11), the Western Med, the Eastern Med and the Adriatic, but the fourth region, the Southern Mediterranean, is sparsely serviced mainly due to political instability. The adjacency of the Mediterranean to Europe provides the advantage of a large pool of customers with discretionary spending. It is a perennial cruise market with a summer peak season since several itineraries are not serviced in the winter. The Mediterranean offers at the same time seaside resort destinations as well as world class cultural amenities since several cities are museums by themselves (e.g. Venice). In 2008, the European Cruise Council, MedCruise and their partners calculated that the cruise industry accounts for 225,586 jobs in Europe, over 12 billion dollars of direct expenditure by cruise companies, shipbuilding yards and cruise passengers, and 15 million visits to European ports. Every million dollars spent by the cruise industry creates 2.7 million dollars in business output and 21 jobs.

Typical seven days itineraries are structured as small loops of four to five ports of call each covering a specific sub-region such as the Adriatic or the Spanish coast (Fig. 12). Since the distances between ports of call are relatively short, this leaves additional time for shore excursions as each port of call offers a wide array of cultural amenities. 14 days itineraries are also being offered covering large parts of the European side of the Mediterranean. Many of the itineraries are focused on historical sites and exceptional scenery. The most popular countries for cruise ports of call in Europe are Italy, Spain and Greece. Strong growth in Mediterranean cruises in the past years has increased congestion at several ports, both on the maritime side (piers) or on the land side (adjacent touristic districts). This is particularly felt in top cruise tourist destinations such as Santorini in Greece, Venice in Italy and Dubrovnik in Croatia, but also hub ports such as Civitavecchia and Barcelona are challenged to cope with the recent strong growth. This may create constraints in the setting of itineraries since only a limited amount of slots to visit several ports of call may be available and could involve additional costs and even a bidding process to guarantee access.

Ports of call: a functional typology

Cruise ports come into three main categories depending of the role they serve within their regions (Table 4):

- **Destination cruise port**. There are several reasons why the cruise port area can be the sole destination. In the case of cities such as Venice and Barcelona, the cultural amenities been offered are world class to the point that tourists will have little incentives to see anything else in the vicinity. The cruise terminal and its immediate area essentially act as a tourist bubble (Jaakson, 2004). Alternatively, in some cases there may be safety and security issues outside the port area, which can be common in developing countries. Security issues continue to remain a concern and have recently incited cruise lines to revise some of their itineraries concerning areas that are judged to be risky (e.g. Mexico, North Africa).
- **Gateway cruise port**. Some cruise ports act as technical stops since they offer no significant cultural or physical amenities, but are used because they are servicing a major touristic destination. For instance, the port of Civitavecchia is the gateway to Rome, one of the most visited cities in the world.
- **Balanced cruise port**. Represent an array of cruise ports where the port can be a destination, but excursions are also available. The balance between the gateway and destination functions varies according to what each port and its region has to offer.

There has been a growing number of hub ports where passengers in whole and in part can begin or end their journey, so the future of the cruise industry may include more partial itineraries. An emerging trend, where possible, has been the setting of dedicated facilities where the cruise company is directly involved in the development of the cruise terminal as well as co-located amenities.

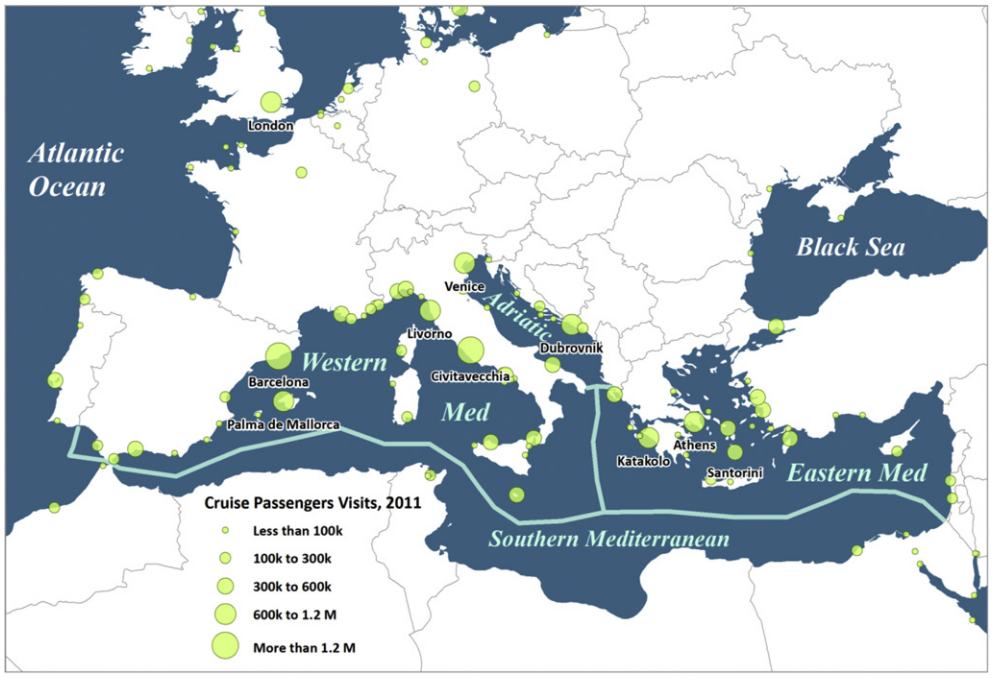

Fig. 11. Cruise passengers visits, Mediterranean, 2011. Source: Data from Cruise Market Watch.

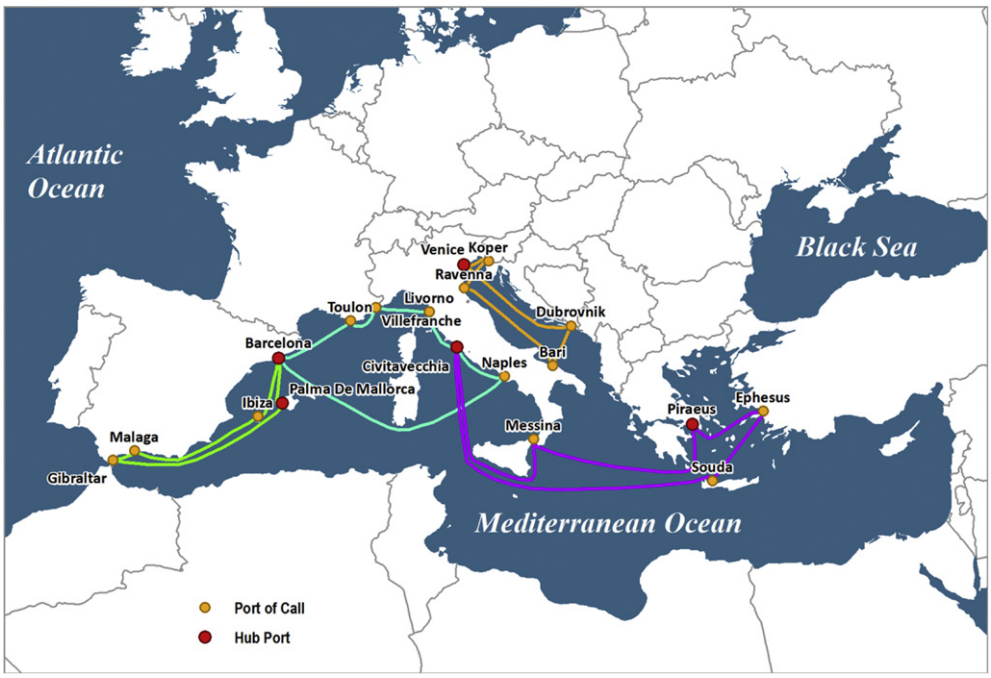

Fig. 12. Selected cruise itineraries, Mediterranean. Source: Itineraries from Royal Caribbean Cruises. Note: Paths are approximate.

Table 4
Functional typology of cruise ports.

Destination cruise port	Gateway cruise port	Balanced cruise port
The cruise port is the sole destination. Limited, if any, excursions outside port area.	The cruise port is not a destination, but a point of embarkation (turn port). Excursions outside port area.	The cruise port is a destination and a point of transit for excursions.
High quality cultural or physical amenities. No other significant amenities in proximity. Security and safety issues.	No significant cultural or physical amenities. Port servicing major touristic destination.	Various balances between the amenities offered at the port and in the region.
Venice, Barcelona, Labadee (Haiti), Cococay (Bahamas).	Civitavecchia, Livorno.	Miami, San Juan, Nassau, Piraeus, Lisbon.

The cruise industry is expanding to provide more options for passengers, particularly for niche markets where higher prices can be commanded than in the competitive mass markets of the Caribbean and the Mediterranean. For instance, cruises are set up for the Antarctic, the Hudson Bay and the South Pacific.

In many ports where cruise ship callings have increased, public and private investments have been channeled to revitalize older port areas encompassing housing, hotels, maritime heritage projects, sports, recreation, tourism and local commerce. Cruise ship facilities are often found in these waterfront conversion zones so that cruise passengers are within walking distance of cultural sites and life in the city center. Cruise vessels near the city reinforce the maritime link between cities and ports and are visible signs of the touristic attractiveness of the city. Typical examples are Barcelona, Nassau, Hamburg, Genoa and Antwerp.

Many ports around the world are vying for a position as turntable or hub in the cruise industry. With many cruise terminals located close to historical city centers, cruise ship activity provide jobs linked to bars, restaurants, convenience shops, etc. Increased tourism expenditure through the multiplier effect can create new investment and employment opportunities. Cruise passengers may also spend time in the metropolitan area before or after their voyages, generating additional economic impacts through their tourism expenditures. Cruise vessels calling a port also generate jobs at the level of pilotage, tugs, provisions, fuel, crew shore leave, passenger services, inspections, immigration, hotels, restaurants, local attractions and other tourism activities in the port area. Further employment is provided by inland transportation involving cruise passengers including air, private car, bus, transit and taxi. Yet, the benefits of cruise ports for local economies can be controversial, particularly in light of the revenue capture strategies pursued by cruise lines that may leave less than expected impacts and infrastructural and environmental burdens (e.g. Seidl, Guiliano, & Pratt, 2006).

Conclusion

The cruise industry has emerged to become a significant niche to the global tourism industry. The selection of ports of call and itineraries are carefully pondered to maximize the commercial potential and utilization of the ship assets. The service pattern and the operational range of cruise services are relying on the hub concept. The schedule integrity of cruises is very important and consistently respected. From a market perspective, the cruise industry has several unique characteristics usually not found in other segments of the tourism industry. Cruise operators follow a supply push strategy as they aim at 'creating' demand simply by providing new capacity (ships) and marketing discounts to fill remaining cabins as sailing date nears. To do so, they offer itineraries where specific regional and cultural experiences can be offered through a combination of sailing time and choice of ports of call. They also expand and capture revenue streams by offering

onboard goods and services as well as shore-based excursions. Cruise lines adapt to seasonal and fundamental changes in the demand by repositioning their ships (seasonal) and changing the configuration of their port calls (fundamental). The outcome has been a complementarity between the world's two largest cruise markets, the Caribbean and the Mediterranean.

The global demand for cruises is likely to see further growth given the increasing level of cruise participation of customers from various age groups, background and regions. The upper boundary on cruise demand is influenced by a series of intra-personal, inter-personal and structural constraints to cruising experienced by individuals (Hung & Petrick, 2010) and the capacity of the cruise business to accommodate the passenger flows on ships and in ports. Since the cruise industry appears fundamentally to be driven by supply, it is thus likely that supply saturation, as opposed to demand saturation, will constrain future developments and impose a maturity on an industry that has continued to grow rapidly. While large hub ports have the capacity to accommodate additional port calls, it is the smaller 'exotic' or 'must see' ports that cruisers are seeking to visit that present challenges for additional capacity. Berth availability and the capacity of small communities to accommodate large tourist influxes of short duration has become a salient issue.

This is likely to incite the additional involvement of the cruise industry in terminal operations, a trend that has already taken place with the setting of private port/resort areas. The next step will involve the development of new cruise terminals co-located with service amenities such hotels, marinas, attractions, condominiums and shopping malls. For instance, the global container terminal operator HPH developed from 2001 Ensenada Cruiseport Village, a 16 ha complex in the port of Ensenada, Mexico, which includes two cruise ship berths and a marina with 200 yacht berths. An additional berth is planned, in addition to a co-located "touristic village" that includes a hotel, a shopping center, souvenir shops, restaurants, a movie theatre and park areas. While a further fragmentation of itineraries with the setting of niche markets is likely to take place, a closer integration between the cruise port and cruise lines is to be expected.

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