

SHIP PURCHASING: CHARACTERISTICS, EMPIRICAL EVIDENCE AND MARKET ATTRACTIVENESS FOR SHIPBUILDERS

The paper suggests a methodology to define market attractiveness for ship builders. It is part of the overall market entry strategy for newcomers and/or market strategy for incumbent players in the shipbuilding segment. The methodology is easily adjustable for marketing actions in segments other than ship building when assessment has to define focus in situations with too many markets, players, and variations.

ABSTRACT

This paper presents an analysis of the ship purchasing process and suggests to shipbuilders a methodology to identify the attractiveness of different markets in terms of location. Two analyses are carried out to identify if there is any correlation between exporting country and buyer size (e.g.: Are Korean exports focused on large clients?) and if the location of the production influences the purchasing decision of the ship buyer. We created a purchasing preference index (PPI) that can be computed for each type of ship and each builder-buyer country pair, and the PPI distribution over several countries is used to evaluate the entry potential for each country which, made up from market size, defines a simple market attractiveness measure. Further analysis is performed aiming to investigate company-level characteristics, such as the size of the players and loyalty in the relationship builder-buyer.

KEY WORDS: Ship purchasing; purchasing preference; market attractiveness; entry strategy, market screening.

1 INTRODUCTION

Over the past decade, many market, regulation and investment decisions and conditions have generated what seems to be one of the most promising eras of the shipbuilding industry. The historically large backlogs, low shipyard idleness, order records, high profitability and investment return have boosted a kind of prosperity and euphoria in the industry. This situation has impelled several incumbent players to expand, but also new players to investigate the attractiveness of the market in order to help in building an entry strategy. As an example, in Brazil alone, dozens of groups (petroleum companies, banks and venture capitalists, engineering

companies, heavy constructors, etc.) are either studying or have already decided to enter the shipbuilding market.

In this context, we became interested in studying the characteristics of the shipbuilding industry from the viewpoint of a new player. The work is rich in information and we believe it could be interesting not only to potential newcomers, but also to researchers in the field and to incumbent players.

The study aims to serve as an initial step for the creation of a market strategy and in the end, for the corporate strategy of the shipbuilder. Koch (2001) and Sakarya *et al.* (2007) would classify our approach as the screening phase of the market selection process. Motivation for the study of such subject is presented by Rahman (2003),

where the author cites that a major reason for failures in international expansion is the inappropriate evaluation of markets, generating an outcome that is almost always very costly.

The remainder of the paper is divided into five sections. The first section tries to map who is the decision maker when a ship is purchased. In the second section we discuss the relationship between ship imports and ship exports, and analyze two important characteristics of the buying process: the size of the players and location relevance for the purchasing decision. In other words, would the main ship owners buy ships from anywhere and from anyone, irrelevant of size or production location? In the third section we propose an index to measure the purchasing preference whose main use in this work was to compute the entry potential for new players in a specific country. Coupled with market size, the entry potential indicates the most attractive countries in terms of size and fragmentation (or distribution among several players) of the purchases. The following section changes the focus from countries to companies, and evaluates characteristics of the purchasing process such as size of shipbuilders and ship owners, repeat purchasing and loyalty in the relationship. The paper concludes with a discussion of applications of this work and suggests deployments.

2 SHIP OWNERSHIP AND PURCHASING DECISION

The identification of the ship owner is difficult. Lloyd's Register uses four main stakeholders in the property and use of a ship: owner, registered owner, manager, and operator. Besides the flag and ship's nationality, each one of the stakeholders has its own nationality, making it very difficult to define the nationality of the entity which really makes the decision on ship purchasing.

The owner (sometimes referred as beneficial owner) is the entity that receives the financial accruals of the ship property, and hence is the effective decision maker of the ship's purchase. The registered owner is often the leasing company or financier of the ship. Accounting is another reason for differences between beneficial and registered owner; some companies prefer to have one or more ships segregated from the parent company, improving the accountability of an important asset / revenue and cost center such as a ship.

Commercial decisions associated with the ship's use are made by the ship operator, or charterer. This entity takes a ship on charter from the owner for a specified period and then trades the ship availability either to carry

cargoes, or to other ship operators. The several charter bases such as time charter, voyage charter, bareboat charter, etc. are defined by the operator whose ultimate function is to define how and when the ship will be used. The ship manager is in charge of the day-to-day activities associated with the operation of the ship. The manager is in charge of crew, maintenance and other operating decisions. It should be evident that a single entity (company) can play one or more of the four roles at the same time. First Marine International (2003, chapter 7) provides further details on this subject.

Owners of large fleets usually have ships under several ownership arrangements at the same time: ownership itself, ships owned by financiers, and ships managed and/or operated by other companies. Besides the complication associated with the operation-management-ownership structure, the registration of the ships requires a flag state which does not need to have any relation with its ownership, management or operation; the flag state will ensure compliance to the law and information about the ship and its owner (United Nations, 1986).

Ultimately, what is important to keep in mind throughout the reading is that the owner is the decision maker in the purchasing decision. Thus, ship buyer and ship owner are used indistinctly. In the article, we will use the country of the owner's headquarters to specify the nationality of the ship buyer.

The data source for the information on shipbuilders and ship ownership is the Lloyd's Register - Fairplay World Shipping Encyclopedia, using the version issued in the first quarter of 2006 (includes 2006 production). Stopford (1997, item 4.3 and other parts of the book) offers a more detailed discussion on the subject. Further information on the purchasing process can be found in Buetzow and Koenig (2003) and in Cushing (2003).

3 RELATIONSHIP BETWEEN SHIP EXPORTS AND IMPORTS

Although ship purchasing is generally a company, and not a country decision, the study of the purchase and sale aspects of a ship transaction will analyze purchasing patterns and the outcome of public policies associated to the shipbuilding and shipping sectors. We use a somewhat inaccurate definition of ship owner, ship buyer, ship builder, etc. For instance, when we highlight a country as a ship importer, we mean the importing companies where the owners are located in that country. The same rationale is extended to the other concepts used throughout the paper.

All types of ships (2002-2006 production)

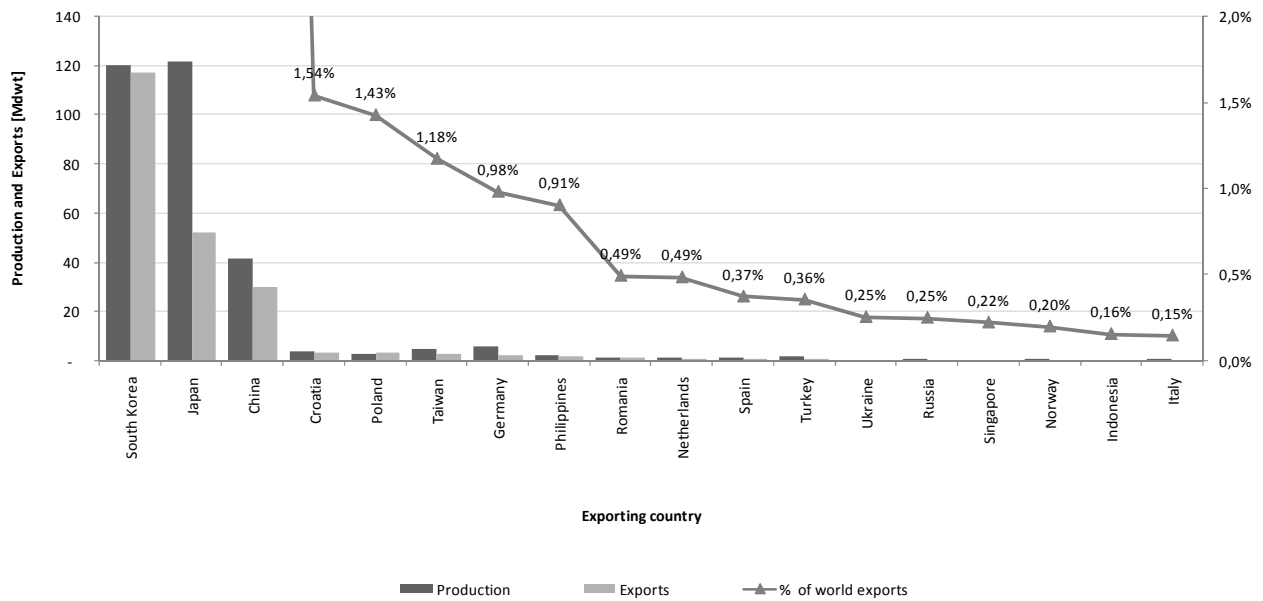


Figure 1: main ship exporting countries

In general the analyses are carried out only for two groups of data: the entire market, including all types of merchant ships, and the tanker ship market given its size and particular importance. Analysis related to the tanker market is cited explicitly.

3.1 Ship exports

Ship exports are highly concentrated. In almost any criterion used, such as number of ships, dwt (Deadweight) or GT (Gross Tonnage), more than 90% of merchant ships exports are dominated by 3 countries: South Korea, Japan, and China. Figure 1 presents the main countries in terms of production and exports, and export market share. All types of merchant ships produced between 2002 and 2006 were included in the analysis. It is clear from the figure that South Korea is “the exporter”, with 53% of world exports in terms of dwt. Both Japan and China also have a highly significant share, especially when compared to that of other exporters. Note that in the period analyzed and criterion used, Japan was the largest producer in the world.

A similar picture is obtained when the analysis is carried out for tanker ships. In this case, the concentration is even larger, since South Korea had a 66% share, and the three main exporters were responsible for 94.7% of all tanker exports worldwide.

While production, which is concentrated, is performed in many countries, exportation is even more concentrated

since it is performed by only a small number of countries. These facts indicate the strict selection of the buyer market which is certainly linked to the price and quality of the deliveries, but also to less objective factors. This evidence indicates the importance of a good market entry strategy for companies wishing to enter into this market. The authors believe that several elements presented in this paper are important for the creation of such a strategy.

3.2 Ship imports

Different to exports, ships are imported by dozens of countries. Between 1975 and 2006, only 26% of total ship purchases in terms of GT were carried out in domestic markets. In the same period, 175 countries bought ships, out of which 114 imported 100% of their purchases. This figure indicates that import barriers are generally not so high in general. Obviously, there are cases in which a country tries to protect its industry, but in many cases, the actions are limited to certain types of ships.

Figure 2 shows the 20 largest ship importers in two periods: between 1990 and 1999, and between 2000 and 2006. Although more recently the purchasing has been concentrated in the largest buyers, as can be seen in the figure, one can see that the share held by the 20 largest buyers is very similar in both periods, accounting for around 83% of total production in terms of GT.

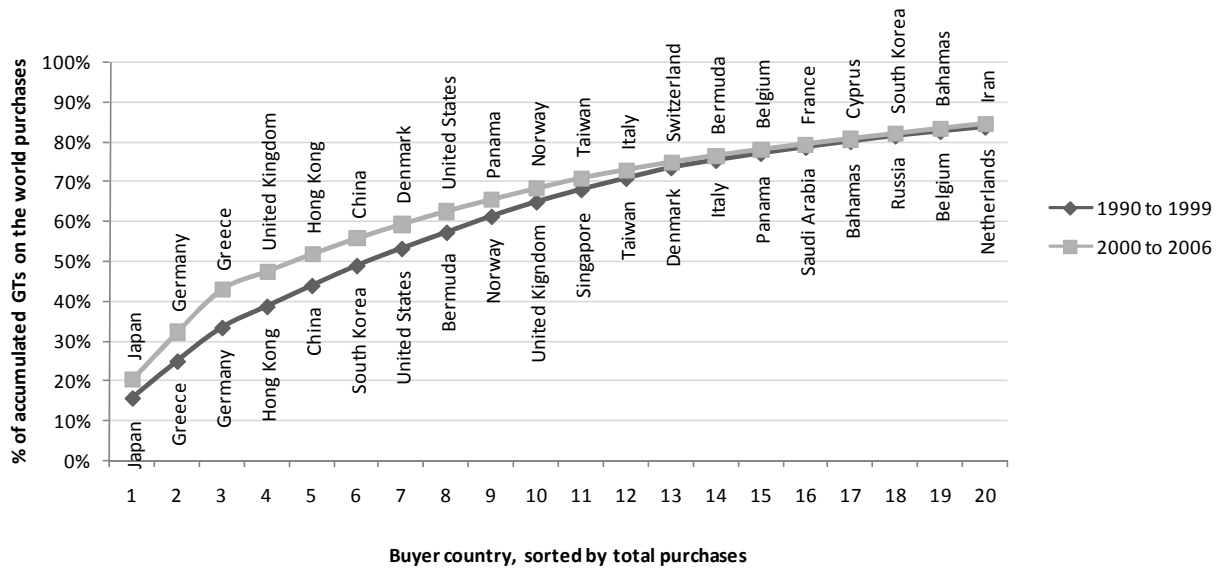


Figure 2: 20 largest ship importers between 1990 and 2006

The import analysis is essential to assess the size of the market, since a market can be large but not necessarily available or addressable for producers. The market availability for foreign entrants is a function of several variables such as tradition/brand, country protection and incentives, legislation, difference in terms of buyer and seller idioms, technology, financing, risks, etc. All these variables make the use of standard procedures to reach the markets difficult, as pointed out by Griffith *et al.* (2000). In this paper we do not analyze the reasons for the addressability, rather just the historical pattern and size of the addressable market.

It is worth noting the purchase profile of the main producing countries (Korea, Japan, and China) since the purchases are very concentrated in the countries themselves, showing some deviation from the average. This purchasing pattern may indicate the difficulty imposed for new entrants wishing to access countries with strong ship producers.

The composition between the share of imports on purchasing and the total purchased by ship owners of the country indicates the total imported by the country, considering all types of ships. Figure 3 offers all this information for the 15 largest importing markets, plus China (26th largest importer), South Korea (35th), and Brazil (80th).

As one can see in figure 3, Japan, with the largest purchasing share in the world, also indicates the smallest import share of the sample, establishing itself as the 13th

largest importer in terms of CGT (Compensated Gross Tonnage). The German market is interesting since, besides being an important shipbuilder, it is also the largest importer in terms of CGT. However, note that the German acquisitions have been approximately 3 times bigger than German construction in terms of CGT (acquired and built, respectively) over the 2002-2006 period. Greece, importing 100% of the total purchased, was found to be the second largest importer in terms of CGT. Acquisitions by Germany, Greece and United Kingdom together are equivalent to the acquisition of the following 12 largest acquirers. Indeed, the 6 largest importers represent approximately 50% of the total amount of world imports.

Regarding tanker ships, out of the 15 largest importers, 10 of them imported 100% of their purchases (pure importers) and the other 5 had a mix of imported and domestic acquisitions. Greece is one of the pure importers, which alone represented 18% of total world tanker ship imports. The United Kingdom, leveraged by the petroleum giant BP (British Petroleum), imported 47 tanker ships between 2002 and 2006, and reached second place among the largest importers. It is interesting to note that the 5 largest importers with tanker production (Germany, Italy, USA, Norway and Russia) also have a developed merchant or naval shipbuilding industry.

3.3 Correlation between exporter and buyer size

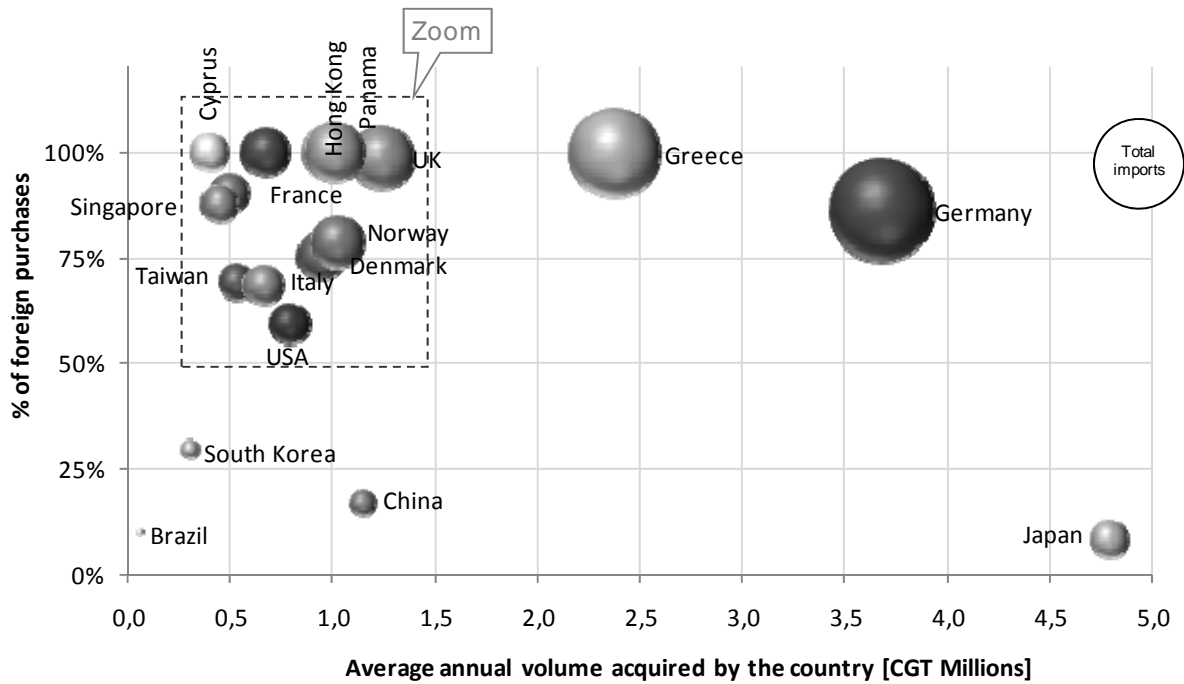


Figure 3: main importers and selected countries (2002-2006)

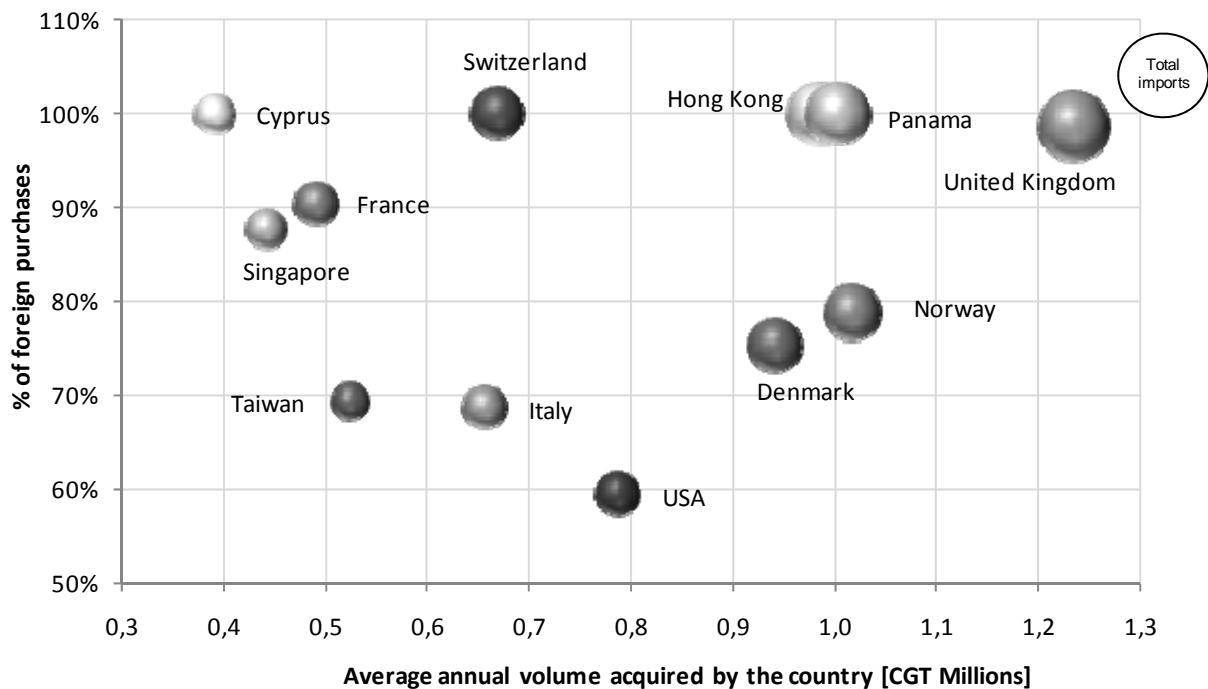


Figure 4: main importers and selected countries (2002-2006): zoom

In this section, the idea is to identify whether exporting countries have any specialization in term of ship buyer size. More specifically, the objective is to assess if there is any correlation between buyer fleet (a proxy for size of the buyer company), exporting country and share of

world exports. The original inquiry was to check if a large buyer would give preference to large shipbuilders at the same time that small shipbuilders would be more specialized in serving small shipping companies.

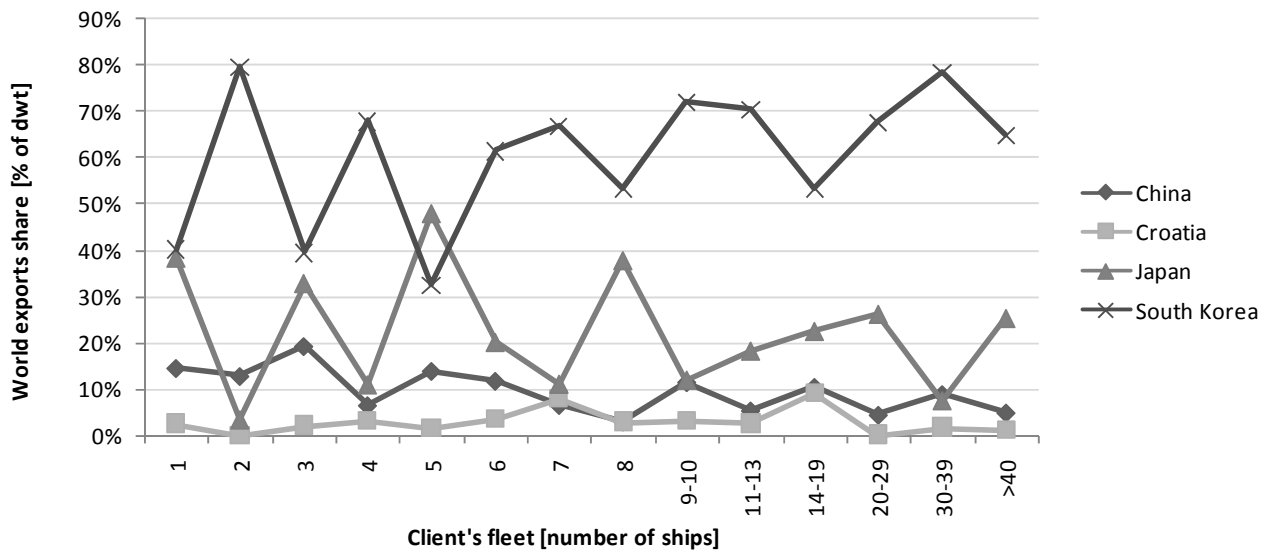


Figure 5: relationship between exporting country and buyer size

The first criterion used to classify the buyer company's size is the fleet size. The implicit rationale is that buyers of different fleet sizes have different demands and use different purchasing processes favoring specialization in the ship selling processes towards large or small clients.

Figure 5 presents the analysis' results for the period between 1997 and 2006. Some conclusions can be drawn.

- The main exporting countries export for companies of all sizes. The sales share for different buyers is reasonably independent of buyer size. Although the correlations do exist, they do not seem to be significant for all cases of the data assessed;
- Chinese producers seem to have the best performance with the smallest shipping companies. China's share of 12.8% in the segment of shipping companies with at most 6 ships decreases to approximately 6.3% for companies with 7 or more ships;
- If Chinese producers are oriented towards small clients, South Korean producers are oriented towards large companies. The participation of 54.3% in the segment below 7 ships increases to 66.7% when buyers have a fleet equal to or greater than 7 ships;
- The results have shown that South Korea and Japan are complimentary when both export markets are assessed together. Figure 5 shows the mirrored effect of the countries' shares. When the share of one increases, the share of

the other decreases with a similar magnitude, and the other way around. A possible reason for this mirrored share pattern is the market dominance of both countries; since the participation of other countries is small, its effect is not easily observable in the analysis.

3.4 Relevance of shipbuilder location on purchasing portfolio

The objective in this item is to assess the recent (from 1997 to 2006) relationship between ship buyer and shipbuilder. Table 1 is very important for the conclusions of the analysis and should be observed carefully. The lines indicate the location of the ship buyer, the columns the location of the shipbuilder, and the elements of the table the share of shipbuilder in the location. The largest 46 ship buyers of ships larger than 1,000 dwt built between 1997 and 2006 were considered in the study. On the production side, the largest 14 builders plus all the others as a single data are included in the analysis. Both shipbuilders and ship buyers are ordered by size.

As the reader can see, some results were observed previously such as the preference of Japanese ship buyers by Japanese ship builders. A hypothesis underlying the analysis is that a country with a significant purchasing variety in terms of producer location is more open and would therefore be more open to the entry of a new player.

Table 1: relationship between builder country and buyer country – All types of ships (- is nil and 0 is a small number rounded to zero); % symbol omitted from figures

Ship buyers	Shipbuilders (all types of ships) [% of dwt purchased (line) from the producers (columns)]														
	Japan	South Korea	China	Germany	Taiwan	Poland	Croatia	Denmark	USA	Spain	Netherlands	Philippines	Turkey	Italy	Others
Japan	94	4	0	0	0	-	-	-	-	-	0	1	-	-	0
Greece	27	57	10	0	0	1	2	0	-	0	0	0	0	0	2
Germany	9	46	15	13	2	8	1	0	-	0	2	0	1	0	3
Hong Kong	47	36	13	-	1	1	-	-	0	0	-	0	0	-	1
China	25	7	67	0	-	-	0	-	-	-	0	-	-	-	0
United Kingdom	29	54	4	0	3	1	0	0	1	0	0	0	0	0	5
USA	13	52	4	0	-	1	1	1	21	2	0	-	0	0	4
Denmark	13	37	15	6	2	0	-	25	0	0	0	-	1	0	1
Bermuda	43	50	6	-	-	1	1	-	0	-	0	-	-	0	0
Taiwan	62	4	3	-	28	-	-	-	-	-	-	1	-	-	1
Norway	21	35	11	1	-	5	0	0	-	7	0	2	0	0	16
Panama	42	46	6	0	0	-	1	-	-	-	-	1	0	2	1
Belgium	28	59	8	0	-	-	-	0	-	2	1	-	-	-	1
South Korea	16	80	3	-	-	-	-	-	-	-	-	0	-	-	0
Italy	17	42	10	1	-	1	3	0	-	1	1	-	1	19	5
Singapore	53	24	16	2	-	-	-	-	-	-	-	1	0	-	4
Switzerland	7	77	6	1	4	-	3	-	-	-	0	-	0	0	2
Cyprus	8	73	7	8	-	1	-	-	-	-	0	-	0	-	2
Russia	16	61	1	1	0	1	11	-	-	0	0	-	-	0	9
Bahamas	14	59	11	0	-	-	-	0	0	11	0	2	1	0	2
Marshall Islands	22	59	12	0	5	0	-	-	-	-	-	-	0	-	0
Iran	-	58	31	4	-	-	-	-	-	-	0	-	-	-	8
Canada	16	51	16	0	15	0	-	0	0	0	-	-	-	-	1
Turkey	20	32	10	4	-	-	-	-	-	-	-	6	24	-	5
France	0	73	6	0	8	0	-	0	0	1	2	-	2	0	7
Saudi Arabia	6	93	0	-	-	-	-	-	-	0	-	-	-	-	0
Netherlands	20	15	11	6	4	5	-	-	-	0	31	0	1	-	5
Malaysia	36	57	1	1	-	-	-	-	0	-	-	-	-	-	4
India	16	63	3	-	1	-	-	-	-	-	1	4	-	-	12
Philippines	89	-	0	-	-	-	-	-	-	0	-	11	-	-	0
Liberia	46	39	8	-	-	1	3	-	-	-	-	2	0	-	1
Sweden	11	28	22	1	-	3	20	-	-	2	4	-	2	2	4
Kuwait	28	71	0	-	-	-	-	-	-	-	-	-	-	-	1
UAE	38	29	10	6	-	0	-	-	0	-	0	-	-	-	16
Spain	31	7	-	-	-	-	17	-	-	37	-	-	5	2	0
Monaco	43	43	7	-	-	0	6	-	-	-	-	-	-	-	-
Finland	18	57	8	3	-	-	-	-	-	1	0	-	-	3	10
Channel Islands	27	73	-	-	-	-	-	-	-	-	0	-	-	-	0
Nigeria	-	99	-	-	-	-	-	-	0	-	0	-	-	-	-
Austria	72	7	19	-	-	-	-	-	-	-	-	-	-	-	1
Indonesia	35	21	7	2	-	-	-	-	-	-	2	-	-	-	32
Israel	19	48	6	26	-	-	-	-	-	0	-	-	-	-	2
Australia	6	82	1	-	-	0	11	-	-	-	-	-	-	-	2
Vietnam	23	11	1	-	-	-	-	-	-	-	0	-	-	-	64
Qatar	-	98	0	-	-	-	-	-	-	-	-	-	-	-	2
Thailand	46	11	14	0	-	-	-	-	-	-	-	7	3	-	18

Between 1997 and 2006, on average, a country purchased ships from 6.77 countries. In order to create a rule to divide markets into easy and hard, it has been considered that a country has easy entry for new players when:

- It bought from 13.5 countries or more (twice the average);
- The average share by builder (total purchasing share ÷ number of builders supplying the market) cannot exceed $\frac{1}{2}$ of the average purchase (3.39) multiplied by the average share by builder, that is, 0.17% of the purchases (6.77 builders/country ÷ 2 × 0.05%/builder).

The first criterion excludes from the selection those countries that purchase from a limited number of ship producers, and the second criterion excludes from the selection countries which buy from several countries but mainly because they buy a lot instead of buying in a diversified manner.

Computations indicate that 15 countries were classified as having easy market entry: United Kingdom, USA, Denmark, Norway, Panama, Italy, Singapore, Switzerland, Russia, Bahamas, Canada, France, Netherlands, Sweden and United Arab Emirates.

Table 2 presents the results related to the tanker ship market. The average number of shipbuilder countries by buyer country is 4.31 in this market. It has been considered that a country has an easy entry for new players when:

Table 2: relationship between builder country and buyer country – Tanker ships (- is nil and 0 is a small number rounded to zero); % symbol omitted from figures

Ship buyers	Shipbuilders (Tanker ships) [% of dwt purchased (line) from the producers (columns)]														
	South Korea	Japan	China	Croatia	Spain	USA	Turkey	Russia	Italy	Germany	Poland	Norway	Romania	Others	
Japan	4	95	0	-	-	-	-	-	-	-	-	-	-	0	
Greece	73	17	5	3	-	-	0	-	-	0	-	-	1	1	
Bermuda	55	41	3	1	-	-	-	-	-	-	-	-	-	0	
USA	64	15	-	2	1	14	0	-	0	-	-	0	-	3	
United Kingdom	62	30	3	0	0	2	0	-	0	-	1	-	0	1	
Hong Kong	52	38	8	-	-	-	0	-	-	-	1	-	0	-	
Germany	45	19	18	5	0	-	0	1	0	6	2	1	2	1	
Denmark	60	3	35	-	0	0	1	0	-	-	-	-	-	0	
Russia	66	15	-	12	-	-	-	6	-	1	-	-	-	-	
Belgium	72	28	1	-	-	-	-	-	-	-	-	-	0	0	
China	1	16	83	-	-	-	-	-	-	-	-	-	-	0	
Bahamas	72	14	-	-	13	-	1	-	-	-	-	-	-	-	
Norway	44	13	12	-	14	-	0	0	-	1	5	9	-	1	
Italy	61	13	7	1	2	-	1	-	13	1	-	-	-	1	
Cyprus	96	2	0	-	-	-	0	1	-	1	-	-	-	-	
Saudi Arabia	93	6	0	-	-	-	-	-	-	-	-	-	-	-	
Panama	79	15	6	-	-	-	-	-	-	-	-	-	-	0	
South Korea	90	5	5	-	-	-	-	-	-	-	-	-	-	0	
Iran	65	-	34	-	-	-	-	-	-	-	-	-	-	2	
Marshall Islands	85	7	8	-	-	-	0	-	-	-	-	-	-	-	
Malaysia	56	41	0	-	-	-	-	-	-	-	-	-	-	2	
Singapore	48	28	23	-	-	-	-	-	-	-	-	-	-	1	
India	81	9	4	-	-	-	-	-	-	-	-	-	-	7	
Taiwan	5	93	2	-	-	-	-	-	-	-	-	-	-	0	
Sweden	24	14	25	26	1	-	3	0	-	0	1	1	-	5	
Liberia	31	52	10	4	-	-	-	2	-	-	-	-	-	-	
Turkey	70	2	0	-	-	-	22	4	-	-	-	-	-	2	
Canada	48	29	22	-	-	1	-	-	-	-	-	-	-	-	
Switzerland	69	3	12	13	-	-	1	-	-	-	-	2	-	0	
Kuwait	93	6	-	-	-	-	-	-	-	-	-	-	-	1	
Channel Islands	73	27	-	-	-	-	-	-	-	-	-	-	-	-	
Spain	9	37	-	21	26	-	7	-	-	-	-	-	-	-	
Finland	68	20	9	-	-	-	-	-	-	-	-	-	-	3	
UAE	60	14	3	-	-	-	-	-	-	-	-	-	-	22	
Qatar	100	-	-	-	-	-	-	-	-	-	-	-	-	-	
Undefined	9	57	11	1	-	-	5	0	1	0	5	-	-	9	
Austria	10	64	26	-	-	-	-	-	-	-	-	-	-	-	
Netherlands	75	-	3	-	-	-	5	0	-	-	-	-	2	15	
Angola	100	-	-	-	-	-	-	-	-	-	-	-	-	-	
France	30	1	-	-	2	-	22	-	-	-	-	2	1	43	
Nigeria	100	-	-	-	-	-	-	-	-	-	-	-	-	-	

- It bought from 8.6 countries or more (twice the average);
- The average share by builder cannot exceed $\frac{1}{2}$ of the average share, that is, 0.52% of the tanker ship purchases.

For the tanker ships, results indicate that 9 countries are classified as having easy market entry: USA, United Kingdom, Germany, Denmark, Norway, Italy, Sweden, Netherlands and France.

4 MARKET ENTRY POTENTIAL AND ATTRACTIVENESS

It is expected that a country with a high aggregated share in terms of the world market will also have a high share in

any buyer portfolio. Using this simple rationale, we will assess how the country purchasing preference is affected by location of the shipbuilder. Preferences are motivated by several factors such as the political, military, market protectionism and commercial situations related to the production and fleet mix. In this paper, we will not assess how preference motivations change or are created.

4.1 Purchasing preference definition and index

For the identification and measurement of preferences among countries, an index has been created to measure the divergence between worldwide shipbuilder market share and market share in the buyer country.

Let the following variables be:

x_{ijk} : the purchases in dwt of the buyer country i of ships type k produced in country j ;

p_{ijk} : the purchasing preference index (PPI) of buyer country i of ships type k produced in country j ;

$i \in I$: a specific country belonging to the set of buyer countries $I = \{1, 2, \dots, m\}$;

$j \in J$: a builder country belonging to the set of builder countries $J = \{1, 2, \dots, n\}$;

$k \in K$: a specific ship type belonging to the set of ship types $K = \{1, 2, \dots, l\}$.

The PPI can be defined as

$$p_{ijk} = \frac{x_{ijk}}{\sum_j x_{ijk}} - \frac{\sum_i x_{ijk}}{\sum_{ij} x_{ijk}}, \quad i \in I, j \in J, k \in K \quad (1)$$

For a given ship type $k \in K$, the preference index can be simplified to

$$p_{ij} = \frac{x_{ij}}{\sum_j x_{ij}} - \frac{\sum_i x_{ij}}{\sum_{ij} x_{ij}}, \quad i \in I, j \in J \quad (2)$$

The first term of the right hand side of the equation (2) defines the share of builder j in the purchasing portfolio of buyer i . That is, for a total purchase $\sum_j x_{ij}$, $x_{ij}/\sum_j x_{ij}$ represents the purchase share of buyer i . $\sum_i x_{ij}/\sum_{ij} x_{ij}$ represents the share of builder j in the world production. Hence, the preference is defined as the deviation between (a) what ship builder j represents in the portfolio of country i and (b) what country j represents in the world portfolio.

Values p_{ij} greater than zero indicate that the builder j has a relevance greater than the average on portfolio of buyer i , and values p_{ij} below zero indicate that builder j has a relevance smaller than the average in the portfolio of buyer country i .

For instance, for $k = \text{all types}$, $p_{Japan, Japan} = 0.549$ since the share of Japanese shipbuilders in the Japanese purchases is $x_{ij}/\sum_j x_{ij} = 0.942$ and the share of Japanese shipbuilders in world purchases is $\sum_i x_{ij}/\sum_{ij} x_{ij} = 0.393$. Thus, Japanese ship buyers give to Japanese shipbuilders an additional preference of 54.9% over the world's average preference given to Japanese shipbuilders. Another example is $p_{Japan, Korea} = -0.327$, that is, the preference of Japanese ship buyers is 32.7% smaller than the world average preference when buying Korean ships.

4.2 Entry potential and market attractiveness

The purchasing preference index of each country was computed. We assumed that a country with smaller preferences would indicate lower barriers to new entrants, and thus we used a measure of PPIs dispersion to compute the entry potential of the country. Formally the entry potential in a country i was defined as

$$e_{ik} = \frac{1}{\sigma(p_{ijk})}, \quad i \in I, j \in J, k \in K \quad (3)$$

where

e_{ik} : entry potential in buyer country i , selling ships of type k ;

$\sigma(p_{ijk})$: standard-deviation of the preference indexes p_{ijk} , computed over the shipbuilder index j .

There are several ways to define the attractiveness of a market. Expected growth, size, acceptability, profitability, timing, risk, and value are variables that may indicate the greater or smaller attractiveness of a given market. In an application in the leasing industry, Agarwal and Ramaswami (1992) use several of the variables obtained in a survey based on management perception; Sakarya *et al.* (2007) extensively review existing literature on the subject and Gao (2004) classifies and reviews literature on dozens of factors affecting foreign entry mode decisions.

In this work we consider two variables to measure market attractiveness: market size and entry potential. Other things remaining constant, for a newcomer, include the facts that larger markets are preferable to smaller markets, and higher entry potential is preferable to lower entry potential. Thus, the most preferable market (or the most attractive market) is the one with either the largest size or the one with the easiest entry potential. We did not develop any rationale to differentiate or assess a weight for each objective and in our models both are equally important.

It is important to note that we are using an entry barrier view as opposed to an alternative view of level of competition. When one assumes the level of competition, more players in a specific market means more competition (e.g., Chan *et al.* 2006). Given the political influence and defense issues related to the shipbuilding segment, we believe that the entry barriers are more important to assess than the level of competition.

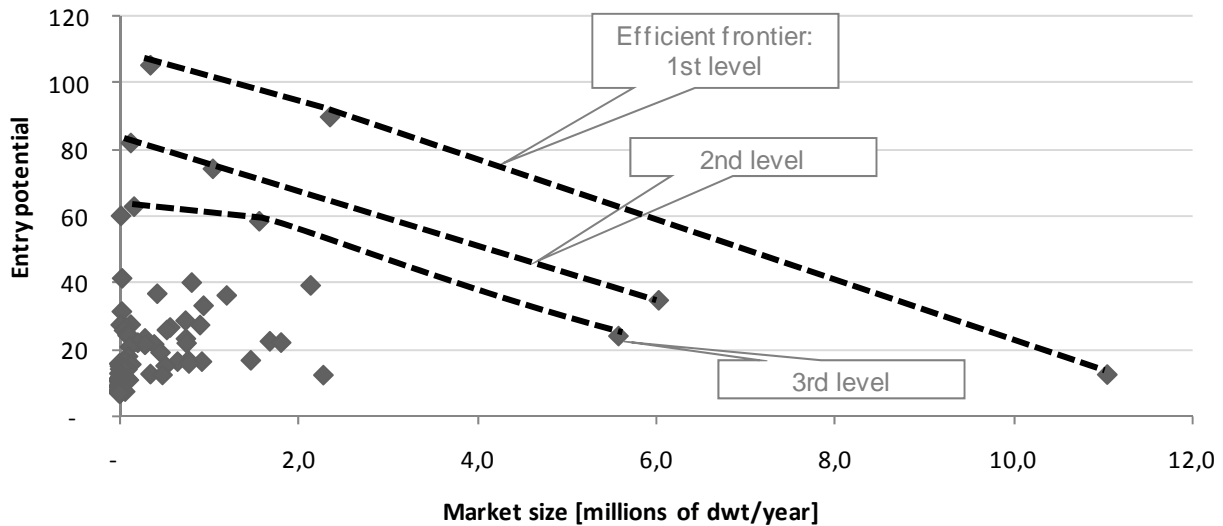


Figure 6: market size and entry potential – All types of ships

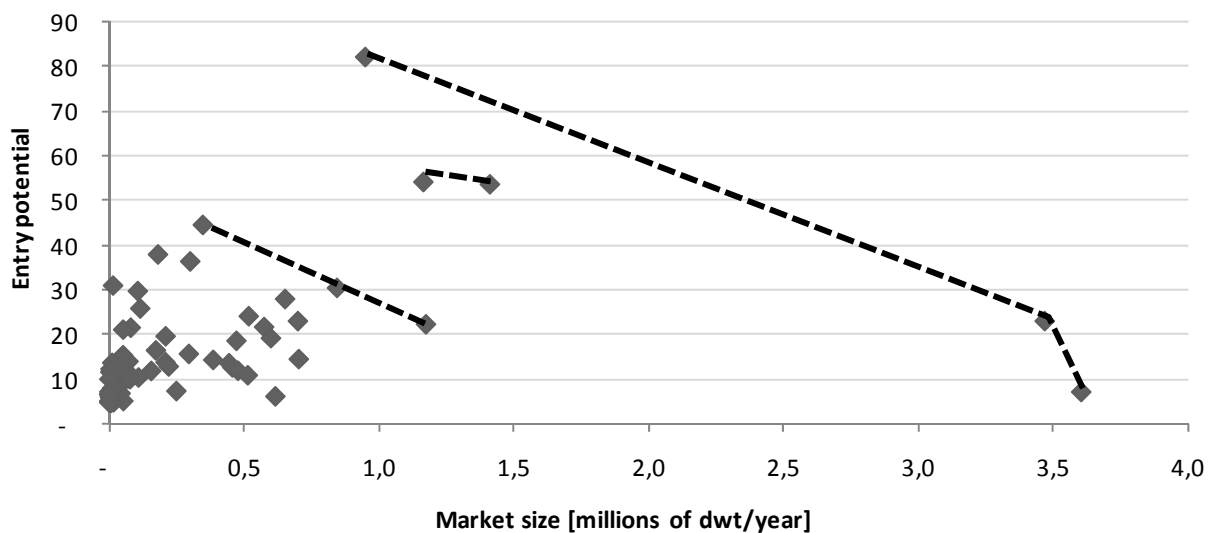


Figure 7: market size and entry potential – Tanker ships

A standard methodology to optimize the decision-making with two objectives is the trade-off curves (see for instance Rosenblatt and Sinuany-Stern, 1989; Winston, 1995, p. 751). The decision maker searches for dominated solutions, where a dominated solution means that the solution is the best regarding at least one of the objectives. Figure 6 shows our data for the ‘all-types’ case and figure 7 represents the tanker ships case. Each dot represents a buyer (or owner) country. The x axis presents the market size in millions of acquired dwt in the period 1997-2006 divided by ten to give an annual average. The y axis presents the entry potential of the country according to the above described methodology. If we “envelop” the dots, some points will lie at the frontier; these points are those with the highest value in

at least one of the two criteria. The curves (dotted line) shown in both graphs tangencies the optimal points which in our case are countries. This type of graph is often called a trade-off curve or an efficient frontier.

The countries belonging to the efficient frontier are the most attractive in terms of market size and entry potential. It should be somewhat obvious that the main purpose of the identification of a smaller set of countries is to bring about an efficient reduction of the number of countries that need in-depth analysis (Koch, 2001). The in-depth analysis can be brought to the level necessary to give comfort for the decision maker to decide to invest or not in a specific market.

For the all-types case, the countries belonging to the efficient frontier are Hong Kong, Liberia and Japan. After excluding these 3 countries and redrawing the efficient frontier (which we call second level frontier) we have the following countries: Greece, Panama and Monaco. Table 3 shows 3 levels of the frontier for the all-types and the tanker ship cases.

Table 3: countries in the efficient frontier

Level of the efficient frontier	All types of ships	Tanker ships
First	Liberia, Hong Kong, Japan	Hong Kong, Greece, Japan
Second	Greece, Panama, Monaco	United Kingdom, Bermudas
Third	Germany, Bermudas, EAU	Malaysia, Germany, EUA

5 CHARACTERISTICS OF COMPANIES: SIZE AND LOYALTY

5.1 Size of ship owners and shipbuilders

The average fleet by owner, operator, or manager, has a very similar size and is equivalent to 4.4, 4.1, and 4.2 respectively in the tanker segment. The sample considers 9,039 ships and 2,048 companies, out of which, 52% (or 1,061) have only one ship.

From the shipbuilder perspective, the average shipyard produces 1.7 tanker ship/year, on average. To be considered in the sample, the shipyard has to have produced at least one tanker ship between 2001 and 2006, 257 shipyards fulfilled this condition; 89 shipyards produced more than one tanker ship/year on average, and the rest produced less than one ship.

For all the ship types together, the 840 shipyards with active production between 2001 and 2006 produced 2.0 ships on average/year. 506 shipyards produced 1 or less ship/year. The average production for companies producing more than 1 ship/year was 4.5 ships/year.

5.2 Repeat purchasing and builder-buyer relationship loyalty

In this section we assessed the existence of repeat purchasing (or purchasing series) and its characteristics. The series considers the time interval between 1975 and

2006 and a direct relationship between a single pair of builder-buyer.

A purchasing series is defined as the period between the first and the last purchase in the relationship between builder and buyer. For example, Petrobras (a Brazilian oil company) bought 8 ships from Caneco, Ind. Reunidas. Three ships were bought in 1996, and one ship in each of the following years: 1989, 1990, 1993, 1994 and 1996. The analysis considers that Petrobras has bought a series of 8 ships over 11 years, or 0.73 ship/year from Caneco.

Figure 8 presents the distribution of relationship time between producer and buyer, and the annual quantity of ships bought over the relationship period. The vertical axis indicates the frequency of occurrence of the relationship time \times quantity bought. It is clear from the histogram that the majority of the relationships builder-buyer last just one year, or more precisely, the acquisition process of one ship. The average number of ships by relationship is 2.1, with the construction of 1.09 ship/year.

From the data and analysis associated, it is evident that ship buyers, on average, are not loyal at all. This empirical evidence suggests that there is a great deal of room for newcomers serving traditional ship buyers.

The analysis was deployed focusing exclusively on the export market. The idea was to check if the builder-buyer relationship is equivalent to the general conclusion drawn above. In general terms, the analysis indicated equivalent results.

6 CONCLUSIONS AND FURTHER COMMENTS

The empirical data used in this paper and the analysis associated offer a rich database for ship builders and ship owners. A first conclusion is associated with the concentration of the ship export market: if production is considered concentrated, exports are even greater. For the importing markets/countries, we tried to identify which are the most promising for an exporter, once no single company has enough resources to develop business in many new markets at the same time. To do that, we proposed a methodology that considers market size and entry potential in the market; bigger markets and a low average market share of producers indicate good potential for new entrants' sales.

Although production and exports are very concentrated, loyalty is not very usual among ship buyers. We have

observed loyalty in some cases, but the average builder-buyer relationship lasts for just 2.1 ships.

The results presented in the paper could be used to guide marketing efforts and to create marketing strategies for ship producers, including newcomers and incumbent players. The marketing strategies should be complemented by further analysis (production, finance, organization, etc.) to build the corporate strategy of the company.

A possible and interesting deployment of this paper would be to focus on results associated to companies instead of countries. Results associated to countries are

important, but the next natural inquiry for a strategy formulator would be to know the results for the particular case of a company, located in a specific country, and possibly producing a specific type of ship.

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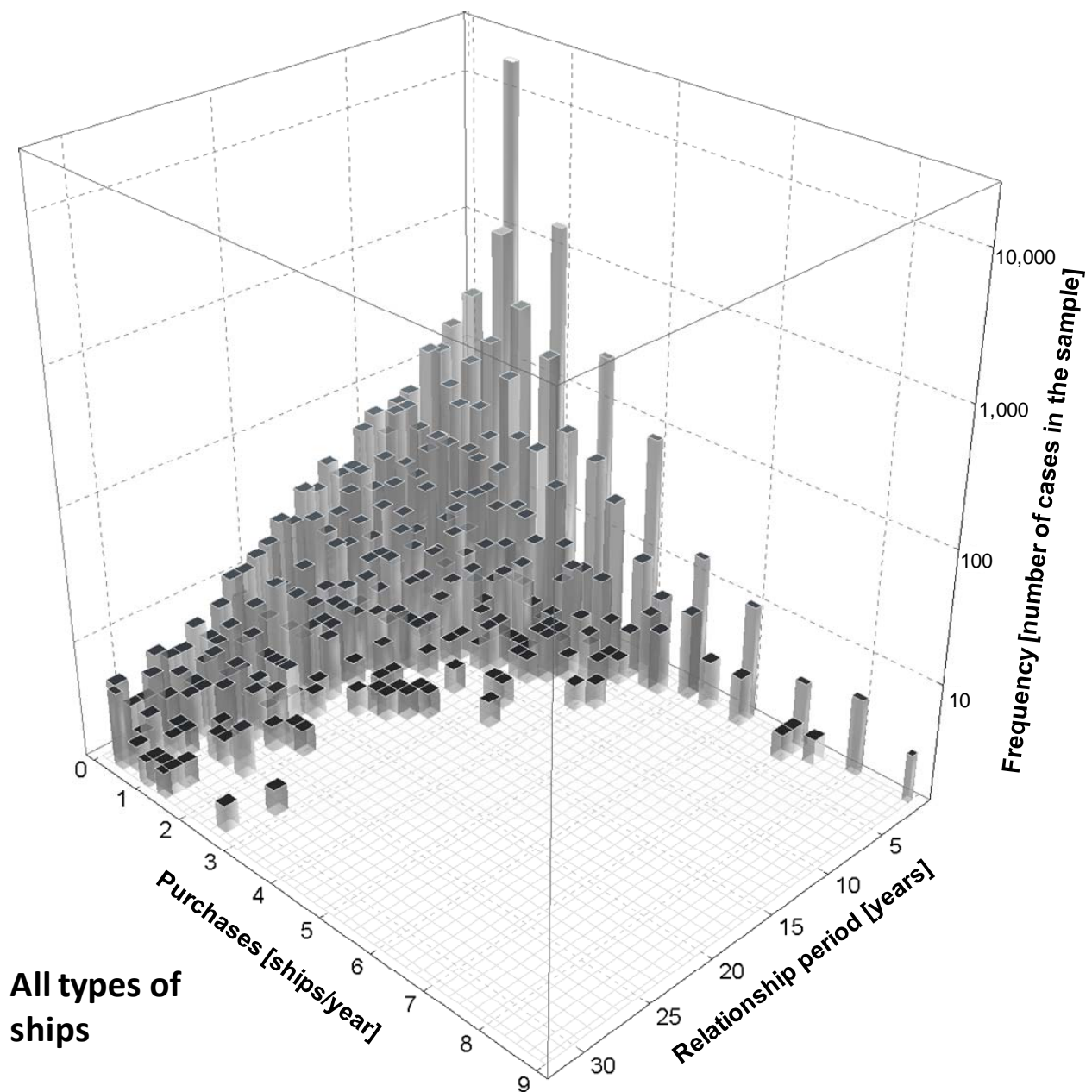


Figure 8: loyalty and average purchasing: all ship types

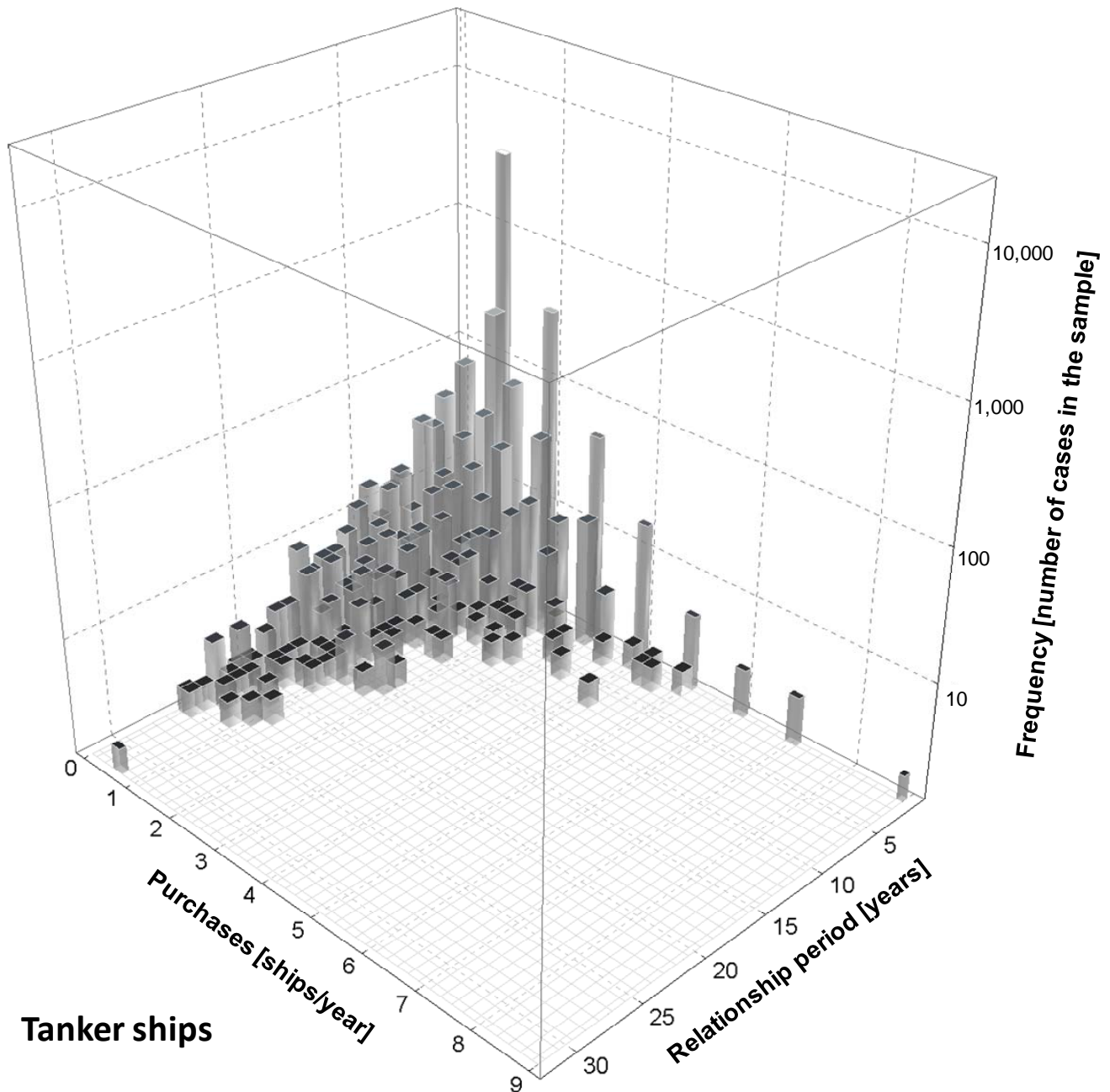


Figure 9: loyalty and average purchasing: tanker ships

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Tel: +55-11-3266-7000

Rua Pamplona, 1018 – cj 51 – Jardim Paulista
01405-001 – São Paulo – SP, Brazil