The Geography of Cruise Shipping: Itineraries, Capacity Deployment and Ports of Call

Jean-Paul Rodrigue
Dept. of Global Studies & Geography, Hofstra University, Hempstead, New York, United States. E-mail: jean-paul.rodrigue@hofstra.edu

Theo Notteboom
Institute of Transport & Maritime Management Antwerp (ITMMA), University of Antwerp, Kipdorp 59, B-2000 Antwerp, Belgium and Antwerp Maritime Academy. E-mail: theo.notteboom@ua.ac.be

Abstract
In the past decades the cruise industry developed into a mass market using large vessels and adding more revenue-generating passenger services onboard. It is a highly concentrated business both in terms of players (i.e. four players accounting for 96% of the market) and markets (i.e. the Caribbean and the Mediterranean accounting for more than 70% of the deployed capacity). Under such circumstances vessel deployment strategies and itinerary design by cruise operators are primordial and are affected by market circumstances and requirements and by pure operational considerations.

This paper focuses on capacity deployment and itineraries in two major cruise markets: the Caribbean and the Mediterranean through an analysis of itineraries and ship deployment. We argue that the cruise industry sells itineraries, not destinations, implying a level of flexibility in the selection of ports of call. 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. 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.

Keywords: Hinterland, cruise shipping, cruise ports, vessel deployment, Caribbean, Mediterranean

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. Weaver, 2005; Wood, 2000). Still, the cruise industry remains an under-researched academic field in maritime economics and geography. 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 cruise shipping: the edited volume covers nearly forty contributions dealing with topics such as the geography and seasonality of the world cruise market (Charlier and McCalla, 2006), the industrial organization of cruise shipping (Papatheodorou, 2006), the demand for cruise tourism (see e.g. Petrick and Li, 2006), the
supply of cruise shipping in specific regions (see e.g. Wilkinson, 2006 and Wood, 2000 on the Caribbean) and other economic, social and environmental dimensions of the cruise market.

Dwyer and Forsyth (1996; 1998) and Dwyer et al. (2004) analyzed the economic significance of cruise tourism and cruise ship calls, while Douglas and Douglas (2004) unraveled cruise ship passenger spending patterns. Key operational research topics include the optimal routing of cruise ships (see e.g. Hersh and Ladany, 1989), the cruise ship port selection process (Marti, 1990) and the optimal cruise-liner passenger cabin pricing policy (Ladany and 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 Vagellas 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. If this holds true, then a geographical perspective of the cruise network structure is particularly revealing of the operational characteristics of the cruise industry. 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 among the geographical markets. 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.

Based upon the analysis of extensive cruise shipping datasets 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 inter-linkages 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 cruise shipping. We also present avenues for further research in this under-researched field of maritime economics and geography.

THE ORIGINS AND GROWTH OF CRUISE SHIPPING

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
The Geography of Cruise Shipping: Itineraries, Capacity Deployment and Ports of Call

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 hours, 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. The early goal of the cruise industry was to develop a mass market since cruising was until then an activity for the elite. A way to achieve this was through economies of scale as larger ships are able to accommodate more customers as well as creating additional opportunities for onboard sources of revenue. The first dedicated cruise ships began to appear in the 1970s and could carry about 1,000 passengers. By the 1980s, economies of scale were further expanded with cruise ships that could carry more than 2,000 passengers. The current large cruise ships have a capacity of about 6,000 passengers, but the bulk of cruise ships are within a 3,000 to 4,000 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 shore side 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 ageing 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 cruise shipping.

**MARKET DYNAMICS IN CRUISE SHIPPING**

**A Growing Customer Base**

The global cruise industry carried about 19.1 million passengers in 2011, up from 7.2 million in 2000 (Cruise Lines International Association, 2011). Since 1990, over 154 million passengers have taken a 2+ day cruise. Of this number, over 68% of the total passengers have been generated in the past 10 years and nearly 40% in the past 5 years. The global growth rate of the cruise industry has been enduring and stable, at around 7% 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 (Figure 1). There is little evidence about the market potential of the cruise industry or when a saturation point could be reached.

![Figure 1: Global Cruise Passengers Carried, 1990-2011](image)

*Source: Cruise Market Watch. Note: shaded grey represents recessionary periods.*

FCCA (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 2 passengers per stateroom (100% occupancy). Since many staterooms can accommodate 3 to 4 passengers, occupancy rates are
generally well above 100% (Figure 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 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.

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. Its highest level of market penetration is in North America with about 3% of the population taking a cruise each year (Figure 3). This includes people who may take more than one cruise in a year so actual figures are actually lower.

---

1 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 dominant source market for cruise shipping remains North America with a penetration level of around 3%, but there is a gradually changing customer base towards developing countries, 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 to 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 2,000 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.

Figure 3: Cruise Source Markets, 2010
Source: adapted from Cruise Lines International Association (CLIA)

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 cruise shipping 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 (FCCA, 2010). They often cruise as part of their vacation mix and plan their cruise trip on average 5 to 6 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 hotel (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). Some cruise operators go very far in developing new entertainment concepts on board of their vessels, including surf pools, planetariums, on-deck LED 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. The average customer spends about $1,700 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 3 to 4 ports on a typical 7 day cruise.

**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 (Figure 4). 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 (Figure 5). Seasonality thus plays a key role in the cruise industry (Charlier and McCalla, 2006; Charlier, 1999) 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 (Figure 5). 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.
The Geography of Cruise Shipping: Itineraries, Capacity Deployment and Ports of Call

Figure 4: Deployment of the Global Cruise Fleet, 2011
Source: adapted from Cruise Lines International Association (CLIA).

- Oceania / South Pacific: 2.9
- Transatlantic: 3.1
- South America: 5.3
- Mexico Pacific/Hawaii: 5.7
- Alaska: 6.7
- Europe/Scandinavia: 8.5
- Mediterranean: 23.0
- Caribbean: 42.7

Capacity in million bed-days

Figure 5: Share of Monthly Cruise Passengers by Region of Embarkation, 2012
Source: own compilation based on Cruise Market Watch.²

² 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.
A closer look at the North American market reveals more specific seasonality patterns (Figure 7). 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 shipping 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 mainly is the outcome of the strategies of the main cruise lines who have built private ports reserved for their exclusive use, such Coco Cay (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 3-4 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.
The cruise industry has a very high level of ownership concentration, since the four largest cruise shipping 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 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 6 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.

Table 1: Market Share of Main Cruise Lines, 2011

<table>
<thead>
<tr>
<th>Carnival Cruise Lines (49.2%)</th>
<th>Royal Caribbean Lines (23.8%)</th>
<th>Others (27.0%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carnival (21.1%)</td>
<td>Royal Caribbean (17.0%)</td>
<td>Norwegian (7.1%)</td>
</tr>
<tr>
<td>Costa Cruises (7.2%)</td>
<td>Celebrity (4.7%)</td>
<td>MSC Cruises (5.8%)</td>
</tr>
<tr>
<td>Princess (6.4%)</td>
<td>Other (2.1%)</td>
<td>Disney (2.9%)</td>
</tr>
<tr>
<td>AIDA (4.4%)</td>
<td></td>
<td>Star Cruises (1.8%)</td>
</tr>
<tr>
<td>Holland America (3.7%)</td>
<td></td>
<td>Other (9.4%)</td>
</tr>
<tr>
<td>Other (6.4%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3 Source: Cruise Market Watch.
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 6,000 passengers and weights 220,000 GT, costs about 1.24 billion dollars and can take 4 years to be delivered. Examples of the costs of large ships on order are included in Table 2. 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

<table>
<thead>
<tr>
<th>Ship's name</th>
<th>Cruise line operator</th>
<th>Gross tonnage</th>
<th>Capacity (passengers)</th>
<th>Price (million USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utopia</td>
<td>Utopia Cruise Res.</td>
<td>105,000</td>
<td>2,013</td>
<td>1,100</td>
</tr>
<tr>
<td>Royal Princess</td>
<td>Princess Cruises</td>
<td>139,000</td>
<td>3,800</td>
<td>735</td>
</tr>
<tr>
<td>Norwegian Breakaway and</td>
<td>NCL</td>
<td>143,500</td>
<td>4,000</td>
<td>840</td>
</tr>
<tr>
<td>Norwegian Getaway</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSC Divina</td>
<td>MSC Cruises</td>
<td>140,000</td>
<td>3,502</td>
<td>742</td>
</tr>
<tr>
<td>Celebrity Reflection</td>
<td>Celebrity Cruises</td>
<td>122,000</td>
<td>2,850</td>
<td>768</td>
</tr>
<tr>
<td>Costa Fascinosa</td>
<td>Costa Crociere</td>
<td>114,500</td>
<td>3,012</td>
<td>726</td>
</tr>
<tr>
<td>Project 'Sunshine'</td>
<td>RCCL</td>
<td>158,000</td>
<td>4,100</td>
<td>1,030</td>
</tr>
</tbody>
</table>

NETWORK CONFIGURATION AND PORTS OF CALL IN THE CRUISE SHIPPING 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 shipping region. Key considerations on the supply side

---

4 Source: AMEM (Austrian Marine Equipment Manufacturers), Communication no. 76, 1 June 2012
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 inter-related 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 7 days with 3 to 5 ports of call depending on their respective proximity (Figure 8). Cruises of 10 to 21 days are also offered but they tend to have lower profit margins as customers are inclined to spend less as the cruise progresses.

![Figure 8: Duration of North American Cruises (in nights), 2011](image)
*Source: own compilation based on US Department of Transportation, Maritime Administration.*

The distribution of cruises by number of days shows very specific characteristics of cruise itineraries. The share of cruise lasting 7 days is dominant (47%) with other prevalent durations in the range of 3 to 5 days. This illustrates a scheduling issue for cruise shipping 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 cruise shipping, 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 2,500 TEU requires a draft of 33 feet, while a sovereign class containership of 8,400 TEU requires a draft of 46 feet. Draft issues that have plagued container ports are a much more marginal issue for cruise shipping. 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.

Environmental considerations play a role, particularly when calling at ports. Large differences in CO₂ emissions can be observed between individual cruise ships (Howitt et al., 2009). Vestlandsforsking (2011) came to an emissions range from 93 to 615 kg of CO₂ per passenger-day, or from 199 to 1,314 g CO₂ 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 CO₂ 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 liters of fuel can be saved in a 10 hour 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 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.** 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.

- **Seasonal.** Weather is the dominant factor explaining seasonality, 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.

- **Repositioning.** Because of the seasonality of the cruise industry the repositioning of ships between seasons is 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 3 ships in the Mediterranean, 9 ships in South America, 4 ships in Asia/Australia, and the remainder in other smaller markets. In the Summer of 2011, only 8 ships were deployed in the Caribbean while 21 vessels sailed in the Mediterranean, 5 ships in Alaska, 4 ships in the Baltic and the remainder in other markets (Tercek, 2011).

**Stability vs. Variation in the Itineraries of a Cruise Vessel**

The container shipping industry is characterized by regular container services whereby a ship is deployed for a long time (several months up to years) in the same loop with the same ports of call. A certain number of vessels are required to maintain the desired frequency at each port of call (on mainline routes one call per week is the standard). For example, on the North
Europe-Far East trade 9 to 11 vessels are required to maintain a fixed schedule of one call per week per port of call with each liner service typically calling at between 8 and 12 ports of call in Europe and Asia (Notteboom and Vernimmen, 2009). The cruise industry generally follows a more 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.

Figure 9 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 157m and a beam of 21.5m. 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 7 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.

<table>
<thead>
<tr>
<th>Month</th>
<th>Itineraries</th>
<th>Ports of Call</th>
</tr>
</thead>
<tbody>
<tr>
<td>April 2012</td>
<td>West Italy, Adriatic / 6</td>
<td>Ven, Adriatic, Aegean, Turkey / 7</td>
</tr>
<tr>
<td>May</td>
<td>Aegaean, West Italy / 7</td>
<td>Rom, no service, Ist, Turkey, Aegean / 9</td>
</tr>
<tr>
<td>June</td>
<td>Aegaean, Aegean, Turkey / 8</td>
<td>Ist, Turkey, Black Sea / 7</td>
</tr>
<tr>
<td>July</td>
<td>Aegaean, Adriatic / 8</td>
<td>Ven, Adriatic, Aegean, Turkey / 7</td>
</tr>
<tr>
<td>August</td>
<td>Aegaean, Turkey, Near East / 11</td>
<td>Pir, Aegean, Red Sea / 6</td>
</tr>
<tr>
<td>September</td>
<td>Aegaean, Turkey, Near East / 11</td>
<td>Pir, Aegean, Red Sea / 6</td>
</tr>
<tr>
<td>October</td>
<td>Aegaean, Turkey, Near East / 11</td>
<td>Pir, Aegean, Turkey, Near East / 11</td>
</tr>
<tr>
<td>November</td>
<td>Aegaean, Turkey, Near East / 11</td>
<td>Pir, Aegean, Red Sea / 6</td>
</tr>
<tr>
<td>December</td>
<td>Aegaean, Turkey, Near East / 11</td>
<td>Pir, Aegean, Red Sea / 6</td>
</tr>
<tr>
<td>January 2013</td>
<td>Aegaean, Turkey, Near East / 11</td>
<td>Pir, Aegean, Red Sea / 6</td>
</tr>
</tbody>
</table>

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 (LOA of 339m and beam of 39m) has a maximum
capacity of 4,370 passengers and operates on only two itineraries (of 7 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 6,360 passengers (LOA: 360m, beam: 65m), offers only two itineraries in the Caribbean during the year centered on hub port Fort Lauderdale.

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

<table>
<thead>
<tr>
<th>Freedom of the Seas - Royal Caribbean Cruises</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Period</strong></td>
</tr>
<tr>
<td>Apr 29 to May 6, 2012</td>
</tr>
<tr>
<td>May 6-13</td>
</tr>
<tr>
<td>May 13-20</td>
</tr>
<tr>
<td>May 20-27</td>
</tr>
<tr>
<td><strong>same two cruises repeated all year round</strong></td>
</tr>
<tr>
<td>Apr 7-14, 2013</td>
</tr>
<tr>
<td>Apr 28 to May 5, 2013</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Allure of the Seas - Royal Caribbean Cruises</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Period</strong></td>
</tr>
<tr>
<td>Apr 29 to May 6</td>
</tr>
<tr>
<td>May 6-13</td>
</tr>
<tr>
<td>May 13-20</td>
</tr>
<tr>
<td>May 20-27</td>
</tr>
<tr>
<td><strong>same two cruises repeated all year round</strong></td>
</tr>
<tr>
<td>Apr 7-14, 2013</td>
</tr>
<tr>
<td>Apr 14-21, 2013</td>
</tr>
</tbody>
</table>

Another example is the MSC Fantasia with a capacity of 3,900 passengers (LOA of 333m and a beam of 38m); MSC Cruises deploys the vessel on a fixed itinerary of 7 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, LOA: 205m, beam: 27m) 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. Figure 10 illustrates the global distribution of cruise port visits based upon the published itineraries of about 85% of the global cruise shipping 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 7 days cruises calling 3 to 5 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 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. It is also indicative that new cruising clusters may emerge to serve a latent demand from a growing middle and upper class in Asia, the Middle East and South America.

A cruise involves two travel segments, the first being air 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 serviced 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 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 shipping 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 (FCCA, 2010). The Caribbean acts an ideal cruising destination for the following reasons:

- **Geography.** 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.

- **Historical and cultural.** 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 very 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.

- **Commercial.** 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 (Figure 1). 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 7 nights of duration, which enables to cover a sub-region of the Caribbean comprising of 3 or 4 ports of call (Figure 12). Cruise ships commonly arrive at the port of call early in the morning and leave in the evening, 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 hours on average in the Caribbean. To take advantage of a location that does not have sufficient infrastructure to accommodate cruise operations, several cruise shipping 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.
The Mediterranean is the world’s second largest cruise shipping market, representing over 23% of the annual cruise capacity. It can be broken down into four regions (Figure 13), 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 (ECC), MedCruise and their partners calculated that the cruise industry accounts for 225,586 jobs in Europe, over 10 billion euro of direct expenditure by cruise companies, shipbuilding yards and cruise passengers, and 15 million visits to European ports. Every million euro spent by the cruise industry creates 2.2 million euro in business output and 21 jobs.
Typical 7 days itineraries are structured as small loops of 4 to 5 ports of call each covering a specific sub-region such as the Adriatic or the Spanish coast (Figure 14). 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.
Ports of Call: A Functional Typology

Cruise ports come into three main categories depending on 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.
Table 4: Functional Typology of Cruise Ports

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

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 itineraries that are partially undertook by passengers. An emerging trend, where possible, has been the setting of dedicated facilities where the cruise shipping company is directly involved in the development of the cruise terminal as well as co-located amenities. The cruise industry is expanding to provide more options for passengers, particularly for niche markets where higher prices can be commended 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.

Figure 15 shows the cruise passenger that transited at the world’s largest cruise ports. 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.
The Geography of Cruise Shipping: Itineraries, Capacity Deployment and Ports of Call

Figure 15: Most Active Cruise Ports by Passenger Visits, 2011
Note: Turn ports are orange. Source: based on data from Cruise Market Watch.

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 visitor 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 visitor 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 visitor activities in the port area. Further employment is provided by inland transportation involving cruise passengers including air, private car, bus, transit and taxi.

CONCLUSION

The cruise industry has emerged to become a significant niche to the global tourism industry. Like the container shipping 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 distance of cruise services is much similar to feeder services in container shipping, as both are relying on the hub concept (transshipment hub versus turn port). The schedule integrity of cruise shipping is very important and consistently respected, as opposed to containerized shipping where the aggregate performance is around 50%. From a market perspective, the cruise industry has the following unique characteristics usually not found in other segments of the tourism industry:
• Supply push strategy of cruise operators as they aim at ‘creating’ demand simply by providing new capacity (ships);
• Offer itineraries where the whole is essentially greater than the sums of its parts. Specific regional and cultural experiences can be offered through a combination of sailing time and choice of ports of call;
• Expand and capture revenue streams by offering on board goods and services as well as shore-based excursions;
• 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.

Since the cruise industry appears fundamentally to be driven by supply, it is likely that supply saturation, as opposed to demand saturation, will constrain future developments and impose a maturity on an industry that until now 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 hectares 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. Paradoxically, a similar trend was observed in container shipping in recent decades as several shipping lines became, through parent companies, terminal operators. While a further fragmentation of itineraries is likely to take place, a closer integration between the cruise port and cruise shipping is to be expected.

REFERENCES


