Cruise ship supply chain: a field study on outsourcing decisions

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Abstract: The aim of this research is to investigate the supply chain of cruise companies and more specifically the factors that determine a company’s decision to outsource. For the purposes of this research, a small deluxe cruise company that offers specialised programmes and a larger mass cruise company were selected for comparison. In the first case, the company decided to outsource specific departments of their supply chain, instead of maintaining and expanding an internal corporate system while growing. In the second case the company developed its own supply chain. 

The results of the study revealed that cost is the top driver for outsourcing for both companies, with a clear difference between the two companies regarding the sub-criteria. This paper fulfills an identified need to study the factors that influence supply chain management criteria as well as the gravity of sub-criteria on a cruise company’s decisions.

Keywords: cruise company; supply chain management; outsourcing decision.


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1 Introduction

The cruise product is characterised by high complexity, since it combines the characteristics of a typical maritime transport (passenger shipping) while offering the services and amenities of a luxury shore hotel to passengers. Alternatively, we can define cruise activity as a diversified maritime activity with organisational characteristics similar to those of a maritime transport, especially in terms of safety and security. The major difference is that the purpose is not the pure transport of a passenger from one place to another (Marti, 1990) but instead the luxury stay and the development of onboard and onshore activities.

The cruise sector records high rates of growth that reach 8% per annum against the traditional tourism sector’s growth, which is an estimated 4% annually (Peisley, 2005). From the supply side, the fleet capacity has grown 5.7% per year from 2008–2012 (Cruise industry News, 2008). From the demand side this alternative way of vacationing attracts more consumers every year from around the world, and predictions show that the number of people going on cruises will surpass 20 million by 2012 (Kwag and Lee, 2009). In the 1990s, the cruise sector’s major criticism concerned the robust growth of supply that was not close to predicted demand (Marti, 1990). According to more recent data, the number of worldwide cruise passengers reached 19.2 million (+4.1%) in 2010 (Cruise Market Watch, 2011).

The cruise sector follows the dogma ‘big is beautiful’ on the basis of lower operational cost per passenger (Marti, 1991). Since then the size of cruise vessels has increased steadily. In 2009–2010, 87 cruise ships were classified as megaships (> 2,000 berths), representing 56% of global cabin capacity (ISL, 2010).

A few years ago the major cluster of cruise destinations was located in the Caribbean, and the major source of passengers was North America. In the past five years, destination trends have altered and the mature Caribbean has given its place to the Med region. The market share of Caribbean cruises decreased from 46.5% in 2005 in 40% in 2009, while the Med region share increased from 12.6% to 17.8%. The European market has become a new source of passengers (1.8% versus 3.5% in North America) (ECC, 2011).

Destinations have changed, new markets have emerged, the European penetration rate is steadily increasing and cruise companies, as consumer-oriented businesses, are
adjusting to these new trends. Cruise products are differentiated for their clientele while the industry is characterised by a high degree of flexibility to the general economic conditions (such as crisis) by repositioning and altering its products to make cruises affordable and to ensure high completeness (Stefanidaki and Lekakou, 2011). Marti (2004) noted that the consumer profile has changed substantially and this is why consumers of different economic status participate in the same cruise.

Different companies operate in the same market (geographic classification) and offer different cruises, addressing the needs of various consumer profiles. The number of cruise ships is decreasing but those entering the market are bigger, leading to an increase of total fleet capacity (ISL, 2011). Simultaneously, new destinations emerge while the older destinations lose their leading position.

Destination development, seasonality, redeployment, itinerary complexity and international passenger sourcing are some of the major considerations for the development of the supply chain of a cruise company.

The core question to investigate is how a cruise company decides whether to develop an in-house supply chain department and which activities are selected to run in-house and which are outsourced. Cruise ship supply chain management is an extremely limited subject in Greek literature, while it has not been addressed much in other international literature. Therefore, this study can contribute to the literature and scientific approach to supply policy in cruise companies. The paper includes the factors that determine the selection of an in-house supply chain department in cruise companies against outsourcing.

The main objective of this research is to investigate the supply chain of cruise companies and more specifically how the geography, cost, type and duration of cruise, nationality, cliental composition and specialisation of suppliers determine a company’s outsourcing decisions.

This paper fulfils an identified need to study the criteria and the sub-criteria that influence supply chain management and evaluate their significance for a cruise company’s decisions, as well as how these factors differentiate among large cruise companies (LCC) and small cruise companies (SCC).

The paper is structured as follows. Section 2 introduces cruise ship supply chain management. Section 3 presents the methodology followed, including a short discussion of the analytical hierarchical process (AHP) used to analyse the data. Section 4 presents the results and the last section concludes the paper.

2 Cruise ship supply chain management

The cruise sector is the most characteristic example of a globalised business. This global deployment brings a set of challenges regarding the supply chain (Veronneau and Roy, 2009). In particular, the supply chains within the cruise sector are highly complicated. One of the reasons is the redeployment of cruise ships according to seasonality and passenger demand, both of which increase the level of planning complexity. In addition, cruise vessels operate within different geographic locations, each of which has its own laws and regulations (O’Bull, 1996). The size of ships is steadily increasing while the time for re-supply remains the same. In the case of charters, the passenger’s profile may substantially vary between cruises, which imply a continuous shifting of supply
requirements. Also, it is crucial to synchronise all the necessary components for the delivery of a cruise product.

Although, there are many definitions of supply chain management, for the purposes of our analysis we accept the definition of Mentzer et al. (2001, p.4) who define it as “a set of three or more entities (organisations or individuals) directly involved in the upstream and downstream of products, services, finances and/or information from a source to a customer”.

The effective management of a supply chain is a vital component for the success of an organisation (Ketchen and Hult, 2007). The importance of supply chain management is highlighted by many researchers. Mentzer et al. (2001, p.2) note that “companies and supply chains compete more today on the basis of time and quality”. Furthermore, competition has shifted from the company level to the supply chain level (Christopher, 2005). O’Bull (1996, p.30) notes that “Cruising provides an extremely good opportunity for multinational operation in tourism, accompanied by international acquisition and deployment of factors of production wherever there is the highest marginal productivity”. The international sourcing of supplies forces cruise companies to find the appropriate supplier in every place they call while looking for the most effective way to coordinate supply flows.

Supply chain management is a way to maximise value under the condition of reducing overall cost. Business environments change rapidly, creating conditions of uncertainty for companies that try to compete in terms of cost and quality. Companies need to divert their resources in order to focus on what they can do best and outsource operations that are of secondary value for the company’s objectives. Outsourcing is defined as “the process whereby activities traditionally carried out internally are contracted out to external providers” [Domberger, (1998), p.12]. Similarly, Ketler and Walstrom (1993, p.449) consider outsourcing as “the transferring of an internal service function to an outside vendor”. Furthermore, Lankford and Parsa (1999) state that there is evidence that outsourcing operations is the trend of the future, and companies that are already involved with outsourcing are satisfied. A comprehensive literature review on outsourcing is presented in Beaumont and Khan (2005) and Hätönen and Eriksson (2009).

Access to specialised suppliers, reduction of investments in assets, better control of costs, (Pyrkatis and Nikitakos, 2006), focus on core competencies (Quinn and Hilmer, 1994) and the transformation of fixed costs to variable costs (Alexander and Young, 1996) are some of the advantages of outsourcing. While it is generally accepted that cost reduction is the most widely preferred advantage of outsourcing (Domberger, 1998; Lankford and Parsa, 1999), Quinn (1999) states that outsourcing must not be connected with the decrease of cost but with the strategic benefits that may arise such as innovation, quality and added value. Apart from the managerial benefits derived from outsourcing decisions, Ketler and Walstrom (1993), while reviewing the historical evolution of information systems outsourcing, identified four trends that led to this phenomenon: globalisation and competition, deregulation of capital markets, high volume of financial transaction and shortage of specialists.

Unless the potential benefits accrue from outsourcing, there are also those who stand critical, referring to the risks that derive from outsourcing. Quelin and Duhamel (2003) provide a summary of the main negative outcomes from outsourcing such as the dependency from the external provider, hidden costs, loss of know-how and the lack of the desired capabilities of the provider.
The literature on the broad area of this paper reveals that the relevant material on supply chain management is immense. However, the literature on the specific topic of cruise ship supply chain management is scant. This is no surprise. According to Papathanassisis and Beckmann (2011), cruise research is subject to fragmentation, managerialism and a lack of unifying theoretical perspectives to characterise empirical research; this is referred to as the poverty of cruise theory. The authors identified only 145 cruise-related academic papers published between 1982 and 2009, of which only ten deal with logistics and financing, supply management and capacity management.

Probably the most recent work that lies within the field of this paper is that of Veronneau and Roy (2009) that discusses the complexity of global cruise ship supply management and presents a field study of a large Florida-based cruise company. According to their work, the main processes when planning for consumable products are divided into three levels: strategic (long term), tactical (for short and medium term) and operational (for day-to-day operations). What is important is that they consider that the supply chain starts with the suppliers of the company and extends to the ship as the ultimate consumer without taking into account the onboard consumption.

A different approach is presented in Vaggelas and Lagoudis (2010) who analyse the supply chain strategy of a small cruise company. The theoretical approach of the strategy is based on a generic supply chain management system for tourism sector based on Zhang et al. (2009). The paper combines three supply chain methodologies that deal with the logistic type, the level of flexibility and the level of complexity that has been tested according to the authors is other fields such as transport and manufacturing. Furthermore, Veronneau and Roy (2009) approach the supply chain starting from the suppliers and end at the cruise passenger as the final consumer.

**Figure 1** Supply chain structures, (a) direct supply chain (b) extended supply chain (c) ultimate supply chain

![Supply chain structures](image-url)

*Source: Mentzer et al. (2001)*
Figure 1 presents three different structures of a generic supply chain based on Mentzer et al. (2001). In the cruise industry, small companies follow the structure presented in Figure 1(b), while the larger companies follow the ultimate supply chain [Figure 1(c)].

According to the same authors the complexity of a supply chain can be classified in three main categories: direct supply chain, extended supply chain and ultimate supply chain.

3 Methodology

The aim of this work is to present the results of empirical research to

a. identify the criteria determining a supply department in a cruise company
b. determine the hierarchy that each of these criteria has.

The methodology used is illustrated in Figure 2.

More precisely, the first step was to identify the key parameters that affect the decision maker’s choices concerning outsourcing parts of the supply chain. The literature on this specific area is rather scant. Therefore, a brainstorming session was performed to map the total number of factors that could influence this decision.

The next step in the research was to develop a questionnaire based on the findings of the previous step. The questionnaire comprises 61 pairwise comparisons on a nine-point Likert type scale. The final stage was the data elaboration and calculation of the importance of each factor by using the AHP.

The AHP method has the ability to structure complex, multi-person, multi-attribute, and multi-period problems hierarchically. Pairwise comparisons of the element (usually, alternatives and attributes) can be established using a scale that indicates the strength with which one element dominates another with respect to a higher-level element. This scaling process can then be translated into priority weights or scores [Yusuff et al., (2001), p.421].

The AHP uses hierarchical decision models that have a mathematical basis. The meaning of the hierarchical decision model must be defined and subsequently, the process for decision making with the use of the model will be explained. The AHP has a successful track record regarding application in the wider transport area and ports (Lirn et al., 2004) following its introduction as a multiple criteria decision-making (MCDM) methodology in the late 1970s (Saaty, 1977). AHP is a multi-criteria method for decision making and priorities ranking [developed by Saaty (1977, 1980, 1999)]. Saaty (1997, p.325) refers that measurement derived from pair comparison and states that: “Paired
comparisons are the intermediate fine-structured process with which one uses one’s best knowledge and understanding to determine how many times the dominant of two elements, on some property, is a multiple of the less dominant one taken as the unit of measurement”. The judgments from the pair comparisons are made by experts or decision makers in combination with the use of the AHP algorithm to produce the final outcome. In the port industry, the AHP has been used mostly to assess port selection criteria (Lirn et al., 2004; Guy and Urli, 2006; Ugboma et al., 2006), carrier selection criteria (Wong et al., 2008) and benefits distribution from port services (Vaggelas and Pallis, 2010).

This method is based on a series of comparisons in the existing data to determine its relative priority. The criteria with which the comparisons are made and the final hierarchy deriving from them are not necessarily determined. It is possible and acceptable to be based on non-measurable factors such as experience and subjective judgment. After the completion of the process, the most important factors have the highest gravity coefficients (Saaty, 1999). The reader is referred to the above-mentioned work of Saaty, the founder of AHP, for further information.

3.1 Identification of critical decision factors and questionnaire development

The first step includes the identification of factors that influence the decisions of cruise companies concerning the structure of the supply chain and particularly the key parameters that affect outsourcing decisions. Given the limited research in this area, brainstorming was first used to identify the broad area of factors that may play an important role in the decision for outsourcing. This process was performed with major stakeholders of the Greek cruise industry (mainly cruise companies and maritime agents) who were asked to confirm or eliminate the factors considered relevant or irrelevant to outsourcing decisions, from a number of listed items. Following discussion with local shipping agents, local suppliers and business executives in the cruise industry, the list of key factors was narrowed to a set of six major criteria categories, each of which can be broken down into sub-criteria. Note that in the AHP method these are called criteria or the parent nodes and sub-criteria or children nodes, as it will be discussed later on.

These categories are as follows:

- **cruise product**: includes all the characteristics of the itinerary such as the home port, the number of ports of call and time of eve at each and the classification of the product as mass, premium, etc.

- **characteristics of the cruise company**: refers to the specialisation of the cruise company and if it is an affiliated or parent company, since the latter may affect the supply chain strategy

- **geographic area of activity**: location of the headquarters, proximity to the distribution centres and concentration of fleet activity to specific areas in terms of number of ships

- **passengers characteristics**: includes the major demographic characteristics of the passengers (age, income, nationality) and their nutritional habits

- **cost**: includes all factors that determine the total cost of the cruise
• **supply strategy**: factors that influence the formulation of the supply chain orientation.

The hierarchic structure of the levels of criteria and the number of criteria in each level are significant in implementing AHP. For this reason, the structure of the present research is relatively simple, with data present on two levels (the criteria and the sub-criteria). The groups of criteria selected with the sub-criteria of each group are presented below in the form of the final questionnaire:

**Figure 3** The groups of criteria and sub-criteria (see online version for colours)

Based on Figure 3, a questionnaire consisting of a total number of 61 questions (comparisons per couples) was developed. The questionnaire simply asks for a pairwise comparison of the sub-criteria for the six major criteria categories that are the major input of the AHP analysis.

The structure of the questionnaire was such that the respondents were asked to compare each sub-criterion included in the criterion. Therefore there is no comparison of the sub-criteria separately with the remaining sub-criteria. This was done to abridge the number of questions. Despite this, with the Expert Choice™ software, the gravity coefficients were calculated without the aid of such a comparison.

### 3.2 Field research and data analysis

The questionnaire was sent to two cruise companies with different market profiles. The first was a small premium cruise company headquartered in the USA that offers specialised programmes and the other was a major cruise company that is very active in the Greek market. Initially, the questionnaire was distributed to the heads of the relevant departments (supplies, technical, safety and training, waste management, accounts, personnel, purchasing and operations departments). Instead of receiving separate responses from each executive, participating companies returned only two collective questionnaires to us. The final respondents were the heads of general management department of the companies selected.
As discussed above, the answers to the questionnaire were the input for the AHP method used to analyse the data and arrive at the rank of each alternative on a numerical scale. AHP aims to identify the experts' opinions by using questionnaires in which the criteria and sub-criteria of each criterion in couples are prioritised. These can determine the impact of the choice of developing own supply chain department or selecting outsourcing for supply needs.

4 Results

This section presents the results derived from the Expert Choice™ software. The degree of participation of each criterion and sub-criterion, which depicts its importance for the achievement of the objective, will reveal the differences and rank the decision factors.

Figures 4(a) and 4(b) present the local (L) and global (G) priorities based on our goal. Global priorities are obtained for nodes by applying each node’s L priority and its parent’s G priority. The G priorities for each alternative are then summed to yield overall or synthesised priorities. The most preferred alternative is the one with the highest priority.

Table 1 presents the ranking of factors and their significance (also illustrated in Figure 5). As discussed in the previous section, cost is the major driver for outsourcing. Based on the results of the data analysis, cost is a very important factor, ranked as the top criterion
for the SCC and the second most important for the LCC, mainly due to economies of scale in the latter case. In the case of LCC, supply strategy was ranked first. Note that this criterion is the least important for the SCC. The complexity, the larger quantities that need to be supplied and the importance of synchronising them justify this difference.

In summary, for the SCC, cost, geographic area of activity and the cruise product are the most important criteria, while the top 3 criteria for the LCC are supply strategy, cost and passengers’ characteristics (see Table 1).

Table 1 The criteria of SCC and LCC and their ranking by significance

<table>
<thead>
<tr>
<th>Criteria</th>
<th>SCC</th>
<th>LCC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cruise product</td>
<td>3 0.203</td>
<td>5 0.054</td>
</tr>
<tr>
<td>Characteristics of cruise company</td>
<td>5 0.112</td>
<td>6 0.045</td>
</tr>
<tr>
<td>Geographic area of activity</td>
<td>2 0.209</td>
<td>4 0.118</td>
</tr>
<tr>
<td>Passengers characteristics</td>
<td>4 0.131</td>
<td>3 0.119</td>
</tr>
<tr>
<td>Cost</td>
<td>1 0.247</td>
<td>2 0.330</td>
</tr>
<tr>
<td>Supply strategy</td>
<td>6 0.097</td>
<td>1 0.334</td>
</tr>
</tbody>
</table>

Regarding the differences in the criteria, the results (gravities) from the AHP analysis of the research with the questionnaires clearly demonstrate the greatest significance of the cruise product with 0.203 of the SCC over the significance of 0.054 for the LCC. Similarly, the criteria characteristics of a cruise company and geographic area of activity depict the greatest significance for the SCC compared to that for the LCC, 0.112 to 0.045 and 0.209 to 0.118, respectively (Figure 5). The significance of the passengers’ characteristics is relatively the same, 0.131 for SCC and 0.119 for the LCC.

Figure 5 Criteria differences between SCC and LCC (see online version for colours)

The synthesis with respect to our goal for the LCC and SCC was calculated by the Expert Choice™ software and is presented in Figures 6(a) and 6(b). Note that synthesis is the process of weighing and combining priorities throughout the model after judgments are made to yield the final result.
For the SCC, the characteristics of the cruise programme, the size of the company and the location of the distribution centres are of extreme importance [Figure 6(a)]. In the case of LCC, trip, supplies and the location of distribution centres are the major decision determinants.

**Figure 6** (a) Synthesis for a small cruise company (SCC) (b) synthesis for a large cruise company (LCC) (see online version for colours)

The significance differences of the sub-criteria between the SCC and the LCC are illustrated in Figure 7. For comparison needs, we selected the ten sub-criteria with the biggest difference in significance between SCC and LCC. The sub-criteria by size of difference are presented in Figure 8(a) (the more significant for SCC) and Figure 8(b) (the more significant for LCC).

The significance comparison in Figure 8(a) shows cruise programme characteristics are 11.45 times more significant for the SCC than for LCC and main activity was 9.75 times more important, followed with a smaller difference by company size (4.07 times), income (3.90), parent or affiliated company (3.17 times), company’s headquarters (2.07), home ports (1.85), ports of call and time of eve (1.59), specialisation and nationality, 1.5 times.

Respectively, the most significant sub-criteria with the biggest difference of significance by size for LCC to SCC [Figure 8(b)] are: special supplies by 8.4 times, regulatory framework by 6.5 times, know-how and experience by 3.5 times. The rest of the sub-criteria, which are more significant for LCC but less than three times more, are quality (2.7 times), trust of local suppliers (2.4), trip (1.9), payment arrangement (1.7), age-health (1.6), packaging (1.5) and nutritional habits (1.4 times).
Figure 7  Sub-criteria differences between SCC and LCC (see online version for colours)

Figure 8  (a) Significance difference SCC to LCC (b) significance difference LCC to SCC (see online version for colours)
5 Discussion and conclusions

This paper dealt with the complex issue of cruise supply chain management and, specifically, the factors that determine outsourcing decisions. The cruise supply chain is characterised by high complexity. According to the literature and opinions of cruise experts, the need for low operating costs, while preserving high levels of quality are very challenging for the management of the supply chain. Outsourcing is a widely applied alternative that has gained a lot of attention lately. The decision to outsource is affected by a number of different factors. The size of the company is of great importance. Therefore, this work tries to identify and rank the key decision parameters for SCC and LCC.

To that extent, the methodology presented in Section 3 was applied. At the beginning, a set of key factors was identified based on a literature review and discussion with experts. Then, a questionnaire was developed for two cruise companies operating in Greece and the wider area of the Mediterranean. The first is a small company that operates in the premium market while the second is a large company that operates in the mass market.

The responses were analysed using the AHP to determine the key decision factors regarding outsourcing. The AHP method, which is analysed in Section 3, is without a doubt the most widely used MCDM method, although it is criticised by some researchers for its credibility. This criticism has been addressed by the founder of the method in Saaty and Vargas (1984) and Saaty (1997).

Regarding the criteria, the analysis revealed that cost is the top driver for outsourcing for both companies. In addition, while the supply strategy is the top factor for the large company, it is the least important for the small company. For the latter, the geographic area of activity is of extreme importance.

A clear difference between the two companies regards the sub-criteria. For the SCC, the characteristics of the cruise programme, the size of the company and the location of the distribution centres are extremely important. In the case of LCC, trip, supplies and the location of distribution centres are the major decision determinants.

Cruise ship supply chain management is an area that has not been addressed much in literature [see Papathanassis and Beckmann (2011)]. This research aimed at identifying the factors that influence the decision of a cruise company to outsource and contributing to the knowledge in the field. Also, we tried to address the contemporary research question posed by Hätönen and Eriksson (2009) who note that the research on SMEs’ outsourcing decisions remains unknown with many challenges. In this context, we make distinct comparisons among the decision criterion of LCC and SCC. Even though this research has not been conducted before, the results cannot be generalised because of the small number of participants. Also, another limitation is the fact that both companies are operated mainly in a specific geographical area (mostly Med region).

Future research should address these limitations and include more cruise companies that operate in different geographic areas (e.g., Caribbean, Alaska and North America) and market segments (e.g., premium, luxury and mass).
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References

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