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Title: The state of container shipping lines in 2050.

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## The state of container shipping lines in 2050

## Table of contents

Summary .....	4
Chapter 1, Introduction and research methods.....	5
1.1 Introduction.....	5
Chapter 2, Methodology .....	6
2.1 Desk research on structure of the container liner industry (chapter 3) .....	6
2.2 Desk research on structure of the container liner Alliances (chapter 4) .....	7
2.3 A setup of four scenario's the container liner industry could face in 2050 (chapter 5) .....	8
2.4 The analysis of the scenarios consequences for each of the carriers and conclusion (chapter 6) .....	9
Chapter 3, Analysis of the box-ship branch, the carriers. ....	10
3.1 Introduction.....	10
3.2 Major players in container shipping industry.....	10
3.2.1 A.P. Møller – Maersk (APMM) .....	10
3.2.2 Mediterranean Shipping Company (MSC).....	12
3.2.3 Compagnie Maritime d’Affrètement & Compagnie Générale Maritime (CMA CGM Group).....	12
3.2.4 China Ocean Shipping Company (COSCO).....	13
3.2.5 Evergreen Marine Corporation (Evergreen).....	15
3.2.6 Hapag-Lloyd.....	15
3.2.7 Ocean Network Express (ONE) .....	17
3.3 A first analysis of the performance of these carriers .....	19
Chapter 4, The three alliances.....	22
4.1 Historic background, from Conference to Alliance .....	22
4.2 The influence of legislation on the form of cooperation in liner shipping.....	23
4.3 The three alliances .....	24
Chapter 5, The four scenarios .....	27
5.1 Introduction, subject matter and first phase: the focal point.....	27
5.2 Phase 2, key issues: .....	28
5.3 Phase 3, most relevant external influences: .....	32
5.4 Phase 4, selection direction in the face of crucial uncertainties.....	33
5.5 Phase 5 and 6, the four scenarios and their corresponding strategies.....	34
Chapter 6, Conclusion .....	40
6.1 Introduction.....	40
6.2 Analysis of strategies from the emerging scenarios .....	40
6.3 Conclusion, answers, suggestions for further research and reflexion .....	42

Appendix I.....	44
Appendix I <sup>a</sup> .....	45
Appendix II.....	46
Appendix III.....	47
Appendix IV .....	48
Appendix V .....	49
Appendix VI .....	50
References.....	51

## Summary

In this thesis the future (in 30 years' time) development and structure of the container shipping industry and especially that of the leading liners, Maersk, MSC, Cosco, CMA CGM, Hapag-Lloyd, ONE and Evergreen is studied.

First the history of shipping after the introduction of the propeller (propulsion system), more in particular container shipping and the different forms of cooperation among vessel operators, is evaluated. An analysis of the seven major carriers, where they originate, their strategy and their current state of affairs is given.

Next, the cooperation between carriers and the three remaining Alliances is discussed. To get a good impression of the situation in 2050 a scenario analysis resulting in four possible futures ("Muddling through", "Take it or shake it", "Total customer value" and "The power game") is developed. Depending on the outcome, for each of the scenarios emerging a carrier-strategy is formulated.

In a final analysis, I concluded that not all of the seven carriers will still be in existence in 30 years' time, at least not independently, a first adopter of new technology has the best chance of survival.

# Chapter 1, Introduction and research methods

## 1.1 Introduction

This paper is written in order to fulfil the obligation of a master thesis to obtain my master's degree in economics and Business at the Erasmus University Rotterdam. The subject drew my attention with the collapse of Hanjin in the fall of 2016 and the conviction that a recovery in the near future is not very likely, despite the rapidly changing container liner business. The number of participants of this economic sector is contracting through mergers and acquisitions and the forming of new alliances. At the same time the world economy is also shifting as a result of political changes, new production methods and tactics (3D-printing, near and re-shore production) and the energy transition that is on hand. Fierce competition on price and the consequent ordering of larger vessels to reduce cost, facilitated by the renewed/enlarged Suez and Panama Canal and extended terminals and port facilities in major hubs and a continuous stagnation or at least subdued demand are a sure recipe for overcapacity and reduced revenues and profits. Furthermore, the failure of Hanjin is not the final solution as the total capacity will only temporarily be diminished and not like in other industries permanently. The Hanjin fleet was sold off (to for instance the Samra Midas Group<sup>i</sup>) by its creditors or released by the lessors (like Seaspan<sup>ii</sup> writing of US\$ 18,9M) to other clients, while hardly any vessels were scrapped. This means that the total capacity was not diminished through the events and the structural imbalance between demand and supply of maritime container transport remained. The main question is: *"How will the supply-structure of ocean going container transport develop over the next generation?"*

Secondary question: *"What is a feasible strategy for a container liner?"*

In order to be able to answer these questions I looked at financial position and the controlled capacity of the most prominent individual liners in a top-ten position.

In the second chapter I will explain the research methods used and the choices made with regard to the collection and comparison of data. In the third chapter individual liners will be discussed and in the fourth chapter I will pay some attention to the liner alliances. In the fifth chapter I will look at the several scenarios in the manner of the book by Lindgren & Bandhold<sup>iii</sup> (2003) and in the final chapter I will pay some attention to the options that will be open to the individual container liner company.

## Chapter 2, Methodology

### 2.1 Desk research on structure of the container liner industry (chapter 3)

As the container liner industry is rapidly changing I have chosen to scan the internet for news items on this subject and I have subscribed to several digital newsletters. Since I am working on a tight budget, all information had to be freely available directly or through the VPN of the university and its library. This meant that all information had to be supported by at least two, but preferably more sources. The start of the information gathering was the collection of the annual reports and (interim) financial statements of the major container liner businesses (with the exception of MSC and until recent of Hapag-Lloyd) over the period 2011 through 2016 as well as the total capacity in TEU (both chartered and owned). To make some comparison between companies and alliances I chose to develop graphs over the said period of time with on the horizontal axis the total capacity in TEU and on the vertical axis the EBIT of the container liner branch of each company. My choice for this method in analogy with the McKinsey report of 2015<sup>iv</sup>, in which a Alphaliner graph was used which gave, in my opinion, a clear picture of the industry at that moment. In appendix 1 I show a graph of a random series of top twenty container companies over the past five years, size differences make comparison hard, so I decided to discuss the individual companies.

The financial position of a company can be analysed in many ways, for instance one can look at a multitude of ratios or at balance sheet totals, the equity, total value (at the stock exchange) or the revenues. A way of doing so is to compare year on year (YoY) development of figures in absolute or relative terms. Many of these figures are seldom readily available on a reliable basis and if relevant underlying data are available then I prefer those. A relative figure is nice, but a large percentage change in a minute amount does not represent much relevant information. To get relevant reliable information I want to use the financial statements of the respective companies. Within this framework revenues give some information, but they are strongly correlated with the companies' size and can depend on other subsidiaries of the organisation and the internal conciliation choices, besides revenues can also be correlated to the cost structure of the organisation. Most important is the power to survive in a difficult if not hostile environment and for this any organisation needs the ability to make profits. There are many ways to express profit, the choice for EBIT is mostly pragmatic for many of the companies do not declare their financial situation on business unit level in greater detail and since there is a great variety in the composition of these companies a consolidated figure would not suffice to create a clear picture. Another aspect, the ability to manipulate a figure is not present in EBIT, neither has financial structure much influence on this figure.

The choice for the US\$ is made in the same manner, most of the companies use the US\$ and it is still internationally seen as the key currency. The EBIT is for a year, so I used the exchange rate (to convert the Chinese Renminbi/Yuan respectively the New Taiwan Dollar into US\$) as close to the thirty-first of December of each year as possible<sup>v</sup>. In case of the Japanese companies the financial year goes from the first of April to the thirty-first of March, which I took over, for the quarterly figures are not of the same quality as those in the annual report with an auditors' certificate. For the conversion from Yen to US\$ I used the exchange rate from the "Financial Highlights" of Kline of each year<sup>vi</sup>, to stay as close to any conversion the three Japanese companies made in their financial statements.

The choice for the total carrying capacity of the fleet<sup>vii</sup> each company controls was made in view of the structural overcapacity in the container liner business. Ownership is not directly relevant for the comparison for the number of loops and the available capacity on each one that can be offered to

shippers. The order book is fluctuating, and companies change policy by postponing delivery or even cancelling orders and I could not find clear information on scrapping activities of individual organisations. In the fourth chapter I will discuss the alliances and the capacity they collectively control or allow each other to use through “vessel sharing” and “slot swapping” agreements.

To get a better insight on the container liners I collected the company profiles and history from the respective websites for analysis of background, ownership and management. So, in the description of the liners I give a brief overview of the history (if possible who was the founder), recent mergers and acquisitions, relevant information on ownership and leadership and finally recent development. In the case of the three Japanese companies I made a table consisting of their (maritime) activities and although they are still independent their container liner business is due to merge into one entity in 2018. However, there are some difficulties with the American Authority (referring them to the Department of Justice (DOJ)), I am sure they will go ahead with this merger. The purpose of this table is to show the relative importance of the container liner trade for each of the companies not only in terms of finance or in fleet size, but also in relation to each other.

Looking into the future brings uncertainty, with pushing the horizon out, uncertainty increases. This was the main reason to choose a scenario analysis followed by a contingency approach. A quantitative analysis with high uncertainty has, in my opinion, little added value, therefore I put the emphasis on the qualitative aspect of my research.

## 2.2 Desk research on structure of the container liner Alliances (chapter 4)

After the individual container lines, I shift focus to the development of the different forms of cooperation between them, finally resulting in the forming of the three alliances. On this subject there is more academic work available, however the actual situation is not documented in great detail and is still very much subject to change. The actual composition and functioning of the three alliances can only be researched through news items on the various news sites, or on the sites of the companies themselves and even then, information on the 2M-Alliance is scarce. In the first paragraph I describe the historic backgrounds of cooperation in the shipping industry. In the second I describe the influence of legislation on the form of cooperation in liner shipping in the United States of America and Europe after the forming of the European Economic Community (EEC). I have chosen those two because they are most influential to the subject matter. Individual European countries did not have the power to internationally enforce their laws and the predecessor of the EEC, the “EGKS” was not involved in maritime transport. In the third paragraph the three now existing alliances are discussed in short and an overview of their composition and activities is given in Appendix III.

Although the International Maritime Organisation (IMO) and Lloyds of London are well established in the maritime world, they mainly represent the nautical side and have less to do with shippers and their interests and are therefore not equipped to regulate competition in the shipping industry. The UNCTAD has some influence in the opinion forming around the world and can suggest a code of conduct, but until the relevant countries have ratified it, it is of no consequence.

For the American side I used several academic papers, discussion papers and presentations of the Federal Maritime Commission (FMC), but also the papers of the OECD Roundtable on Liner Shipping of June 2015<sup>viii</sup>. The European information is based on the original legislation and also on the documents of Working Party II (WP2), the group of government officials who prepare the proposals for the central meeting that decides on regulations, and press releases of the EU. The discussion



papers give some idea of regulation interpretation and development, but also of potential rulings by the competent authorities.

### 2.3 A setup of four scenario's the container liner industry could face in 2050 (chapter 5)

As it goes with predictions over a longer period of time, in the end they all will fail without exception. In a dynamic world there are several options (real or otherwise) to use as a decision aiding device in strategic choices. I have chosen for the scenario method, although some of the carriers seem to use the real option method because they build capacity in an environment of overcapacity, presumably to be able to resolve all excess demand even in peak season. As standard predictions give one path with a bandwidth for uncertainty, but no direct alternatives, feasibility can be calculated by the net present value, payback time or any of the other method. The real option method is merely facilitating the possibility to postpone decisions until the path of the future is clearer, in the meanwhile some basic investments have to be made (like, in the oil industry, buying a concession and wait until the energy market is bullish before they start drilling).

For the building of the scenarios a media-based method is used, meaning selected information (publicly available) is collected from many sources over a prolonged period.

The process of developing a scenario analysis is best described in six steps or phases.

- Phase one is to decide the subject on the matter and for who's benefit the analysis is written. In this case the scenarios are on the deep-sea going container carrier industry in 2050, to assist in strategic management decision making within the industry primarily, but other stakeholders e.g. port authorities, regulators and competent authorities could also benefit from it.
- In phase two the relevant key issues are chosen from the selected sources.
- The third phase is to select the most relevant external influences.
- In the fourth phase the two preceding phases are confronted with each other to come to a selection of crucial directions the branch might develop into without going into details or exact numbers.
- Phases five and six are combined to arrive logically at the four scenarios, which are explained and followed by contingencies for the accompanying optimal carrier strategy.

Information about the carriers themselves came from documents used in the earlier chapters, furthermore the outlooks of the IMF, OECD and forecasts from PWC, HSBC as well as trend documents of the US government (NIC and EIA) and others were consulted to build four likely scenarios. Horizons of these documents are quite different, whereas one<sup>ix</sup> spans only a few years, others like the McKinsey report<sup>x</sup> deal with a fifty-year period. To harmonize the two, I have extended trends and or strait-lined developments as an approximation, whereas the truly short horizon articles were only used indicative. Some of the experience, especially the step by step planning process from the seminar FEM11044 Seminar Port Economics and Global Logistics 2016 is also applied (see above).

At the moment there is no indication that the existing imbalance between demand and supply will subdue in the near future (the world economy is growing by 4 – 5% YoY and the accelerator (multiplier) is under 1,4 according to Bimco<sup>xi</sup>, amounting to an average growth in demand of 6,4% and a capacity growth for 2017 of 3,3% (new deliveries minus scrap) also according to Bimco<sup>xii</sup>, not

counting the reactivated idle fleet. For the coming years the new orders represent a growth of about 9% and an expected growth in demand of  $\pm 6,5\%$ . According to the OECD/ITF 2016, the trade multiplier of the GDP-growth will decline to 1,2 in 2050 at an estimated global GDP growth rate of approximately 2,9%.

In Appendix IV the concentration of the carriers and separately the alliances seen as entities is shown as a strongly concentrated market. This combination is certainly justified since the alliance members can advertise their services (number of routes and ports of call) as if they can control the entire fleet. Although the market is concentrated as it is and resembles an oligopolistic structure, price forming mechanisms in this unbalanced market ensure rates barely recovering cost if that at all. From the viewpoint of the shippers' punctuality and extra service (like the APL "Eagle" services in the United States of America) are important meanwhile price is still a deciding factor in booking a carrier. So, market concentration will be treated as an important factor influencing the four scenarios, but not as a key issue.

The four points at the axes are formed by the following elements:

In chapter 3 (the individual carriers) the choice between specialisation and diversification is put forward, in chapter 5 this will be translated in the key issue on the vertical axis:

- Horizontal integration (more capacity in one organisation) concentrating on transport and port logistics
- Vertical integration (up and downstream from sea transport) working towards a door to door service in house (or at least as close by as can be) and total logistics.

On the horizontal axis the key issue is vessel size (is bigger always better?) is put forward and explained:

- The maximum vessel size (24.000 TEU) is (almost) reached
- McKinsey predicts a (unlimited) vessel capacity growth in 50 years' time up to 50.000 TEU (that translates to about 40.000 TEU in 2050)

Economic and logistic implications for the hinterland, however do not fall within the scope of this paper, as I am concentrating my research predominantly on carrier activities.

In chapter 4 the regulatory complex of the carriers and alliances is mentioned which will serve as one of the relevant external influences in this scenario analysis, not only with regard to the competent authorities, but also the protectionist aspects of legislation in many parts of the world (for instance cabotage is only allowed to domestically owned vessels in many countries). Other relevant external influences are capacity (ports and port infrastructure, seaways, canals locks), the environment and energy transition and economic and political development.

Internal influences are market structure, cost development (ea. bunker rates), market balance, but also the innovative capabilities and motives of stakeholders.

## 2.4 The analysis of the scenarios consequences for each of the carriers and conclusion (chapter 6)

In this final chapter I will come to an analysis of the four scenarios, looking at the major carriers and their chances for survival in the four-scenario's. In the conclusion I will attempt to answer the two formulated questions, reflect on the process of my research and finally make a recommendation for further research.

## Chapter 3, Analysis of the box-ship branch, the carriers.

### 3.1 Introduction

As we have seen September 2016 it is not always the biggest company that is on the front page, but in the end, most certainly dominant. In order to rank container liner companies and avoid any discussions I will follow the Alphaliner “Top 100”<sup>xiii</sup> published on the 4<sup>th</sup> of January 2017. Furthermore, I have selected carriers from each of the three alliances as they play a dominant role in recent developments in the industry. Although MSC is second in the statistics, it is a privately (Italian) owned, Swiss registered company which isn’t compelled to publish an Annual Report and is extremely reticent in publishing any information, be it on finance or corporate policy, so I can not elaborate on MSC. As a source for information on the embellish carriers I mainly use their press releases and annual reports as well the Alphaliner Newsletter for the past five/six years as far as available from public sources and the EUR library. In the comparison of the different carriers I use, as far as possible, EBIT and US\$. In order to convert the Annual Report figures into United States of America Dollars I applied exchange rates quoted as close to the 31 of December of any year as possible. Sometimes the EBIT for the container business is not readily available, so in those instances I use “profit before taxes depreciation and investment” or any similar figure. I am always looking to find confirmation from a different source for financial statements are not always unambiguous in this regard.

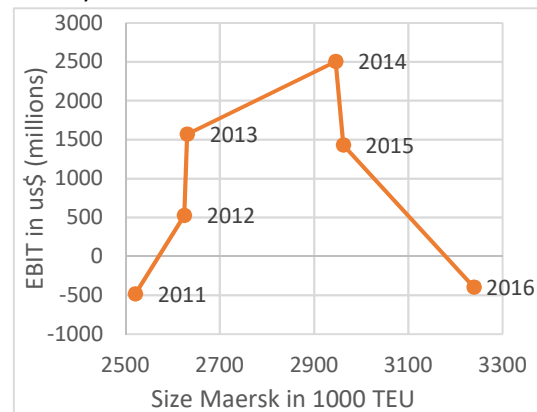
### 3.2 Major players in container shipping industry

#### 3.2.1 A.P. Møller – Maersk



This Danish conglomerate is active in container transport and logistics, energy (oil and gas winning and transportation), shipbuilding, retail, manufacturing and banking, although participation in Danske Bank was significantly reduced the past two years.

A.P. Møller – Maersk<sup>xiv</sup> (APMM), a company founded in 1904 by father and son, they then purchased a second-hand steamship used as a tramper. The first liner service was introduced in 1928 and after a long period of mainly organic growth in shipping and shipbuilding, from the sixties onward APMM starts to diversify through acquisitions. In the early eighties APMM acquires a listing on the Copenhagen stock exchange, although the family stays in control. Major transactions took place in 1999, when APMM acquired Safmarine (a South-African based shipping company) and the container lines from Sealand (an important North-American transport and logistics firm with substantial ministry of defence contracts). In this way APMM was able to supplement its services and gained access to the African continent, where Safmarine still is known and trusted. Sealand had an important inland (rail and road) network in North-America and substantial complementary services on the America’s and Asia. With the acquisition of TORM Lines in 2002 APMM gained established services between the American east coast, the Gulf of Mexico and the west coast of Africa. So, when in 2005 P&O Nedlloyd came up for sale, just their box vessel capacity was relevant for APMM (growth by acquisition). At the



Graph 1 Maersk results vs capacity

same time business management and services were standardized to cope with the complexity of the organisation.

After the financial crisis of 2008 APMM tried to economize through reducing the number of services in the periphery, especially those feeder lines that were least profitable, and standardizing services (thereby neglecting the individual needs of relative small clients).

Some parallels with developments in the airliner business of a couple of decades ago spring to mind and in recent years it was decided to open up more special services, because the long hauls and intercontinental lines suffered from this reduced service. The experience with Safmarine that kept operating under its own name and in their indigenous manner led to the reintroduction of the “Sealand” brand with the explicit mission to pay more attention to the individual client and for instance wait for delayed cargo (relevant for the Latin and Central American clientele).

Around 2010 APMM has changed its corporate business model completely from a focus on historic facts linked to a formalized standard budget (prepared bottom-up and sanctioned by the headquarter) into an organization with a form free rolling forecast, to be more flexible to market developments. This transition was coached by BASICO and implemented in 2011. At the moment APMM is in a new stage of its repositioning process, concentrating on becoming a ‘container shipping, logistics and ports company’ (2016 Maersk Group annual report). The most recent development is acquisition of Hamburg Süd pending approval by different competition authorities, this process will be finished before the end of 2017. This acquisition is to strengthen the North-South trade lines, where APM has already terminals on the Latin American continent. Hamburg Süd is number 7 on the ‘Alphaliner Top 100’ with a capacity of over 600.000 TEU and APMM has changed its strategy into growth through acquisition rather than by ordering new builds (they haven’t ordered any new vessels recent). In order to acquire the approval of the competent authority of South Africa<sup>xv</sup> they had to divest part of their activities on the southern hemisphere (see also CMA CGM) which takes place at the same time (4<sup>th</sup> quarter 2017) the deal with the Dr Oetker Group is completed and Hamburg Süd is integrated.

On their own accord APMM suffered from weakness in many of their main markets but expect to recover strongly in 2017 and to be able to declare a profit of at least 500 million US dollars over 2017 (2016 Maersk Group annual report). According to Lloyds list “show me the money” publication APMM is well underway with a first half year profit of US\$ 339million, after a less successful first quarter (a loss of US\$264 million), due to relative high cost at tankers and terminals and despite the losses as a result of the cyber-attack on the terminal in Rotterdam (which makes clear the importance of an excellent IT-system). APMM is realigning its strategy and wants, after the sale of Maersk Oil to Total S.A. for US\$7.45billion, to concentrate on maritime container transport, terminal activities and logistics. To achieve these goals, they have brought Maersk Tankers A/S under the flag of APMH Invest to be able to form a joint venture with companies like MOL to exploit the tanker fleet<sup>xvi</sup>. APM Terminals and Logistics<sup>xvii</sup> form a new division, more independent of Maersk Lines. The concept of the Rotterdam terminal becomes the new standard, some terminals will be closed or sold off, like the one in Tacoma, where the ending lease was transferred to SSA Marine<sup>xviii</sup>. According to Maersk Line CEO Søren Skou the likelihood of even bigger vessels is not quite as big as David Tozer (Lloyds Register) suggested, which could jeopardize their choice for port of call and navigational options in general<sup>xix</sup>.

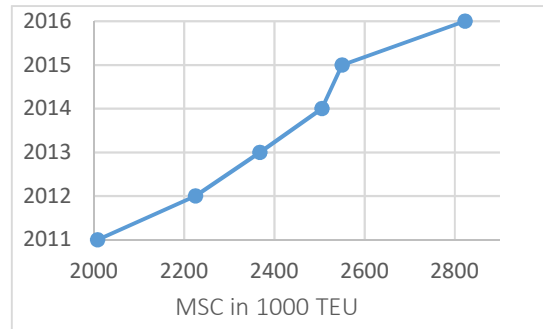
Another recurring theme is sustainability of container shipping lines, although APMM published strict measures with regard to design (designing all new vessels fully recyclable<sup>xx</sup>) and guarding the existing fleet from being scrapped irresponsibly. At least until 2015 they were involved in sales to third parties

that buy cheap vessels and consequently sell them to notorious scrapyards. Contracts to prevent this from recurring should now be operational, but we will have to wait and see.

### 3.2.2 Mediterranean Shipping Company (MSC)



The second liner is the Mediterranean Shipping Company, as stated before there is little information about this organization available. MSC was founded in 1970 by Gianluigi Aponte<sup>xxi</sup>, a member of an old Neapolitan family. It started<sup>xxii</sup> with the acquisition of again a second hand tramp and grew organically to become the second largest liner, branching out into cruising and terminal investment. The diversification into cruising made them less vulnerable to weakness in the container liner business and the terminal investment made worldwide berth capacity available to them and thus MSC became less dependent on third parties. On the other hand, the cooperation with APMM resulted in a more positive perception of the services by MSC clients (more punctuality), in figure above you see the development of the fleet size in TEU. The growth is quite remarkable in this market of structural overcapacity and fierce (government sponsored) competition. However, the order book has declined dramatically over the past fifteen months (from 44 to 18) and also there was a shift from owned towards chartered vessels. In 2015 MSC had just started to operate a series of new 19.000plus vessels, specially designed to be more fuel efficient (hull and engine design) and have a lower CO<sub>2</sub> emission.



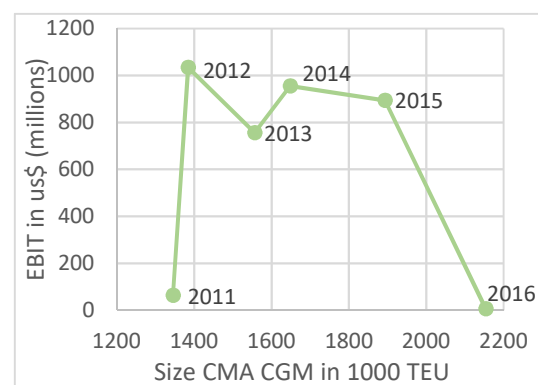
Graph 2 MSC capacity

The conduct with regard to responsibility for the environment was in the past not always exemplary, but in more recent years MSC at least proclaims to act environmentally conscientious through cargo handling, ship design, awareness and training of crew and most and for all exemplary behaviour by management and owner. More information is not obtainable at this moment, so I will exclude MSC from further consideration with the exception of the constellation of the alliances.

### 3.2.3 Compagnie Maritime d’Affrètement & Compagnie Générale Maritime (CMA CGM Group)



CMA was founded<sup>xxiii</sup> in 1978 by Jacques Saadé<sup>xxiv</sup> and became the CMA CGM Group, when in 1996 the French government privatized CGM and sold it to CMA. CGM stems from the middle of the nineteenth century and was over a long period of time state sponsored and even state owned, it was built from two separate companies operating respectively on the Western routes (the Atlantic Ocean), the Compagnie Générale Transatlantique (CGT) and the Eastern routes (the Pacific Rim) & the Messageries Maritimes (MM). Before the new company (CMA) was sold to Saadé it was restructured and organized in four geographically separate trade lane groups<sup>xxv</sup>.



Graph 3 CMA CGM results vs capacity

The company developed a strong inland network, more recently especially on the African continent, of multimodal or intermodal transportation and answering customer specific transportation needs/wishes. At the same time CMA CGM acquired a direct or indirect interest in terminal facilities/spaces in order to be less dependent on third parties and have berthing slots available at

scheduled times in some 30 ports in different locations. Not only is this relevant for timely delivery and customer service, but essential for the perishable goods transport, a specialty of CMA CGM.

For the results of 2016 I used the information from the Annual Report 2016 (page 20), disregarding the contribution of the Neptune Orient Lines (NOL) and just looking at the container shipping segment. NOL was acquired in the summer of 2016 but not yet fully integrated in the organisation. The main brand of NOL was American President Lines (APL), until mid-2016 number eleven on the 'Alphaliner Top 100' with a capacity of around 550.000 TEU and a service concentrated on the Pacific rim. A year earlier the Singapore owner of NOL already had sold the logistics branch of this company. The CMA CGM Group is also in the midst of a restructuring operation through a sell and operational lease back construction for 13 vessels and 8 vessels being sold for scrapping, however more recently CMA CGM<sup>xxvi</sup> confirmed ordering 9 vessels with a 22.000 TEU capacity each to be delivered towards the end of 2019.

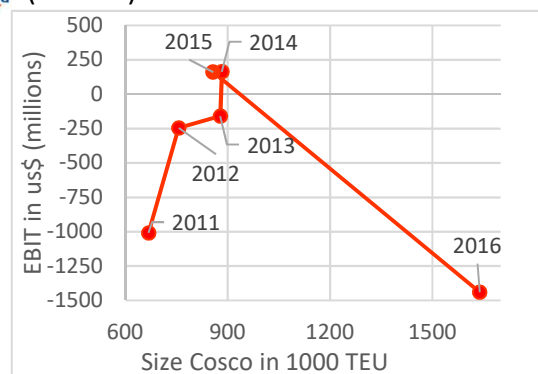
August 2017 Saadé agreed to acquire Brazil's Mercosul Line<sup>xxvii</sup> from Maersk, which company had to sell off some of its interests in Latin America as a result of the acquisition of Hamburg Süd to comply with rulings of the competent authorities (South Africa). Even before the completion of this deal CMA CGM announced five new feeder lines on the Indian Ocean to connect the Islands, including Madagascar, to its existing network<sup>xxviii</sup>. Strengthening the customer service even more CMA CGM is extending its APL "Eagle"<sup>xxix</sup> services in the United States of America with more guaranteed space on board, priority shipping, accelerated discharge and day specific delivery on one of the six rail-terminals spread over North America at the expense of a refund in the case of non-compliance. In the same line lies the acquisition of "Sofrana"<sup>xxx</sup> Uninilines" to service Australia and several of the islands in the Pacific, completing its portfolio of services in the region. Through the acquisition of smaller but locally embedded lines Saadé build CMA CGM to become known as a quality total logistics supplier with a strong advertised sustainability paragraph. Being environmental conscious a low carbon footprint (per container-kilometre) is an important issue and features in an e-Business calculator for CMA CGM clients. By using bigger vessels especially Eco conscious designed (bulbous bow, double hull, integrated waste management systems and energy efficient engines)<sup>xxxi</sup> in relation to average (slow steaming) speed (15-18kn) CMA CGM has managed to realize a 50% reduction of CO<sub>2</sub>-emission per container (74g/km → 37g/km). Less positive is that at the beginning of this century CMA CGM was several times mentioned as being involved in arms trafficking in disputed areas (Middle East and Africa).

### 3.2.4 China Ocean Shipping Company

Cosco<sup>xxxii</sup> was first established in 1961<sup>xxxiii</sup> and has undergone many changes and has diversified in almost all, even the most remotely, related to ships in the widest sense (from leasing and trading in vessels to utilising them for offshore windfarms or just ordinary transport). In transport Cosco is active on the high seas as well as on inland waterways, terminal operation/exploitation, rail and even road services. Over the years Cosco has developed a strategy to offer full service to its clients all over the world with a strict adherence to the time schedule given (95% on time delivery) at a desired level (from port to port to total logistic solutions). COSCO has recently acquired<sup>xxxiv</sup> the hardly smaller CSCL, in 2015 number 7 on the 'Alphaliner Top 100' with a capacity of nearly 700.000 TEU.



(COSCO)



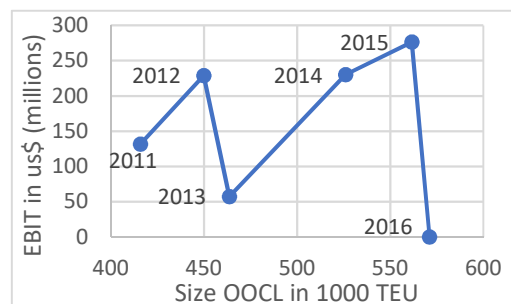
Graph 4 Cosco results vs capacity

Over the years Cosco has received openly and more concealed government support in the form of reduced land rents, tax reductions, and full compensation if they renewed their fleet by offering their older (mainly from the eighties) vessels for scrapping and exchange them for new builds from designated shipyards (in China). This is a recurring method in state owned enterprises (SOE's). One can put question marks at the effectiveness as in the end most of those SOE's are eventually sold off or terminated. Obviously, the growth through building new vessels wasn't fast enough and the Chinese government sought a strong concentration in the shipping. The integration of the two conglomerates takes a lot of time, money and effort so the Chinese development bank has made available a credit line of about twenty-six billion dollar for the next five year<sup>xxxv</sup>. The ultimate goal is to reorganise Cosco in such a manner, making the best use of its advantages in the field of finance, (home) market, information and capital supply and geographic position that it eventually becomes the primus inter paries of the whole shipping industry. Key in this whole restructuring process of the combined new Cosco is to retain the original corporate culture of "one team, one culture, one target and one dream"<sup>xxxvi</sup>

The background for this Chinese government policy is the fear for dependency on any foreign country for its energy supply, raw materials or any other commodity. Believing strongly in independence and economies of scale, the Chinese party leaders strongly support the construction of these large conglomerates although recently some critical remarks have been made. In a recent speech one of the party leaders announced mega redundancies in coalmining and heavy industry in the North-East of China, at the same time warning for critical surveillance of the results of other companies. For Cosco this means that the different parts of the fleet have to be modernised and economised (less but larger vessels and lower fuel consumption) and closing of one or more shipyards (since the order book for non-domestic orders is practically empty). Probably the number of enterprises comprising Cosco has to come down, but as long as the Chinese government has sufficient means to keep Cosco afloat they will continue to do so. Another part of the Chinese policy is the realisation of its "One belt one road" initiative with which the government wishes to promote trade opportunities with Europe by sea as well as over land, reviving the old silk route.

In all aspects Cosco has the intention to operate strictly within the legal framework relevant in situ, be a good employer (agreeing with collective bargaining), exercising as much influence as possible for human rights, and against child or forced labour, against discrimination, promoting honesty, equality and openness.

After half a year of rumours<sup>xxxvii</sup> the 9<sup>th</sup> of July Cosco, in combination with the Shanghai International Port Group Co (SIPG), finally made a public offer of HK\$ 78,67 (US\$10,07), totalling US\$ 6,3 billion for the shares of Orient Overseas International Lines (OOIL)<sup>xxxviii</sup> the parent company of Orient Overseas Container Line (OOCL)<sup>xxxix</sup>. The Tung family, controlling shareholder of the company has, after long and hard negotiations, accepted the offer. CEO Andy Tung and his predecessors have built OOCL<sup>xl</sup> (in January number 10 on the Alphaliner "Top 100") to a leading organization when ICT and management quality is concerned, both aspects for which COSCO is not reputed. Before the announcement the trade in shares COSCO on the Shanghai stock exchange has been suspended since the 17<sup>th</sup> of May<sup>xli</sup>, pending governmental approval the deal will be finished in half a years' time making COSCO the third largest container carrier in the world.

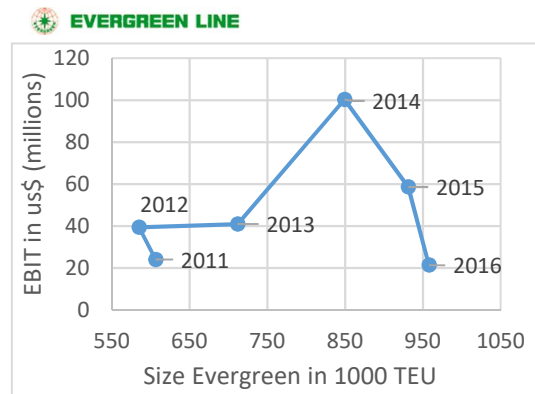


Graph 5 OOCL results vs capacity



### 3.2.5 Evergreen Marine Corporation (Evergreen)

The Evergreen Marine Corporation<sup>xlii</sup> was established in 1968 by Y.F. Chang<sup>xliii</sup> through buying his first (second hand) vessel and started a tramp service<sup>xliv</sup>. Within a year the first line service to the Middle East was opened, a route with little competition and good margins. In the next two decades the company grew rapidly and was very successful where the competition experienced some tough times. In 1984 Evergreen was the first container shipping line that introduced a West-bound and an East-bound round the world service, at the same time huge amounts were invested in containers, trucks, new vessels and terminals. After this period of strong, continued growth and becoming the largest container shipping line, Evergreen started to diversify in air travel and freight, hotels and hospitality based on the same high service level philosophy. As an independent carrier Evergreen was able to beat the conference members on the North-Atlantic route and East-bound from the Far East through the Panama Canal to the East Coast of (North) America, later establishing a terminal in Panama for transferring containers.



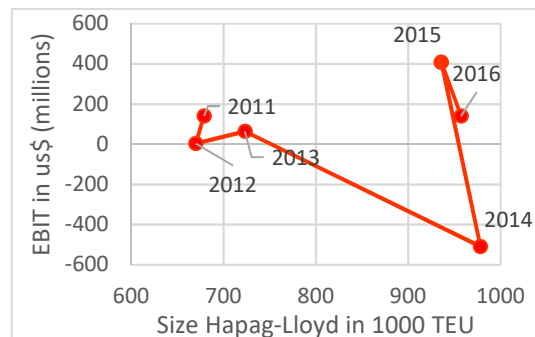
Graph 6 Evergreen results vs capacity

Evergreen<sup>xlv</sup> was able to obtain better results through choosing mainly niche markets and taking good care of its workers (paying higher wages and giving shares in the company as a bonus), but also engaging as little staff as possible. As a former captain mister Chang ran a tight ship by delivering high quality against competitive pricing, at the same time trying to be as environmentally conscious as possible employing state of the art engine and vessel design. The result of this philosophy was that Evergreen was operating at a lower cost than everyone else.

By constantly applying the latest technology on board, implementing the newest ICT-applications in Satnav, tracking and tracing, thus informing its clients of the whereabouts of their containers with pinpoint accuracy. In his vision dr. Chang advocated a sustainable<sup>xlvi</sup>, honest a positive attitude towards society in general and assuring a safe and secure working environment for his employees, responsible behaviour towards directly affected (port-)communities and life at sea especially, or in a direct quote from dr. Chang: *"We will not wait for legislation to be introduced. We will use the latest technology as soon as it is available so as to minimize the impact of container shipping operations both on marine life, on port communities and on humanity worldwide."*

### 3.2.6 Hapag-Lloyd Hapag-Lloyd

Now slightly ahead of Evergreen, after the completion of the takeover of UASC<sup>xlvii</sup> and its integration the new combination will be about one and a half times as large. Hapag-Lloyd<sup>xlviii</sup> is the result of a nineteen seventies merger of two mid nineteenth century established shipping companies (the "Hamburg-Amerikanische-Packetfahrt-Actien-Gesellschaft" and the "Norddeutscher Lloyd"). Both had suffered great losses during and directly after the World Wars since many vessels and foreign offices were damaged and/or given as war damage payment to the allied countries. Just before the new millennium TUI took over the company integrating the tourism and air travel parts into the own organisation while merging the container division a couple of years later with the newly acquired Canadian shipping company, CP



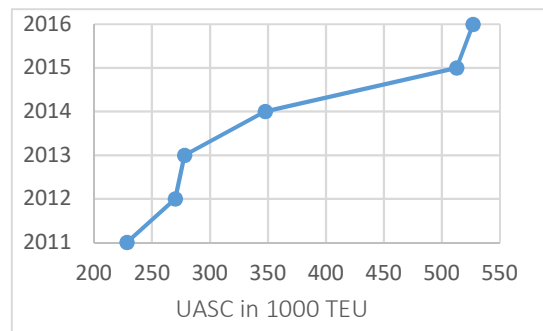
Graph 7 Hapag-Lloyd results vs capacity



Ships, resulting in the then fourth largest container liner. Just a couple of years later (in 2009) TUI decides to sell off a majority (57%) interest in Hapag-Lloyd to a local consortium of banks and insurance companies, a logistics firm and the town council of Hamburg. In 2012 the town council takes over another 21% of the shares still held by TUI that kept just 22%<sup>xlix</sup>.

A reorganisation and efficiency measures make the company more economically viable, during this time talks are held with fellow city container liner Hamburg-Süd (dr. Oetker group), but in the end, they could not agree upon the terms of a merger. However, the 2013 talks start with the Chilean shipping company CSAV and by the end of 2014 they come to an agreement. In exchange for an interest of 30% in (new-) Hapag-Lloyd shares the container division of CSAV, together with a substantial amount of cash (for an extra 4% in shares) goes to Hapag-Lloyd. In light of the reorganisation the consortium of banks, an insurer and the town council decide to pool a controlling number (51%) of shares to lead in decision-making and replace the key members of the two-tier board. The next year is dedicated to the integration of the complementary, mainly Latin American services and so extending the network furthermore. To become even more competitive new investments are necessary, five larger vessels (10.500 TEU) are ordered for the Latin American service. As more investment in containers and vessels is deemed necessary, in the fall of 2016 Hapag-Lloyd decides to go public in order to raise sufficient capital. In the spring of 2017 they actually acquired a quotation at the stock exchange and as a result of this recent change in the obligation to publish figures I could not find any historical information on a sustainability policy or human resources management practice of Hapag-Lloyd<sup>l</sup>.

The latest development (2017) is the acquisition of the United Arab Shipping Company S.A.G. (UASC)<sup>li</sup>, although the extreme weak financial position of this organisation has postponed the transaction for a couple of month (completed by June 2017)<sup>lii</sup>. Strong points for the acquisition are the efforts from UASC with regard to the environment and the modern fleet, their many branches around the world and of course the strong bonds with the Arab world (Qatar a Saudi Arabia Investment funds hold together just under 25% in Hapag-Lloyd), inland service support on the Indian Sub-continent, the Middle East and North Africa. UASC's focus on sustainability is shown in the design of the new fleet which entails eleven 15.000 TEU and six 18.800 TEU vessels with low resistance hull design and coating, fuel-efficient and LNG-ready engines and an extensive waste management package. They strongly advocate the paperless office, both in the own organization (through training and environment awareness programs) as well as through the whole logistic chain (promoting EDI). In their containers they switch to bamboo flooring for new builds and try to minimize the carbon footprint of the cargo transport.



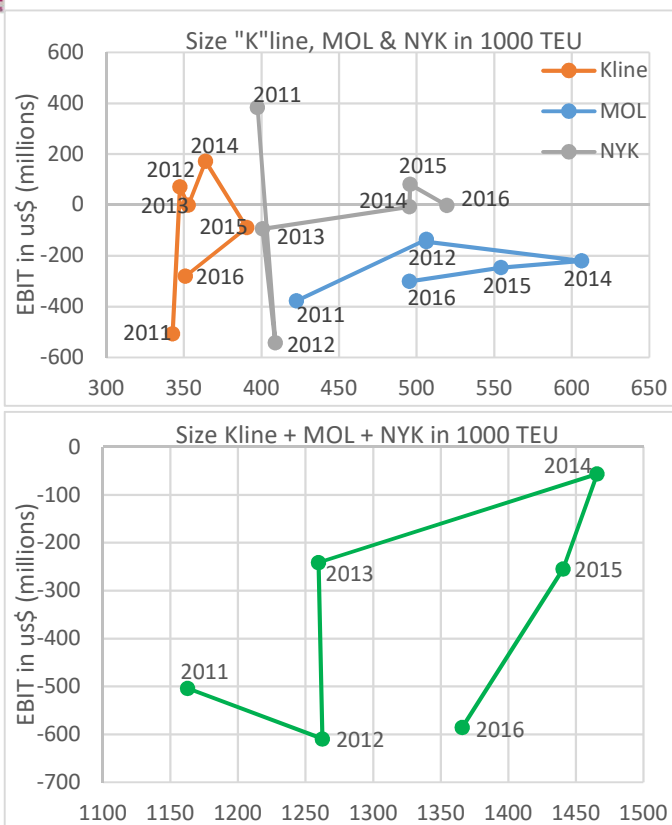
Graph 8 UASC capacity

After the completion of the acquisition of UASC one of the partners and prime investors in Hapag-Lloyd, the Chilean CSAV announced recently to extend its stakes to at least 25%<sup>liii</sup>, a transaction financed by issuing 6.1 billion new shares CSAV. To obtain this desired 25%, stock was bought directly as preferred buyer and the not claimed shares by other shareholders, all this from an emission announced September 2017 to raise at least US\$414 million guaranteed by the main shareholders of Hapag-Lloyd, to restructure their finances and pay off part of it huge debt.

### 3.2.7 Ocean Network Express (ONE)



The next group is the new joint venture of Japanese shipping companies formed by the container divisions of “K”line, MOL and NYK and is planned to become operational by April 2018<sup>liv</sup>. All three are active in more or less the same part of the economy, best characterised by transport & logistic services, energy supply and offshore & special purpose services (see also Appendix 2)<sup>lv</sup>. As the container branch is suffering from a prolonged crisis, the three are too small in comparison to their direct competitors as far as the container business is concerned and unable to show results in black on their own. Last October they decided to form a joint venture as of July 2017 and have their container services fully integrated ultimately April the next year<sup>lvi</sup>. “K”Line and MOL will participate for 31% each and NYK-Line will contribute the remaining 38%, the total investment in the new venture will be approximately ¥300 Billion (at the actual exchange rate<sup>lvii</sup> us\$2.7 Billion), consisting mostly of vessels, containers and terminal activities abroad, resulting in a fleet of approximately 1.4 million TEU capacity<sup>lviii</sup>.



Graph 9 & 10 One results vs

Quite surprisingly with the number of vessels and their capacity in other categories is far greater than the container ships although the revenues are of a similar magnitude, where profit and loss differ substantially (see appendix 2). The best performer is MOL whereas “K”Line is weakest of those three both relative and absolute. It is of strategic importance to the Japanese government to have a domestic (container-) transport industry and thus be able to import energy and raw materials and export finished goods. If you look at the table three aspects of the fleet are remarkable. First the number of Car carriers for the world-wide export of the finished product although there are many assembly plants in the various parts of the world. Second the number and capacity of the woodchip and LNG carriers supplying an alternative energy source in order to become less dependent on nuclear power (after the Fukushima disaster in 2011) or oil, at the same time working in the direction of a more sustainable energy supply. This is also relevant in the instance of the final aspect, the number of relative small (shuttle) tankers, mostly “handysize” and other offshore service vessels for production, storage and offloading (FPSO for crude oil and LNG) while Japan is about 90% dependant on energy import. So far, the Ocean Network Express and over to more information on the three (still independent) individual organisations.

“K”Line<sup>lix</sup> started with a merger in April 1919<sup>lx</sup> to form “Kawasaki Kisen Kaisha” and experienced some tough times especially during the great depression at the beginning of the nineteen-thirties and during and directly after the second world war. After the Oil Crisis of 1973 “K”Line felt contradicting economic movements for car exports (and thus transports) to America grew rapidly whereas the economy as a whole declined. The Financial Crisis of 2008 also had a huge impact on the economy and therefore on the transport sector and its participants, on the other hand “K”Line had very good times at the end of the nineteen-thirties, the nineteen-sixties and at the

beginning of the new millennium. In the nineteen-sixties “K”Line had the good fortune that the Japanese government forced a reorganization of the shipping industry to prevent companies’ failure through too fierce domestic competition and came out on top as one of the remaining six conglomerates.

After a series of management plans, reorganizations and cost saving strategies over the past decade, “K”Line<sup>lxii</sup> now wants to focus on stable business, become less market sensitive and diversify into new and promising business. They want to achieve this by providing customers with high quality services, unique logistic solutions, while being eco-sensible, safe and secure in transport with high operational quality and (environmental responsible) ship management. Now with less than 400.000 TEU capacity and limited terminal capacity they are not able to keep up with major players in the field, especially where fleet size and global covering and relative performance (see graph comparing the three carriers) is concerned. So the time has come to refrain from misplaced pride and competitive feelings in the domestic market and bundle forces to keep on delivering services at the high “K”Line standard at the same time cutting cost to an acceptable level, returning to black.

**Mitsui O.S.K. Lines (MOL)**<sup>lxiii</sup> started in 1878<sup>lxiii</sup> with a single vessel transporting coal from Japan to China, although only as recent as 1964 the Mitsui Steamship Company merged with the Osaka Shosen Kaisha (OSK Lines) to form MOL, at the expressed orders of the Japanese government. Looking at the figures over the past six years the container business is the only division with year on year losses and although the revenues for “Bulk ships” and “Containerships” is of a same magnitude the profit and losses differ quite substantially (2016: +39.0 respectively -/-32.8 billion Yen). The number of container carriers (91) is substantially lower than the dry bulkers (337), tankers (169) and LNG carriers (84) together. MOL is striving to become an emission-free organisation, building on their own knowledge, promoting CO<sub>2</sub>-emission reductions at its customers as well as investing in training and education for MOL personnel, development of technologies to reduce the overall impact on the environment. On the main land of Japan there are many problems with the application of renewable energy or alternative fuels, partly through legislation but also as a result of public opinion, this is why MOL is planning (long term)<sup>lxiv</sup> to be active in the exploitation of offshore wind-parks, solar, hydrogen and biomass power.

The strategy focus on sustainability is seen in the application of ICT technology in vessel operation support and technological implementations diminishing the impact on the environment and enabling safer vessel operation. The ambition to stay at the forefront of promotion and development, a sustainable and innovative business model is another expression of the MOL philosophy. Finally, in this context their human resources policy is to create a culture in which employees are stimulated to think innovative and have pleasure in and are proud of their work. To realise these ambitions MOL has several training, operational safety and research facilities to train and support its personnel.

Mitsui O.S.K. Lines is restructuring the organization to become less market sensitive by aligning lease contracts for vessels in transport agreements with clients, investment in strong growth market, such as the LNG carrier business and new projects, for instance in the offshore business. The latter may become difficult at the current oil price of US\$ 48.35 (WTI Crude) and 50.8 (Brent Crude)<sup>lxv</sup> at which the oil industry is postponing research into new development and cutting back on costs at existing projects, so the offshore industry has also an excess capacity this moment in time.

The **NYK**<sup>lxvi</sup> group started with the merger of the “Yubin Kisen Mitsubishi Kaisha” and the “Kyodo Unyu Kaisha” to form the “Nippon Yusen Kaisha” (NYK) in September 1885<sup>lxvii</sup>. They had a tramp fleet of fifty-eight steamships, but soon started their first liner business to mainland China. After a decade of activities concentrated on the Asian part of the Indian Ocean and the East and South

Chinese Sea, NYK ventured out to Europe, Australia and the East Coast of America (probably as a result of the war with China). During the First World War they branched out to South America and the East Coast of North America. In the Second World War NYK lost about eighty-five percent of its fleet (83% vessels, 88% capacity) and it is not until 1951 that they were able to resume business. The organisation evolved rapidly in a major energy transport organisation, first adding crude oil tankers to its fleet soon followed by LNG tankers and a short while later a wood-chip carrier was added. From 1968 onwards NYK becomes more and more involved in container transport.

At the end of the last century NYK became more environmental conscious<sup>lxviii</sup>, probably as a result of their spillage of fifteen hundred tonnes of oil in Tokyo Bay in 1997. Just a few years later it introduced a series of mid- to long-term management plans with tighter operational targets, expanding particularly in logistics and obtaining ISO14001 certification on its entire organisation. Another development is the establishment of a maritime academy on the Philippines to recruit and train new crewmembers more economically, in line with a human resources policy in which union membership is discouraged. Especially after 2008 restructuring of the group takes place, with a focus on sustainability (innovative, technological, R&D targets) and energy supply (investment in offshore energy transport and exploration).

The new strategic planning “More Than Shipping 2018 (MTS2018)”<sup>lxix</sup> copies parts of the strategic planning of MOL (or vice versa), they both concentrate on LNG and offshore at the same time working in the direction of an asset light organisation and alignment of contract terms (length) between customers and capacity (capacity providers or lessors). NYK particularly wants to review its asset intensive part of the business and get hold of leverage levels, working towards a stable dividend policy and looking for opportunities to enlarge the balance totals. Compliance is still an issue with NYK, but the new strategy includes the determination to comply with not only the Japanese monopoly legislation (for which it was challenged in 2014) but to all legislation worldwide. NYK is still one of the most environmental sensitive companies in the trade and has the first LNG bunkering vessel delivered February 2017.

### 3.3 A first analysis of the performance of these carriers (see the graphs and appendix I & Ia)

First thing apparent is that fleet size is not the single decisive factor influencing the financial performance of the carriers selected neither is the average vessel size crucial. As is apparent also from Appendix I & Ia and the individual graphs over the past five years the container liner business followed more or less the same development and is converging to the same level of relative performance (EBIT/TEU capacity): From 2011 until 2014 the pain from the depression of 2008 was gone, in the container liner business demand was growing as where the results. In this optimistic environment more and more orders for ever larger vessels were placed not aware of the new reality in which the demand multiplier from the growth of the world economy would decline to a factor of just above to around the unity<sup>lxx</sup> (for the period 2015 – 2019 predicting an ongoing decline to about 1,3 and is probably not the end). This meant that capacity grew more rapid than demand in 2015 and even more so in 2016. Overcapacity was there again with plummeting prices to record lows of below US\$ 500 on the main Asia-Europe lane (2 February 2017: BDI 297<sup>lxxi</sup>), culminating in the demise of Hanjin in 2016, after which event prices slightly recovered. In order to survive the big companies aimed for growth through acquisition and in ordering bigger vessels. For instance, Maersk is, according to its newest strategy, growing organically ordering new capacity in 2015 (27 vessels, average capacity 13.597 TEU), of which delivery is delayed until end 2018 and acquisitions, focussing

on existing capacity<sup>lxxii</sup>. At the same time Cosco is aiming to become the largest container liner company both by ordering in the same period (35 vessels with an average capacity of 16.025 TEU) new large vessels and acquisitioning companies like OOCL (after the merger with CSCL) to beat the competition, growing aggressively faster<sup>lxxiii</sup> than anyone else. If we look at the data from Alphaliner or UNCTAD<sup>lxxiv</sup> the average vessel size has grown from around 4.000 TEU to between 5.000 and 6.000 TEU for the main container carriers, except for UASC with an average size of over 9.000, while performing financially poor. Also, the order book does not seem to be indicating in a certain direction (comparing Alphaliner top 20 December 30<sup>th</sup>, 2015 to November 17<sup>th</sup>, 2017 the order book for vessels averaging a capacity over 10.000 TEU is 204 vessels, 13.786 TEU respectively 128 vessels, 14.680 TEU) while growth mainly takes place through merger and acquisition, especially in the top 10.

Other factors are management and ownership, both seem to be relevant for the performance of the leading firms in this branch of the economy, for SOE's (until privatised CMA CGM performed poorly, UASC was before its acquisition deep in the red and CSCL and Cosco did not perform at the same level as the benchmark) perform significantly worse than privately owned companies (like Evergreen, OOCL and CMA CGM). Deep pockets can be helpful to survive in times of a recession or suboptimal management performance (Chinese government has announced stricter controls), at the same time strategic choices, merger and acquisition and survival become political rather than economical.

What really seems to matter is personal involvement of a dedicated owner/manager like mister Jacques Saadé of CMA CGM, dr. Chang of Evergreen Marine Corporation and the Tung family of OOIL (the parent company of OOCL). These people have been able to build and maintain a competitive advantage over their counterparts mainly by choosing an alternative route, better service, individual treatment of shippers and more attention for human resources within their own organisation. The results is a more dedicated workforce, more satisfied customers or a superior IT-system, looking at Appendix Ia a more stable financial performance and no substantial losses.

Overall 2016 was an unsatisfying year for container carriers with substantial losses across this economic branch. As no carrier is really dominant or able to influence price forming or differentiation through service or any other way there is a stalemate developing so, with this lack of real market power, the fear for an oligopoly (now or in the near future) bears no ground. Differentiation is possible through offering more ports of call or more frequent sailings but will only warrant a premium if it represents a distinguishing advantage over the competition. Inland transportation (both upstream and downstream) is a viable proposition, providing it commands a premium price, if that is the case vertical integration offers an opportunity to escape the negative price spiral. In order to survive, carriers grow bigger and bigger to reduce prices, demand is not keeping pace, so overcapacity continues. It looks that the individual carriers all have gotten the tiger (the market for container transportation) by its tail. Letting go means losing out to competitors while holding tight (continue on the chosen path of selling at marginal cost to prevent wasting excess capacity) means losing money each and every time. Where will this end?

Apparently, there are two routes emerging:

1. Even stronger concentration on the main routes and its port logistics, more horizontal growth, with standard service for many customers and at highly competitive prices.
2. Extended service in a vertically integrated transport/logistics chain with an extensive feeder line network, good performance on the main routes and an ever-growing hinterland connectivity, resulting in a vertically integrated network.

In an analysis of their financial data, SeaIntel<sup>lxv</sup> found a statistical significant correlation between reliability and profitability for carriers over the fourteen-month research period, pointing out however that there was no prove of causality or indeed any direction, but Maersk was in this case the most reliable carrier of the period (together with Hamburg Süd) according to Marine-insight<sup>lxvi</sup> in reference to Drewry. Another survey this time by Drewry Maritime<sup>lxvii</sup> indicates a strong decline in idle container vessels to less than 500K TEU since June 2017, whether this stays the same or will reverse in the near future is still unknown. According to “Show me the money: Second-quarter results” by Alastair Hill there is an almost 12% increase in capacity on its way until 2019 and a decline of just 1% in the World Container Index<sup>lxviii</sup> reported in the third week October 2017. This perhaps as a result of CMA CGM ordering nine 22K TEU vessels and MSC placing an order for eleven 22K TEU vessels, these can only be used in the Asia-Europe route (size wise). In order to avoid a renewed increase in idle vessels the world economy has to grow about 8% to absorb this extra capacity (The Boston Consulting Group in “Sailing in strong winds” quotes an overcapacity prediction of between 8,2 and 13,8 percent and a multiplier of around 1,3 so a simple calculation results in an average of about 8,4%). In a recent publication Drewry<sup>lxix</sup> expects no further M&A activities by lack of suitable candidates, however the death of Dr Chang and the change in management and new policy (joining the Ocean Alliance) of Evergreen Marine Corporation makes it feasible that they are open to a suitable offer from (for instance) fellow alliance member CMA CGM or even the new Japanese joint venture ONE. Another candidate could well be the container liner division of Hyundai HMM after its Strategic Cooperation Agreement with Maersk.

## Chapter 4, The three alliances

### 4.1 Historic background, from Conference to Alliance

Cooperating in one way and competing the other is not a new phenomenon in the shipping industry. At the last quarter of the XVIII<sup>th</sup> century individuals started to experiment with steam as an auxiliary power for vessels, first with different forms of paddles and still using a wooden hull. Those vessels were mostly employed in estuaries and on broad rivers, because the governors of canals and smaller fluvial systems were afraid that banks might erode and be damaged beyond repair. At the turn of the XIX<sup>th</sup> century they were still working at atmospheric pressure and had a low energy efficiency, as a result they were not able to carry much cargo beyond the coal needed for the propulsion of the vessel. With the introduction of the railroads, resulting in the need for speed made the use of inland waterways for transport purposes less attractive so they came in a state of disuse.

Around the middle of the XIX<sup>th</sup> century engines became more powerful, introduction of steel parts in the construction of vessels was needed and by the end of the century steel had replaced wood entirely. During this period the paddlewheel was gradually replaced by the propeller (helix) as a propulsion system. These developments made the vessels size restrictions redundant, and thus facilitated the payload capacity growth. More reliable schedules, faster crossings (even with a competition for the Blue Riband) and poor economic circumstances in Europe made the demand on the Atlantic route stronger in the passenger segment, this mostly at rock-bottom prices. On the East-West trade lane the opening in 1869 of the Suez-canal was a major shock, transfer times were dramatically reduced making Asia and Australia more accessible while at the same time freeing cargo capacity from the shortened journey. Each time a technologic development came into effect it reduced the distance between ports, literally for instance through the first use of the Panama Canal in 1914, or figuratively speaking when traveling times were reduced as a result of higher speed at sea or new technologies in ports which lead to an excess capacity and so a decline in prices.

As the planning horizon is long and shipping industry is capital intensive every time there is a sudden excess of capacity, the tendency to cooperate in order to survive arises. Competition in these circumstances is fierce and liner companies will make one on one arrangements with competitors for certain routes between a selection of ports regarding prices, cargo and number of passengers. It occurs regularly that companies compete on one route and cooperate on another.

The conference system can be divided in an open and a closed system, whereby new entrants are welcome in the open system and heavily contested in the closed system. In extreme cases the closed conference members use excess capacity to schedule vessel departures to coincide with potential competitors or new entrants on their routes. Long time these kinds of monopolies were protected by the competent authorities. Private deals between a shipper and a carrier had to be published and a "me too" rule was applicable. Although the industry still claims exceptional circumstances, the Federal Maritime Commission (FMC) and the Department of Justice (DoJ) of the USA, the Directorate-General for Competition of the EU and the Chinese Ministry of Commerce (MOFCOM) have since the end of the last century faced out many of the privileges for the shipping industry (Mariner Wang 2015<sup>[xxx]</sup>). Argumentation was that the stability in transport supply (frequency, accessibility and spread) was no long in danger, price fluctuations would settle, and competition would benefit shippers.

The new system of alliance was allowed under the conditions that they sought approval before becoming operational, vessel sharing, and slot arrangements were allowed but individual carriers had to agree prices (confidential) with shippers. To avoid price fixing the shipping companies have to

publish their (binding open offer) maximum prices no more than 31 days in advance<sup>lxxxix</sup> to prevent colluding. Also, general price rate increase announcements are forbidden, and prices should include special charges such as bunker, security, terminal handling and peak season charges if applicable. They are not allowed to use collective bargaining in ports to obtain facilities or tug services and the like.

Originally shipping companies could be a member of different conferences on different routes, mergers and acquisitions happened both within and outside these conferences. So, a carrier could be a member of one conference on just one route or port pair, or of several conferences and many port pairs. A conference could consist of just a couple of carriers and concern a few port pairs or be more complex of constellation. With start of the carrier alliances at the end of the 1990s this was drastically reduced, and partnerships were for the worldwide trade, however Slot Charter or Charing Agreements outside and across the boundaries of Alliances still exist. New mergers will change the composition of alliances if the two parties belong to separate alliances, for a company can only be a full member of one alliance, but not all vessels of an operator have to be part of an alliance agreement. For over a hundred fifty years factors outside the branch frequently induced forms of cooperation which were reluctantly tolerated by the competent authorities. The financial crisis of 2008 and the aftermath was the most recent source of overcapacity and as a result of fierce competition between container shipping lines. Realising economies of scale and scope made concentration and larger vessels a necessity, at the same time overcapacity and high energy prices induced slow steaming. As the supply surplus continues the situation has gradually become the survival of the fittest or of the one who has the deepest pockets.

Until April 2017 there were four major alliances, through a reshuffle resulting from recent mergers and acquisitions only three are left, the 2M-Alliance, the Ocean Alliance and Transport High-Efficiency Alliance (THE Alliance). The members of the three alliances most and for all share their services, so they can offer more frequent arrivals without employing more vessels or stop slow-steaming and extend the number of ports of call, at the same time resulting in less idle slots on board. There should be a fair bit of trust among the carriers, which is not readily available, as a result, long negotiations take place constantly and the configuration is quite dynamic and also driven by the (financial-) problems of alliance-members. The default of Hanjin of September 2016 created even more urgency to reorganize the branch, in the case of the Chinese through strategic planning and active governmental involvement, backed by financial support.

#### 4.2 The influence of legislation on the form of cooperation in liner shipping<sup>lxxxii</sup>.

There is a constant discussion regarding the desirability of any form of exemption for shipping lines concerning a reduced competition and the level of supervision and the adhering enforcement.

Arguments pro are:

- National strategic interests, having a strong merchant marine
  - security in a conflict situation and its aftermath (rapid deployment of personal and materials)
  - independent supply of energy and other essential (natural) resources
  - Protection of the domestic container liner industry
- Stability in price and transport supply on a regular basis

Arguments con are:

- Reduced competition (barriers, prices above cost)
- Lack of innovation



- Arbitrary delay or exclusion of cargo

There has been a form of cooperation amongst ocean liner businesses since the end of the 1870s and as early as 1916 the United States of America introduced its first shipping act to create a form of stability under supervision of the Federal Maritime Commission (FMC). This piece of legislation was replaced in 1984, but already in 1961 it was amended to create another independent agency which tasks it was reviewing potential conferences and guarding against observed abuse. In 1968 the FMC was granted the power (by the Supreme Court) to award, in the public interest, antitrust exemptions, while still allowing only “open” conferences. In 1984 the FMC got more and stronger powers of control over the industry whilst its protection from antitrust legislation was intensified. In order to gratify the shippers part of the “Rebate System”, conditional rewarding loyalty, was abolished under the new law. Still the act of 1984 was more of a compromise than anything else and was constantly criticized by all parties involved. The “me too” rule, meaning every deviation from the published conference rates had to be listed with the FMC, who published these terms, consequently all other shippers could demand the same terms (discount became less frequent). Meanwhile the European Economic Community (EEC) did not include the shipping industry in Regulations until 1986, when it introduced its version of an antitrust immunity rule, further developing the EU competition policy originating from 1962. However, they had ratified the UNCTAD Code of conduct for liner carriers in 1982, this code of conduct was developed in the 1970s, after much discussion especially from the developing countries, who felt themselves were too much depending on the industrialised world for their transport. The code of conduct meant that both the sending and the receiving country would be eligible for at least 40 percent of sea transport by any vessel sailing under their flag, the remainder was available to vessels carrying a third nation flag.

The system with the open conferences, the Block Exemption (of the antitrust laws) and the “me too” rule was neither satisfactory to the container liners nor for shippers or the Government of US (the merchant marine under US flag was shrinking). The inability to have private contracts under undisclosed terms was a hindrance to develop product differentiation through service variations. So, in 1998, after years of discussion and lobbying the Shipping Act of 1984 was replaced by OSRA (Ocean Shipping Reform Act), that came into effect on 1<sup>ste</sup> of May 1999. It took the EU until 2006 to repeal the “Liner Block Exemption” and also adopt the non-disclosed Service Contract (S/C) option in their law. The main objective of the legislative powers and their competent authorities is to enhance a high level of service quality and reliability in a market with strong oligopolistic aspects, allowing cooperation on routes (vessel sharing agreements, slot sharing/exchange/purchase agreements), but not allowing joint bargaining for facilities or tariffs or price fixing. In his paper Mariner Wang (2015) concludes that the legislation was, at least for the first decade of this century, functional as the alliances were reducing cost and offered a more differentiated product (vertical integration to be able to offer a complete transport package).

#### 4.3 The three alliances (see also Appendix III)

An alliance cannot immediately start working together and using vessels on certain routes, they have to put in advance the Vessel Sharing Agreement (VSA) to the competent authorities of each country involved. After a predetermined period without objection (or indeed a positive decision) they can go ahead. Members of alliances try to reduce cost by sharing capacity (one way or the other) and at the same time extending their services. For instance, an alliance has two members and they agree to use each the same vessels of a certain capacity on a route, so they can double the frequency of calls on the ports on that route and have a higher occupation of slots on board. A negative characteristic of alliances is that they need permission from their alliance partner(s) to deviate from the agreed

schedule (e.g. if a shipper asks for an additional port of call). Although the carriers work together in the alliances and share capacity and make use of each other's port facilities like the terminals, the carriers have their own contracts with shippers on private terms and in many contracts, they are responsible for their own slot allotment, so when they have won a small quantity of cargo they still have to pay the full cost. The carriers are not allowed to use their position as member of an alliance in negotiations with service providers like tug companies.

Besides the port choice the hinterland transport may be more complex since neither the shipper nor the consignee has much influence or even information on who's vessel the cargo is loaded and subsequently on which terminal or even in which it will be unloaded. In case of a 'cost insurance freight' (CIF) contract that is not an issue, but other contract like 'free on board' (FOB) or 'EX-Works' (is Incoterm for EXW which means delivery at the location of production), the consignee has to arrange for further transport and documentation at the right place. Getting vehicles in the right place at the right time is a problem, in general trucks are the most flexible (traffic permitting), but rail links and the correct wagon sequences can make extra handling (and so cost) necessary and barges have a fixed window to load or unload and have to wait in turn, what makes the process very time-consuming and often calls for extra handling and temporary storage on the terminal. Even greater difficulties arise when one of the members of the alliance has financial difficulties of the magnitude of Hanjin, goods on board of these vessels will be held hostage even when the transport was arranged with a fellow alliance member. For this reason, the alliances (with the exception of 2M) have instated an emergency fund to be able to rescue their own cargo from the vessels of their broke partner. Both the shippers and consignees should remember this risk and entertain the possibility to book not only on separate carriers but also on members of different alliances if delivery of goods is crucial. Another aspect that makes working with alliances more complex for shippers is the right of first refusal when the demand for cargo space is high, the carrier exploiting a vessel that is fully booked and has excess demand can, under specific conditions refuse cargo from an alliance partner. Of course, this will be less favourably received by their partner(s) and the disappointed shipper and could seriously harm the relation between shipper and carrier of the refused cargo. In the long run this could have negative consequences for the operations of the alliance as a whole.

The members of 2M have control over almost seven (7.3 including the strategic cooperation between Maersk and HMM) million TEU capacity the highest of the three alliances, yet in their schedules they have committed only about one third (2.4 million TEU) of this capacity to the alliance, whereas the rest is dedicated to the own organisation<sup>lxxxiii</sup>. If one looks at the websites of the members of the three alliances with the exception of Maersk and MSC they all present the schedules of their alliance. The smallest of the three, the Transport High-Efficiency Alliance (THE Alliance), even advertises with a capacity greater than their combined fleet. THE Alliance can do so through a series of Space Charter Agreements (SCA) and VSA<sup>lxxxiv</sup>. The difference with the other alliances is that THE Alliance uses the entire capacity in a joint effort while Ocean Alliance uses about two-third of the joint capacity and 2M Alliance only one-third of the capacity in their alliance, the remaining capacity is managed by and available only to the individual carriers.

In a recent (February 2017)<sup>lxxxv</sup> analysis Drewry concluded that choice of port of call is not correlated with terminal ownership, at least as far as 2M Alliance is concerned. They investigated the main ports in the Benelux and the main hubs in "South Pacific West" and "South China/Hong Kong". These findings are in strong contrast with the findings of Theo E. Notteboom et al. (2017)<sup>lxxxvi</sup>, who concluded that the chance that a carrier would call on a port was higher when an alliance member had an interest in that specific port, even more so when two members had an interest. The data in this research were collected over the second quarter of 2006, 2015 and 2017 over the Le Havre –

Hamburg range. Furthermore, they found that there was no real change over the period of observation in the relationship between terminal involvement and calling on a port. There was only one exception and that entailed the port of Zeebrugge in combination with 2M Alliance. The striking difference between both conclusions may be influenced by the choice of ports and the representativeness of these ports to be able to come to a generalizing result. Further research has to bring clarity in the subject matter, not in the least since information is sparse and the investigated ports/area are so dissimilar. This subject matter is of the greatest importance to the shore side of the business, especially for port authorities, consignees and hinterland transport organisations.

## Chapter 5, The four scenarios

### 5.1 Introduction, subject matter and first phase: the focal point

This scenario planning process revolves around strategic planning of container carrier organisations. It originates from the collapse of Hanjin in a market with prolonged imbalance between supply and demand (a frequently recurring situation in the shipping industry, mostly brought about by long lead times in capacity adjustment). In many instances and over a broad spectrum industrial failure reduce total capacity in troubled branches, not so in shipping. Vessels stay afloat, lease contracts can change hands in a relative short period of time and vessels owned by the failing company are sold off on behalf of its financiers. As ownership structures and so the distinction between leased and owned container vessels is not decisive for main strategies it will be ignored in this analysis.

Often container carrier organisations are part of a larger conglomerate of businesses, but for the purpose of this analysis the box logistics in general and the strategic choices for those active on the seaborne leg of the supply chain is the focal point. Other (maritime) activities are not taken into consideration here, however up- and downstream logistics can be relevant in this framework, if so, they will be investigated.

For the purpose of this paper only the top seven carriers are observed, they represent more than 75% of the total fleet capacity and the remainder is scattered over a large number of operators (the next largest carrier with a market share of less than 3% is Yang Ming Marine Transport Corporation).

So how can a carrier (being asset heavy) survive in the long run in a predominantly commoditised and fierce contested market? There are at least three options to consider.

- Aggressive growth, the strategy described by Li, X, el. in “Competitive Capacity Investment under Uncertainty”, March 2016 is the first option. In this case the carrier needs deep pockets, a strong stomach and patience. The sole purpose is to gain market share by competing on price using economies of scale and finally become market leader or at least one of leaders.
- Diversification, carriers going for integration along the supply chain, not only have to compete among themselves and (asset light) NVOCC’s (Non Vessel Operating Common Carrier = acting as carrier in its dealings with shippers and as shipper in relation to the carriers), but also with asset light freight forwarders.
- Specialisation (a specific option for smaller carriers), it might be on a serviced region or route (e.g. remote or inaccessible places), a product group like reefers and jumbo-size HMM<sup>lxxxvii</sup> or special services. These niche players create value and so are able to charge higher prices without losing customers, although this strategy limits their growth potential. Another potential specialism is the feeder line, which in many parts of the world has right of existence due to the protective cabotage rules in countries like China, United States of America and many others (e.g. recent legislation in India applies to almost all shipping).

In the next paragraphs successively the key issues, the external influences and the crucial directions are put forward, evaluated and brought together in the four scenarios.

The central structure is built around four recurring themes being:

- Economic aspects;
- Technical aspects;
- Environmental aspects;
- Political, social and legal aspects.

## 5.2 Phase 2, key issues:

- Economic aspects:
  - The 'world' economy (growth, stationary or decline);
  - Imbalance or lack of restraint ordering new capacity (market situation);
  - Vessel size and economies of scale (price competition);
  - Specialisation or differentiation (product choice);
  - Branch concentration (competition).
- Technical aspects:
  - Vessel size;
  - Automation (autonomous vessels) & digitisation (blockchain – Internet of Things (IoT) - cybersecurity);
  - New (production) technics (3D-printing).
- Environmental aspects:
  - Sulphur cap and other restrictions (CO<sub>2</sub> emissions);
  - Energy choice/supply (LNG, wind or solar power);
  - Waste and ballast water management.
- Political, social and legal aspects:
  - Rules and regulations;
  - Directions and disallowances;
  - Work conditions.

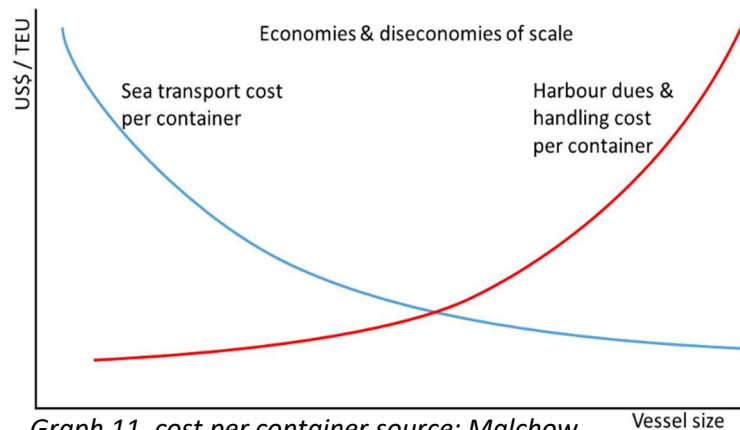
Economic: Economy in general is influencing the container transport industry, however in recent years the multiplier has dropped considerably and will continue to do so (see paragraph 2.3). If the world GDP<sup>lxxxviii</sup> development (in total or industrial and developing countries separately) is compared with the fleet<sup>lxxxix</sup> (See appendix V), it seems there is only a shallow similarity and as the growth figures of the fleet show many changes in direction, they must come from other sources. The GDP does influence all carriers, but not all routes equally. For this reason, the general economic situation will not be taken into account, specific economic aspects are however relevant both internally and externally. For the sake of argument however, I consider the economic development as a Kondratieff-cycle (K-curve) for the long-term, with some shorter-term cycles superimposed on top, resulting in a slightly tilted AM-like wave (= Amplitude-Modulated radio-wave), wherein the trendline tangent represents the average growth factor.

The self-inflicted stalemate of striving for a competitive advantage through economies of scale by ordering ever bigger ships, ending up with level playing field on which everyone has the same size ships and there is an overall excess capacity. The bankruptcy of Hanjin brought only temporary relief and now rates are even lower than before. The economy, and thereby trade, follows a conjectural cycle with a hardly predictable pattern, lead-times in shipbuilding are long, so there are frequently unbalances in this branch. As argued before this may lead to ever bigger vessels to reduce cost, but if everybody is doing so no one will gain an advantage. Furthermore, there are forces that are counterproductive in this pursuit for economies of scale. These forces are economic, physical and technological of nature. Although economies of scale exist for the vessel exploitation (albeit

decreasing), time spend in ports is increasing (vessel manoeuvring and container handling) as is the cost of handling equipment in the port and subsequently the harbour dues (increasing diseconomies of scale).

These two aspects will level out and even reverse when the total cost is concerned, bearing in mind the consequences of growing vessel size for the (dis-)economies of scale (see the graph<sup>xc</sup> below).

Optimal vessel size has been studied by many as is apparent from the OECD/ITF 2015 report, "THE IMPACT OF MEGA-SHIPS" page 19 figure 1.4 "What is the relation between vessel cost and transport cost?" based on Jansson and Shneerson (1982). As a result, economies of scale are positive for exploitation of the vessel itself but have a negative influence on the time dwelling in ports.



Graph 11, cost per container source: Malchow

As vessels become bigger and bigger the congestion on the terminal (limited capacity) but also in the vicinity of the port will increase. Handling capacity of cranes the number of lorries, trains and barges might pose a problem, especially when a suboptimal mix of hinterland transport modes is used as a result of planning issues in the daily activities or the infrastructural mix in the past.

However, over-capacity and a lack of product differentiation (only a few carriers offer more than just port to port service) result in a market dominated by competition on price only. Only an extreme strategy (invest in new capacity in a market dominated by overcapacity) as described by Li, X, et. (2016) might bring some advantage to one competitor at the expense of all others in this branch.

In the economic environment the mutual relations between the carriers are very important, growth through horizontal or vertical integration and diversification are key issues. Another dilemma the carriers are facing is the strategic choice between:

- concentration on just the maritime leg, eventually including the terminal logistics (specialisation);
- vertically integrate other parts of the logistic chain, to compete with freight forwarders (differentiation).

Some, like CMA CGM are, by means of their subsidiaries (APL) developing and promoting extended services on land (rail links and trailer service in the USA) with tight schedules but at a premium price. Others, like HMM are developing special reefer services at ultra-low temperatures with guaranteed links to inland transportation and controlled transfers.

While Maersk, CMA CGM and Hapag-Lloyd have successfully completed their merger and acquisition (M&A) activities, Cosco suffers some delay from the American authorities in completing their transaction with OOCL, especially where the Long Beach Terminal is included in the deal. MSC has always believed in autonomous growth, a strategy which the other top five carriers are most probably forced to follow. The reason being that the various competition authorities will object against more M&A activities from this group of carriers in this branch. Although more M&A activity among the lower ranks in the Alphaliner top 30 is expected. Moreover, acquisitions of up- or

downstream companies in the logistic chain are also expected, this could mean a new leg in the concentration competition.

A totally different aspect is the vertical integration (both deployed and acquired), which puts pressure on relations with (customer) freight forwarders, but on the other hand adds value to the proposal to shippers.

Internally, the prolonged fierce competition, the imbalance between supply and demand as well as the ongoing M&A activities of recent years are issues. Externally for instance, trade barriers will hinder, but in the long run they will only slow down development. Near sourcing, reshoring and 3D-printing have a more permanent and possibly far reaching negative impact on seaborne trade, while continued growing prosperity of people in less developed countries has an opposite effect, resulting from increased demand. The market conditions are such that many parties especially those on the demand side (shippers), but also intermediates and end users cry “wolf” out of fear for an oligopoly. If we regard the information of appendix IV (concentration of the industry), it seems, at first glance justified, but after calculating the Herfindahl-Hirschman Index (see for details appendix IV: Lorenz-curve and HHI based on Alphaliner Top-100 2017, November 17, and HHI classification according to Drewry Maritime Research in Global Trade Magazine), one must conclude that there is at best a slight concentration and certainly no oligopoly.

Technology: At first glance digitalization and automation seem to be the most important technological developments, but vessel design, energy source (mode of propulsion) and alternative hinterland logistics can be as influential. For some time now, vessels are build following the same design concept and are, as discussed before, reaching the maximum capacity for these technical specifications:

- Hull design: stiffness and stability;
- Propulsion system: engine power, propeller size and power transfer;
- Sheer size: maneuverability, navigable waters and port facilities.

Over the years repeatedly a maximum capacity was announced and broken, looking at the development of the size over time (see also the graph on maximum vessel size in Appendix VI based on data from Mehdi, R.A., el., (2018) “North Sea Region Programme 2015 – 2020, European Commission”<sup>xcvi</sup>) the trend is close to the linear and not yet diminishing. McKinsey states in its report that 50.000 TEU vessels are conceivable in 50 years’ time, but in 2008 Blauwens, G., el.<sup>xcvii</sup>, expects a maximum vessel size of around 18.000 TEU, but argues that the optimal size is nearer the 12.500 TEU, now just ten years later 22.000 TEU vessels are operational despite the recession.

In 2014 DNV GL saw economies of scale as the decisive motivator for ever larger vessel, at the same time wondering whether growth over 20.000 TEU is feasible without a complete new design<sup>xcviii</sup>. Just only four years later, Bergmann, J., (2018), writes on the DNV GL website that vessels up to 26.300 TEU are achievable without fundamental changes in the design<sup>xcix</sup>.

In reflexion on the McKinsey report the moderator of the Gateway Container website<sup>xcv</sup> (2018) it is argued that in the next 20 years the maximum vessel size might be 42.000 TEU. In another reaction Bebbington T., (2018) of Container-Logic deems it technically achievable, while not sure about the desirability, he welcomes a serious discussion on the subject matter. And even before the McKinsey report was published Hyongmo J. Ph. D., (2015) anticipated 30.000 TEU vessels in the foreseeable future<sup>xcvi</sup>.

Earlier another McKinsey report (Bisson, P., el., 2013) stresses the importance for Board members to think out of the box and be aware not to be caught out by new technology that might come from unexpected sources and/or on unexpected moments<sup>xcvii</sup>.

Innovative ideas on global logistics, new routings like the “North Passage” and further development of the block train<sup>xcviii</sup> from China to Europe are ongoing and could each influence the carrier business, each with a potential of saving up to 20% of total cost. Intensified digitalisation of paper flows, automation in the direction of crewless vessels, advanced track and trace (T&T) systems and Electronic Data Interchange (EDI and Blockchain<sup>xcix</sup>) are part of the near future, although cyber criminality and hacking pose serious threats that needs solving.

In future 3D-printing, re-shoring and near sourcing will influence global trade, new flows will replace old ones, total outcome is not yet determent. The same holds true for new technologies in vessel design (articulated vessels?), power supply and propulsion systems.

Environmental: Rules and regulations are arguably in favor of larger vessels and have a negative cost-effect and might in the end put limitations to the total capacity of the branch. A non-polluting energy source might be a gamechanger, depending on the type of technology it will be in favor of either extreme small or extreme large modes of transportation. Social demands for sustainability e.g. IMO’s 0,5% Sulphur cap and reduced carbon footprint/TEU. A change in fuel choice can already be seen in the order book, characterised by a transition towards LNG or dual fuel (LNG & oil), since emission (stricter rules for emission right transactions and emission logs) is high on the agenda and awareness slowly gathers momentum. In their social reports many of the carriers put a lot of attention to their environmental performance, specifically waste and ballast water management.

Political: Influence comes from tariffs and trade barriers as well cabotage rules, demands for health, safety and environment. Further realization of “One belt, one road” might also jeopardize merchant shipping. The protection of domestic interests is still high on the agenda in many countries<sup>c</sup> (Russia, China, USA and Brazil to name a few), for instance cabotage is restricted to home owned vessels in many countries. Negotiations on free trade or even access to each other’s ports are even more in the balance. There is an ongoing discussion among politicians encouraged by the various lobbyists to move into one or the other direction. The only clear direction can be found in the field of the ecology, all be it just as long as the domestic economy is not negatively influenced. Although restrictions on emissions are agreed upon, the enforcement is not high on the agenda. Both social and environmental aspects are prominent on the agenda of politicians, although there are no indications that this has influence on the market structure as yet.

Although carriers are adamant in publishing their success stories regarding their efforts in promoting better working conditions, offering in-house training and education and even supporting infant entrepreneurship<sup>ci</sup>, if observed more closely, contradicting facts come to light. For instance, a Japanese carrier started an academy on the Philippines to train Philippine crewmembers, which are cheaper than Japanese. On the other hand, carriers are in agreement with the ILO (International Labour Organisation) to comply with rules concerning work environment. In all published social reports by carrier companies, compliance with international law and competition rulings are professed and declared top priority just as measures to protect the environment are.

Of these issues the mutual relations and strategic choices will have, in my opinion, the most impact. The environmental aspects will limit choices but are non-discriminating. Of new technologies cybersecurity is a must and autonomous shipping will be a fact in the next 15 to 20 years in one form or another. Other issues are very uncertain, both in direction, speed and magnitude.



### 5.3 Phase 3, most relevant external influences:

**Economic:** Economy is leading in the progression of the branch, although, as discussed before, the influence of the world economic growth on box-ship-branch is ever diminishing and non-discriminating between the carriers and therefore not carried further in this paper.

Now fuel prices and interest rates are low but have a slight tendency to rise. Furthermore the 2020 cap of 0,5% sulphur contents in fuel makes either the fuel or the engine (-equipment like scrubbers) more expensive and as the economy is rising so will interest rates. These effects will result in higher prices (compensating cost increase) and dampen the demand for transport.

The new Trans Pacific Partnership (TPP11) trade agreement is lacking the participation of the USA, China and Indonesia. According to an article in Lloyds List, Maritime intelligence by I. Walia (2018-03-09) the participants will benefit from this agreement not only by their mutual trade, but also as an intermediate for non-participating countries. The recently announced trade tariffs on steel and aluminium by the USA have gathered a host of negative reactions from countries and carriers around the world alike, sending a warning to the USA of fierce repercussions, probably ending in a reverse effect for its domestic industry.

A totally different economic factor is the tendency for near-sourcing and re-shoring also in view of global stability (international conflicts and terrorism). One or two defaults might occur in the next thirty years, if it entails one of the seven leading firms it will shake up the entire branch and lead to temporarily disruption. However much of the capacity will be redistributed among the survivors. A new fast-growing competitor might emerge like the Korean Samra Midas Group did in the aftermath of the Hanjin debacle, in all other circumstances the company will be absorbed by one of the leading organisations.

**Technology:** It has an important influence on the evolvement of yet bigger vessels and their use, both in vessel design and port installations. New technological developments offer a variety of opportunities (e.g. innovative propulsion systems), threads (e.g. 3D-printing) and hard borders (emission limits). Advancement in new energy applications and propulsion systems, to become more efficient and less polluting, not just from an economic perspective but also to make the industry more sustainable are also influential, thus creating a positive public opinion. So, solutions are called for issues on energy supply, hull design, propulsion systems and sustainability as well as ICT, with reference to both T&T and Crewless sailing.

It is understood that 24.000 TEU poses a serious capacity threshold on the present structure of the hull. An overall length over 400 meters could compromise the longitudinal stability<sup>cii</sup>, adding more stiffeners and producing a thicker hull might not be the solution. An increased beam or draught is problematic in passing critical waterways (Strait of Malacca) and canals (Panama & Suez), makes container handling in ports more demanding and asks for stronger quays, at the same time less ports will be accessible. If these challenges are overcome the shaft, thrust blocks and propeller become critical design issues to be able to reach an adequate speed. The next test is the power supply itself, designing a sustainable system with sufficient, preferably renewal, energy yield at a cost-efficient level. In the search for new and cheaper exploitation of vessels the crewless ship is often mentioned, one of the main hindrances in the development and execution of these technologies are the legal issues regarding the liability in case of an incident or calamity. The use of wind or solar energy on a larger scale is probably only applicable as auxiliary power or in combination with e.g. hydrogen-cell technology and electric propulsion.

Environmental: The demands on the corporate conduct with regard to the environment will certainly increase, so the introduction of new and innovative fuel is paramount. The treatment of ballast water (containing e.g. exotic water plants, algae and crustacean) is ever so important as is a good waste management system and the reduction of sulphur and CO<sub>2</sub> emissions. One of the latest developments is advocating the general reduction of speed and making slow steaming the new norm. As well as for the benefit of drag reduction (efficiency) and the prevention of exotic organisms in foreign waters, sustainable antifouling and regular hull cleaning are a must, further development of innovative methods is necessary.

Political: Politics will have some influence on market conditions in the sense that world trade agreements and local regulation aimed at protectionism (e.g. cabotage) reduce trade and therefore container traffic. Environment protection codification (international legislation) is likely to restrict the use of older technics and call for innovation in fuel choice, emission levels, the use of ballast and waste management. Of course, concentration and competition will stay in focus with politicians and every now and again the discussion in the matter of supposed, but not actually existing oligopolistic powers (see also Appendix IV) of the carriers is rekindled by the shippers' lobby and the like. A solution for overcapacity and arbitrage regarding autonomous growth in view of sluggish demand cannot be expected from the international forum of politicians, who have hardly any interest in coming to an agreement on capacity distribution.

In the future, social aspects are important although they are only of indirect influence on the evolvement of the container carrier industry as a whole and therefore I did not take them into account by my scenario building.

## 5.4 Phase 4, selection direction in the face of crucial uncertainties

Recapitulating the previous:

In the container liner business demand is critical and this is directly dependent on international trade for which two factors are of eminent concern. First the economic circumstances, meaning in what stage of the economic cycle we are (continued growth, maturity or decline) second the degree of freedom in international trade in combination with the level of protectionist politics. As long as there is growth, trade barriers slowly decline, just to reappear in the other two economic stages. Also, less democratic countries and more nationalistic governments have a tendency towards protectionism.

Autonomous research might not be able to provide technological solutions for an energy transition towards sustainable clean energy at a scale applicable to container liner vessels. As discussed in the last paragraph in the case of improved demand new vessel design is called for and innovation of port facilities has to keep up with this.

Sustainability and the extend of restrictions concerning emissions, energy use (quantity and type) form a definite challenge for future carriers and their business environment.

Last but not least is the extent to which the service propositions can be differentiated to demand a premium price (at what level and is that sufficient to survive for the true specialists?).

Economic uncertainties:

In the economic environment the mutual relations between the carriers are very important, growth through horizontal or vertical integration and diversification rather than specialization are key issues.

Competition by means of premium pricing stemming from a distinct discerning ability or cost-efficient transport through economies of scale and specialisation has also a huge impact on functionality of the carrier in coherence with its competition. Of course, trade barriers will hinder, but in the long run it will only slow down development, although near-sourcing and reshoring will have a permanent effect as has 3D-printing.

Technology uncertainties:

At first glance digitalization and automation seem to be the most important technological developments, but vessel design, energy source (mode of propulsion) and alternative hinterland logistics can certainly be as influential. Cyber security is a must in most of these evolutions, especially so for autonomous shipping.

Environmental uncertainties:

Environmental rules and regulations are arguably in favor of larger vessels, these larger vessels have a negative cost-effect and might in the end put limitations to the total capacity of the branch. A non-polluting energy source might be a game-changer, depending on the type of technology it will be in favor of either extreme small or extreme large modes of transportation.

*So, in my opinion mutual relations and strategic choices will have the greatest bearing on future developments in the branch (e.g. horizontal vs vertical integration).*

Firstly, the up- and downstream logistics will be developed or acquired, secondly total capacity will be acquired by buying and building more (and bigger) vessels. Up until now every predicted maximum of vessel capacity has proved wrong and as it entails such a huge risk factor for competitiveness among carriers and, port and hinterland logistics alike, it demands attention.

The environmental aspects will limit choices but are non-discriminating regarding the carriers.

## 5.5 Phase 5 and 6, the four scenarios and their corresponding strategies

The development of the four scenarios for the container liner industry in 2050 (see also graph 12).

Fundamental vessel design is an ongoing activity but is very costly (often in excess of US\$ 100 M), shipyards are suffering from lack of orders and do not have the means to study extensively on innovative engineering, unless they have a paying customer. There is a number of academic research institutes on maritime technology, but most of them lack the funds to work on life-size concepts. So, will the economic development warranting these expenses for a single carrier and will others be prepared (or forced) to follow or seek alternatives? Somewhere in the next thirty years there will be a period of prosperity in which money will be available to the industry for innovative design. As mentioned before, if the time is ripe, bigger vessels are coming into service. Meanwhile smaller vessels (between 10.000 TEU and 15.000 TEU) are, according to several publications in Lloyds List<sup>ciii</sup> and among others, one by Baker, J., and one by Tan, W.Z., being ordered by some carriers to be more flexible in the choice of port of call and routing, still meeting demand quite comfortably. In the meantime, ecological demands call for sustainable transport and an environmental effect report is a must. This in combination with a feasibility study will decide the path taken.

A totally independent, but just as important part is the energy production, although innovation in this field is not exclusively relying on the maritime sector. Investment in new, innovative energy resources (type of power plants) and transformation to a maritime propulsion system will take time and huge amounts of money but have to be made. For instance, hydrogen-cell technology on this

scale or even hydrogen fusion might prove to be the future although they will not be available in the next decade.

Finally, the attitude of the new and younger management (Maersk, CMA CGM and Evergreen) towards business opportunities could prove to be the decisive factor. While, when autonomous shipping is concerned Maersk management is not convinced that it will be operational within any foreseeable future whereas others<sup>civ</sup> are adamant this will happen by 2030. In the South China Sea, a stretch of water is momentarily made available for testing with some autonomous vessels and companies like MOL are working on models that make crewless vessels feasible. They build fully electronic motor management systems and are testing diagnostic systems with audio sensors in the engine room allowing for precautionary maintenance. In the meantime, Gronholt-Pedersen, J., (2018) reports in a Reuters<sup>cv</sup> article the merger of Damco (logistics service provider) with and the consequent integration by Maersk in its organization setting the pace for vertical integration. As mentioned before CMA CGM has, with the Eagle-services of its subsidiary APL, already achieved some inland logistic services, on top of that CMA CGM has recent intensified cooperation with CEVA and made an open bid on its outstanding shares (Baker, J., 2018)<sup>cvi</sup> which is a strong indicator that they wish to further proceed in direction of vertical integration and extended logistic services. Another signal in that direction is sought-after and acquired permission of the European Commission to take over the Finn company Containerships<sup>cvi</sup>. As Cosco is a complex conglomerate of among other things container shipping, port services, finance and logistics at the same time organizations as ZIM, HMM and the Samra Midas Group concentrating on the sea-born logistics or even specific parts of that.

The choice for vertical and/or horizontal integration is a strategic decision and will have a serious impact on the company. Failing to choose either will result in losing focus within the organization and even result in conflicting interests among departments (betting on two horses while losing out to a third one). So, best practice here is the choice of one direction as main goal, where the other direction can serve as a secondary target in a more tactical manner (keeping future options open and avoiding conflicts of interest within the organization).

The previous results in the four points at the axis of graph 12 (next page):

The strategic choice between specialisation and diversification, [horizontal versus vertical integration](#) is represented on the vertical axis:

- Horizontal integration (more capacity in one organisation) concentrating on transport and port logistics
- Vertical integration (up and downstream from sea transport) working towards a door to door service in house (or at least as close by as can be) and total logistics.

The strategic choice for vessel capacity, [vessel size \(24.000-40.000 TEU\)](#) is represented on the horizontal axis:

- The maximum vessel size (24.000 TEU) is (almost) reached
- McKinsey predicts an almost unlimited vessel capacity growth up to 50.000 TEU over the next 50 years, which translates to about 40.000 TEU in 2050.

### Horizontal integration

Limited growth in vessel size	<i>Muddling through</i>	<i>Take it or shake it</i>	Unlimited growth in vessel size
	<p>Vessel capacity is limited through physical limitations and lack of initiative for port and waterway development</p> <p>The market is reduced to just a few relevant players and small local satellites necessary for cabotage</p> <p>Competition is on price alone based on economies of scale and standard product offerings (commoditisation)</p> <p>The average economic growth is at best 0,5%</p>	<p>Vessel capacity is not limited by physical limitations and innovative development has enabled access to main port on all continents</p> <p>The dominant carrier(s) (flanked by small satellites in nice markets) is/are acting in a league of their own but should continue investing in yet bigger vessels to keep new entrants out.</p> <p>Service consists of just the transport from main port to main port and terminal handling, further transport takes place outside the scope of the main carriers and is left to local providers</p> <p>The average economic growth is at least 2,5%</p>	
Limited growth in vessel size	<i>Total customer value</i>	<i>The power game</i>	Unlimited growth in vessel size
	<p>Vessel capacity is very diverse but still limited by natural and port restrictions</p> <p>Total logistics is key and optimal service to shippers is focal</p> <p>Market conditions are moderate and suffer from sustainability issues</p> <p>Competition is on total added value and punctuality</p> <p>The average economic growth is a moderate 1%</p>	<p>Through innovative development of both vessels and port facilities, the main routes are serviced by extreme large vessels to just that one hub</p> <p>New energy and power units are applied in these vessels only feasible on a large scale so hub and spoke is the way forward with smaller vessels servicing the regions</p> <p>Only the very large organisations have the capability to deliver this kind of service and should be able to have adequate and timely door to door transport in house</p> <p>The average economic growth is at least 4,5%</p>	

### Vertical integration

Graph 12, a diagram presenting the scenarios for the 2050 situation discussed below

Existing carriers are “*Muddling through*”:

In this situation the economy is growing slowly, at best an average of 0,5%, near sourcing and reshoring are taking an important place together with and facilitated by new production methods like 3D-printing<sup>cviii</sup> of components or complete products. Seafaring transport of containers is not a booming business, so price is key in acquiring cargo and little is spent on innovative design. The remaining three or four leading carriers are using conventional, low emission LNG engines. Seaborne

transport consists mainly of raw materials and fuels in bulk whereas transport of (half-)products is commoditized. Governments are reluctant to invest in infrastructure (road, railroad and inland waterways), so each of the carriers has his own select group of regional distributors with whom they have exclusive contracts for cabotage and inland transport.

A surviving strategy for “*Muddling through*”:

As there are but a few carriers ferocious competing on a global scale, the product/service is commoditized and break-even is the best obtainable result. Here the best strategy is to develop an adequate network of satellites for cabotage and punctuality (stable and reliable schedules, more important than speed) at predictable pricing (predetermined bunker surcharge calculation and application). Lack of restraint in ordering new capacity (capacity growth exceeding demand growth) remains the main hinderance for a flourishing container carrier branch, so cost reduction is a must. While bigger vessels are not feasible autonomous shipping is, so the more successful carrier company operates a fleet of crewless vessels of a moderate size (between 14.000 and 18.000), being more flexible and having access to more ports. By realizing a higher load factor and thus a higher efficiency and a cost/TEU reduction resulting in an advantage over the competition. At first skeleton crews were still on board, but cost-based arguments forced the transition to fully autonomous shipping in combination with advanced blockchain and T&T facilities. In line with this development digitisation of the entire organisation together with enhanced cybersecurity are of the utmost importance, further reducing total cost.

Competition is fierce in “*Total customer value*”:

The economic situation is not that different from the first described scenario with an average economic growth at a moderate 1%, but now the carriers aim to please their customers and offer complete packages of total supply chain solutions with added value to the shipper, resulting in higher margins. Vertical integration is the name of the game. As competition is mainly based on complete logistic solutions inland transport is more important and going the extra mile (preferably including the final one) wins the contract. Shippers still have the upper hand in many rate negotiations, but margins are a lot better and there is room for investment in vessel improvement and innovative distribution techniques.

As the economy, especially in the seafaring container business is slow, existing capacity is quite adequate, so new initiatives are mostly aimed at more sustainable transport and reducing the carbon footprint of a TEU/km. Regional cooperation is still important but does not lead to exclusivity and new forms of cooperation for inland transport are found, especially for the more remote areas.

A rewarding strategy for “*Total customer value*”:

As competition is still fierce in this slow growing (on average about 1%) economy carriers now compete on total added value, global coverage is essential, but the reward lies in better margins. The question here is make or buy? Building inland logistics networks is not only costly and time consuming but also bears the risk of failure imaginably through a lack of confidence caused by unfamiliarity. On top of this freight forwarders and/or shippers might choose other carriers (Porter, J., 2018<sup>cix</sup>) during the initial stages. A more prudent strategy is the acquisition of (or merger with) one or more established logistic service providers (like Kühne & Nagel). In this scenario the final mile will make the difference, but not unless reliability and timeliness are exceptionally high. An alternative strategy is available to carriers with a proven track record in inland logistics like CMA CGM through their subsidiary APL (Baker, J., 2018<sup>cx</sup>) strengthened participating in an organisation like CEVA Logistics (Baker J., 2018<sup>cx</sup>). On a secondary level sustainability will play an important role (renewable energy and IT optimised navigation) as will labour conditions (such as a skeleton crew and magnetic mooring).

Competition in *“Take it or shake it”* is limited to the ‘happy’ few who could keep up the pace: Through daring innovative investment in new hull, propulsion system and mobile power supply design, the possibilities are practically endless for those who dared. The current (2050) vessel size is 40.000 TEU, but in the near future it will grow to at least 50.000 TEU, competition is hardly an issue, only the very big can afford to exploit this size of vessel. Those who cannot keep up are doomed to lose out and disappear into the margin, accepting the role of satellite, eligible for transport to and from the few main remaining Hubs (in the new “Hub and Spoke” system). The big three offer transport between the Hubs on each of the (sub-)continents at rock-bottom rates, profitable only through the use of the largest vessels loaded close to the maximum capacity. Customer service is not on the agenda of the carriers, just the most efficient transport of as many containers possible. The only way to survive here is to be one of the big three or become a persistent nice player and be satisfied with crumbs from the head table. So, it is ‘up or out’ in environmental circumstances where the average economic growth is at least 2,5%. Governments compete among each other to gain the privilege of hosting the main Hub on the continent regardless of the cost, even neglecting their responsibility towards the environment, also allowing fully automated<sup>cxii</sup> and crewless vessels<sup>cxiii</sup>.

A gratifying strategy in *“Take it or shake it”* is:

For as long as more than one carrier operates on a global scale, vessels will grow, just moving boxes from hub to hub. For the carrier the most relevant strategy is to reduce cost through applying the newest technology in shipbuilding and propulsion systems as well in vessel operation (autonomous sailing and IT aided navigation), docking and terminal operations. Being the first to apply a new technology or methodology will make the difference between being successful or losing out to the competition. The only service that can be delivered is punctuality at rock-bottom prices, probably while speed is of the essence (slow steaming will end here).

For governments, becoming one of these hubs gives a huge boost to the economy of a country, both in relation to transshipment, hinterland transport and terminal activities as in creation of added value through assembly, repackaging and warehousing. This means however that dredging wide ports basins (if natural deep water is not available in the vicinity) to enormous depth with long berth space and providing high capacity hinterland infrastructure is obligatory.

Finally, there is only one left in the *“The power game”*:

Everyone involved is looking for new opportunities, but only one has the tenacity and capital to go forward in this brave new world, the average economic growth is at least 4,5% New power sources are of an extreme large scale demanding larger vessels (at the same time working at low cost and emission free), the only drawback is the prohibitive high initial investment (in the order of several billion US\$). As a result, innovative hull design is needed and new dock design<sup>cxiv</sup> is necessary. To be able to attract enough cargo up- and downstream transport are part of the package deal. Preventing congestion either in the harbour basin or on the terminal, the hinterland transport is integrated into the system, so inland barges and rail links to at least the central inland terminals as well as the cabotage for a larger region are essential. The risk of a true monopoly is real, assuming that the remaining carrier is excellently managed. An alternative is not readily available, for this remaining, dominant carrier has grown mostly organically in this situation (a parallel with Microsoft is likely to happen). Being the first (and only one) able and willing to invest in those innovative huge vessels, since the market is not big enough to facilitate several of these carriers. There is some room for specialised niche players on a local or regional scale servicing small ports, special needs and exceptional routes. Governments will have to cooperate in regulating rates and frequent scheduled services, mainly controlled by both territorial waters and harbour access.

The strategy to survive in the “*The power game*” as the last carrier standing:

The only carrier that will remain in this situation is the first to adopt the innovative propulsion system and hull design along with an investment in regional (continental) serving port facilities (berth, cranes and terminal space and equipment). This in combination with cabotage alliances, hinterland transport links and a complete door to door service proposition for all shippers alike with regard to the needs of beneficiary cargo owners (BCO's). If well planned and executed competition is unable to keep up and the new rates leave no profitable proposition for other competitors. In this scenario the innovator gains a decisive advantage but has to guard his strategy and has to refrain from reaping monopolistic profits otherwise governments might refuse access to territorial waters and at the same time provide an opening for the competition to work profitable with more conventional vessels. A probably decisive advantage will be the zero emission from the new power source and propulsion system, combined with low operating cost, the only drawback is the discontinued growth line since this new technology demands a significant jump up in the size of vessel and the adherent investment.



## Chapter 6, Conclusion

### 6.1 Introduction

In previous chapters, data were collected on respectively shipping, container shipping and container liner alliances to develop scenarios on the industry in 2050. The main question posed in chapter one was: *“How will the supply-structure of ocean going container transport develop over the next generation?”*. As the scenarios show there is not an unequivocal answer to this question. The secondary question: *“What is a feasible strategy for a container liner?”* as answered in the contingency approach for each of the four scenarios in the last chapter was more straightforward. In the next paragraph I will give a more personal opinionated analysis of what the most likely outcome in each of the four scenarios is for each of the seven leading carriers, along with weighing the graphs from the appendixes.

If maximum vessel size in 2050 is 40.000 TEU and growth in the next decade to 50.000 TEU, as predicted by McKenzie, competition will hardly be an issue, only the very big can afford to exploit this size of vessel. Unlimited growth is not the most likely scenario, the risk factor is high and therefore worth mentioning. Discussing a sure thing (like autonomous shipping) has little added value. So, if one looks at the risk factor (risk = probability x effect) involving the significant consequences of a wrongly estimated capacity growth magnitude and probability, this entails the pursuit of a failing strategy. Size does not make manoeuvrability and containers handling just an economic issue (cost) but also a technical one (there are limits to what is practically feasible). When vessel keep on growing (e.g. forced by an energy transition due to emission legislation) one would have to think out of the box. For instance, the creation of a hub at sea (floating or fixed to the bottom of the sea) like an oversized oilrig. Another possibility is the use of extreme deep waters such as the Norwegian fjords. On the other hand, modular or articulated vessels could overcome some manoeuvrability problems, although dredging would still be a problem in many a port basin. Yet another solution might be the reintroduction of a new form of LASH ships. The availability of berth length and crane reach, might be solved by creating dedicated docks (tailor made to the beam) with portal cranes stretching across, handling groups of containers, more extensive terminals and smart hinterland connections. Here, governments and port authorities are striving to gain the privilege of hosting a (continental) hub and are prepared to make huge sacrifices, providing required hinterland infrastructure to retain the business.

The choice between horizontal or vertical integration is a strategic decision and needs undivided attention of senior management avoiding suboptimal results.

### 6.2 Analysis of strategies from the emerging scenarios

In general, the best strategy in any situation of innovative technology is to be the first to incorporate when it comes available, this might turn out to be a race to the post. The planning horizon is approximately seven to ten years (or even the twenty years of the lifespan of vessels). The capital acquired makes it advisable for the carrier to form an alliance with a large vessel owner (for instance Seaspam) and a large shipyard (or group of shipyards) and a syndicate of finance providers (or seek government support) well in advance of the strategy becoming operational. In shipping, container transport is relatively young and consists mainly of liner business, being a liner, the drawback is the lack of freedom to move with the trade like a tramp could do. Efficiency commands optimal use of the (maximum) capacity, so carriers have to entice shippers to make use of their service by offering attractive deals (low pricing, flexibility and diversity in destinations and high frequency in sailing

dates). To be able to meet demand without extensive supply is at best precarious especially in a frantically contested branch, also a consistent strategy is important to survive. On top of that trade barriers (cabotage restrictions, tariffs and quota) and a demand for more sustainable transport and tighter limits to the environmental load acceptable (waste water management, restricted fumigation and CO<sub>2</sub>-cap) make logistics more complex and often more expensive.

While writing this thesis there are three Alliances left, but the European Union is re-evaluating the block exemption and many shippers are protesting the situation as it stands (they do so already for many years), so I expect some fundamental changes in the system. The Alliances as such will eventually cease to exist, already many across Alliance boarder VSA's and other forms of cooperation are in place. Meanwhile the largest carriers have formed a new group tackling ICT problems especially for the formation of a standardised format for Blockchain in the industry. There will always remain collaboration among carriers, but under external (shippers lobby) and political (foreign policy) pressure less obvious and more loosely. E.g. individual carriers will continue to make bilateral deals (slot agreements) on specific routes, over time however the number of (surviving) global operating carriers will further decline to two or at the utmost three depending on the scenario evolving.

Four of the top 7 carriers are European, Maersk, MSC, CMA CGM and Hapag-Lloyd, for individual carriers the scenarios can be quite devastating. For example, looking at market leader Maersk in Appendix I they stand out in a league of their own, but in Appendix I<sup>a</sup> their performance is mediocre at best. After integrating Hamburg Süd (wrapping up their M&A strategy) they now have ordered four new build feeders (2200 TEU) with an option for another five. While integrating Damco into the own organisation, they have difficulty selling off parts no longer considered essential for the core business. From the past (integration of Sea-Land) it is apparent that integration and standardisation is not always the most successful option (loss of most of the Latin American clientele from Sea-Land). As Søren Skou (CEO Maersk) does not believe in autonomous shipping or ordering new, bigger vessels only "Muddling through" or "Total customer value" are accessible, nonetheless in the case of "Total customer value" emerges, CMA CGM is the better equipped organisation with a superior focused strategy. Based on these arguments it is far from evident that Maersk will still be in existence in 2050.

The second largest carrier MSC has an organic growth strategy ordering ultra large, LNG powered vessels, financed partly with money from China. This privately (the Aponte family) owned Swiss company also has a fleet of state of the art cruise vessels. By keeping a low profile in media and maintaining a neutral position in many circumstances, not in the least in concentrating on sea-transport, ignoring inland transport, they achieved a formidable market share. Whether this strategy is adequate to take on Cosco regarding a scenario in which ultra large vessels are dominant is a question, however in "Muddling through" MSC will outmanoeuvre Maersk.

CMA CMG is also privately owned (Saadé family and Turkish Robert Yildirim), but has a totally different (M&A-) strategy by in contrast with Maersk not fully integrating and standardizing new acquisition, rather retaining the individual company (and more importantly brand) strength, hence serving distinctive market segments at discrete rates. By acquiring a major stake in the logistics service provider CEVA, CMA CMG has strengthened its position on the market for door to door logistic service, so especially in the case of "Total customer value", but even in "The power game", CMA CMG will be a formidable competitor, possibly the sole survivor at any rate overpowering Maersk in both scenarios.

Management of the smallest European carrier, Hapag-Lloyd, is developing a new strategy in which growth is no longer an issue, but cooperation in one way (talks with CMA CMG) or other

(participating in Kühne Logistics University [KLU]<sup>cxv</sup> of Kühne & Nagel) might indicate a first direction, a sovereign survival in any of the scenarios is, in my view, quite unlikely. It is feasible in any of the scenarios that the likes of Amazon feel the need to become independent of third party logistics (3PL) providers and buy or start their own carrier service (possibly serving others as well). Amazon has proven this ambition by the order of 20.000 Mercedes delivery vans, a natural continuation might be the acquisition of Hapag-Lloyd.

An obvious survivor in any case, but certainly in “The power game” is Cosco with its deep (governmental) pockets, an aggressive growth strategy with the means to accomplice, strategic partnerships in the South-East Asian region (Hutchison and Port of Singapore Authority [PSA]) and recent advances Sovcomflot (SCF) a force to be reckoned with. Not ushered as such publicly, in my opinion supremacy is predominantly high on their agenda. With the acquisition of OOCL Cosco has obtained a superior ICT and planning department and has as a result gained a substantial profit generating ability. In “Take it or shake it” Cosco is best positioned to become the dominant player. Due to the collaboration with Hutchison and PSA they can realise the necessary hubs on each continent (two on each) serving the ultimate hub and spoke system. In both these, in my opinion less likely, but still relevant (risk factor) scenarios (even if the maximum vessel size in 2050 is significantly less probably no more than about 30.000 TEU), Cosco will emerge as market leader. A future link with Alibaba can guaranty a capacity load on each journey and make container repositioning easy.

A true survivor is ONE, of national interest to Japan, which makes this carrier almost immune to results or competition, although the initial stages were far from ideal, it seems they are now recovering lost territory. The parent companies were small carriers, but each in their own right major nautical players as can be seen in Appendix II. In any of the scenarios One will play a secondary role guarantying Japans independence in nautical container transport.

The smallest, but still almost twice as big as the next carrier of the Alphaliner top 100 carriers is (the also privately owned) Evergreen with the ambition to strive past ONE with an orderbook of 78 vessels. The new management (after dr. Chang died) were adamant in staying independent and go forward serving less conventional trade routes and guarantying Taiwan’s independence in nautical container transport. This independent strategy makes Evergreen a survivor in each of the scenarios.

### 6.3 Conclusion, answers, suggestions for further research and reflexion

From the previous the conclusion is: In each of the scenarios a different set of carriers will survive, in specific instances more marginal than under other circumstances and at least Cosco, MSC, CMA CGM, ONE and Evergreen will survive, with the overall winner Cosco (backed by the Chinese government). ONE and to a lesser degree Evergreen have a strategic value to their respective countries and therefor will keep on going and find their own destination, albeit neither as market leader nor as dependant satellite. MSC has a competitive advantage in the provision of the singular product (ocean container transport) and an efficient management with a tendency towards survival, especially in commoditised market. Whereas CMA CGM is providing superior total and individual logistic solutions thus creating a competitive advantage in a differentiated market with possibilities price differentiation. Simultaneously CMA CGM is building an innovative environment in Marseille, encouraging and supporting upstarts in logistics and ICT. The current (2018) market leader Maersk has difficulty to unload its energy division and is struggling to stay on course, changing direction every couple of years. Although Hamburg-Süd, for now, is handsomely contributing to Maersk’s bottom-line, the integration will deduct from that soon enough. Their strategic financial resources

resulting from sale of their retail and financial branches might prove hardly adequate to moderate compounding losses from poor market conditions (idle vessels and stricken services on the Asia-Europe route) and the lingering energy division. Strategically, the top 5 major carriers (ONE and Evergreen are not competing for market leadership) are focussed on their position in the ranking and gain advantages (in scale and scope) over their competitors with less consideration for the level of demand, ultimately resulting in the demise of at least two of them. Carriers keep on ordering new and larger capacity vessels, partially neglecting the smaller feeder segment, as rates threaten to become uneconomical due to dwindling demand, alliances cut services leaving capacity idle, for instance see Baker, J., 2018<sup>cxvi</sup>. So, for as long as there is more than one carrier globally active, the market situation remains tough and a synchronised supply and demand cycle is rarely occurring, resulting in just the occasional match between the two.

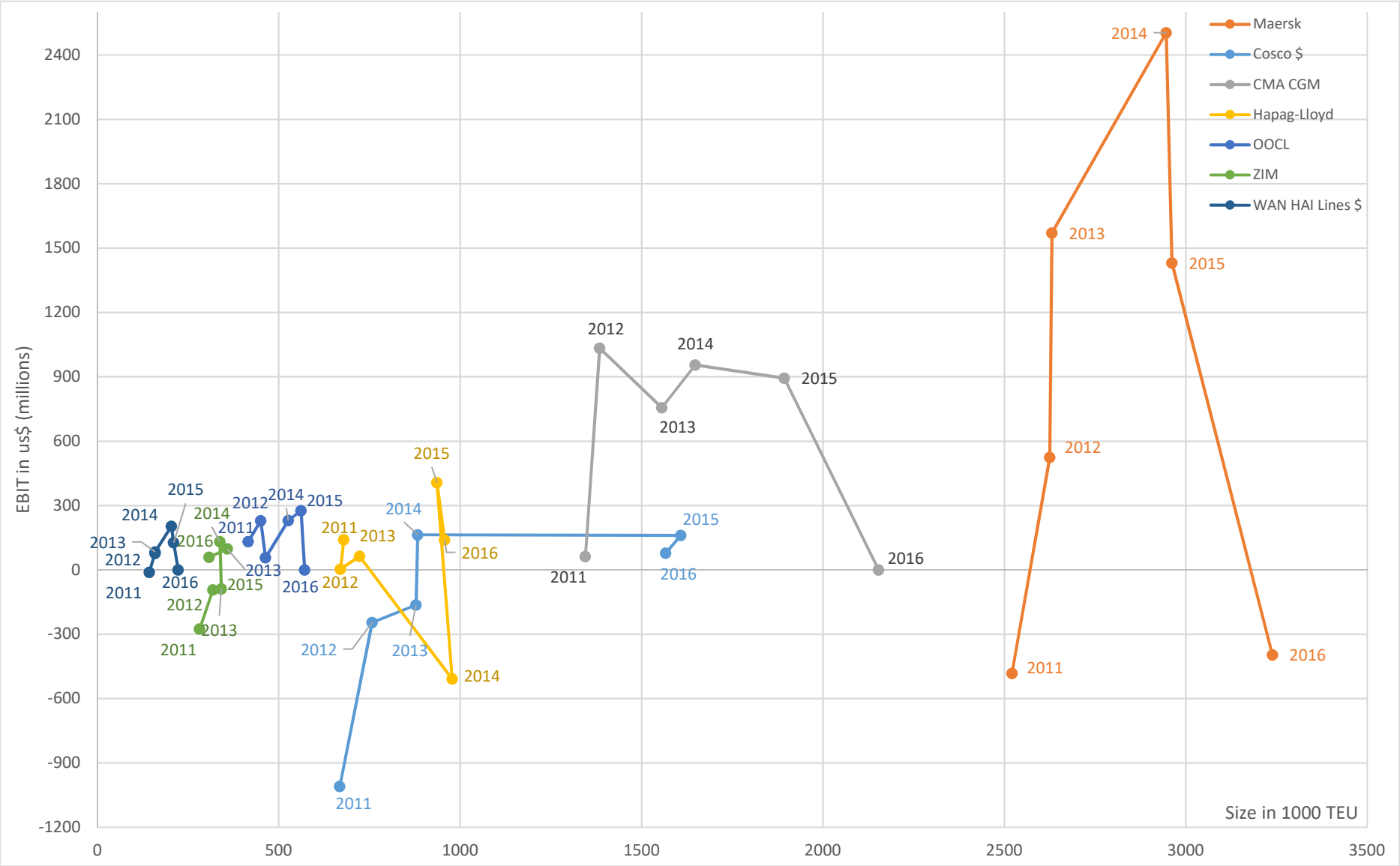
Earlier 3-D printing was mentioned as a factor in future demand as was near sourcing, nonetheless in both cases raw materials and particularly the rarer ones have only a few sites where they can be found and accordingly need transport to the production site. A similar situation occurs when a minimum production volume is needed. The augmented prosperity in the developing countries (e.g. China and India) results in demand growth and locally rising production cost. Both occurrences instigate global transport demand to stay similar or even rise.

The answer to the main question *“How will the supply-structure of ocean going container transport develop over the next generation?”* therefor, in combination with demand, is: *“As a pair of intertwined sinusoids converging and diverging at regular intervals with limited influence from global economic circumstances”*. The secondary question *“What is a feasible strategy for a container liner?”* has already been answered. The best conceivable strategy however, has arguably been applied by the Tung family in selling off the parent company of OOCL to Cosco (realising a return otherwise unobtainable).

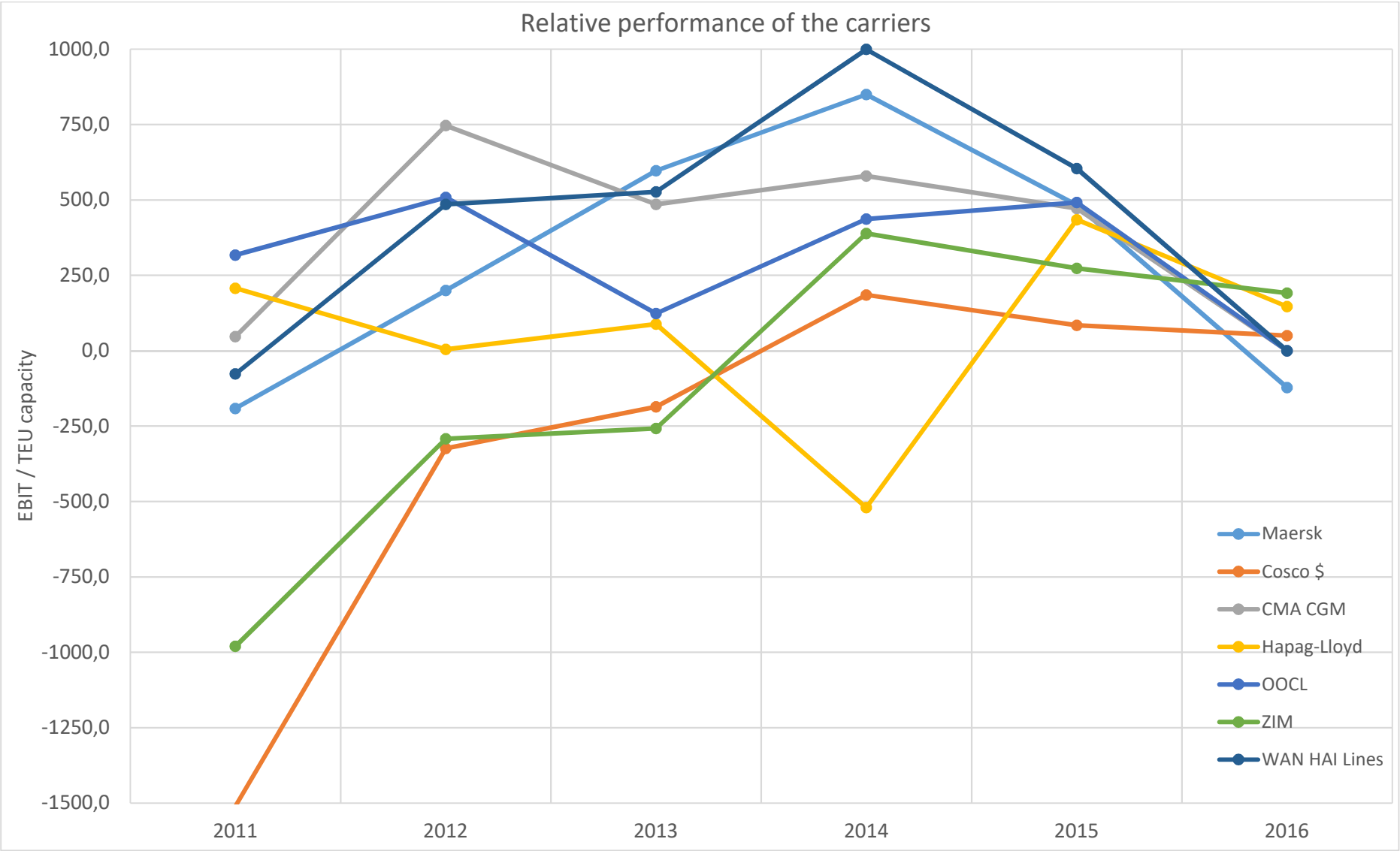
As in this thesis the emphasis lays on the supply-side of the carrier’s industry, research on the demand side developments for these scenarios can narrow down the strategic choices in each of them. Other and totally different aspects into which further research is desirable are innovative and mainly technical aspects of vessel design, power supply and energy transition. A completely different setting for future research is harbour basin (or offshore facilities) design naturally followed by need for a new terminal layout/construction. The previous cannot function properly without a thorough investigation into future hinterland transport or transport-sustainability as a whole.

Looking back at the process of writing this thesis I have learned a lot, more so then in many a university course. As I mentioned in the introduction, the demise of Hanjin triggered my curiosity and interest in the subject matter, however in hindsight it proved to be just a ripple on the ocean wave of container carriers. The Hanjin capacity appeared to be at that time less than the idle fleet, although the main disruption was the cargo held hostage on board their vessels just at the beginning of the peak season running up to Christmas.




As I progressed the carrier-landscape changed rapidly and the need for actual, reliable information grew. Yet the sheer quantity made selection of sources necessary and also forced me to focus on a more restricted subject matter. It was, due to the many interesting new occurrences, hard to come to an end, the support from the staff and especially dr. Bart Kuipers was crucial, never directive, still critical and open minded. The subject matter has certainly capsulated me and will keep on doing so. In retrospect the factual historic development was perhaps less relevant for this paper, however the evolution of the market structure has an important bearing on future processes. Finally, a closer inspection of ground breaking new forms of cooperation (with a shipper and/or producer of goods) might shed a new light on this evolution.



Appendix I<sup>a</sup>



## Appendix II

Industrial Segment	Type of Vessel	Kawasaki Kisen Kaisha, Ltd. (川崎汽船株式会社?) 				Mitsui Steamship Company & Osaka Shosen Kaisha (OSK Lines) 				Nippon Yusen Kabushiki Kaisha (NYK Line) 			
		Total		FY end 17/3 (¥bln)		Total		FY end 17/3 (¥bln)		Total		FY end 17/3 (¥bln)	
		Number	DWT (x1000)	Revenue	Profit/Loss	Number	DWT (x1000)	Revenue	Profit/Loss	Number	DWT (x1000)	Revenue	Profit/Loss
Liner Trade	Container ships	67	4431	519,0	-31,5	91	6947	620,7	-32,8	97	6097	585,9	-12,7
Bulk Carriers	Dry Bulk	191	31222	456,0	-9,5	202	23778	744,2	39,0	372	36007	717,7	-4,2
	Wood Chip Carriers	9				39	2158			43	2321		
	Car Carriers	93				120	2042			111	2011		
	Tankers	22				40	10498			63	10080		
	LNG	42	4510			80	6290			29	2177		
Offshore	Shuttle Tankers	48	734	19,4	-5,1	29	93	132,0	16,8				
	Other Ships	23				4	0			43	704		
Other Ships	Not mentioned before					242	10274						
Logistics												461,4	7,7
Other	Business			35,3	2,5			7,3	1,8			238,0	13,2
Adjustments					-8,8			1,3	0,5			-79,1	-2,9
Total		495	40897	1029,7	-52,4	756	55133	1504,2	25,3	758	59397	2003,0	1,04

For the figure above I used the details from the respective Annual Reports and applied the annual average exchange rate quoted by “K”Line on the segment profit/loss for the “container ship” or “liner business” and the details from Alphaliner “Top 100” lists. Furthermore, the financial year of these companies starts on the first of April and ends the thirty-first of March the next year.

## Appendix III<sup>cxviii</sup>

		2M				Ocean				THE			
				TEU	PoC			TEU	PoC			TEU (M)	PoC
		Weekly	Vessels	(M)		Weekly	Vessels	(M)		Weekly	Vessels	(M)	
Alliances	totals		1228	6,7			1125	5,3			564	3,5	
Routes	A-NWC	5	50	0,6	24	13	78	0,6	30	11	65	1,2	29
	A-NEC	5			29	7	71	0,5	22	5	52	0,9	16
	A-NE	6	25	1,2	31	6	66	0,9	31	5	52	0,9	29
	A-ME	0				5	34	0,3	25	1	7	0,1	11
	A-M	4			33	5	41	0,4	33	3	29	0,5	20
	TA	3	47	0,6	18	3	17	0,1	21	7	34	0,6	16
Others	A-RS	2			14	2	16	0,1	12	1	7	0,1	15
Shared totals		25	193	2,4		41	350	3,5	174		246	4,4	
												(SSA)	

Alliances: 2M = Maersk & MSC (Capacity routes calculated!)  
 THE = ONE, Hapag-Lloyd & Yang Ming (Capacity TEU calculated!)  
 Ocean = CMA CGM, Cosco & Evergreen  
 Routes: A-NWC = Asia to North America West Coast A-M = Asia to Mediterranean  
 A-NEC = Asia to North America East Coast TA = Transatlantic  
 A-NE = Asia to North Europe A-RS = Asia to Red Sea  
 A-ME = Asia to Middle East PoC = Ports of Call

2M Alliance (total capacity 7.23 million TEU):

Maersk capacity<sup>cxix</sup> 3.828M TEU and MSC capacity 2.916M TEU in a Vessel Sharing Agreement (VSA), started 2015 for a period of ten year with a capacity of 2.1M TEU in the VSA

Hyundai Merchant Marine capacity 458K TEU in a Strategic Cooperation Agreement (outside 2M) – Slot Exchange/Purchase Agreement (SEA) per 1<sup>st</sup> April 2017<sup>cxx</sup>

Ocean Alliance (total capacity 6.03 million TEU):

CMA CGM capacity 2.168M TEU, Cosco capacity 2.185M TEU and Evergreen capacity 984K TEU in a Vessel Sharing Agreement (VSA), started 1<sup>st</sup> April 2017



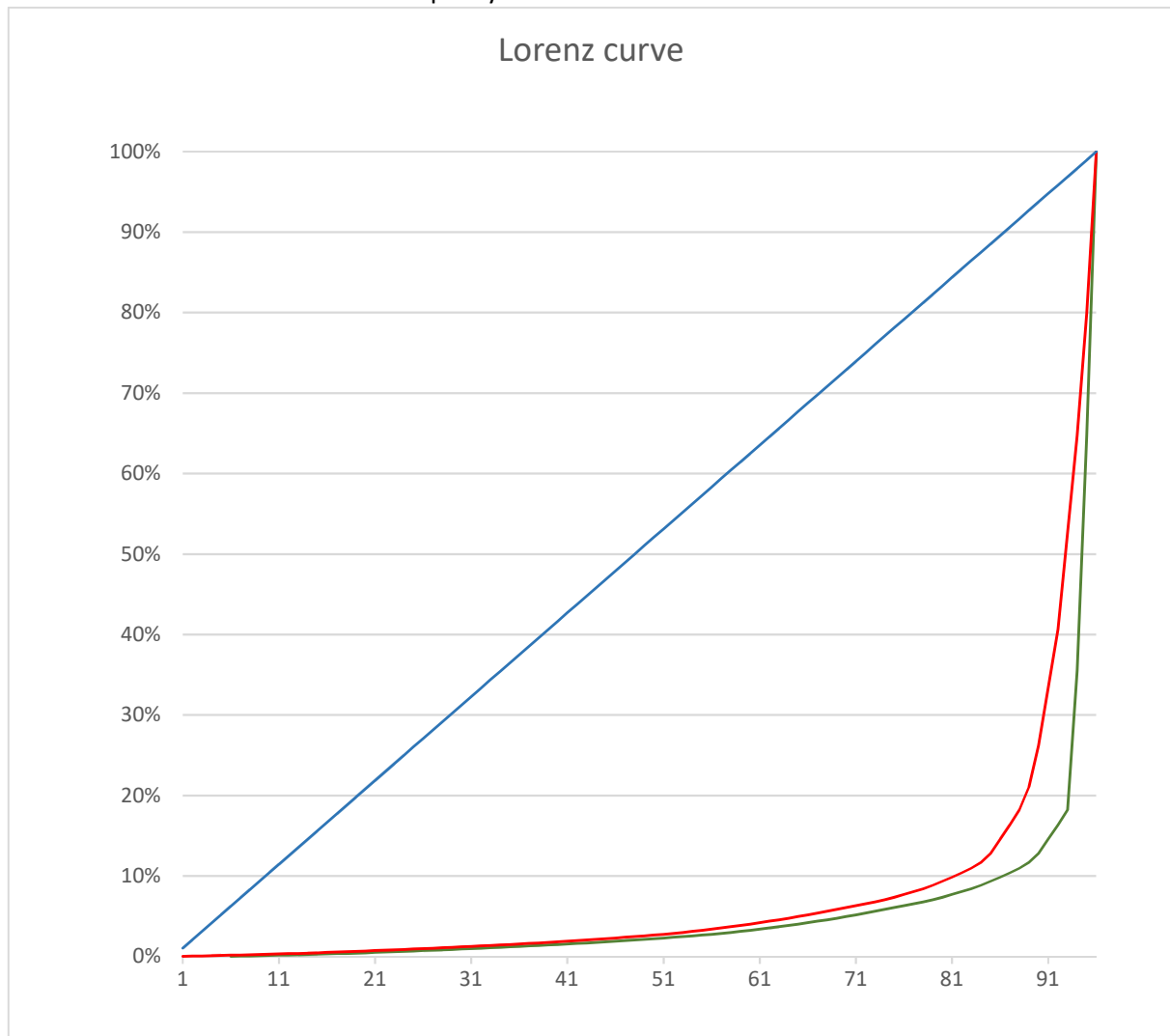
THE Alliance (total capacity 3.52 million TEU):

ONE capacity 1.378M TEU, Hapag-Lloyd capacity 1.533M TEU and Yang Ming capacity 596K TEU in a Vessel Sharing Agreement (VSA), started 1<sup>st</sup> April 2017



## Appendix IV

Concentration in container carrier capacity distribution.



This Lorenz curve is made based on the data of the Alphaliner Top 100<sup>cxix</sup> of 17 November 2017.

In this graph I have taken the situation as is after the completion of the takeovers by Maersk, Cosco and Hapag-Lloyd and after the realisation of the joint venture of ONE (the carriers outside the Alphaliner Top 100 have a capacity just under 780.000 TEU (or 3,65%) of the total), with an average vessel capacity of 876 TEU.

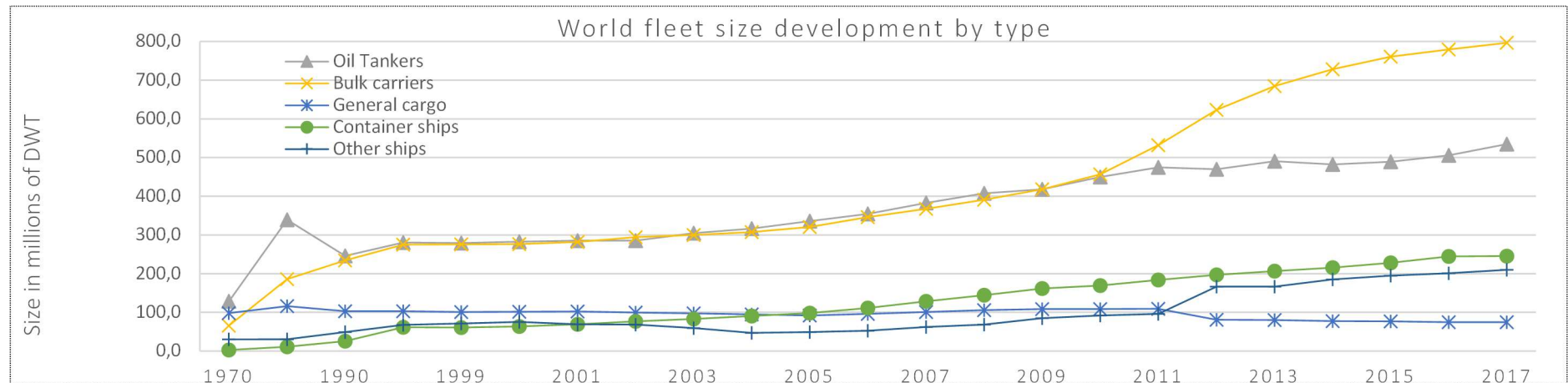
The horizontal axis arranges the carriers from small to large (96 in total), the vertical axis shows the cumulative percentage of capacity of these carriers.

The diagonal (blue line) represents the equal distribution, whereas the red line represents the actual distribution, the capacity concentration of the three alliances, each seen as one entity, in respect to the remainder of the carriers is an even more skew distribution (green line).

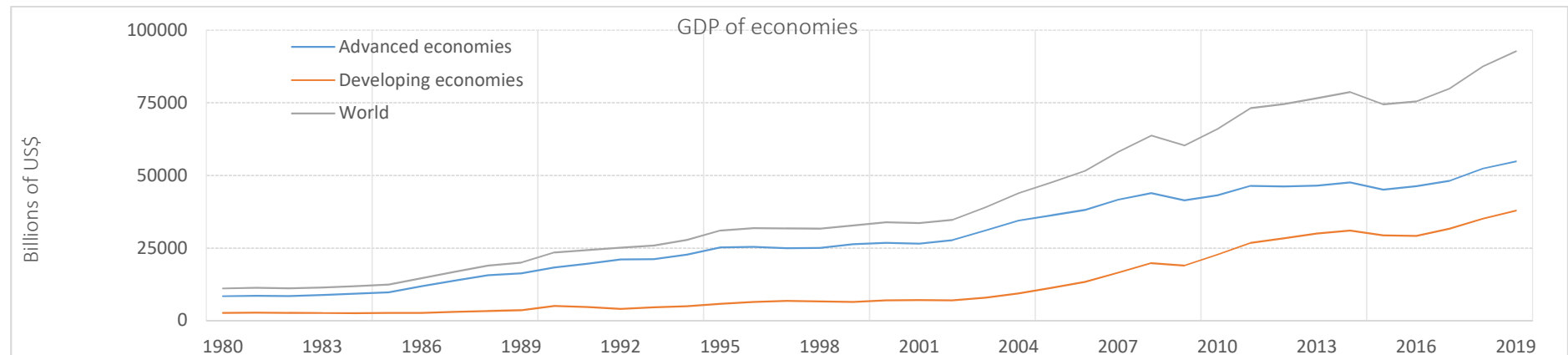
A Herfindahl-Hirschman Index calculated on the same figures results in a moderate 1077 for the market regarding just the size of the individual carriers, which is considered a competitive market and 2410 if the three alliances are seen as fully integrated organizations, which bears down to a moderately concentrated market. Drewry Maritime Research published a more detailed analysis in Global Trade Magazine<sup>cxix</sup> January 22, 2018.

## Appendix V

### World economic growth and fleet development



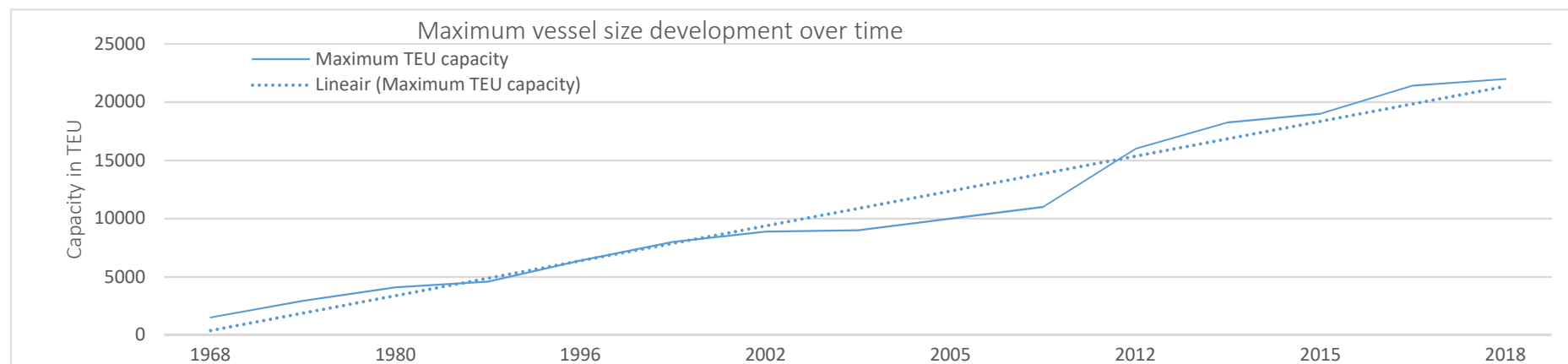
Graph depicting the growth of the world fleet categories, based on the data from the “Review of maritime transport” 2001 through to 2017, UNCTAD, Geneva, tables for “World fleet size by principal types of vessel”.



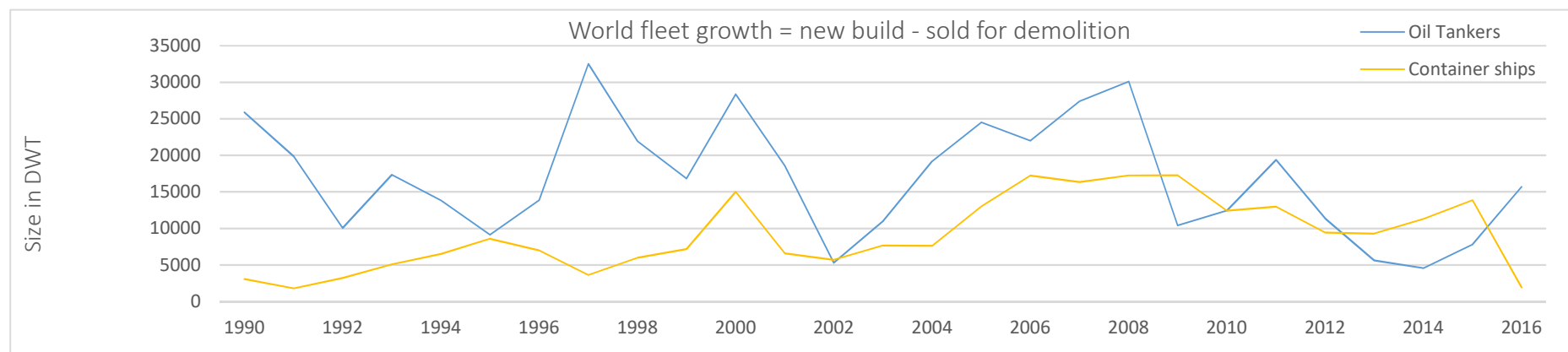
Graph depicting the evolvement of the GDP as a benchmark for the economic growth over time based on data from IMF data mapper: “GDP, current prices (Billions of U.S. dollars), IMF, 2018<sup>cxix</sup>”.

## Appendix VI

Size of fleet and individual vessel development over time.



Graph based on data from Mehdi, R.A., et., (2018) “North Sea Region Programme<sup>cxix</sup> 2015 – 2020, (2018) from the European Commission”. Only in the 2002 – 2012 period the vessel size is under the trendline.



Graph depicting the development of the world fleet size regarding Oil Tankers & Container Ships based on the data from the “Review of maritime transport” 2001 through to 2017, UNCTAD, Geneva, tables for “New Build container vessels” & “Sold for Demolition container vessels”.

## References:

- <sup>i</sup> Lakshmi, A. (2017). 'SM Group Mulls More Takeovers'. Retrieved from <https://www.marinelink.com/news/takeovers-group-mulls423354>, 2017, July 5;
- Sung-mi, A., (2016). 'Samra Midas Group eyes shipping industry', The Korea Herald. Retrieved from <http://www.koreaherald.com/view.php?ud=20160902000605>, 2017, July 5.
- <sup>ii</sup> Presentation 'Seaspan Q3 2016 Financial Results Conference Call' (2016). seaspancorp.com. Retrieved from [http://files.shareholder.com/downloads/SSW/5314648670x0x914800/84a7ac66-5434-47e6-82ab-b61078980b2b/SSW\\_Q3\\_2016\\_FINAL.PDF](http://files.shareholder.com/downloads/SSW/5314648670x0x914800/84a7ac66-5434-47e6-82ab-b61078980b2b/SSW_Q3_2016_FINAL.PDF), 2017, September 2.
- <sup>iii</sup> Lindgren, M., & Bandhold, H. (2003). *Scenario planning*. Palgrave. Retrieved from <http://innovatiecentrum.be/upl/doc/20160610-9FqTm-Scenario%20Planning%20-%20The%20link%20between%20future%20and%20strategy.pdf>, 2016, December 7.
- <sup>iv</sup> Joerss, M., Murnane, J., Saxon, S., & Widdows, R. (2015) 'Landside operations: The next frontier for container-shipping alliances'. Retrieved from <http://www.mckinsey.com/industries/travel-transport-and-logistics/our-insights/landside-operations-the-next-frontier-for-container-shipping-alliances>, 2017, February 28.
- <sup>v</sup> Data for US\$/CNY-conversion from, 2017. Retrieved from <http://www.exchange-rates.org/Rate/USD/CNY/>, 2017, February 3;
- Data for US\$/TWD-conversion from, 2017. Retrieved from <http://www.exchange-rates.org/Rate/USD/TWD/>, 2017, April 4.
- <sup>vi</sup> Data for US\$/¥-conversion from "Financial Highlights" for each year of 'Kline'. Retrieved from <http://www.kline.co.jp/en/ir/library/bs/index.html>, 2017, May 3.
- <sup>vii</sup> UNCTAD, Review of Maritime Transport 2011, (2011), United Nations publication. Retrieved from [http://unctad.org/en/docs/rmt2011\\_en.pdf](http://unctad.org/en/docs/rmt2011_en.pdf), 2017, May 10;
- UNCTAD, Review of Maritime Transport 2012, (2012), United Nations publication. Retrieved from [http://unctad.org/en/PublicationsLibrary/rmt2012\\_en.pdf](http://unctad.org/en/PublicationsLibrary/rmt2012_en.pdf), 2017, May 10;
- UNCTAD, Review of Maritime Transport 2013, (2013), United Nations publication. Retrieved from [http://unctad.org/en/publicationslibrary/rmt2013\\_en.pdf](http://unctad.org/en/publicationslibrary/rmt2013_en.pdf), 2017, May 10; UNCTAD, Review of Maritime Transport 2014, (2014), United Nations publication. Retrieved from [http://unctad.org/en/PublicationsLibrary/rmt2014\\_en.pdf](http://unctad.org/en/PublicationsLibrary/rmt2014_en.pdf), 2017, May 10;
- UNCTAD, Review of Maritime Transport 2015, (2015), United Nations publication. Retrieved from [http://unctad.org/en/PublicationsLibrary/rmt2015\\_en.pdf](http://unctad.org/en/PublicationsLibrary/rmt2015_en.pdf), 2017, May 10;
- UNCTAD, Review of Maritime Transport 2016, United Nations publication (2016). Retrieved from [http://unctad.org/en/PublicationsLibrary/rmt2016\\_en.pdf](http://unctad.org/en/PublicationsLibrary/rmt2016_en.pdf), 2017, May 10;
- UNCTAD, Review of Maritime Transport 2017, (2017), United Nations publication. Retrieved from [http://unctad.org/en/PublicationsLibrary/rmt2017\\_en.pdf](http://unctad.org/en/PublicationsLibrary/rmt2017_en.pdf), 2017, May 10;
- Alphaliner top 100, 2013 January 1. Retrieved from <https://www.alphaliner.com/liner2/reports/AR2012.pdf>, 2017, March 1;
- Alphaliner top 100 2015 January 1. Retrieved from [https://www.alphaliner.com/liner2/research\\_files/newsletters/2015/no01/Alphaliner%20Newsletter%20no%2001%20-%202015.pdf](https://www.alphaliner.com/liner2/research_files/newsletters/2015/no01/Alphaliner%20Newsletter%20no%2001%20-%202015.pdf), 2017, March 1;
- Alphaliner top 100 2017 January 6. Retrieved from <http://www.mttshipping.com.my/v2014/wp-content/uploads/2014/10/Alphaliner-Ranking-January-2017.pdf>, 2017, June 12.
- <sup>viii</sup> Meersman, H., Sys, C., Voorde E. van de, & Vanelander T., Competition issues in liner shipping (2015). Retrieved from <http://www.oecd.org/daf/competition/competition-issues-in-liner-shipping.htm>, 2017, June 12.
- <sup>ix</sup> World Bank, global economic prospects 4 January 2017. Retrieved from <https://openknowledge-worldbank-org.eur.idm.oclc.org/bitstream/handle/10986/26800/9781464810244.pdf>, 2017, May 3.
- <sup>x</sup> Saxon, S. & Stone, M. Container shipping: the next 50 years, report October 2017 McKinsey & Company, (2017) Retrieved from <https://www.mckinsey.com/industries/travel-transport-and-logistics/our-insights/how-container-shipping-could-reinvent-itself-for-the-digital-age>, 2017, November 6.
- <sup>xi</sup> Container Shipping: Testing the strength of the market makes spot rates drop, from (2017). Retrieved from [https://www.marineinsight.com/shipping-news/container-shipping-testing-strength-market-makes-spot-rates-drop/?utm\\_source=feedburner&utm\\_medium=feed&utm\\_campaign=Feed%3A+MarineInsight+%28Marine+Insight%29](https://www.marineinsight.com/shipping-news/container-shipping-testing-strength-market-makes-spot-rates-drop/?utm_source=feedburner&utm_medium=feed&utm_campaign=Feed%3A+MarineInsight+%28Marine+Insight%29), 2017, November 14.
- <sup>xii</sup> Container Shipping Facing Choppy Waters, from (2017). Retrieved from <http://worldmaritimenews.com/archives/234580/container-shipping-facing-choppy-waters/?uid=94674>, 2017, November 8.
- <sup>xiii</sup> Alphaliner top 100 2017, January 4, news.ehikoo.com (2017). Retrieved from <http://news.ehikoo.com/ehikoo/news/dataCenter/cdgm/images/20170104/22356.pdf>, 2017, March 24.
- <sup>xiv</sup> A.P. Møller - Mærsk A/S (2013). Group Annual Report 2012. Retrieved from [http://files.shareholder.com/downloads/ABEA-3GG91Y/6181097453x0x637683/2468E292-4017-45CD-AA20-1EF07FDA8B9A/Group\\_Annual\\_Report\\_2012.pdf](http://files.shareholder.com/downloads/ABEA-3GG91Y/6181097453x0x637683/2468E292-4017-45CD-AA20-1EF07FDA8B9A/Group_Annual_Report_2012.pdf), 2016, December 19;
- A.P. Møller - Mærsk A/S (2015). Group Annual Report 2014. Retrieved from [http://files.shareholder.com/downloads/ABEA-3GG91Y/6181097453x0x817087/42CD9C58-9686-4AEC-B0C4-0C7A291FDF14/Annual\\_Report\\_2014.pdf](http://files.shareholder.com/downloads/ABEA-3GG91Y/6181097453x0x817087/42CD9C58-9686-4AEC-B0C4-0C7A291FDF14/Annual_Report_2014.pdf), 2016, December 19;
- A.P. Møller - Mærsk A/S (2017). Group Annual Report 2016. Retrieved from [http://files.shareholder.com/downloads/ABEA-3GG91Y/6181097453x0x926927/1313EF10-D845-4BDE-A0B6-BFEC276D0EE5/Maersk\\_Annual\\_Report\\_2016.pdf](http://files.shareholder.com/downloads/ABEA-3GG91Y/6181097453x0x926927/1313EF10-D845-4BDE-A0B6-BFEC276D0EE5/Maersk_Annual_Report_2016.pdf), 2017, March 24;

---

Olesen, A., Corporate planning at A.P. Moller – Maersk, Basico CFO services, case story (2012). Retrieved from <http://bbart.org/wp-content/uploads/2014/11/Basico-Case-Story-APMM-Sep-2012.pdf>, 2016, December 19.

<sup>xv</sup> South African Regulator Gives Nod to Maersk Line's Hamburg Süd Deal, (2017). Retrieved from <http://worldmaritimenews.com/archives/231683/south-african-regulator-gives-nod-to-maersk-lines-hamburg-sud-deal/>, 2017, October 9.

<sup>xvi</sup> Maersk Tankers Sale Wrapped Up, (2017). Retrieved from <http://worldmaritimenews.com/archives/232092/maersk-tankers-sale-wrapped-up/?uid=94674>, 2017, October 12.

<sup>xvii</sup> APM Terminals and Damco slip into the red after first six months of the year, (2017). Retrieved from <https://theloadstar.co.uk/apm-terminals-damco-slip-red-first-six-months-year/>, 2017, October 13.

<sup>xviii</sup> APM Terminals puts an end to Tacoma lease. Retrieved from <http://worldmaritimenews.com/archives/231703/apm-terminals-puts-an-end-to-tacoma-lease/?uid=94674>, 2017, October 9.

<sup>xix</sup> Vogdrup-Schmidt, L., Lloyd's Register: 24,000 teu ships on the way, shippingwatch.com (2017). Retrieved from <http://shippingwatch.com/carriers/Container/article7115808.ece>, 2017, October 6.

<sup>xx</sup> How to effectively recycle 168 Eiffel Towers, A.P. Moller – Maersk (2016). Retrieved from <http://www.maersk.com/en/hardware/triple-e/how-to-effectively-recycle-168-eiffel-towers>, 2016, December 19.

<sup>xxi</sup> 6.Aponte Family, Mediterranean Shipping Co, Lloyd's List (2014). Retrieved from <https://lloydslist.maritimeintelligence.informa.com/LL048550/6-Aponte-Family-Mediterranean-Shipping-Co>, 2017, April 13; 8. Aponte Family, Mediterranean Shipping Co, Lloyd's List (2016). Retrieved from <https://lloydslist.maritimeintelligence.informa.com/LL110063/8-Aponte-Family-Mediterranean-Shipping-Co>, 2016, December 19.

<sup>xxii</sup> History of the Mediterranean Shipping Company, (2016). Retrieved from <https://www.msccruises.co.uk/en-gb/About-MSCC/MSCC-History.aspx>, 2017, April 12.

<sup>xxiii</sup> CMA CGM, a world leading container shipping Group, (2017). Retrieved from [http://www.cmathai-schedule.com/UserFiles/File/Brochure\\_CMA%20CGM\\_UK\\_V4.pdf](http://www.cmathai-schedule.com/UserFiles/File/Brochure_CMA%20CGM_UK_V4.pdf), 2017, April 14.

<sup>xxiv</sup> Jacques Saadé, founder chairman of the CMA CGM Group, (2017). Retrieved from <https://www.cma-cgm.com/the-group/management/jacques-saade>, 2017, April 19.

<sup>xxv</sup> CMA CGM consolidated financial statements (Annual Consolidated Accounts), [2011–2016]. Retrieved from <https://www.cma-cgm.com/finance>, 2017, March 1.

<sup>xxvi</sup> SECOND QUARTER 2017: CMA CGM outperforms the market with very strong operating and financial results, (2017). Retrieved from <https://www.cma-cgm.com/news/1750/second-quarter-2017-cma-cgm-outperforms-the-market-with-very-strong-operating-and-financial-results>, 2017, September 21.

<sup>xxvii</sup> CMA CGM agrees to buy Mercosul from Maersk, (2017). Retrieved from <https://www.maritime-executive.com/article/cma-cgm-agrees-to-buy-mercotel-from-maersk>, 2017, September 21.

<sup>xxviii</sup> CMA CGM to launch its fifth service in Indian Ocean market, (2017). Retrieved from [https://www.marineinsight.com/shipping-news/cma-cgm-launch-fifth-service-indian-ocean-market/?utm\\_source=feedburner&utm\\_medium=feed&utm\\_campaign=Feed%3A+MarineInsight+%28Marine+Insight%29](https://www.marineinsight.com/shipping-news/cma-cgm-launch-fifth-service-indian-ocean-market/?utm_source=feedburner&utm_medium=feed&utm_campaign=Feed%3A+MarineInsight+%28Marine+Insight%29), 2017, October 12.

<sup>xxix</sup> APL adds “Eagle GO” to suite of “Eagle Guaranteed Services”, (2017). Retrieved from [https://www.marineinsight.com/shipping-news/apl-adds-eagle-go-suite-eagle-guaranteed-services/?utm\\_source=feedburner&utm\\_medium=feed&utm\\_campaign=Feed%3A+MarineInsight+%28Marine+Insight%29](https://www.marineinsight.com/shipping-news/apl-adds-eagle-go-suite-eagle-guaranteed-services/?utm_source=feedburner&utm_medium=feed&utm_campaign=Feed%3A+MarineInsight+%28Marine+Insight%29), 2017, October 12.

<sup>xxx</sup> CMA CGM to acquire SOFRANA Unilines (2017). Retrieved from <http://worldmaritimenews.com/archives/231350/cma-cgm-to-acquire-sofrana-unilines/>, 2017, October 9.

<sup>xxxi</sup> CMA CGM Group: The [Corporate Social Responsibility](https://www.cma-cgm.com/the-group/corporate-social-responsibility/environment/sea-biodiversity-protection), sea-biodiversity-protection, (2017). Retrieved from <https://www.cma-cgm.com/the-group/corporate-social-responsibility/environment/sea-biodiversity-protection>, 2017, April 18; CMA CGM Group: The [Corporate Social Responsibility](https://www.cma-cgm.com/the-group/corporate-social-responsibility/environment/innovation-eco-solutions), innovation-eco-solutions, (2017). Retrieved from <https://www.cma-cgm.com/the-group/corporate-social-responsibility/environment/innovation-eco-solutions>, 2017, April 18.

<sup>xxxii</sup> China COSCO Holdings Company Limited, Annual Report 2011 (2012). Retrieved from [http://en.chinacosco.com/ChinaCosco/uploadFile/2011\\_ANNUAL\\_REPORT\\_E.pdf](http://en.chinacosco.com/ChinaCosco/uploadFile/2011_ANNUAL_REPORT_E.pdf), 2017, April 3; China COSCO Holdings Company Limited, Annual Report 2012 (2013). Retrieved from <http://en.chinacosco.com/attach/101/2012%20Annual%20Report.pdf>, 2017, April 3; China COSCO Holdings Company Limited, Annual Report 2013 (2014). Retrieved from <http://en.chinacosco.com/attach/101/LTN20140429508.pdf>, 2017, April 3; China COSCO Holdings Company Limited, Annual Report 2014 (2015). Retrieved from <http://en.chinacosco.com/attach/101/1505261138348815050.pdf>, 2017, April 3; China COSCO Holdings Company Limited, Annual Report 2015 (2016). Retrieved from <http://en.chinacosco.com/attach/101/LTN20160427454.pdf>, 2017, April 3; China's COSCO Shipping flags 9.9b yuan loss for 2016, (2017). Retrieved from <http://www.businesstimes.com.sg/transport/chinas-cosco-shipping-flags-99b-yuan-loss-for-2016>, 2017, April 25; COSCO Shipping International (Hong Kong) Co., Ltd., 2016 Annual Results (2017). Retrieved from <http://www.coscointl.com/cmsdoc/p2017327143417ppten.pdf>, 2017, April 3;

Dupin, C., COSCO Shipping records \$1.4b loss in 2016, (2017). Retrieved from <http://www.americanrunner.com/main/news/cosco-shipping-records-14b-loss-in-2016-67124.aspx?taxonomy=Ocean1>, 2017, April 3;

"China COSCO Holdings-A (601919) Details", (2017). Retrieved from <https://www.bloomberg.com/research/stocks/snapshot/snapshot.asp?capId=26003482>, 2017, April 3.

xxxiii Cosco group history, (2013). Retrieved from <http://en.cosco.com/col/col770/index.html>, 2017, April 20.

xxxiv Approves merger of Cosco Group, China Shipping, (2017). Retrieved from <https://www.bloomberg.com/news/articles/2015-12-11/china-s-cabinet-approves-merger-of-cosco-group-china-shipping>, 2017, April 20.

xxxv Dupin, C., COSCO to receive massive \$26b loan from China development bank, (2017). Retrieved from <http://www.americanrunner.com/main/news/cosco-to-receive-massive-26b-loan-rom-china-devel-66479.aspx>, 2017, April 20.

xxxvi "COSCO SHIPPING Lines CO., Ltd", video presentation, (2012). Retrieved from [http://www.cosfresh.com/html/index\\_EN.html#](http://www.cosfresh.com/html/index_EN.html#), 2017, April 20.

xxxvii Huang, R., & Feng, C., COSCO to join bid to take over Hong Kong shipping giant OOCL, (2017). Retrieved from <http://www.caixinglobal.com/2017-01-18/101046327.html>, 2017, January 19.

xxxviii Orient Overseas (International) Limited Annual Report 2011-2016. Retrieved from <http://www.oocl.com/eng/pressandmedia/ooclannualandinterimreports/Pages/default.aspx>, 2017, July 13.

xxxix French, E., Ho, S., Wong, K., & Zhao, T., COSCO Shipping holdings and SIPG jointly offer to acquire OOIL, OOCL press release, brunswickgroup.com (2017). Retrieved from <https://www.ooilgroup.com/newsroom/pressrelease/2017/Documents/COSCO%20SHIPPING%20HOLDINGS%20AND%20SIPG%20JOINTLY%20OFFER%20TO%20ACQUIRE%20OOIL%20ENG.PDF>, 2017, July 13;

Cosco Shipping Offers \$6.3 billion to buy Orient Overseas, (2017). Retrieved from <https://www.bloomberg.com/news/articles/2017-07-09/cosco-agrees-to-buy-orient-overseas-in-6-billion-deal-wsj-says>, 2017, July 10.

xl Ken Cih, K., GemStone and Orient Overseas Container Lines: A shipping industry case study, (2017). Retrieved from [http://seaside.gemtalksystems.com/docs/OOCL\\_SuccessStory.pdf](http://seaside.gemtalksystems.com/docs/OOCL_SuccessStory.pdf), 2017, February 20.

xli Paris, C., China's Cosco Agrees to Buy Shipping Rival OOCL, (2017). Retrieved from <https://www.wsj.com/articles/chinas-cosco-agrees-to-buy-shipping-rival-oocl-1499523063>, 2017, July 10.

xlii Evergreen Marine Corp. (Taiwan) Ltd. Financial statements and report of independent accountants December 31, 2012 and 2011, (2013). Retrieved from [https://www.evergreen-marine.com/tbf1/pdf/2012\\_Financial\\_Report.pdf](https://www.evergreen-marine.com/tbf1/pdf/2012_Financial_Report.pdf), 2017, April 3;

Evergreen Marine Corp. (Taiwan) Ltd. Financial statements and report of independent accountants December 31, 2014 and 2013, (2015). Retrieved from [https://www.evergreen-marine.com/tbf1/pdf/2014\\_Financial\\_Report.pdf](https://www.evergreen-marine.com/tbf1/pdf/2014_Financial_Report.pdf), 2017, April 3;

Evergreen Marine Corp. (Taiwan) Ltd. Financial statements and report of independent accountants December 31, 2016 and 2015, (2017). Retrieved from [https://www.evergreen-marine.com/tbf1/pdf/2016\\_Financial\\_Report.pdf](https://www.evergreen-marine.com/tbf1/pdf/2016_Financial_Report.pdf), 2017, April 3;

Evergreen Marine Corp Taiwan Ltd, reuters.com, (2017). Retrieved from <http://www.reuters.com/finance/stocks/overview/2603.TW>, 2017, April 3.

xliii The history of the Evergreen Group, (2017). Retrieved from [http://www.evergreen-group.com/puf1/jsp/PUF1\\_EvergreenGroup\\_en.jsp](http://www.evergreen-group.com/puf1/jsp/PUF1_EvergreenGroup_en.jsp), 2017, April 28.

xliv Paris, C., Taiwan approves \$1.9 Billion aid package for shipping companies, The Wall Street Journal, (2016). Retrieved from <http://www.msn.com/en-us/news/other/taiwan-approves-dollar19-billion-aid-package-for-shipping-companies/ar-AAknbsA>, 2017, April 28;

Evergreen Marine Corp Taiwan Ltd, corporate profile, (2017). Retrieved from [http://www.evergreen-marine.com/tbi1/jsp/TBI1\\_CorporateProfile.jsp](http://www.evergreen-marine.com/tbi1/jsp/TBI1_CorporateProfile.jsp), 2017, April 28.

xlv International Directory of Company Histories, Vol. 50. St. James Press, Evergreen Marine Corporation Taiwan Ltd. Company, (2003). Retrieved from <http://www.company-histories.com/Evergreen-Marine-Corporation-Taiwan-Ltd-Company-History.html>, 2017, April 28.

xlvi Evergreen Marine Corporation Taiwan Ltd. Company, notices and news, (2017). Retrieved from [http://www.evergreen-line.com/tuf1/jsp/TUF1\\_Html.jsp?page=TBN1\\_170306.jsp](http://www.evergreen-line.com/tuf1/jsp/TUF1_Html.jsp?page=TBN1_170306.jsp), 2017, April 28;

Evergreen Marine Corporation Taiwan Ltd., corporate governance, (2017). Retrieved from [http://www.evergreen-marine.com/tbi1/jsp/TBI1\\_Governance.jsp](http://www.evergreen-marine.com/tbi1/jsp/TBI1_Governance.jsp), 2017, April 28.

xlvii Lopez, E., Hapag-Lloyd, UASC merger completion postponed until May 31, (2017). Retrieved from <http://www.supplychaindive.com/news/hapag-lloyd-uasc-merger-delay-THE-Alliance/438377/>, 2017, May 2;

Berglund, P., Hapag-Lloyd: is there light at the end of the tunnel? (2016). Retrieved from <https://www.xeneta.com/blog/hapag-lloyd-light-at-the-end-of-the-tunnel>, 2017, May 2;

Saul, J., & Arno Schuetze, A., Exclusive: Financing hitches could delay Hapag Lloyd, UASC shipping tie-up sources, (2017). Retrieved from <http://www.reuters.com/article/us-uasc-m-a-hapag-lloyd-idUSKBN1491V7>, 2017, May 4;

Kristiansen, T., Hapag-Lloyd: UASC merger will cost one in ten positions published, (2016). Retrieved from <http://shippingwatch.com/carriers/Container/article9171697.ece>, 2017, May 4;

Saadi, D., Hapag-Lloyd ready to expand after UASC merger, (2017). Retrieved from <https://www.thenational.ae/business/hapag-lloyd-ready-to-expand-after-uasc-merger-1.11415>, 2017, August 21.

xlviii Hapag-Lloyd Investor relations, (2017). Retrieved from <https://www.hapag-lloyd.com/en/ir.html>, 2017, May 8;



Hapag-Lloyd annual report 2012, (2013). Retrieved from [https://www.hapag-lloyd.com/content/dam/website/downloads/pdf/hapag\\_lloyd\\_annual\\_report\\_2012\\_en.pdf](https://www.hapag-lloyd.com/content/dam/website/downloads/pdf/hapag_lloyd_annual_report_2012_en.pdf), 2017, March 1;

Hapag-Lloyd annual report 2013, (2014). Retrieved from [https://www.hapag-lloyd.com/content/dam/website/downloads/pdf/hapag\\_lloyd\\_annual\\_report\\_2013\\_en.pdf](https://www.hapag-lloyd.com/content/dam/website/downloads/pdf/hapag_lloyd_annual_report_2013_en.pdf), 2017, March 1;

Hapag-Lloyd annual report 2014, (2015). Retrieved from [https://www.hapag-lloyd.com/content/dam/website/downloads/pdf/Hapag\\_Lloyd\\_Annual\\_Report\\_2014\\_englisch.pdf](https://www.hapag-lloyd.com/content/dam/website/downloads/pdf/Hapag_Lloyd_Annual_Report_2014_englisch.pdf), 2017, March 1;

Hapag-Lloyd annual report 2015, (2016). Retrieved from [https://www.hapag-lloyd.com/content/dam/website/downloads/pdf/Hapag\\_Lloyd\\_Annual\\_Report\\_2015.pdf](https://www.hapag-lloyd.com/content/dam/website/downloads/pdf/Hapag_Lloyd_Annual_Report_2015.pdf), 2017, March 1;

Hapag-Lloyd annual report 2016, (2017). Retrieved from [https://www.hapag-lloyd.com/content/dam/website/downloads/pdf/HLAG\\_Group\\_Annual\\_Report\\_2016.pdf](https://www.hapag-lloyd.com/content/dam/website/downloads/pdf/HLAG_Group_Annual_Report_2016.pdf), 2017, May 8;

Desormeaux, H., Hapag-Lloyd's revenues, earnings tumble in 2016, (2017). Retrieved from <http://www.americanshipper.com/main/news/hapagloyds-revenues-earnings-tumble-in-2016-66851.aspx>, 2017, May 8;

D&B Hoovers, company information, Hapag-Lloyd Aktiengesellschaft, (2017). Retrieved from [http://www.hoovers.com/company-information/cs/revenue-financial.hapag-lloyd\\_ag.739a669f5832bc8b.html](http://www.hoovers.com/company-information/cs/revenue-financial.hapag-lloyd_ag.739a669f5832bc8b.html), 2017, May 8;

Shipping made in Hamburg, The history of the Hapag-Lloyd AG, (2016). Retrieved from [https://www.hapag-lloyd.com/content/dam/website/downloads/pdf/HLAG\\_Shipping\\_made\\_in\\_Hamburg\\_eng.pdf](https://www.hapag-lloyd.com/content/dam/website/downloads/pdf/HLAG_Shipping_made_in_Hamburg_eng.pdf), 2017, May 8.

<sup>xlix</sup> Walker, I., TUI sells remaining stake in Hapag-Lloyd, (2017). Retrieved from <http://www.marketwatch.com/story/tui-sells-remaining-stake-in-hapag-lloyd-2017-07-11>, 2017, August 21;

Pieffers, T., TUI verkoopt alle aandelen in Hapag-Lloyd, (2017). Retrieved from <http://www.nieuwsbladtransporthet.nl/Nieuws/Article/ArticleID/54043/ArticleName/TUIverkooptalleaandeleninHapagLloyd/Access/Anonymous>, 2017, August 21;

Hapag-Lloyd, CMA CGM hit the road for bond financing, (2017). Retrieved from <http://www.tradewindnews.com/liner/1296619/hapag-lloyd-cma-cgm-hit-the-road-for-bond-financing>, 2017, August 21.

<sup>i</sup> Hapag-Lloyd Group, Strategy & Outlook (2017). Retrieved from <https://www.hapag-lloyd.com/en/ir/company/strategy-outlook.html>, 2017, March 10;

Kristiansen, T., Hapag-Lloyd: UASC merger will cost one in ten positions, (2016). Retrieved from <http://shippingwatch.com/carriers/Container/article9171697.ece>, 2017, March 10.

<sup>ii</sup> Henderson, J., Hapag-Lloyd takeover of UASC completion postponed, deal not in doubt, (2017). Retrieved from <http://www.seatrade-maritime.com/news/middle-east-africa/hapag-lloyd-takeover-of-united-arab-shipping-company-postponed-deal-not-in-doubt.html>, 2017, May 4;

<sup>iii</sup> Hapag-Lloyd Alert: UASC's financials are a negative surprise, in our view, Deutsche Bank, (2016). Retrieved from <https://secfinmonitor.airexmarket.com/documents/5795661069702d2f4700002e>, 10 2017, May 10;

Hapag-Lloyd merger reveals uasc's huge net losses, (2017). Retrieved from <http://www.arabiansupplychain.com/article-12667-hapag-lloyd-merger-reveals-uasc-huge-net-losses/>, 10 2017, May 10;

Hapag-Lloyd Aktiengesellschaft Hamburg, Voluntary additional information regarding the intended merger of the Company with United Arab Shipping Company S.A.G., The Management Board, (2016). Retrieved from [https://www.hapag-lloyd.com/content/dam/website/downloads/pdf/HLAG\\_Voluntary%20Additional%20Information%20on%20the%20Transaction%20with%20UASC\\_HV\\_2016.pdf](https://www.hapag-lloyd.com/content/dam/website/downloads/pdf/HLAG_Voluntary%20Additional%20Information%20on%20the%20Transaction%20with%20UASC_HV_2016.pdf), 10 2017, May 10.

<sup>liii</sup> CSAV Wants 25 Pct Stake in Hapag-Lloyd, (2017). Retrieved from <http://worldmaritimenews.com/archives/231419/csav-wants-25-pct-stake-in-hapag-lloyd/>, 2017, October 9.

<sup>liiiv</sup> Meyer, B., APL to join former G6 partners NYK, OOCL on Japan-U.S. loop, (2017). Retrieved from <http://www.americanshipper.com/main/news/apl-to-join-former-g6-partners-nyk-oocl-on-japan-us-loop-66972.aspx>, 2017, May 3;

Notice of Agreement to the Integration of Container Shipping Businesses, (2016). Retrieved from <http://www.kline.com/News-and-Press/2016/161031-Notice-of-Agreement-to-the-Integration-of-Container-Shipping-Businesses.html>, 2017, May 3;

Drewry: Launch of new alliances will cause delays, (2017). Retrieved from <http://container-mag.com/2017/02/22/drewry-launch-new-alliances-will-cause-delay/>, 2017, May 3;

Infographic: Will 2M defeat largest alliance? (2017). Retrieved from [https://www.porttechnology.org/news/infographic\\_will\\_2m\\_defeat\\_largest\\_alliance](https://www.porttechnology.org/news/infographic_will_2m_defeat_largest_alliance), 2017, May 3;

2017 Brings Significant Changes to the Ocean Carrier Landscape, (2016). Retrieved from <http://cvinternational.com/2017-brings-significant-changes-to-the-ocean-carrier-landscape/>, 2017, May 3.

<sup>lv</sup> Liang L., H., Japan's "K" Line, MOL, NYK to merge container shipping business, Seatrade maritime news (2016). Retrieved from <http://www.seatrade-maritime.com/news/asia/japan-s-k-line-mol-nyk-to-integrate-container-shipping-business.html>, 2017, May 3;

Big in Japan, The joint venture of NYK, MOL and "K" Line, (2017). Retrieved from <https://www.lloydslist.com/ll/incoming/article541232.ece>, 2017, May 3.

<sup>lvi</sup> NYK, MOL and "K" Line to combine container shipping units, (2017). Retrieved from <https://www.ft.com/content/dbdf7318-9f5e-11e6-86d5-4e36b35c3550>, 2017, May 18.

<sup>lvii</sup> US\$/¥ spot exchange rate, (2017). Retrieved from <https://www.bloomberg.com/quote/USDJPY:CUR>, 2017, May 30.

<sup>lviii</sup> Mitsui O.S.K. Lines, Ltd, financial highlights: fiscal year 2016 ended March 31, 2017, page 17 (April 28, 2017).

<sup>lix</sup> Kawasaki Kisen Kaisha, Ltd, financial highlights [2011 – 2016] & management data. Retrieved from <http://www.kline.co.jp/en/ir/library/index.html>, 2017, May 18.

<sup>lx</sup> Kline corporate history, (2017). Retrieved from <http://www.kline.co.jp/en/corporate/history/>, 2017, May 18;  
 SAL Heavy Lift – Company Portrait, (2017). Retrieved from <http://sal-heavylift.com/company/history/>, 2017, May 18;  
 PSA Corporation Limited, (2017). Retrieved from <https://www.singaporeindustryscholarship.sg/industries/maritime/psa-corporation-limited>, 2017, May 18;  
 From 1919 to 1944 preface, corporate milestones, (2017). Retrieved from <https://www.kline.co.jp/en/corporate/milestones/1919.html>, 2017, May 24;  
 About Kawasaki Kisen Kaisha Ltd, (2017). Retrieved from <https://www.bloomberg.com/quote/9107:JP>, 2017, May 24;  
 President Hiroyuki Maekawa's Remarks on "K" Line's 90th Anniversary (2009). Retrieved from <https://www.kline.co.jp/en/oceanbreeze/index.html#year2009>, 2017, May 24.

<sup>lxi</sup> "K" Line's core business, service profile, container ships, (2017). Retrieved from <http://kline.com.ph/index.php/services/containerShips>, 2017, May 3;  
 "K" Line's company profile, (2017). Retrieved from <http://kline.com.ph/index.php/about>, 2017, May 3;  
 "K" Line group's CSR Initiatives, (2017). Retrieved from <http://www.kline.co.jp/en/csr/group/index.html#1>, 2017, May 3;  
 "K" Line group's corporate governance, (2017). Retrieved from <http://www.kline.co.jp/en/csr/governance/index.html>, 2017, May 3;  
 "K" Line group's stakeholder engagement, (2017). Retrieved from <http://www.kline.co.jp/en/csr/stakeholder/index.html>, 2017, May 3;  
 "K" Line group's compliance, (2017). Retrieved from <http://www.kline.co.jp/en/csr/fair/index.html>, 2017, May 3;  
 "K" Line group's risk management, (2017). Retrieved from <http://www.kline.co.jp/en/csr/risk/index.html>, 2017, May 3.

<sup>lxii</sup> Mitsui O.S.K. Lines, Ltd. annual report 2011, (2012). Retrieved from <http://www.mol.co.jp/en/ir/data/annual/pdf/ar-e2011.pdf>, 2017, May 3;  
 Mitsui O.S.K. Lines, Ltd. annual report 2012, (2013). Retrieved from <http://www.mol.co.jp/en/ir/data/annual/pdf/ar-e2012.pdf>, 2017, May 3;  
 Mitsui O.S.K. Lines, Ltd. annual report 2013, (2014). Retrieved from <http://www.mol.co.jp/en/ir/data/annual/pdf/ar-e2013.pdf>, 2017, May 3;  
 Mitsui O.S.K. Lines, Ltd. annual report 2014, (2015). Retrieved from <http://www.mol.co.jp/en/ir/data/annual/pdf/ar-e2014.pdf>, 2017, May 3;  
 Mitsui O.S.K. Lines, Ltd. annual report 2015, (2016). Retrieved from <http://www.mol.co.jp/en/ir/data/annual/pdf/ar-e2015.pdf>, 2017, May 3;  
 Mitsui O.S.K. Lines, Ltd. annual report 2016, (2017). Retrieved from <http://www.mol.co.jp/en/ir/data/annual/pdf/ar-e2016.pdf>, 2017, May 3.

<sup>lxiii</sup> Mitsui O.S.K. Lines, Ltd., over 130 years of history, underscored by our never-ending spirit of challenge (2016). Retrieved from <http://www.mol.co.jp/en/corporate/history/index.html>, 2017, May 3.

<sup>lxiv</sup> New management plan MOL "Rolling plan 2017" Friday, (2017). Retrieved from <http://cms.molpower.com/announcementdetail?id=1303>, 2017, May 3;  
 MOL group corporate principles, (2017). Retrieved from <http://www.mol.co.jp/en/corporate/principle/index.html>, 2017, May 3;  
 Mitsui O.S.K. Lines, Ltd., basic concept of corporate governance, (2017). Retrieved from <http://www.mol.co.jp/en/ir/management/governance/index.html>, 2017, May 3;  
 Mitsui O.S.K. Lines, Ltd., income statement, (2017). Retrieved from <http://www.mol.co.jp/en/ir/accounts/data/pl/index.html>, 2017, May 3;  
 MOL's business portfolio, (2017). Retrieved from <http://www.mol.co.jp/en/ir/accounts/segment/portfolio/index.html>, 2017, May 3;  
 World's largest boxship readies to Join THE Alliance, (2017). Retrieved from <http://worldmaritimeneeds.com/archives/216261/worlds-largest-boxship-readies-to-join-the-alliance/>, 2017, May 3.

<sup>lxv</sup> Actual oil price, (2017). Retrieved from <http://oilprice.com/>, 2017, May 3.

<sup>lxvi</sup> Nippon Yusen Kabushiki Kaisha, annual report 2011, (2012). Retrieved from <http://www.nyk.com/english/ir/library/nyk/pdf/2011.pdf>, 2017, May 4;  
 Nippon Yusen Kabushiki Kaisha, annual report 2012, (2013). Retrieved from <http://www.nyk.com/english/ir/library/nyk/pdf/2012.pdf>, 2017, May 4;  
 Nippon Yusen Kabushiki Kaisha, annual report 2013, (2014). Retrieved from [http://www.nyk.com/english/ir/library/nyk/pdf/2013\\_nykreport\\_all.pdf](http://www.nyk.com/english/ir/library/nyk/pdf/2013_nykreport_all.pdf), 2017, May 4;  
 Nippon Yusen Kabushiki Kaisha, annual report 2014, (2015). Retrieved from [http://www.nyk.com/english/ir/library/nyk/pdf/2014\\_nykreport\\_all.pdf](http://www.nyk.com/english/ir/library/nyk/pdf/2014_nykreport_all.pdf), 2017, May 4;  
 Nippon Yusen Kabushiki Kaisha, annual report 2015, (2016). Retrieved from [http://www.nyk.com/english/ir/library/nyk/pdf/2015\\_nykreport\\_all.pdf](http://www.nyk.com/english/ir/library/nyk/pdf/2015_nykreport_all.pdf), 2017, May 4;  
 Nippon Yusen Kabushiki Kaisha, annual report 2016, (2017). Retrieved from [http://www.nyk.com/english/ir/library/nyk/pdf/2016\\_nykreport\\_all.pdf](http://www.nyk.com/english/ir/library/nyk/pdf/2016_nykreport_all.pdf), 2017, May 4.

<sup>lxvii</sup> Nippon Yusen Kaisha (NYK), history, (2015). Retrieved from <http://www.nyk.com/english/profile/profile/history/>, 2017, May 4.

<sup>lxviii</sup> NYK's corporate governance, (2017). Retrieved from <http://www.nyk.com/english/csr/gvn/action/index.html>, 2017, May 4.



- <sup>lxxix</sup> NYK's corporate governance guidelines, (2016). Retrieved from [http://www.nyk.com/english/ir/manage/gvn/gvn\\_report\\_01.pdf](http://www.nyk.com/english/ir/manage/gvn/gvn_report_01.pdf), 2017, May 4; NYK, more than shipping 2018 (MTS2018), (2013). Retrieved from [https://www.nyk.com/english/ir/library/fact01/pdf/2016\\_factbook01\\_01.pdf](https://www.nyk.com/english/ir/library/fact01/pdf/2016_factbook01_01.pdf), 2017, May 4; NYK posts huge loss on write-downs, (2017). Retrieved from <http://www.hellenicshippingnews.com/nyk-posts-huge-loss-on-write-downs/>, 2017, May 4.
- <sup>lxx</sup> Camille Egloff, C., Fæste, L., Italiano, J., Kolind, J., Lars Kloppsteck, L., David Lee, D., Riedl J., & Sanders, U., The transformation imperative in container shipping, mastering the next big wave, The Boston Consulting Group, (2015). Retrieved from <https://www.bcg.com/publications/2015/transportation-travel-tourism-transformation-imperative-container-shipping.aspx>, 2017, September 22.
- <sup>lxxi</sup> BDI Baltic Exchange Dry Index, (2017). Retrieved from <https://www.bloomberg.com/quote/BDIY:IND>, 2017, October 4.
- <sup>lxxii</sup> Drud von Haffner, C., Henrichsen, B., & Cage, S., Maersk annual magazine, the 2016 financial highlights, markets and people of A.P. Møller - Mærsk A/S, charting a new direction (2017). Retrieved from <https://www.maersk.com/-/media/press/press-release-archive/2017/annual-report-2016/20170208-maersk-annual-magazine-2016-2017-en.ashx>, 2017, February 20.
- <sup>lxxiii</sup> Dekker, R., Koster, M.B.M. de, Li, X., & Zuidwijk, R., Competitive capacity investment under uncertainty, Erasmus University Rotterdam, the Netherlands, [x.li@rsm.nl](mailto:x.li@rsm.nl), (2016). Retrieved from <https://pdfs.semanticscholar.org/ea60/916358ef0ea6a5eb6dea7814bce050476cfc.pdf>, 2016, December 19.
- <sup>lxxiv</sup> 2M Alliance, 2M facts VSA update.pdf, Lloyd's List Graphic, Source: Companies, (2015). Retrieved from [www.c-online.co.uk](http://www.c-online.co.uk), 2017, September 21.
- <sup>lxxv</sup> Murphy, A. SealIntel: reliable carriers are more profitable, (2017). Retrieved from <http://worldmaritimenews.com/archives/231732/seaintel-reliable-carriers-are-more-profitable/?uid=94674>, 2017, October 9.
- <sup>lxxvi</sup> Maersk and Hamburg Süd are the most reliable container shipping carriers, (2017). Retrieved from <https://www.marineinsight.com/shipping-news/maersk-hamburg-sud-reliable-container-shipping-carriers-drewry/>, 2017, January 20.
- <sup>lxxvii</sup> The idle containership fleet is shrinking, a sign of industry's improving vitality, says Drewry, (2017). Retrieved from <http://www.globaltrademag.com/global-logistics/idle-containership-fleet-shrinking>, 2017, October 10.
- <sup>lxxviii</sup> Nero, M.E., Drewry: world container Index down 1% this week, (2017). Retrieved from <http://www.americanshipper.com/main/asd/drewry-world-container-index-down-1-this-week-69357.aspx>, 2017, October 16.
- <sup>lxxix</sup> Drewry: takeover of OOCL takes container industry one step closer to liner paradise, (2017). Retrieved from <https://www.marineinsight.com/shipping-news/drewry-takeover-oocl-takes-container-industry-one-step-closer-liner-paradise/>, 2017, October 10.
- <sup>lxxx</sup> Wang, M., (2015), The formation of shipping conference and rise of shipping alliance, International journal of business administration Vol. 6, No. 5, p22 – p36, (2015). Retrieved from <http://ijba.sciedupress.com>, 2017, June 8.
- <sup>lxxxi</sup> Antitrust: Commission accepts commitments by container liner shipping companies on price transparency, European Commission, press release (2016). Retrieved from [http://europa.eu/rapid/press-release\\_IP-16-2446\\_en.htm](http://europa.eu/rapid/press-release_IP-16-2446_en.htm), 2017, June 29.
- <sup>lxxxii</sup> For this paragraph the following (academic) literature was used:  
Cardoso, R., & Komel, G., Antitrust: Commission accepts commitments by container liner shipping, companies on price transparency, European Commission, press release, Brussels, (2016). IP/16/2446. Retrieved from [http://ec.europa.eu/competition/index\\_en.html](http://ec.europa.eu/competition/index_en.html), 2017, June 29;  
Rodrigues, A., & Vitale, C., Competition issues in liner shipping, directorate for financial and enterprise affairs competition committee, DAF/COMP/WP2(2015)3 and DAF/COMP/WP2(2015)5 10-Jun-2015, Retrieved from [http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=DAF/COMP/WP2\(2015\)3&docLanguage=En](http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=DAF/COMP/WP2(2015)3&docLanguage=En), 2017, January 19;  
Danas, A.M. Deregulation of the liner conference system: The creation of countervailing power in shippers as a means to control oligopoly market power, 6 Nw. J. Int'l L. & Bus. 373 (1984-1985). Retrieved from <http://scholarlycommons.law.northwestern.edu/cgi/viewcontent.cgi?article=1175&context=njilb>, 2017, October 16;  
Fusillo, M. Rev Ind Organ (2013) 42: 85. <https://doi-org.eur.idm.oclc.org/10.1007/s11151-012-9359-3>, Retrieved 2017, January 19;  
Hirata, E., (2016) Contestability of Container Liner Shipping Market in Alliance Era, The Asian Journal of Shipping and Logistics 33(1) (2017) 027-032, Retrieved from <https://www.journals.elsevier.com/the-asian-journal-of-shipping-and-logistics/>, 2017, September 1;  
Huang, S.T., & Yoshida, S., (2013), Analysis of key factors for formation of strategic alliances in liner shipping company: service quality perspective on Asia/Europe route after global economic crisis, World Academy of Science, engineering and technology, International journal of social, behavioral, educational, economic, business and industrial engineering vol:7, no:6, 2013. Retrieved from <http://waset.org/publications/15244/analysis-of-key-factors-for-formation-of-strategic-alliances-in-liner-shipping-company-service-quality-perspective-on-asia-europe-route-after-global-economic-crisis>, 2017, September 6;  
Munari F. (2012) Competition in liner shipping. In: Basedow J., Magnus U., & Wolfrum R. (eds) The Hamburg lectures on maritime affairs 2009 & 2010. Hamburg studies on maritime affairs (International Max Planck research school for maritime affairs at the university of Hamburg), vol 23. Springer, Berlin, Heidelberg. Retrieved from [https://link-springer-com.eur.idm.oclc.org/chapter/10.1007%2F978-3-642-27419-0\\_1](https://link-springer-com.eur.idm.oclc.org/chapter/10.1007%2F978-3-642-27419-0_1), 2017, January 19;

- Panayides, P.M., & Wiedmer, R., (2011). Strategic alliances in container liner shipping, research in transportation economics, Vol. 32, pp. 25-38. (DOI:10.1016/j.retrec.2011.06.008). Retrieved from <https://www.researchgate.net/publication/236839957>, 2017, August 21;
- Review of the system for exemption from the antimonopoly act for international ocean shipping (summary of the report), 2016, Japan Fair Trade Commission. Retrieved from <http://www.jftc.go.jp/en/pressreleases/yearly-2014/March/140318.html>, 2017, June 12;
- Su, Y.-L., & Wang, D.-H., (2016), Impact of repeal of conference on European liner market, *Journal of marine science and technology*, vol. 24, no. 2, pp. 135-142 (2016). (doi: 10.6119/JMST-015-0521-5) Retrieved from [http://jmst.ntou.edu.tw/marine/un\\_paper/JMST-2015-014.pdf](http://jmst.ntou.edu.tw/marine/un_paper/JMST-2015-014.pdf), 2017, October 4.
- <sup>lxxxiii</sup> Infographic: Largest shipping alliance ever, (2017). Retrieved from [https://www.porttechnology.org/news/infographic\\_largest\\_shipping\\_alliance\\_ever](https://www.porttechnology.org/news/infographic_largest_shipping_alliance_ever), 2017, May 12.
- <sup>lxxxiv</sup> Data for alliance composition and other relations on North American routes, Federal Maritime Commission agreement library, (2017). Retrieved from <https://www2.fmc.gov/FMC.Agreements.Web/Public>, 2017, October 27.
- <sup>lxxxv</sup> Davidson, N., Illogical port choices by liner alliances, Drewry, News & Events London, (2017). Retrieved from <https://www.drewry.co.uk/news/news/illogical-port-choices-by-liner-alliances>, 2017, October 25.
- <sup>lxxxvi</sup> Notteboom, T.E., Parola, F., Satta, G., & Pallis, A.A., 2017, The relationship between port choice and terminal involvement of alliance members in container shipping. *Journal of Transport Geography* 64 (2017) 158-173, <http://dx.doi.org/10.1016/j.jtrangeo.2017.09.002>.
- <sup>lxxxvii</sup> We believe only the best, HMM service, 2018. Retrieved from <https://www.hmm21.com/cms/company/engn/container/introduction/index.jsp>, 2018, May 30.
- <sup>lxxxviii</sup> GDP, current prices (Billions of U.S. dollars), IMF, 2018. Retrieved from <http://www.imf.org/external/datamapper/NGDPD@WEO/OEMDC/ADVEC/WEO WORLD>, 2018 May 9.
- <sup>lxxxix</sup> Data source: "Review of maritime transport" 2001 to 2017, UNCTAD, Geneva, Retrieved from <http://unctad.org/en>, 2018, May 1;
- North Sea Region Programme 2015 – 2020, European Commission. Retrieved from [http://www.northsearegion.eu/media/4836/northsee\\_finalshippingreport.pdf](http://www.northsearegion.eu/media/4836/northsee_finalshippingreport.pdf), 2018 May 9.
- <sup>xc</sup> MALCHOW, U. (2014). Größenwachstum von Containerschiffen – eine kritische Reflexion. *HANSA International Maritime Journal* 7/14, pp. 40-43.
- <sup>xci</sup> Mehdi, R.A., Nilsson, H., Overloop, J., Van, & Pålsson, J., North Sea Region Programme 2015 – 2020, European Commission" (2018). Retrieved from [http://www.northsearegion.eu/media/4836/northsee\\_finalshippingreport.pdf](http://www.northsearegion.eu/media/4836/northsee_finalshippingreport.pdf), 2018 May 9.
- <sup>xcii</sup> Blauwens, G., Sys, C., Omeij, E., Voorde E. Van De, & Witlox, F., In search of the link between ship size and operations, transportation planning and technology, 2008, Vol. 31, No. 4, pp. 435\_463, DOI: 10.1080/03081060802335109
- <sup>xciii</sup> The limits of large container ships' development: Will the trend for ever-larger container vessels continue? Dimar, Boletín Informativo del Sector Marítimo, (2014). Retrieved from [https://www.dimar.mil.co/sites/default/files/atach/offshorecol\\_def.pdf](https://www.dimar.mil.co/sites/default/files/atach/offshorecol_def.pdf), 2018, May 16.
- <sup>xciv</sup> Bergmann, J., ULCS - The next generation will be Suezmax, (2018). Retrieved from <https://www.dnvgl.com/article/ulcs-the-next-generation-will-be-suezmax-58937>, 2018, May 15.
- <sup>xcv</sup> Will container ships keep growing in size forever? (2018). Retrieved from <https://www.gatewaycontainersales.com.au/will-container-ships-keep-growing-in-size-forever/>, 2018, May 15.
- <sup>xcvi</sup> Hyongmo J. Ph. D., The era of mega vessels and challenges to ports, Korea Maritime Institute, 2015
- <sup>xcvii</sup> Bisson, P., Bughin, J., Chui, M., Dobbs, R., Manyika, J., & Marrs, A., Disruptive technologies: Advances that will transform life, business, and the global economy, McKinsey Global Institute, 2013. Retrieved from <https://www.mckinsey.com/business-functions/digital-mckinsey/our-insights/disruptive-technologies>, 2018, May 16.
- <sup>xcviii</sup> Werd, A. de, & Huang, B., 2017, Damco launches first block train service from China to Europe, (2017). Retrieved from <http://www.damco.com/en/about-damco/press/press-releases/2017/damco-launches-first-block-train-service-from-china-to-europe>, 2017, October 30.
- <sup>xcix</sup> Blockchain breakthrough for paperless bills-of-lading, (2017). Retrieved from [https://www.porttechnology.org/news/blockchain\\_breakthrough\\_for\\_paperless\\_bills\\_of\\_lading?utm\\_source=GatorMail&utm\\_medium=email&utm\\_campaign=Newsletter+Daily+21-11-2017&utm\\_term=%5bPTI+Daily%5d+Blockchain+Bill+of+Lading+Breakthrough...Hapag-Lloyd+Orders+R](https://www.porttechnology.org/news/blockchain_breakthrough_for_paperless_bills_of_lading?utm_source=GatorMail&utm_medium=email&utm_campaign=Newsletter+Daily+21-11-2017&utm_term=%5bPTI+Daily%5d+Blockchain+Bill+of+Lading+Breakthrough...Hapag-Lloyd+Orders+R), 2017, November 30.
- <sup>c</sup> Study on the analysis and evolution of international and EU shipping, final report, Panteia, research to progress, (2015). Retrieved from <https://ec.europa.eu/transport/sites/transport/files/modes/maritime/studies/doc/2015-sept-study-international-eu-shipping-final.pdf>, 2017, November 6.
- <sup>ci</sup> CMA CGM to set up its own start-up incubator, (2017). Retrieved from <http://worldmaritimeneeds.com/archives/232204/cma-cgm-to-set-up-its-own-start-up-incubator/?uid=94674>, 2017, October 13.
- <sup>cii</sup> The limits of large container ships' development: Will the trend for ever-larger container vessels continue? (2014). Originally retrieved from <http://www.safety4sea.com/the-limits-of-large-containerships-development-22589>, Later retrieved from [https://www.dimar.mil.co/sites/default/files/atach/megabuques\\_def.pdf](https://www.dimar.mil.co/sites/default/files/atach/megabuques_def.pdf), 2017, November 27.

- <sup>ciii</sup> Baker, J., Data Hub: world boxship fleet update: 14,000 TEU class back in vogue, (2018). Retrieved from <https://lloydlist.maritimeintelligence.informa.com/LL1121928/Data-Hub-World-Boxship-Fleet-Update-14000-teu-class-back-in-vogue>, 2018 March 22;
- Tan, W.Z., Evergreen Marine launches fleet expansion plan, (2018). Retrieved from <https://lloydlist.maritimeintelligence.informa.com/LL1120837/Evergreen-Marine-launches-fleet-expansion-plan>, 2018, January 15.
- <sup>civ</sup> Bilttoo, M., Nightingale, L., Rodey, P.M.A., & Warwick, G., Lloyd's List webinar on: Autonomous shipping: lessons for maritime from aviation and trucking, (2018). Retrieved from <http://maritime.intelligence.informa.com/lloydlist-autonomousship>, 2018, March 22.
- <sup>cv</sup> Gronholt-Pedersen, J., Maersk to merge Damco, Ocean Product units (2018). Retrieved from <https://www.reuters.com/article/us-maersk-strategy/maersk-to-merge-damco-ocean-product-units-idUSKCN1LZ0YO>, 2018, September 20.
- <sup>cvi</sup> Baker, J., CMA CGM offers to buy out CEVA shareholders (2018). Retrieved from <https://lloydlist.maritimeintelligence.informa.com/LL1124804/CMA-CGM-offers-to-buy-out-CEVA-shareholders>, 2018, October 26.
- <sup>cvi</sup> World Maritime News, CMA CGM Gets EU Approval for Containerships Takeover (2018). Retrieved from <https://worldmaritimenews.com/archives/263178/cma-cgm-gets-eu-approval-for-containerships-takeover/?uid=94674>, 2018, October 25.
- <sup>cvi</sup> Damen unveils world's 1st class approved 3D printed propeller, (2017). Retrieved from <http://worldmaritimenews.com/archives/236694/damen-unveils-worlds-1st-class-approved-3d-printed-propeller/?uid=94674>, 2017, December 1.
- <sup>cix</sup> Porter, J., 2018, Is MSC set to be the big winner from Maersk's plan to become a global integrator? Lloyds List, Maritime intelligence, Informa. Retrieved from <https://lloydlist.maritimeintelligence.informa.com/LL1121536/Is-MSC-set-to-be-the-big-winner-from-Maersks-plan-to-become-a-global-integrator>, 2018, February 26.
- <sup>cx</sup> Baker J., 2018, APL extends guaranteed service to Europe. Lloyds List, Maritime intelligence, Informa. Retrieved from <https://lloydlist.maritimeintelligence.informa.com/LL1122997/APL-extends-guaranteed-service-to-Europe>, 2018, June 14.
- <sup>cx</sup> Baker J., 2018, CMA CGM's planned CEVA investment raises questions. Lloyds List, Maritime intelligence, Informa. Retrieved from <https://lloydlist.maritimeintelligence.informa.com/LL1122347/CMA-CGMs-planned-CEVA-investment-raises-questions>, 2018, April 26.
- <sup>cxii</sup> Dutch consortium to study autonomous shipping, (2017). Retrieved from <http://worldmaritimenews.com/archives/236788/dutch-consortium-to-study-autonomous-shipping/?uid=94674>, 2017, December 4.
- <sup>cxiii</sup> MOL succeeds in marking a step toward remote vessel operation technology, (2017). Retrieved from [https://www.marineinsight.com/shipping-news/mol-succeeds-marking-step-toward-remote-vessel-operation-technology/?utm\\_source=feedburner&utm\\_medium=feed&utm\\_campaign=Feed%3A+MarineInsight+%28Marine+Insight%29](https://www.marineinsight.com/shipping-news/mol-succeeds-marking-step-toward-remote-vessel-operation-technology/?utm_source=feedburner&utm_medium=feed&utm_campaign=Feed%3A+MarineInsight+%28Marine+Insight%29), 2017, December 4.
- <sup>cxiv</sup> Kim, K.H., Phan, M.-H.T., & Woo, Y.J., PECC international project seminar, the era of mega vessels and challenges to ports, Industrial Engineering & Management Systems Vol.11 No.4 pp.299-309, (<https://doi.org/10.7232/iems.2012.11.4.299>)(2012). Retrieved from <http://www.iemsil.org/journal/article.php?code=1556>, accessed Friday 8 December 2017
- <sup>cxv</sup> Worldmaritimenews.com, Hapag-Lloyd, KLU open new research center for shipping and logistics, 2018. Retrieved from <https://worldmaritimenews.com/archives/265427/hapag-lloyd-klu-open-new-research-center-for-shipping-and-logistics/?uid=94674>, 2018, November 27.
- <sup>cxvi</sup> Baker, J., Service cuts leave containerships idle, 2018 Lloyd's List maritime intelligence. Retrieved from <https://lloydlist.maritimeintelligence.informa.com/LL1123450/Service-cuts-leave-containerships-idle>, 2018 July 19.
- <sup>cxvii</sup> Capacity data container liner companies as of:
- 1-1-2011: UNCTAD, Review of maritime transport 2011, (2011). Retrieved from [http://unctad.org/en/docs/rmt2011\\_en.pdf](http://unctad.org/en/docs/rmt2011_en.pdf), 2017, May 10;
- 1-1-2012: UNCTAD, Review of maritime transport 2012, (2012). Retrieved from [http://unctad.org/en/PublicationsLibrary/rmt2012\\_en.pdf](http://unctad.org/en/PublicationsLibrary/rmt2012_en.pdf), 2017, May 10;
- 1-1-2013: Alphaliner annual review 2012, A market awash with capacity, (2013). Retrieved from <https://www.alphaliner.com/liner2/reports/AR2012.pdf>, 2017, March 1;
- 1-1-2014: UNCTAD, Review of maritime transport 2014, (2014). Retrieved from [http://unctad.org/en/PublicationsLibrary/rmt2014\\_en.pdf](http://unctad.org/en/PublicationsLibrary/rmt2014_en.pdf), 2017, May 10;
- 1-1-2015: Alphaliner weekly newsletter volume 2015 no.1, (2015). Retrieved from [https://www.alphaliner.com/liner2/research\\_files/newsletters/2015/no01/Alphaliner%20Newsletter%20no%2001%20-%202015.pdf](https://www.alphaliner.com/liner2/research_files/newsletters/2015/no01/Alphaliner%20Newsletter%20no%2001%20-%202015.pdf), 2017, March 1;
- 1-1-2016: UNCTAD, Review of maritime transport 2016, (2016). Retrieved from [http://unctad.org/en/PublicationsLibrary/rmt2016\\_en.pdf](http://unctad.org/en/PublicationsLibrary/rmt2016_en.pdf), 2017, May 10;
- 6-1-2017: Alphaliner top 100: Operated fleets as per 06 January 2017, (2017). Retrieved from <http://www.mttshipping.com.my/v2014/wp-content/uploads/2014/10/Alphaliner-Ranking-January-2017.pdf>, 2017, March 1.
- <sup>cxviii</sup> Capacity data container liner alliances:

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The new shipping alliances, launched April 1st, 2017, Norman global logistics, (2017). Retrieved from <http://www.normanglobal.com/wp-content/uploads/2017/06/The-new-shipping-alliances-INFOGRAPHIC.pdf>, 2017, October 12;

April 2017 saw great changes, operations wise, in the ocean freight industry, Klaus Lysdal, K., iContainers, (2017). Retrieved from <http://www.icontainers.com/us/2016/12/20/ocean-alliance/>, 2017, July 3;

Hylton, S., (Hitachi transport system) How will new ocean carrier alliances affect shippers? (2017). Retrieved from <http://info.hitachi-vht.com/blog/how-will-new-ocean-carrier-alliances-affect-shippers>, 2017, July 3;

Doyle, W.P., (Commissioner with the U.S. Federal Maritime Commission), Full ahead: new generation of carrier alliances, (2017). Retrieved from <https://www.maritimeprofessional.com/news/full-ahead-generation-carrier-alliances-305025>, 2017, July 3;

New 2017 alliance networks take shape – with capacity increases on key routes, (2017). Retrieved from <http://www.hellenicshippingnews.com/new-2017-alliance-networks-take-shape-with-capacity-increases-on-key-routes/>, 2017, July 4;

New Alliances phase in extra capacity in 1 April launch, (2017). Retrieved from <http://www.hellenicshippingnews.com/new-alliances-phase-in-extra-capacity-in-1-april-launch/>, 2017, October 12;

Craig, T., (Logistics & supply chain management consulting), Shipper-carrier alliances, (2017). Retrieved from <http://www.ltdmgt.com/art5.php>, 2017, July 3;

Shipping alliances shore up industry, unsettle customers, wsj.com, (2017). Retrieved from <https://www.wsj.com/articles/shipping-alliances-shore-up-industry-unsettle-customers-1483439400>, 2017, July 3;

Carnarius, J., Shipping alliances: what do they do and what does it mean? (2017). Retrieved from <https://freighthub.com/en/blog/shipping-alliances-mean/>, 2017, July 13;

Poskus, N., (Flexport), Guide to Ocean Alliances, (2017). Retrieved from <https://www.flexport.com/blog/what-are-ocean-alliances/>, 2017, July 13;

MSC routes, msc.com, (2017). Retrieved from <https://www.msc.com/getattachment/dfebb208-935e-4060-b0c7-a514efd1cfd/636440371184821781>, 2017, October 6;

Waters, W., (2016), Maersk and MSC rule out HMM joining 2M alliance. Retrieved from <http://www.lloydsloadinglist.com/freight-directory/news/Maersk-and-MS-C-rule-out-HMM-joining-2M-alliance/68053.htm#.WVoKMYjyg2w>, 2017, July 3;

Churchill, J., 2M begins: First container transported, (2015). Retrieved from <https://www.maersk.com/stories/2m-begins-first-container-transported>, 2017, October 6;

Filipova, V., Hyundai Merchant Marine signs with 2M Alliance, (2017). Retrieved from <http://www.maritimeherald.com/2017/hyundai-merchant-marine-signs-with-2m-alliance/>, 2017, July 3;

The Ocean Alliance, (2017). Retrieved from <https://www.apl.com/wps/portal/apl/apl-home/services/OCEANALLIANCE>, 2017, October 12;

THE Alliance: another reason to count on MOL, (2017). Retrieved from <https://www.molconsolidation.com/NewStarlinkDocs/THE%20Alliance%20Global.pdf>, 2017, September 27;

Lopez, E., FMC rejects Japanese lines' merger over jurisdiction concerns, (2017). Retrieved from <http://www.supplychaindive.com/news/FMC-rejects-Japanese-K-Lines-NYK-MOL-merger/441796/>, 2017, July 4;

Guidance for transition to Ocean Alliance (OA) service rollout, (2017). Retrieved from <http://lines.coscoshipping.com/OCEAN-Q&Aen.pdf>, 2017, July 3;

THE Alliance service overview, (2017). Retrieved from [http://www.uasc.net/sites/default/files/UASC THE Alliance service pack.pdf](http://www.uasc.net/sites/default/files/UASC%20THE%20Alliance%20service%20pack.pdf), 2017, October 6;

THE Alliance, (2017). Retrieved from <http://www.icontainers.com/us/2017/01/12/the-alliance/>, 2017, July 13.

<sup>cxix</sup> Drewry: Takeover of OOCL takes container industry one step closer to liner paradise, (2017). Retrieved from <https://www.marineinsight.com/shipping-news/drewry-takeover-oocl-takes-container-industry-one-step-closer-liner-paradise/>, accessed 2017, October 10.

<sup>cxx</sup> Three shipping alliances to control container shipping, (2017). Retrieved from <http://www.ft.lk/article/608934/Three-shipping-alliances-to-control-container-shipping>, 2017, October 6.

<sup>xxxi</sup> Alphaliner top 100: Operated fleets as per 17 November 2017. Retrieved from [www.alphaliner.com/liner2/top100/export\\_pdf.php?top30=0](http://www.alphaliner.com/liner2/top100/export_pdf.php?top30=0), 2017, November 17.

<sup>xxxii</sup> Drewry: Container market still competitive, and there's still potential for more M&A activity, (2017). Retrieved from <http://www.globaltrademag.com/global-logistics/drewry-container-market-still-competitive>, 2018, February 21.

<sup>xxxiii</sup> GDP, current prices (Billions of U.S. dollars), IMF, 2018. Retrieved from <http://www.imf.org/external/datamapper/NGDPD@WEO/OEMDC/ADVEC/WEO/WORLD>, 2018 May 9.

<sup>xxxiv</sup> "Review of maritime transport" 2001 to 2017, UNCTAD, Geneva, Retrieved from <http://unctad.org/en>, 2018, May 1;

North Sea Region Programme 2015 – 2020, European Commission. Retrieved from [http://www.northsearegion.eu/media/4836/northsee\\_finalshippingreport.pdf](http://www.northsearegion.eu/media/4836/northsee_finalshippingreport.pdf), 2018 May 9.