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Panama Canal Expansion and the Implications for Increased Competitiveness

by

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Abstract

This study concentrates on the expansion of the Panama Canal and the implications for increased competitiveness. According to ACP (Panama Canal Authority) ships from all over the world cross the Canal daily; it is estimated that the Panama Canal deals with more than 144 maritime routes connecting 160 countries, reaching approximately 1.700 ports worldwide (ACP, 2013). Recent evidence exposes that 13 to 14 thousand vessels use the Canal each year (ACP, 2013). Economies of scale have been an important driving factor behind the idea of the Panama Canal Expansion.

Over the last two decades, the containerised fleet has been growing larger and beyond the Panamax limit. Orders placed for new ships have risen in recent years, despite the economic recession which broke out in 2008. In 2012, we notice close to a 10% increase in container fleet capacity; 194 new deliveries of Post-Panamax vessels comprised with a capacity of more than 10,000TEU (ISL - Statistical Publications, 2012). A similar trend was noticed in the Dry-Bulk segment, which was determined by a surprisingly high contracting of new buildings.

The Panama Canal has not only the advantage of its strategic location, but also presents the opportunity for reduction of time and distance by eliminating thousands of miles from a vessel's route. The need for deep water demands continuous dredging which has a major effect on the Canal's physical and financial viability. This, to a great extent, is in contrast to the Suez Canal which is already able to accommodate and handle Post-Panamax vessels.

By the opening of the new third set of locks in 2015, the Panama Canal will have the advantage to exploit the economies of scale by handling bigger ships with a greater volume of cargo, which, in turn, will have a major impact on the Canal's revenues. Since the time the Canal commenced its expansion, prospects for increasing exports to Asia from U.S. Gulf ports, have already been boosted.

Having investigated in considerable depth the implications for the future of the Panama Canal, the writer is convinced that the Canal, will not only increase its viability as a way of transit, but also as a transshipment hub and business centre for Central and South America, doubling the capacity of the Atlantic and Pacific oceans (The Journal of Commerce, 2013).

Acknowledgements

First of all, I would like to express my gratitude to my supervisor, Mrs. Valerie Stringer, for both, her priceless assistance and, patience to guide me during the process of writing this dissertation. Her comments, recommendations and feedback gave me the motivation to investigate the present subject in depth and, finally to draw a conclusion.

I would also like to express my thankfulness to the people who were involved in the process of Interviews, for their giving of their valuable time in order to help gather the relevant information required, on time.

Lastly, I would like to dedicate this dissertation to my family, Ioannis, Eugenia and Stelios, for their constant support throughout the year in every circumstance, as well as encouraging and believing in me. Last but not least, I would like to thank all of my friends for their continuous motivation to complete this project.

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List of Abbreviations

ACP	Panama Canal Authority
GDP	Gross Domestic Product
SWOT	Strength, Weakness, Opportunities, Threat
TEU	Twenty-foot Equivalent Unit
UNCTAD	United Nations Conference on Trade and Development

1. Introduction

1.1 Introduction

The Panama Canal possesses a strategic location and plays an important role in facilitating the carriage of goods within the Asia-U.S. East Coast route. The increased competitiveness between the Panama Canal and the U.S. Intermodal System as well as the Suez Canal, has become more challenging due to trends in the shipbuilding industry.

“Panama Canal has never before had the opportunity to capture the growing flows of world trade” (ACP , 2006). An expected scenario is that the Canal’s PCUMS tonnage volume will be increased (to almost double) in the following twenty years, with an increase of 3% per year. Therefore, an increase of the Canal’s tolls at around 3.5% annually is estimated, which will entail a doubling of present tolls by 2015 (ACP , 2006).

A prediction of the highest growth scenario reveals that by 2025, traffic will be increased to 585 million PCUMS tons. On the other hand, the lowest growth scenario depicts a growth of around 480 million PCUMS tons by 2025 (ACP , 2006). In other words, this represents an equal increase of 72% to 110% (ACP , 2006).

By sufficiently increasing capacity, the Canal will be able not only to increase its competitiveness, but it can also slip into a connectivity center for transportation, transshipping and logistics worldwide (ACP , 2006).

The above statements captured the attention of the author and constitute the motives initiating this Study. “The capability of the Panama Canal to be transformed into a transshipment hub and business centre for Central and South America, by doubling the capacity of the Atlantic and Pacific oceans, while at the same time boosting the trade between the Northeast Asia-U.S. East Coast routes”, underlie the rationale for choosing this topic.

1.2 Overall Research Aim and Individual Research Objectives

As far as the aims of this study are concerned, it can be said that the investigation concentrates on the economies of scale, which have been an important driving factor behind the idea of the Panama Canal Expansion. Moreover, ship size growth with a capacity of more than 10,000TEU seems to be a current trend and, despite the economic recession which broke out in 2008, the orders of buildings of new Post-Panamax vessels have been increasing; the main reason which is lying behind this trend, is the transportation of a greater volume of cargo, in terms of the lower costs per TEU.

In addition, once the third set of is ready to handle and accommodate the new generation of Post-Panamax vessels, the opportunity arises for a reduction of time and distance in transportation of cargo arises, by eliminating thousands of miles from a vessel's route.

Being in a highly competitive position, the Panama Canal is expected to increase its market share with regard to its competitors, like the Suez Canal and the U.S. Intermodal System (ACP , 2006). Moreover, it can be a factor to discourage potential competitors to enter into the business. Whilst the Canal will be able to serve the growing demand, "it can be transformed into the most important connectivity hub in the continent by joining together at the Isthmus the North-South continental routes with the East-West transcontinental routes" (ACP , 2006). In this way, the Canal can be competitive in all of its routes and segments and at the same time, it can manage to retain its position as one of the main world trade routes (ACP , 2006).

Different methods of obtaining data are used. First of all, interviews from four different people, with a variety of background expertise will be presented, pointing out the current trends in the Shipbuilding Industry and the reasons lying behind the New Post-Panamax vessels, where the orders have increased dramatically. Furthermore, a statistical analysis, will present the traffic of the Panama Canal by type of vessel, concentrating on the containerized and dry-bulk segment; the main commodities shipped via the Panama Canal at the moment. Finally, a SWOT Matrix Analysis presents the Strengths, Weaknesses, Opportunities and Threats of the Canal.

Additionally, the objectives of this study are to evaluate the decision to expand the Panama Canal at this time in its history when previous plans were aborted. The opportunities and threats posed to the Panama Canal, which possesses a strategic maritime location, have been examined in detail by the collection of primary data and extensive literature review. Inter alia the objectives are listed as follows:

- Major competitors of the Panama Canal. U.S. Intermodal System and Suez Canal seem to be the main competitors at the moment.
- Major trades shipped via the Panama Canal. Container and dry-bulk segment seem to be the main leaders at the moment.
- Shipbuilding trends. Larger vessels are being built in order to carry more cargo and make use of the economies of scale. The dimensions of New-Panamax vessels will result in the Canal's efficiency.
- Port Infrastructure. How it is adjusting to meet the current shipping trends.
- In the process of interviews, as a means of collecting primary data, there is a subjectivity issue. The interviewees are coming from different backgrounds and interests, thus may have different opinions and views concerning the issue.

2. Literature Review

2.1 General Information

A project proposal for the expansion of Panama Canal and the construction of the third set of locks in order to connect the existing channels with the new locks is under construction (ACP, 2006). The specific project which was approved by the national referendum in 2006 is going to take seven to eight years to complete. The new locks will be able to start its operational function between 2014 and 2015 (ACP, 2006). The proposal is consisting of a third lane, where the construction of two new locks each side of the Canal, will take place. The construction of the two new locks is illustrated below, on Figure 1:

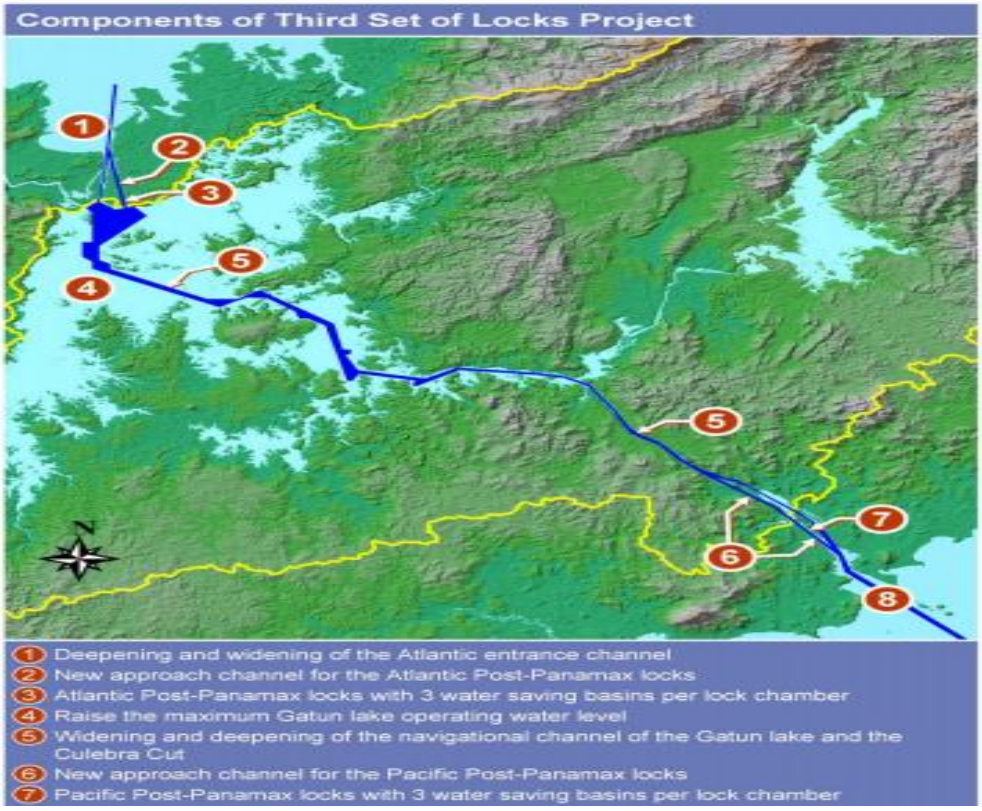


Figure 1: Components of third set of locks Project (ACP, 2006)

Panama Canal Authority has published its latest information about New-Panamax vessels and the initial demands for new buildings. As mentioned above, the construction of the two new locks, one in the Atlantic and one in the Pacific will be completed in 2014. The main purpose for the expansion of Panama Canal is the ability to handle bigger ships, “of greater beams, lengths and drafts” (DVN, 2011).

From 2014 and onwards, like it is shown on Figure 2, all the ships have to apply to the inter alia dimensions:

	Panamax	New Panamax
Length	294.13m (965 ft)	366 (1,200 ft)
Beam	32.31 m (106 ft)	49m (160.7 ft)
Draft	12.04 m (39.5 ft)	15.2 m (49.9 ft)
Deadweight Cargo Capacity (DWCC)	Approx 52,000 dwt	Approx 119,000 dwt
TEU	Approx 5,000 TEU	Approx. 12,000 TEU

Figure 2: New dimensions of the New-Panamax vessels (DVN, 2011)

Because of the Americas Bridge in Balboa the maximum air draft will remain stable without any changes at 57.91 (190 ft). The cargo capacity of a New–Panamax vessel is closely related to the cargo which is carried onboard. This feature has a major impact to the Economies of Scale. As a consequence, a Post–Panamax bulker in any case of carrying up to 119,000 deadweight tones, can refrain the considerably longer route via the Suez Canal or the Straits of Magellan (ACP, 2006). As far as the rest of deep–sea vessels are concerned, such as Suezmax and Post-Panamax containerships, the above mentioned dimensions can be interpreted to 12,000 TEU (DVN, 2011). By the end of the expansion programme, it will be able Post–Panamax containerships, Capesize dry–bulk carriers, Suezmax liquid-bulk tankers, passenger ships, Natural Gas Carriers and other similar type of vessels with the dimensions stated above, to cross and navigate the channels (DVN, 2011).

Finally, any vessel before transiting the Panama Canal is required to submit its drawings for evaluation to ACP, in order to receive a “positive permission”. It is of utmost importance, for all the existing and newly designed vessels to comply with the initial requirements, so as to secure safety (DVN, 2011).

2.2. Competing Routes

The Suez Canal can be considered a strong competitor of the Panama Canal, especially between South and Southeast Asia–U.S. East Coast trades. The major advantage of Suez Canal for the time being is that routing via Suez Canal can accommodate Post–Panamax vessels (ACP, 2006). Martin Stopford (2010) in his book (3rd edition) demonstrates and analyzes the prevailing competition between the two canals, as the Far East–Europe route transits via Suez Canal due to the key intermediate ports, like Jeddah, Singapore and ports of the Mediterranean. The US Intermodal system is another major competitor in comparison to Panama Canal in the Northeast Asia–U.S. East Coast container routes.

The US Intermodal system which is a land extension of the Trans-pacific route receives containers from Asia in West Coast ports and distributes them through a pioneering hinterland connection system (Stopford, 2010). Clients may choose either Panama Canal because it costs less and it is also highly reliable, but the hours of navigation are more; or the U.S Intermodal System (navigation plus a railroad and transcontinental system for the onward distribution of goods to the rest of the country) which route offers on one hand, fewer hours of navigation but on the other hand, the costs are higher and the service dependability varies (ACP, 2006).

38% of market share of the Northeast Asia U.S. East Coast route is currently held by the Panama Canal. The Intermodal system possesses a 61% share and it is actually the main Canal competitor in the maritime trade between north East Asia and the U.S. East Coast and, whilst the Suez Canal has just a 1% share (ACP, 2006). It can be seen further down on Figure 3:

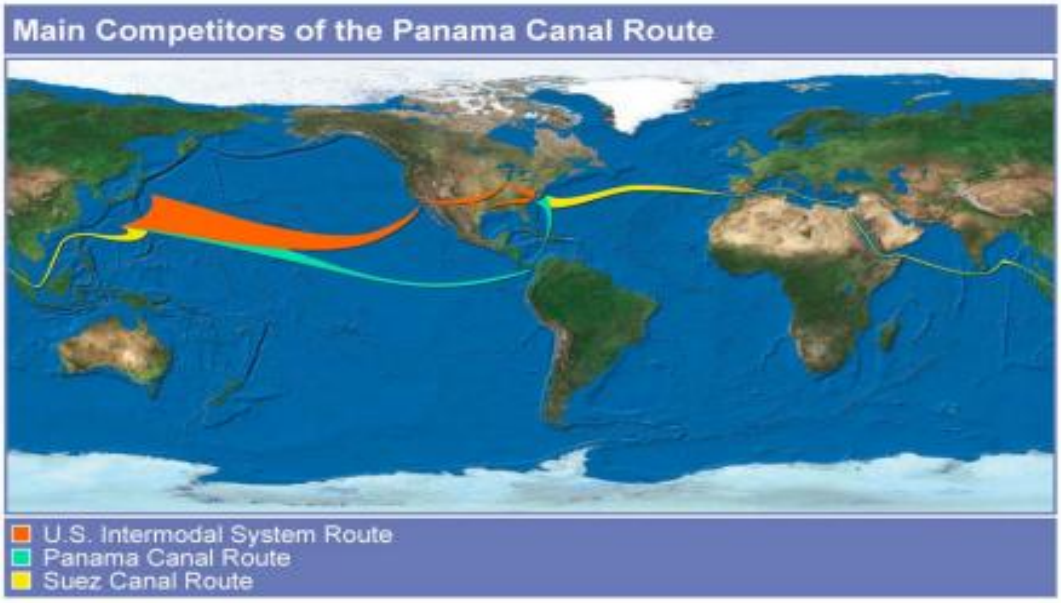


Figure 3: Main Competitors of the Panama Canal (ACP, 2006)

The route through the Panama Canal is considered as an “all water” route in contrast to the Intermodal route which is partially on land (ACP, 2006). Costs of maritime transportation derive from alternative route itineraries in combination with both sizes and the types of vessels. Inland transportation costs are, however, subject to market rates for different ways of transportation (Sabonge, 2012).

The Panama Canal Route Competitiveness Analysis Model (PCRCAM) has created a process of evaluating different total transportation costs per route, depending on fluctuations of different cost factors related to main routes and transportation modes, for each origin and destination (Sabonge, 2012). The following Figure 4 illustrates the size of vessel and potential alternative routes:

	Headhaul/backhaul	Vessel size (TEUs)
Panama Canal route	Asia–ECUSA–Asia Panama Canal Route	4000
Potential alternate routes, maritime	Asia–ECUSA–Asia via Suez Canal	8000
	Asia–ECUSA–Asia via Cape of Good Hope	8000
	Asia–ECUSA–Asia via Cape Horn	4000
	Asia–ECUSA–Asia transpacific via USNWC	8000
	Asia–ECUSA–Asia transpacific via USSWC	8000

Figure 4: Potential Alternative Routes (Sabonge, 2012)

As mentioned previously, there are two areas of Canal's competitiveness: 1) the water routing options (i.e. Suez Canal, Cape of Good Hope and Cape Horn) and 2) the multi–modal transport options (Intermodal U.S.).

For example, let's regard the container service AEU–2, which is currently deployed through Panama Canal. This service is being held by China Shipping and Evergreen. The itinerary is Shanghai, Hong Kong, Yantian, Lazaro Cardenas, Panama Canal and New York. The other direction is New York to Norfolk, Savannah, Miami, Panama Canal, Lazaro Gardenas and Shanghai. The frequency of this service is every week, uses HFO as fuel and sails at 22 knots average speed. The percentage of utilization in full containers is 93% in head haul and 42% in backhaul respectively.

An alternative route would be via Suez Canal, Cape Horn, and Cape of Good Hope by using the transpacific route arriving ports in the Pacific Northwest or Pacific Southwest. In these routes the size of the vessel can differ. In some routes it is allowed to be transferred 8000 TEU by Post–Panamax vessels (as it can be seen in the table above) (Sabonge, 2012).

Let's say that we want to move cargo from Shanghai to Allentown, PA, a region which is located in the Northeast of the USA. In which case a comparison between the delivery of the cargo through the Panama Canal and an alternative route, using the US intermodal system via Cape Horn (Sabonge, 2012) will be made. It is going to be assumed the total transportation cost and the competitive index for each route.

This specific way of calculation, allows the changes which are updated like charter rates, new building costs, fuel costs and operating costs (Sabonge, 2012).

In this case, it is counted the provision expenses are calculated according to charter rates (Sabonge, 2012). Firstly, it can be seen from the Figure 5, that all the water routes are cheaper in contrast to US Intermodal system, at around $400/TEU (Sabonge, 2012). The depiction in terms of the competitive index, it can be said that the Intermodal system shows indexes varying 1.35 – 1.33, in other words 33 – 35% more expensive than the Panama Canal route. On the other hand, as far as total transportation time is concerned, by using the Intermodal system can save up to 3 days in contrary to Panama Canal (Sabonge, 2012).

Vessel size (TEUs)	Charter rate per day	Operating cost per day		New building cost
4000	$15 663.00	$9382.28		$43 187 000.00
8000	$31 980.00	$11 851.64		$78 000 000.00
Area		HFO	IFO	MDO
North Europe–Rotterdam		$632.78	$674.58	$993.44
Mediterranean–Genoa		$642.54	$674.58	$974.60
Mid-East–Mina Al Ahmadi		$694.65	$744.56	$994.13
Far East–Singapore		$679.39	$689.01	$974.19
WCUSA–Los Angeles		$664.68	$685.44	$969.10
Caribbean/Central America–Cristobal		$650.93	$682.28	$1034.00
US Gulf–Houston		$630.03	$660.28	$984.50

Note: HFO stands for Heavy Fuel Oil, IFO for Intermediate Fuel Oil and MDO for Marine Diesel Oil.
Source: Drewry.

Figure 5: Competitiveness of Different Routes (Sabonge, 2012)

If we make a comparison among the alternative routes for several inland locations in the US, it is easy to create a map implying the competitiveness of Panama Canal in serving specific regions (Sabonge, 2012).

Route	Cost per TEU			Competitive index	Transportation time (days)
	Maritime	Inland	total		
Panama Canal route	$1123.41	$357.00	$1480.41	1.00	28.0
Via Cape Horn	$1376.31	$357.00	$133.31	1.17	41.0
Intermodal via USNWC	$745.92	$1253.33	$1999.25	1.35	25.5
Intermodal via USSWC	$755.48	$1219.00	$1974.47	1.33	25.0

Source: Panama Canal Authority (ACP).

Figure 6: Map implying the competitiveness of Panama Canal in serving specific regions (Sabonge, 2012)

In the above Figure 6, it can be said that the area to the right implies the regions where the Panama Canal is the most competitive, the area in the middle, where the Panama Canal is competitive and, the area on the left where the Panama Canal is the least competitive.

From the above example, it can be reported that the competitive landscape of the Panama Canal is a changing one (Sabonge, 2012). Current values, like charter rates, fuel costs and new shipbuilding are the main determinants which predetermine the final competitive index for specific inland locations. These values are related to the economic and shipping cycles immediately (Sabonge, 2012).

In other words, the ranking of competing routes will range across time, in accordance with the fluctuations of the international trade and the shipping cycle. As a consequence, it can be said that the PCRCAM is a useful and reliable tool to monitor trade route competitiveness by using current market data (Sabonge, 2012).

In the case of the AEU – 2 services through the Panama Canal, if the vessel has this specific size, it is easier to have a comparison to the total maritime costs per one way for both selected routes: the first one through the Panama Canal and the second one through a competing route–Cape Horn. In the times of the recession in 2009, the competitive index of the Cape Horn vs. Panama Canal route pointed out a major reduction, which was the lowest part of the shipping cycle (a shipping cycle lasts approximately 7 years) (Sabonge, 2012).

There is a depiction where it can be said that the cost competitiveness of the Canal route is decreased, when the level of economic activity and the prices of fuels are low. And vice versa; the cost competitiveness of the Canal route is increased, when the level of activity is high and fuel prices are increased (Sabonge, 2012). The same analysis was conducted in all almost container services through the Canal and it was noticed the same behavior. On Figure 7, can be seen:

	Average	Route		Cost per one-way slot		Competitive index	
Service	Size (TEU)	Out	Return	Contraction (2009)	Growth (2008)	Contraction (2009)	Growth (2008)
AUE2 (CSCL /Evergreen)	4000	Panama	Panama	$731	$978	1	1
	4000	Cape Horn	Cape Horn	$805	$1177	1.1	1.2

Figure 7: Competitiveness of the Canal in all container services (Sabonge, 2012)

A statement to be proven, as far as Panama Canal is concerned, is the reduction of time and distance by eliminating thousands of miles from a vessel's route. The shorter is the route; the lower the expenses in vessel provision and fuel consumption. An analysis of the market conditions at the peak and through the shipping cycle, result in finding that the value of the Canal routes increases in times of economic prosperity and high fuel prices.

The canal route will lose competitiveness in contrast to alternative routes, with an increasing probability that some vessels / cargo will choose another route away from the Canal; in the circumstances of weak markets with falling oil prices. On the contrary, in the case of strong markets with the oil prices being at a high level, the Canal route becomes more competitive "as a distance and time shortcut" (Sabonge, 2012).

2.3. Major Trades

With the Panama Canal expansion a prediction of a steady annual growth of cargo volumes transportation is a reality (ACP, 2006). By 2025 there is a prediction that the numbers of transportation will be doubled and the Canal's transitions will be increased by 3% per year. The transition of larger vessels through the Panama Canal will have a great impact to Canal's efficiency; it will allow transits of higher cargo volumes, but at the same time the water utilization and transits will be less (ACP, 2006).

Traffic of Panama Canal is subject not only to global economic and maritime factors, but also to new technological developments, like the design of Post–Panamax vessels, pipelines, etc (Llacer, 2004). Panama Canal has divided its market into eight segments according to market's commercial needs. This kind of classification is based on the type of the cargo and, the type of vessels which are being used to transport the cargo in the routes using the Canal. These eight segments are classified as:1) the containership segment, 2) the dry bulk segment, 3) the vehicle carrier segment, 4) the liquid bulk segment, 5) the reefer segment, 6) the cruise ship segment, 7) the general cargo segment and, 8) the miscellaneous vessel segment, containing navy vessels, dredges and fishing boats (ACP, 2006).

Recent evidence reveals that dry bulk segment which used to be the main income generator of the Canal, has been recently replaced by the containerized cargo segment (ACP, 2006). Furthermore, the liquid bulk segment which used to be a major generator income of the Canal, has been replaced by the vehicle carriers segment; being the third income generator at the moment (ACP, 2006).

Containership segment is the leading force to Panama Canal's traffic growth (ACP, 2006). In 2005 fiscal year, "containership segment depicted 98 million PCUMS tons (ton in the unit of measure used in the Canal to establish tolls), 35% of the total PCUMS volume passing through the Canal and 40% of its revenues" (ACP, 2006). Dry bulk segment, in the same year accomplished 55 million PCUMS tons volume and 19% of the revenues. On the other hand, the segment of vehicle carriers achieved 35 millions PCUMS tons or 11% of the income (ACP, 2006). Trade between Northeast Asia (Japan, Korea, China, Taiwan and Hong Kong) and the U.S. demonstrates the highest rate of the Canal transits, in the segment of containerized cargo (Sabonge, 2012).

The specific route reveals more than 50% of the PCUMS volume of the containerized cargo segment transiting the Canal and, it is expected to become a key factor for the Canal's revenues (ACP, 2006).

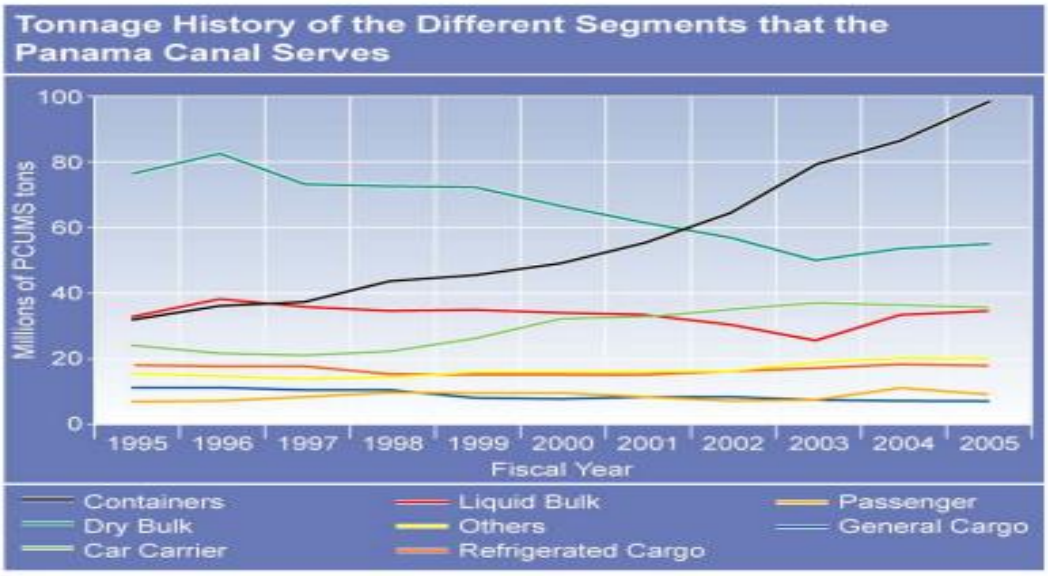


Figure 8: Tonnage History of the Different Segments that the Panama Canal Serves (ACP, 2006)

In the above Figure 8, the traffic of the Canal per market segment from 1995 to 2005 is shown. It is worthwhile to mention the increase of the container liner segment and the reduction of the dry bulk segment, even if in the most recent years there is a return to normal levels. During a period of ten years, the other segments are seen to be stable (ACP, 2006).

According to ACP, during the fiscal year 2011–2012, Panama Canal's Traffic by segment was configured like the Figure 9 illustrates (ACP, 2012):

10/25/2012

Panama Canal Traffic by Market Segment [1]
Fiscal Years 2011 - 2012

	Number of Transits		Tolls (thousands)		TEUs (thousands)		Panama Canal/UMS NetTonnage* (thousands)		Berths [2/ 3/]		Cargo (long tons) (thousands)		Percent Increase or (Decrease)				
Market Segment	2012	2011	2012	2011	2012	2011	2012	2011	2012	2011	2012	2011	Transits	Tolls	TEUs	PC/UMS	Cargo
Container	3,331	3,253	960,083	889,986	12,187	11,543	0	0	0	0	50,760	53,582	2.4%	7.9%	5.6%	-	(5.3%)
Dry Bulk	3,339	3,285	337,690	312,004	0	1	83,386	80,020	0	0	98,620	99,119	1.6%	8.2%	(30.8%)	4.2%	(0.5%)
Refrigerated	1,116	1,479	50,617	58,109	109	119	9,979	12,604	0	0	3,543	4,283	(24.5%)	(12.9%)	(8.1%)	(20.8%)	(17.3%)
Tankers	2,475	2,320	212,195	196,349	0	0	51,658	49,014	0	0	47,979	46,923	6.7%	8.1%	40.0%	5.4%	2.3%
General Cargo	917	943	42,659	40,562	54	42	8,826	8,862	0	0	6,494	7,447	(2.8%)	5.2%	28.5%	(0.4%)	(12.8%)
Vehicle Carriers	669	633	153,861	136,439	0	0	37,661	34,677	0	0	3,501	2,919	5.7%	12.8%	(20.0%)	8.6%	20.0%
Others	804	850	53,973	48,785	6	11	11,862	10,976	0	0	7,161	8,083	(5.4%)	10.6%	(43.6%)	8.1%	(11.4%)
Passengers [2/3]	211	225	39,785	46,180	0	0	1,502	1,497	248,674	310,991	0	0	(6.2%)	(13.8%)	0.0%	0.3%	-
Total	12,862	12,988	1,850,862	1,728,415	12,357	11,716	204,875	197,650	248,674	310,991	218,058	222,355	(22.5%)	26.0%	(28.4%)	5.3%	(25.0%)

Figure 9: Panama Canal Traffic by Market Segment-Fiscal Years 20011-2012 (ACP, 2012)

It can be seen that during the previous fiscal year, the number of transits in the Container segment was almost equal to the Dry Bulk segment. As a result, the revenues for the Canal were mostly generated from these two segments. But, it has to be mentioned at this point that everything is correlated to the principle of the Supply and Demand. Tankers and refrigerated cargo were the following segments with the higher number of transits.

When the decision was taken in 2006 about the expansion of Panama Canal, there was no prediction about the economic recession that was coming in 2008, which had subsequent effects on seaborne transportation and in general terms on the global economy.

Data from Baltic Exchange have revealed that the dry bulk segment started recovering during 2011. Since then, dry bulk shipping markets are fluctuating in significant levels (Baltic Exchange, 2013).

According to the Annual Review of Maritime Transport published by UNCTAD for the fiscal year 2011 to 2012, freight rates have not recovered from pre – crisis levels of 2008, having experienced another downturn in the second half of 2011 (UNCTAD, 2012). As far as containerized cargo is concerned, the lowest freight rate levels were indicated in 2011.

Due to the financial crisis which broke out in 2008, the demand still tries to recover in comparison with rates of the global container carrier capacity which seem to be stable. The main reason for the above mentioned situation is that ship owners are not able to retract their buying contracts (UNCTAD, 2012).

As far as the dry bulk shipping market is concerned, this is divided into two categories, major bulk and minor bulk. In major bulk, commodities included are iron ore, grain and coal which are mostly transported by large Panamax and Capesize vessels. Minor bulk comprises steel products, non-grain agricultural products, forest products and fertilizers, where such products are carried mostly by the smaller Handymax and Handysize vessels (UNCTAD, 2012). A considerable recovery was noticed in the middle of 2011. Baltic Exchange Dry Index depicts the growth which pointed out in August 2011 from 1,256 points to 2,173 points in October (Baltic Exchange, 2013). The most important factor that is lying behind this finance equity is the increasing demand for coal and iron ore from Asia (UNCTAD, 2012).

2.3.1. Principal Commodities Shipped through the Panama Canal

According to ACP Statistics for the fiscal year 2012, the major commodities which transited through the Panama Canal are the Containerized cargo from West Coast of Canada to Europe with a total amount of 3,669 Thousands of Long Tons, West Coast of the United States to Europe with a total amount of 2,127 Thousands of Long Tons, East Coast of the United States to Asia with a total amount of 559 thousands of Long Tons, East Coast of the United Stated to West Coast of South America with a total amount of 147 thousands of Long Tons (ACP, 2012).

To be more precise, Grains which include Soybeans, Corn and Sorghum is a principal commodity shipped through the Panama Canal from East Coast of the United States to Asia with a total amount of 58 thousands of Long Tons; Petroleum Chemicals and miscellaneous amount to 24 thousands of Long Tons respectively (ACP, 2012).

Iron and steel from East Coast of Central America to Asia is approaching46 Thousands of Long Tons. Coal and Coke(excluding petroleum coke) is another major commodity which is shipped through Panama Canal from East Coast of the United States to West Coast of South America with a total amount 32 Thousands of Long Tons(ACP, 2012). Finally refrigerated and canned cargo which includes bananas and fish, moved from Europe to West Coast of South America via Panama Canal comes up to 36 Thousands of Long Tons (ACP, 2012).

According to Baltic Exchange Dry Index where there was a boom in August 2011 from 1,256 points to 2,173 points in October, it can be seen the increased demand for Iron and Coal from Asian counties (Baltic Exchange, 2013). Moreover, in Japan for example due to the earthquake and tsunami which happened some years ago, they increased its imports of these raw materials in order to rebuild and reconstruct areas which were affected by the earthquake (UNCTAD, 2012). A rapid reduction has been noted since October; however, where it reached in February of 2012 647 points (UNCTAD, 2012).

2.4. Shipbuilding and Port Infrastructure

2.4.1. Shipbuilding

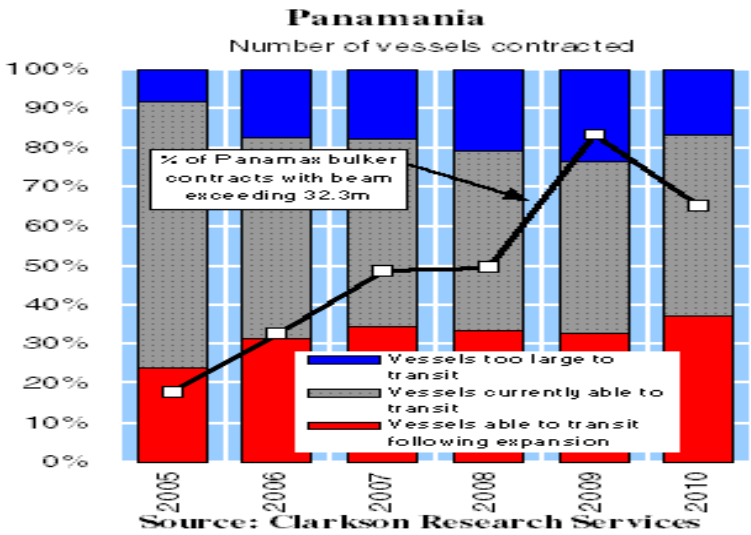
According to ACP, the sizes of vessels that the expanded Panama Canal will be able to handle have already been defined. By the completion of the third set of locks, the navigational channels will allow the transit of the existing Post–Panamax containerships; Suezmax liquid–bulk tankers; Capesize dry–bulk carriers; bigger Natural Gas carriers, passenger ships and any other types of vessel within the dimensional limits (ACP , 2011). Maximum dimensions for all type of ships which will transit these locks are 366meters LOA, 49 meters in beam and 15.2 meters in tropical freshwater draft (TFW). The above mentioned dimensions are being used in order to determine the New Panamax size vessel (ACP , 2011).

Due to the economic and financial recession which broke out in 2008 and 2009, ship-owners seem to be reluctant to invest capital in such a new design. Ship owners have the tendency to observe the trends of the market in the coming years before taking such decisions.

In another meaning, the whole shipping industry was affected by the economic recession of 2008-2009, as a consequence ship owners think twice before they invest such a capital for this new ship design. Indications point out that the new orders are less than tonnage delivered in by the shipyards (UNCTAD, 2012).

As it is shown on Figure 10, since the time the Panama Canal Authority announced the new dimensions of vessels that have to comply with in the new canal facilities, Clarkson Research Services assesses an increase of 10% in new orders of ships able to fit in the new canal facilities (Natalie Burrows , 2011). The line on the graph depicts the percentage of all 60–100k dwt bulker contracts where the beams are larger than the existing canal locks. Yards draw attention to Kamsarmax vessels of 82–88,000 dwt, where a growth of these contracts was noticed (Natalie Burrows , 2011). Its usage seem to be limited due to draft restrictions of Pacific basin coal ports, but owners are expecting in the nearest future, by 2017, that the future coal demand will be risen, given the 150MW of new power generation (Natalie Burrows , 2011). In addition to this, these kinds of vessels are supposed to benefit grain exporters from the US Gulf to Asia in the future, via the Panama Canal (Natalie Burrows , 2011).

Figure 10: Dry bulk vessel orders 2005-2010



(Natalie Burrows , 2011)

According to an annual Report of the Odense Steel Shipyard in Denmark, since the shipyard started its operation in 1962 they have built more than 150 ships, tankers and Panamax vessels able to move 3,500 TEU (Winner, 2006). Since 1996 they have built approximately 60 Post–Panamax ships Ultra-Panamax ships capable of carrying at around 10.000 TEU, which can be translated three times the carrying capacity of the M-class 3,500 TEU vessels like the “Margrethe Maersk” (Winner, 2006). It can be said that ship size is increasing in measure because operators want to exploit the economies of scale to compete in an always more challenging market (Winner, 2006).

Since the time where a reduction in unit costs per TEU takes place, economies of scale in ship size vest a short-competitive benefit. As a consequence, competitors have to evaluate, if such a benefit does exist or not and respond by requesting similar tonnage (Kevin Cullinane, 2000).

Post-Panamax fleet is growing rapidly, the growth is estimated at around 7 to 8 times faster than the global economy. In 2009 containership orders figured at 36%. On the contrary, the total average in orders of Post-Panamax fleet is counted at around 74% (IMSF, 2010). It is regarded that the Post-Panamax fleet has already increased at around 49% of the fleet capacity the last 3 years (IMSF, 2010). Further down on Figure 11, it can be seen what was mentioned above:

World Containership Orders by Size, Year-end 2009					
Size (TEU)	No.	Mil. TEUs	Age	Draft	Speed
All Sizes	803	4.7	-	41.2	22.5
> 5,000	358	3.5	-	48.6	25.1
< 5,000	445	1.2	-	35.3	20.8
Source: Clarkson Research.					

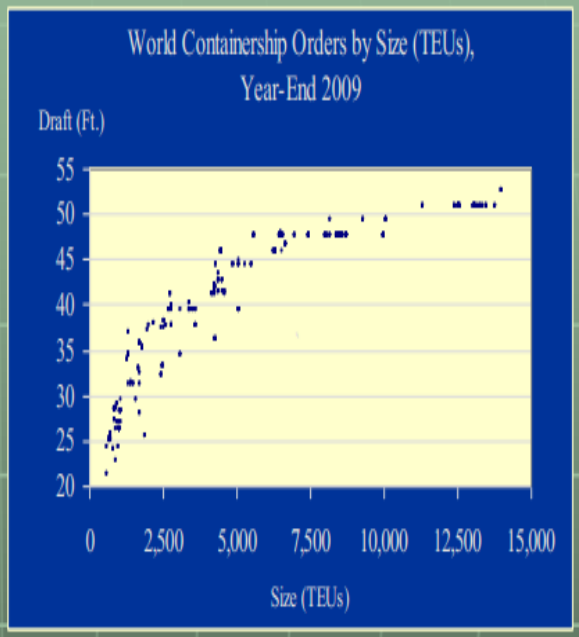


Figure 11: Post-Panamax fleet (IMSF, 2010)

While fleet grows above 5,000 TEU, it is assumed that only 86% of Top 10 ports will be able to be expanded and handle the growing capacity, in a percentage of 95% (IMSF, 2010). On Figure 12, inter alia are presented the amounts:

Containership Capacity Calling, Percent, 2009 (TEUs in Thousands)						
	Size (TEUs)					
	<5,000		>=5,000		Total	
Ports	TEUs	%	TEUs	%	TEUs	%
Top 5	22,070	51	21,290	81	43,360	62
Top 10	35,327	81	25,060	95	60,387	86
Top 20	42,383	97	26,421	100	68,804	98
Total	43,625	100	26,432	100	70,057	100
Source: Clarkson Research.						

Figure 12: Containership Capacity Calling, Percent, 2009 (TEUs in Thousands) (IMSF, 2010)

2.4.2. Port Infrastructure

Many larger ports are able to handle some of the smaller Post-Panamax ships, despite the fact that all the dredging works have not finished at the moment. It is assumed that by the end of 2014 most of the ports will be able to handle bigger Post–Panamax vessels (Leach, 2012). According to Richard Larrabee (Leach, 2012), port commerce director of New York and New Jersey ports, the greater volume of cargo is a reality, which is being carried in bigger ships, as a result the expansion of most of the ports are mandatory. For example, one of the ports fueling this growth is Mediterranean Shipping; from the Far East through its Golden Gate Service has added calls at the ports of New York – New Jersey, Baltimore Savannah, Charleston and Norfolk (Leach, 2012). The specific service conducts ships where the capacity is varying between 6,700 to 9,200 TEUs (Leach, 2012).

The whole maritime community is expecting the completion of the expanded Panama Canal at the end of 2014 allowing ships of the size up to 12,500 TEUs to transit the third set of locks; trade is growing in volume employing larger vessels, as a consequence improvements are in progress in key ports (Leach, 2012).

After the expansion of Panama Canal, Post-Panamax vessels will become the dominant choice for the industry due to the economies of scale they produce. Pacific routes will be then open to this new type of ships (Leach, 2012).

Most of the East Coast ports will not be ready to deal with the biggest vessels which are supposed to transit the new locks, due to infrastructure works which will not have completed (Leach, 2012). Ports of New York, New Jersey, Baltimore and Miami will have finished its dredging works by the end of 2014, with a water depth of 50 feet, but ports of Charleston and Jacksonville will take some more years till the time that it will be ready to accommodate Post-Panamax vessels. Savannah's port expansion project will only expand the Savannah River up to 48 feet till the end of 2014 (Leach, 2012).

By the end of 2012, both ports of New York and New Jersey, which have been dredging for years, finished a 50–foot channel to the New Jersey container terminals in Port Newark, Port Elizabeth and Port Jersey(Leach, 2012). Moreover, it is presumed that by the end of 2013 New York Container Terminal on Staten Island will be ready to accommodate the new generation of vessels (Leach, 2012).

Port of Colombia is considered as one of the most important Latin American importers of agricultural goods; furthermore exports of coal are noteworthy concerning the global trades (United States of America Department of Commerce , 2012). The country's more used ports which are being considered as the major production and consumption of Bogota, Medellin and Cali, are Buenaventura, Barranquilla, Cartagena and Santa Maria(United States of America Department of Commerce , 2012). Among the above mentioned ports, the Port of Santa Maria is the only deep port, which complies with the new dimensions of Post–Panamax vessels. As Colombian trade is developed and the Third set of Locks Project will be ready soon, expansion works are to be carried out to the other ports as well, in order to accommodate Post-Panamax vessels (United States of America Department of Commerce , 2012).

"Carriers that not deploy Post-Panamax vessels, are those that have not taken delivery of the big fuel-efficient Post-Panamax ships, like Cosco, Yang Ming and Hanjin" (Leach, 2012).

The main reason for the above mentioned shift is pure economics. Carriers can do have a profit by using large Post-Panamax vessels by carrying up to 9,200 20–foot–equivalent units on the Suez route to the East Coasts, decreasing slot costs than Panamax vessels. On the contrary, carriers cannot make a profit by using the Panama Canal route, due to the less fuel efficiency that Panamax vessels are offering; as a result "the less fuel-efficient Panamax ships are, limited to a capacity of around 4,800 TEU's by the size of the existing Panama Canal locks" (Leach, 2012).

Fuel efficiency in new Post-Panamax ships is 30% more than the older version; consequently it can be assumed approximately a safe of 40,000$ a day in fuel expenses (Leach, 2013). It is a reality that China remains as one of the major traders all over the world; on the other hand Southeast and East Asia are growing their imports. Therefore, it can be said that the developed cargo volume which is being transited, allows ocean carriers to understand economy of scale by using Post–Panamax vessels (Leach, 2013).

2.5. Summary

The expansion Program for the Third Set of Locks is a reality. By the end of 2014, it is estimated that the new generation of Panamax vessels with the new dimensions which were mentioned previously, Post-Panamax vessels will be able to transit the locks. This has a major impact firstly to the Panamanian economy and secondly to the annual volume, which will be increased.

Containerized and Dry Bulk cargos appear to be the two principal commodities which are being transited more via Panama Canal at the moment. Ship size is increasing in measure because operators want to exploit the economies of scale to compete in an always more challenging market. Post-Panamax fleet is growing rapidly, the growth is estimated at around 7 to 8 times faster than the global economy. Though, ship owners seem to be reluctant to invest capital in such a new design.

They appear more inclined to observe the trends of the market in the coming years before taking such decisions, because of the current economic recession.

The United States are expected to benefit most from the expansion of Panama Canal, growing their exports. Port developments have already started taking place, especially in the U.S. ports in order to be able to accommodate the incoming traffic. Post-Panamax vessels will become the dominant choice for the industry due to the economies of scale they produce. Pacific routes will be then open to this new type of ship.

The following chapter provides a complete description of research methodology and approaches applied by the author in conducting the research process.

3. Research Methodology

3.1 Introduction

The main purpose of this chapter is to expose the way data was gathered in order to draw a background to the author's research topic. The author's main objective in studying this subject will be to explain the methods and the data which were used to verify the validity of the hypothesis.

By taking into account the subject of the study, Panama Canal expansion and implications for increased competitiveness, it can be said that ship size growth has a major impact to both, the expansion of the Canal and the competitiveness of it. The expansion of the Canal is now a reality. Consequently, ship-owners are aware of the adjustments that they have to pursue either in their existing vessels or in the new ship buildings, in order to fit in the new locks. The bigger the size of the vessels, the greater the volume of cargo which can be transited through the Canal. Furthermore, due to the expansion of the Canal, most of the ports have to perform dredging works so as to be able to accommodate the new generation of vessels. Competitiveness of the Canal is another major factor which is also affected. The canal route will lose competitiveness in contrast to alternative routes, in the case of weak markets with falling oil prices. However, the canal will be more competitive in the case of strong markets with oil prices being in a high level. Canal route becomes more competitive "as a distance and time shortcut" (Ricardo Ungo, 2012).

In addition, an interview approach was conducted in order to attain a reliable reply for the statistics on orders for new buildings of Post-Panamax vessels during the years of the economic recession until today, where let's say that the market has started to recover. The author will present the collection of data in two different ways; from interviews which took place during the period of writing the dissertation, and by examination of the Literature Review. A summary of the findings will be explained in the Conclusion too.

3.2 The Type of Research and Methodology used

It is really important to be sure that the research methodology conducted is the most appropriate to accomplish the objectives of the project. Failing to obtain interviews with reliable sources will definitely undermine the overall quality of research; it could also be a cause for an ambiguous result of the whole investigation. In order to achieve a meaningful result for further analysis, this has been composed and determined cautiously.

To begin with, it is of a high importance to distinguish whether the research is considered as a qualitative or quantitative research. Silverman (Silverman, 2013) pointed out the major differences between these two types of methodology which can be seen inter alia on Figure 13:

Methodology		
Method	**Quantitative Research**	**Qualitative Research**
Observation	Preliminary work, e.g. prior to framing questionnaire	Fundamental to understanding another culture
Textual Analysis	Content analysis, i.e. counting in terms of researchers' categories	Understanding participants' categories
Interviews	"Survey research": mainly fixed-choice questions to random samples	"Open – ended" questions to small samples
Transcripts	Used infrequently to check the accuracy of interview records	Used to understand how participants organize their talk and body movements

Figure 13: Types of Research Methodology (Silverman, 2013)

By nature, quantitative research is generally "conclusive". "The main purpose of a quantitative research is to present results based on large unbiased samples with most of the data summarized numerically" (Kathleen McMillan, 2010).

Conversely, qualitative researches are those kinds of approaches based on descriptive textual information.(Kathleen McMillan, 2010). In this study, a qualitative research approach will be followed, along with some quantitative analysis of secondary data.

3.3 Sources of Data

3.3.1 Primary Data: Interviews

In most qualitative studies, asking questions or making observations is very common. “Interview studies are being used in order to elicit respondents’ viewpoint” (Silverman, 2013). A qualitative research technique is the usage of “open” questions like, “according to ISL (Shipping Statistics and Market Review), the order in new containerships between 2008 - 2012 was increased. The container fleet expanded on average by 9.2% per year in terms of TEU and the number of Container Ships by 4.1%. In 2011, 194 new deliveries of Post-Panamax vessels delivered. The capacity of these Post-Panamax vessels was exceeded the 10,000TEU. Based on the current order book the container fleet capacity was increased by 10% in 2012 and is estimated at around 9% in 2013–if ships are delivered as planned. What are the reasons behind this and how can it affect the Panama Canal which is being expanded at the moment? The main purpose of these kinds of questions is to reach an outcome from a blank response to more detailed answers (Kathleen McMillan, 2010).

The collection of answers to open questions can be useful because a dissertation can be enriched with authentic quotes which depict a representative point of view or opposing, polarized angle (Kathleen McMillan, 2010). For the purpose of this study, primary data are acquired directly from representative persons who are being interviewed in order to obtain reliable data.

In this study, the author pursuits to interview Mrs. Susan Oatway, Mr. John Fossey and, some other experts who are aware of Shipbuilding Statistics such as orders for new buildings.

3.3.2 Secondary Data: Statistical Analysis

By Statistical sampling procedures in quantitative research, generalizability can be achieved (Silverman, 2013). Such sampling has two different purposes. First of all, it gives you the feeling of confidence, as far as representativeness of your sample is concerned. Secondly, such representativeness gives you the opportunity to make sufficient inferences (Silverman, 2013). Silverman identified "The purpose of sampling, which is usually to study a representative subsection of a precisely defined population in order to make inferences about the whole population (Silverman, 2013).

The numerical (quantitative) data about the Panama Canal Traffic by Type of Vessel and by type of Cargo which are being transited via the Canal regarding the Number of Transits, the PC/UMS net tonnage (thousands) and the Cargo (thousands of long tons) are obtained from online sources and reports, where most of the Statistical Data are being published in the website of Panama Canal Authority.

3.4 Data Analysis

3.4.1 Primary and Secondary Data Analysis

Many questions derive from the collection of primary and secondary data, concerning the reliability of the data during the process of research. The main purpose of the data is to depict the current state of the Panama Canal and the expansion works that are taking place and the implications to Ship Size Growth and Port Developments. The data are being selected so as to give the opportunity to the author to evaluate the short term and long term impact of Ship Size Growth, as well as to determine the competitiveness of the Canal. Nevertheless, the data availability and collection is restricted by the number of interviewees. As a result, because the expansion of the Panama Canal is a developing topic, information as to the trends of global trade and transportation are concerned, were not available from textbooks. Thus, market reports published by companies, statistics, government reports, maritime press and websites were important in order to complete the research. Panama Canal Authority was one of the most useful sources, as far as canal facilities, changes that are going to happen in the nearest future and the Traffic of Panama Canal by Type of Vessel and by Market Segment are concerned.

In addition, Baltic Exchange Reports were useful and valuable information providing daily fixture lists and market trends. Finally, Shipping Statistics and Market Review (ISL), Global Shipping Markets Review published by HSBC and Clarkson Research Services were data of outmost importance helping to collect the statistical data of Ship buildings.

3.4.2 SWOT Analysis

The Panama Canal cannot currently accommodate Post-Panamax vessels in contrast to the Suez Canal, for which a major benefit prevails until such time that the expansion works will have finished. Far East–Europe route transits via Suez Canal, due to the key intermediate ports, like Jeddah, Singapore and ports of the Mediterranean. A good strategy in order to understand Canal's advantages is to apply a SWOT (Strengths, Weaknesses, Opportunities, Threats) Analysis, which is a widespread method for the decision making process.

It is constituted of a matrix form, where are included the Strengths and the Weaknesses; the internal factors of the organization, which are controllable. On the other hand, are also contained the Threats and the Opportunities; the external factors of the organization, which are too difficult to attain control over (John F. Dix, 2012). The most important aspect, after the conduction of a SWOT Analysis is to relate strengths and opportunities, as well as to convert weaknesses or threats to strengths or opportunities.

It can be said that Panama Canal's Strengths and Weaknesses are closely connected to the internal factors of the Canal, conversely opportunities and threats to the external factors. The major factors which ascertain the Canal's strengths and weaknesses can be considered to be the following: location, hinterland connection, Canal's costs, performance, nautical constraints, physical assets of the Canal, adaptability, experience and value-added services.

On the contrary, elements which are related to the opportunities and threats of the Canal can be considered the following: technological evaluation, market specialization, appraisal of the Canal's customers' value chain and legal and regulatory comprehension (Institute of Chartered Shipbrokers , 2011).

Inter alia it can be seen a SWOT matrix Analysis and the four constituent elements. Having identified the four components, the organization is able to confront with the identified strengths, weaknesses, opportunities and threats applying the appropriate strategies.

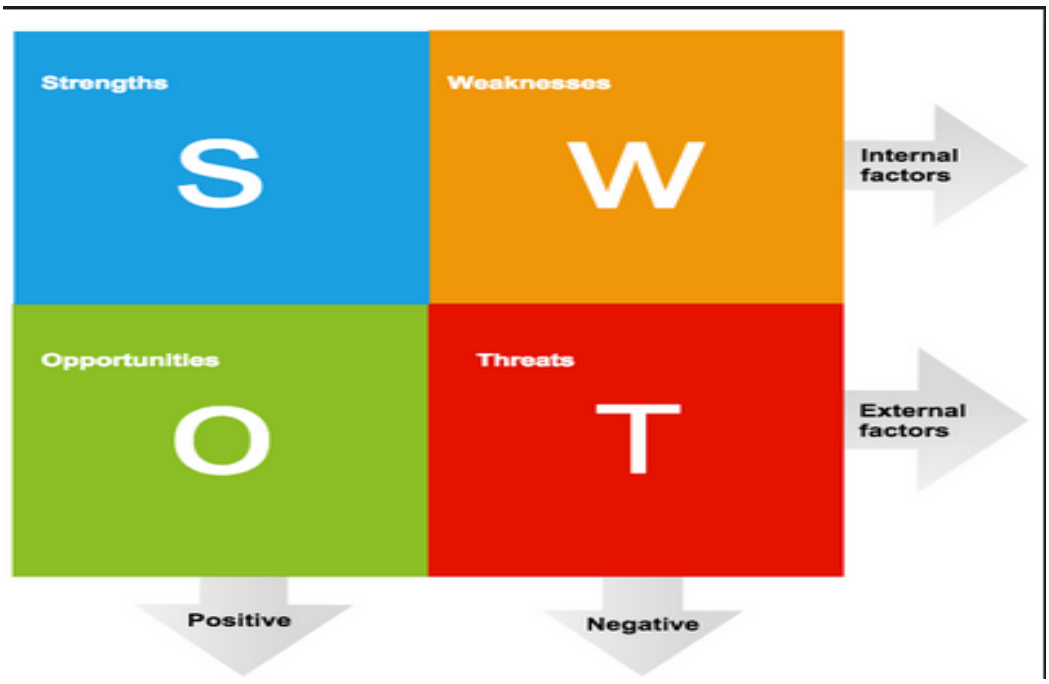


Figure 14: SWOT Matrix Analysis

In this research, the author tries to apply a SWOT Analysis to the Panama Canal in order to identify the Strengths, Weaknesses, Opportunities and Threats that the Canal is confronted with, to determine the competitiveness of the Canal in relation to the Post-Panamax vessels which are estimated will change the current situation. Finally, more strategies will try to give a better approach to the current situation of the Canal.

3.5 Research Validity, Reliability and, Generalizability

According to the primary and secondary data which were collected, the validity and reliability of the results can be limited to a certain point. As far as primary data are concerned, an interview which took place from a specialized person on the new ship building markets, the results can be considered as objective. A precise definition of subjectivity can be considered as follows “the ability to reach to a detached, unprejudiced viewpoint, based on the evidence and without the influence of feelings or emotion” (object is the thing which is observed) (Kathleen McMillan, 2010). The main purpose of the “open” questions is to reach an outcome from a blank response to more detailed answers (Kathleen McMillan, 2010). On the contrary, the Secondary data which are being collected from existing resources are reliable to a certain extent. The percentage of claiming a 100% validity of the research which was conducted cannot be claimed, however a well-structured methodology is carried out, which tries to eliminate invalid results and conclusions.

A statistical analysis which contains the Number of Transits, PC/UMS net tonnage (thousands) and the Cargo (thousands of long tons) which is shipped through the Panama Canal the last 6 years in the Dry – Bulk Carriers and Full Container Ships can assure the validity of the data, regarding the reliability of the Shipping Statistics and Market Review (ISL).

The following chapter is going to present the outcomes of the Research Methodologies which were adopted. The information which were gathered from the interview and the statistical analysis which was conducted during the period of the research are going to be presented accordingly.

4. Data Collection, Analysis and Discussion

4.1 Introduction

Earlier in this paper, it was mentioned that the main purpose of this study is the Panama Canal Expansion and the implications for increased competitiveness. The expansion of the Canal is now a reality and, the construction of the third set of locks in order to connect the existing channels with the new locks is under construction (ACP, 2006). The new locks will be able to start its operational function between 2014 and 2015 (ACP, 2006). The proposal is consisting of a third lane, where the construction of two new locks each side of the Canal, will take place. The strategic location of the Canal makes it unique, especially in the Northeast Asia-U.S. East Coast Container routes.

Another major factor which affects the expansion of the Canal is the increasing size of new vessels being built. The main purpose laying behind this trend is the transportation of more goods in bigger vessels and resultant economies of scale. According to the order book of shipbuilding at the end of 2010, a key lesson which derives from the years of the Economic Recession (2009) “was just how adaptable supply is in the face of sharply lower demand” (HSBC, 2011). Shipyards were in the mood of cancelling, converting orders and delay in the deliveries too. In this chapter, are described the interview results as primary data. Additionally, a quantitative analysis of secondary data is presented too.

4.2 Results from Primary Data: Interviews

This section deals with data gathered directly from participants from different background and interests with respect to the subject of inquiry. The author confronted industry knowledgeable people with personal interviews so as to obtain relevant information.

In this study, replies were obtained from 4 interviewees; the list of interviewees can be seen in the Appendix. This section tries to incorporate the outcome from the interviewees concerning the increased Container fleet; by 9.2% per year in terms of TEU and the number of Container ships by 4.1% (ISL - Statistical Publications, 2012). In 2011, Post-Panamax vessels comprised those having a capacity for more than 10,000 TEU.

Moreover, in Bulk tonnage was observed a strong and steady growth. The growth in supply of available capacity exceeds the demand growth for new materials by far (ISL - Statistical Publications, 2012).

The future supply/demand balance in the bulk markets is demonstrated by a surprisingly high contracting of new buildings. Despite the Economic Recession which broke out in 2008, a steady growth in ordering new ships in both segments is noticed (ISL - Statistical Publications, 2012). Overall, the interviewees are trying to depict the reasons and the consequences behind these trends which can affect the Panama Canal and, how the competitiveness of the Canal can also be influenced. Additionally, due to the rapid growth of Post-Panamax fleet, which is estimated at around 7 to 8 times faster than the Global Economy; there is an assumption that only 85% of top ports will be able to expand and handle the growing capacity in the percentage of 95% (ISL - Statistical Publications, 2012). What might be the consequences behind this trend? Finally, a description of the major impact on the Ship-owners revenues is illustrated.

To begin with, according to Mr. Ravindra Galhena, (who not only has years of experience in Containerization, but is also well aware of the current trends in Shipping Markets), pointed out that despite the current sluggish demand in general, the industry believes that the demand for Container ships will increase. This is the main reason for ordering larger ships. He explained “we are now experiencing the arrival of ships as large as 18,000 TEU capacities” which necessitates a greater width and depth in order to pass the Panama Canal. To minimize transit times between Asia and East Coast of America, this is essential. As far as reasons for the steady growth in ordering new ships are concerned, Mr. Galhena reported that the main reason is the gut feeling of the industry; nobody wants to be left behind, consequently everyone follows each other. This strongly suggests that most people believe this situation will not remain forever and there will be a boom. But, we are in the recession more or less for five years.

On the other hand, most ship owners / operators are unhappy of their bottom line. Overcapacity creates a lot of adverse effects. As far as the competitiveness of the Canal is concerned, he mentioned that the canal operators need to follow the industry trends as much as possible, but there could be limitations.

Due to the growing of Post-Panamax fleet which is estimated 7 to 8 faster than the global economy, it is presumed that only 86% of the top ports will be able to be expanded and handle the growing capacity in a 95%. For the above mentioned statement, Mr. Galhena points out that larger ships (15,000TEU or so upwards mainly) are not meant to call at many ports around the world to make them economical.

The second interviewer Mr. Alexandros Georgiadis who is a Deputy Chartering Director in Exmar Shipping Company in Antwerp in Belgium; mentioned that financing opportunities and healthy cash flows for some of the players in these markets, who managed to take advantage of the cyclical nature of the shipping markets, mostly by asset plays during 2004-2008, have positively affected the increased shipbuilding activity for the years that followed.

Furthermore, he referred to the role of the expanding Chinese shipbuilding industry, which attracts more and more orders from foreign ship owners, even for specialized and project/offshore tonnage. From 2004-2008, in view of the long- lasting expected growth in most of the economic/shipping indexes, major expansions in shipbuilding capacity took place in Japan, Korea and China. This extra capacity / idle slots needed filling in and hence shipyards have given a lot of incentives for shipbuilding during the years that followed the credit crunch in 2008. Steel prices have been more or less kept in muted levels during the first couple of years of the above mentioned subject period, affected by the slowing growth numbers for most of the leading and developing economies worldwide, while at the same time, the new building prices should be also considered as attractive.

Although he is not specialized in the Dry Bulk and Container shipping markets, he was able to give an example of more specialized sectors like LPG and LNG shipping (when it comes to shipbuilding, the effects are similar). Starting from 2011 and especially during 2012, it seems that the new building prices have bottomed out to new record low levels. This is evident especially when, at the same time, considering the inflation adjusted prices and steel price developments.

The development of the so called eco-design vessels in 2012, have also boosted the new building orders for some of the shipping sectors. In the latter part of the subject period (especially 2012), the scrapping activity increased for most of the shipping sectors, reducing the available shipping supply and the competition of older already depreciated tonnage that is traditionally driving freight rates down in times of recession.

With regards to the second part of the question: “and how the expansion of the Panama Canal has affected the shipbuilding activity at the moment?”; he wants to believe that the expanded Panama Canal will reduce significantly the sailing distance for some of the main long haul shipping routes, where traditionally vessel sizes employed on such trades have rapidly expanded their carrying capacity taking advantage of economies of scale.

Although this reduction in sailing time will come at a cost for the new larger vessels that will be able to cross the expanded Canal, it is still resulting in substantial savings for some of the trades. This expansion is obviously boosting the shipbuilding activity for the so called Post-Panamax vessels; however the effect for some of the smaller/larger sizes seems to be negative rather than positive.

As far as the Dry Bulk sector is concerned, where there is a strong and steady growth in bulk tonnage and the bulk market is determined by a surprisingly high contracting of new buildings; Mr. Georgiadis from his point of view and again not a specialist in this segment, he wants to believe that the main reason (apart from those listed above) could be the expectations for the rapid growth of China and the rest of “BRIC” countries. With the bright exceptions of the dry-bulk Post-Panamax segment and the role of Brazil as coal/iron ore exporting country towards mostly China, he cannot highlight many reasons why the extended Panama Canal has affected the dry bulk ordering boom in 2011.

Concerning the effects on ship owners revenues, Mr. Georgiadis observed that the effects are already seen in most of the markets, maybe with the exception of Offshore, LPG and LNG shipping and smaller /MR oil/product carriers. With the oversupply more than evident in most of the segments and fuel prices at rather high levels as well as the ever increasing operational costs for all types of vessels, it is no surprise that a lot of previously well positioned ship owners are becoming insolvent.

Another sign highlighting the deteriorating return for shipping companies is the fact that there is increasing consolidation activity in most of the sectors and recently even between major players and former rivals.

Eventually, due to Post-Panamax fleet which is growing rapidly and the assumption that only an 85% of Top Ports will be able to expand and handle the growing capacity, Mr. Georgiadis observed that it would be really interesting to compare if and how the Handysize segments are also moving in the same direction. It is obvious that for some cases there might be a development of imbalances but shipping sectors in the past have always followed this path and it seems that most major ports will be sooner or later adjusting to this trend. For the rest of the ports, offshore off-loading and loading solutions, STS transfer locations and development of Hub & spoke systems with mother ships (Post-Panamaxes) and smaller sized Handys feeding them / lightering them, could provide useful solutions in both short term as well as on a permanent basis.

According to the third interviewee, Mr. John Fossey, who is considered as one of the most knowledgeable representatives of Containerization segment, he mentions that the main reasons for the strong order book has been the need for carriers to maximize their economies of scale and reduce unit transport costs by deploying bigger ships. It has been claimed that vessels of 10,000TEU plus can reduce per TEU transport costs compared to a 4,000TEU ship by up to 50%. However, these savings are affected by utilization levels of the ships and can drop away significantly if load factors are poor. Modern ships are also more fuel efficient and cleaner on the environment, principally because of ongoing technological changes. There has also been something of “following the Jones”. In other words, as a competitor has moved up the size range another operator has felt that they must also have similar ships in service in order to compete. Of course, ship owners/operators continue to argue that expected solid long term growth in the container markets justify such investment and a ship is built for 25-30 year life span. He thinks that current projections for trade growth are in the 4-5% range for the next 10 years, with some yearly fluctuations. This compares with nearer to 7-8% over the past decade or so. Most of the ships being built – all apart from Maersk Line’s Triple E class units and the 18,400TEU units ordered by China Shipping Container Lines- will be able to transit the Panama Canal as it will be 59m wide, a depth of 18m and a length of over 400m.

Being able to deploy larger ships on Panama Canal routings will probably mean more direct all-water connections between Asia and U.S. East Coast ports depending on the latter's infrastructure; some changes could be seen in Asia/ECSA service options and lead to a return of some round the world service options.

It will squeeze existing Panamax-class vessels, with more of these being switched to intra-regional and emerging markets' trades and also scrapped. Considerable investment is also taking place in Panama's ports and logistics infrastructure and he can also see this as giving the Central American country considerable opportunities as a pan America's maritime and freight distribution hub. Regarding steady growth in new orders of both segments, despite the economic recession which broke out in 2008, he believes that the fuel issue is becoming more important and this is having an impact on new orders. In the container sector there is global and individual trade lane overcapacity and in such an environment it is difficult for liner companies to raise freight rates and/or ship owners to get remunerative charter hires. Consequently, these two sectors of the industry are likely to be faced with squeezed revenues and/or clean out of the fleet to change this situation in the short term. While it is difficult to balance supply and demand in the liner shipping industry, there needs to be slowdown in the level of ordering new tonnage. In his point of view, revenues and profits are likely to remain under pressure for the next two-three years. As far as the competitiveness of the canal is concerned, he thinks that the Panama Canal is such a global artery that he does not think that will be affected by current developments, although he has read that the ACP is already looking at a possible fourth set of locks. Moreover, he does believe that it is highly preliminary and may be partly related to other pan American transport corridor options, including a Canal through Nicaragua. Obviously, tolls through the Canal are rising and the Suez Canal option for the ASIA/USEC trade has gained some ground in recent years, but partly because those carriers assigned to the route cannot currently transit the Panama Canal. This will change in 2015 when the larger Panama Canal will be opened. It is also likely that if traffic starts to fall away because of its tariffs, this will be adjusted. Finally, the Panama Canal is looking at value-added initiatives on the cargo processing and logistics fronts and this might give more reasons for shipping lines to use the Panama Canal option. The larger super-Post-Panamax tonnage tends to call at only the mega ports that have invested in deeper channel and alongside berth draughts and have the storage space and handling equipment for them; although the widespread use of slow speed strategies has changed it a bit.

While, not ideal, bigger vessels can be handled by turning them around while on the quay, and work them from the other side and/or stow them carefully to take into account actual port calls and where they occur in the itinerary. It seems that with the Triple E class the main problem appears to be the cranes' heights as the ships will have such a high number of tiers of containers loaded on deck.

Algeciras is raising its cranes, Rotterdam and several other ports are buying the larger cranes and others are waiting to see if Maersk Line is likely to nominate them as a port of call on Triple E itineraries before taking a decision. The bigger ships will lead to more feeder activity and he also does not see this as being a major problem for ports. He would also suggest that higher Super-Post-Panamax cranes will become cheaper to build as orders pick up and more ports/terminal operators will choose them, if only to give them faster cycle times and better handling rates.

The last interviewee, Mr. Layendu Krishna, Senior Manager at Drewry in Singapore, is specialized more in the Dry-Bulk segment. His view of the strong and steady growth in the dry-bulk segment was that the main reasons behind ordering Capesize are the following: 1) China has been undergoing dramatic boom for over past decade. Consequently, the demand for iron ore and coal has increased tremendously. Every ship owner wants to cater to Chinese market. 2) Most of the ports which are exporting coal and iron ore have port infrastructure to support Capes trade. 3) Bigger vessels are closely related to the economies of scale, thereby minimizing the average cost. Most of the trade between Brazil and China is VLOC trade. In the future, Capes might not be traded enough and even if will be traded; they will be able to transit the Panama Canal. As a result, he does not believe that Panama Canal will facilitate Cape market to a great extent. The new orders are driven by market sentiments, rather than market fundamentals. Since the time there was an improvement in rates, there is a great euphoria. He mentioned that our memory is short-lived. According to Keynes who said that all of us are dead in the long term. Effectively, new orders are mainly due to his epic view of the shipping market. Of course, there are orders that are attributable to replacement demand. Finally, the latest ordering spree is mainly driven by the carrot where most of the yards have been offering for about two years now, in the form of fuel efficient eco design.

Moreover, as far as ship owners revenues are concerned, Mr. Krishna points out that most balance sheets are red. He guesses that with new ordering their balance sheet will continue to be in red for the following years.

About the competitiveness of the Canal he has referred to the Nicaraguan Canal that can affect the Panama Canal in the future, by 2020. Tolls will be an important factor, especially in the low market, like it is at the moment.

Finally, he does not believe that port infrastructure will be a serious issue, considering that most of the emerging economies are already focusing on dredging projects.

4.3 Results from Secondary Data: Statistical Analysis

This section describes the traffic of the Panama Canal by type of vessel before the economic recession broke out in 2007 until 2012, encompassing quantitative data obtained from the Panama Canal Authority. The Statistical Analysis includes two different segment types, the Full–Container and the Dry Bulk segment. The author attempts to evaluate the Number of Transits, the PC/UMS net tonnage (thousands) and the cargo (thousands of long tons) from previous data, analyzing the trends and, as a result foreseeing possible future trends.

As it was mentioned in previous chapters, Panama Canal is the main transshipment hub between Asia and East Coast of America region. Panama Canal facilities are described in Chapter 2; and the Canal is currently undergoing redevelopment with extension of the third set of locks. Inter alia on Figure 15, it can be seen the amount of cargo in Full-Container Ship, which was transited among 2007 to 2012. Moreover, for further Statistical Information, see Appendix Number 19 and 20.

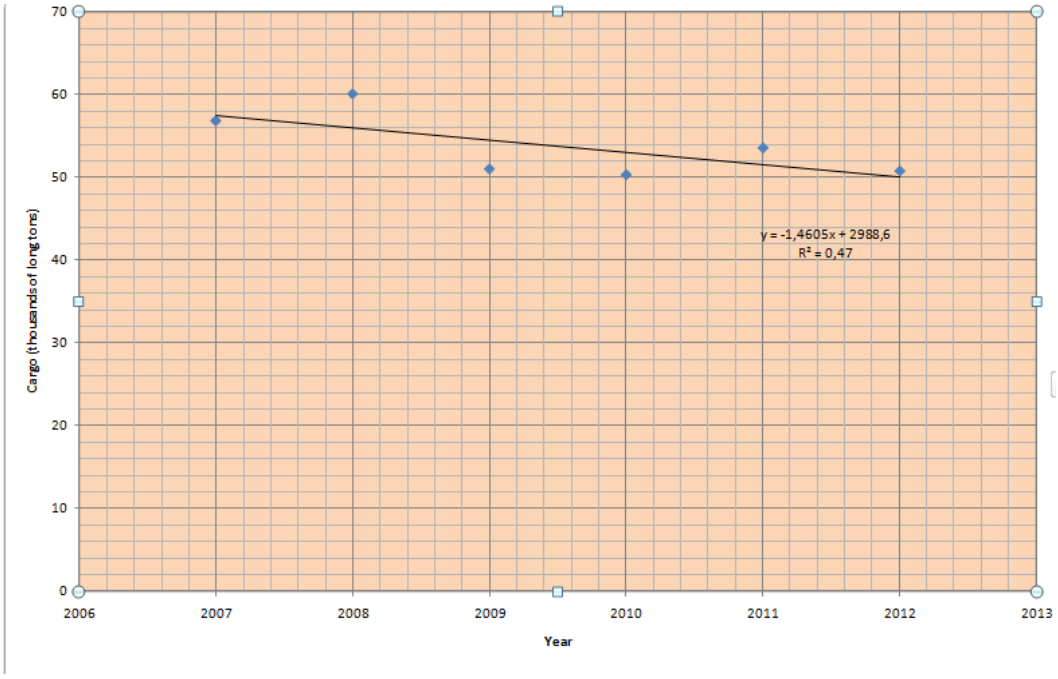


Figure 15: Cargo (thousands of long tons) in Full-Containership

It can be seen from the graphs, that during the years of the economic recession between 2009 to 2010 there was a noteworthy decrease in all of the graphs, where the Full-Containership is concerned. The Number of Transits, the net tonnage and the Cargo which was shipped through the Canal declined especially from 2008 to 2010. From 2011 and onwards a steady growth is noticed. Despite this fact, it has to be mentioned that the containerized segment is the leading force to Panama Canal's traffic and it depends on this segment for a great amount of its revenue.

In terms of economy, the Panama Canal is not able to accommodate Post-Panamax vessels at the moment, in contrast to the Suez Canal; consequently there is a major loss in the Canal's revenues. In a market which is risen, most of the times larger ships offer substantial economies of scale (Eddy Van De Voorde, 2009). As a result, the fact that the Canal cannot accommodate larger vessels, affects it promptly. Emma Maersk, the largest container ship in the world at the moment, is capable of transporting over 11,000 20-foot-long containers (TEUs). Nonetheless, it is considered that the true capacity is at around 15,000 containers. The major reason for increased capacity of the vessels is the rapid growth of global trade, at around 9.5% per year, since 1990's. Even though, it is assumed that this annual growth will continue steadily into the next decade, does this mean that container vessels shall continue to grow in size (Eddy Van De Voorde, 2009)?

As far as the Dry-Bulk segment is concerned, further down on Figure 16, it can be seen the amount of cargo which was shipped through the Canal during the years of 2007 to 2012. For further Statistical Information, see Appendix number 21 and 22.

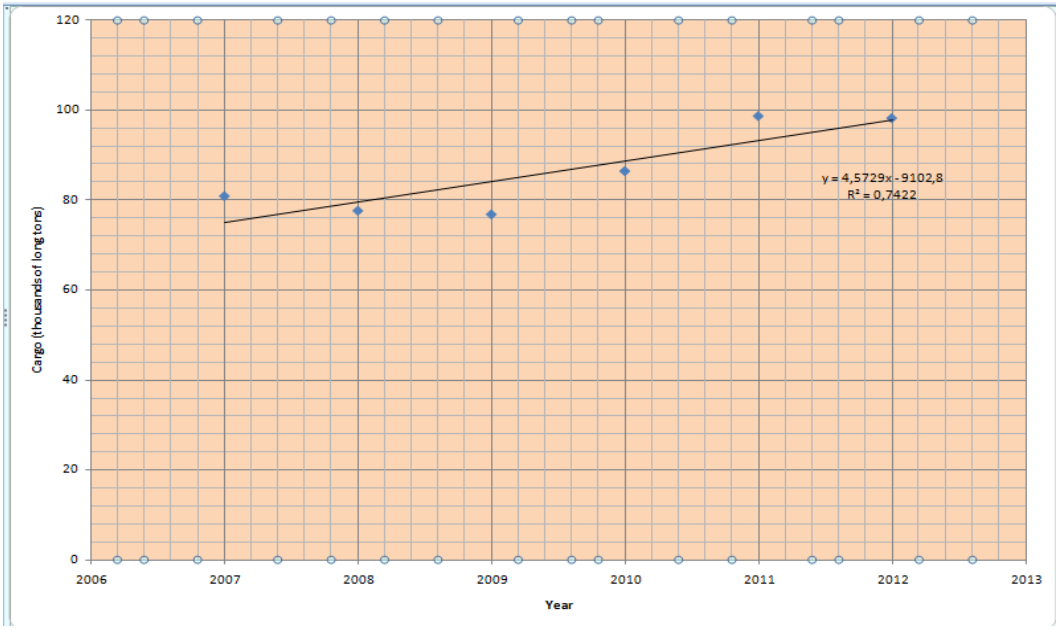


Figure 16: Cargo (thousands of long tons) in Dry-Bulk Segment

The graphs show that the Dry-Bulk segment is steadier than the containerized segment. In all of the graphs there is the slightest decrease during the years of the economic recession in 2008 and 2009, but after 2010 an annual growth is indicated. According to ACP, the dry-bulk segment used to be the main income generator of the Canal, which was replaced by the Container segment. But, according to the Panama Canal Traffic by type of vessel, for the fiscal years 2007 to 2012, the statistical analysis reveals that the dry-bulk segment was steadier through the years.

4.4 Discussion of Results from Primary and Secondary Data

From the primary and secondary data, it is shown that the Panama Canal plays an important role of carriage of goods within the Asia-U.S. East Coast route, especially due to its strategic location. Panama Canal's infrastructures are being expanded, in order to be able to accommodate the world's current largest vessels which are being constructed bigger and bigger offering substantial economies of scale. Panama Canal is confronted with heavy competition.

On the first hand, the Suez Canal which has a major advantage of accommodating Post-Panamax vessels and on the other hand, the US Intermodal System which has an innovative transcontinental system for the onward distribution of goods.

According to the interviews shipbuilding is increased, despite the economic recession which broke some years ago. Data gathered from Drewry Reports, HSBC-Global Shipping Markets Review (HSBC, 2011) and ISL (Shipping Statistics and Market Review), reveals the same trend in both segments. The industry supposes that the demand will increase for both Container and Dry-Bulk ships. This is the main reason for ordering larger ships. To confront with larger vessels of 15,000 TEU and more is a unique experience. Consequently, the Panama Canal needs to adjust its locks, because the larger ships require a greater width and depth. This has a positive effect of reducing the transit time between Asia and East Coast of America route and as a result makes the Canal more competitive.

On the other hand, the Traffic of the Canal by type of vessel for both segments reveals how many vessels transited the Canal, the net tonnage and the cargo which passed through the Canal for 6 years.

A noteworthy volatility is noticed in both segments, especially in the container segment, but this depends on the shipping cycle. As mentioned in Chapter 2, the cost competitiveness of the Canal route is decreased, when the level of economic activity and the prices of fuels are low and vice versa (Ricardo Ungo, 2012). The value of the Canal routes increases in times of economic prosperity and high fuel prices. The major advantage of the Canal is that it can be more competitive “as a distance and time shortcut” (Ricardo Ungo, 2012).

The next Chapter illustrates a SWOT analysis based on the data gathered in this chapter, so as to analyze the expansion of the Panama Canal and the impact for increased competitiveness, and to suggest strategies that can be adopted by the Canal in response to the possible implications.

5. SWOT Analysis

The SWOT Analysis is conducted in order to understand Canal's advantages, to evaluate the Canal's competitiveness and to suggest feasible strategies for the Canal.

5.1 SWOT Analysis

This chapter points out the result of SWOT analysis conducted for the Panama Canal Authority (ACP). A SWOT Analysis is a verified, sufficient and beneficial tool in the process of evaluation in the strategic planning procedure (John F. Dix, 2012). A major purpose of a SWOT Analysis is to achieve an objective. For this study, the main purpose is to increase the Canal's market share and the competitiveness of it.

The SWOT matrix of Panama Canal is depicted on Figure 17 (see Appendix), illustrating the strengths, weakness, opportunities and, threats. According to the SWOT matrix Analysis, it is obvious that the Panama Canal has great potential and opportunities to take advantage of. At the end of the expansion works, the new Post-Panamax vessels which will be able to transit the new locks; a strong advantage will be given to the Panama Canal, firstly to increase its market share and, secondly to increase its revenue from the additional containers. According to Tongzon (Jose Tongzon, 2005), port's efficiency is closely related to the average size of the vessels and the cargo which is shipped via the Canal (Jose Tongzon, 2005). When the expansion works are finished and the Canal will be able to accommodate the bigger vessels which have already started being built, the average vessel size and cargo exchange will grow; as a consequence the opportunity to increase efficiency is born. The possible impacts of the opportunities and threats are also presented on Figure 18.

Competition from other Ports and Canals is more than expected, but the Panama Canal has not only the advantage of its strategic location, but also the reduction of time and distance by eliminating thousands of miles from a vessel's route. The need for continuous dredging and deep waters has a major impact on the Canal. It affects it to a great extent in contrast, that is, to the Suez Canal which is able to accommodate and handle Post-Panamax vessels.

As far as the increased Asia-U.S. East Coast trade is concerned, it appears promising enough, but it seems better not to over-invest in the Canal because of the current high demand, and this is because the Canal planning, like port planning, takes many years to be completed and the economic condition may or may not be favorable when the final dredging works for the development of the Canal is finished.

From the SWOT Matrix, it can be seen inter alia on Figure 18 a list of strategies for the Canal to accomplish the objective of increasing market share and competitiveness, without negotiating the profit.

	Strengths (S)	Weaknesses (W)
Opportunities (O)	**SO strategies** • Expansion of the Canal • Construction of the 3rd set of locks to handle Post-Panamax vessels	**WO strategies** • Hinterland connection limited
Threats (T)	**ST strategies** • Need for continuous expansion in the future • Growing competition between ports	**WT strategies** • Need for future expansion

Figure 18: SWOT strategies for the Panama Canal

SO Strategies

In SO strategy, a powerful combination of the Canal's strengths and opportunities is making the difference. The Panama Canal which is being expanded at the moment will be able to attract and accommodate Post-Panamax vessels in the near future. A major advantage to the Panama Canal Authority will be realized from the efficiencies and consequent revenue from numbers of Post-Panamax vessels transiting it.

ST Strategies

In ST strategy, the Canal has to use its strengths in order to avoid threats. The main competitors at the moment are the Suez Canal and the U.S. Intermodal System, where the Suez Canal can accommodate Post-Panamax vessels at the moment and the Intermodal system in the U.S., which is a land extension of the Trans-pacific route which receives containers from Asia in West Coast ports and distributes them through a pioneering hinterland connection system (Stopford, 2010). A suitable strategy could be, by securing long term contracts with shipping lines. In Panama Canal, the hours of navigation maybe are more but, a major benefit prevails due to fewer costs and due to the high reliability. The U.S. Intermodal system may be preferred by some shipping lines because of the navigation hours which are less, but if the Panama Canal secures long term contracts with shipping lines, first of all the traffic will be higher and secondly, it will enable Panama Canal to have the feeling of assurance of handling the traffic which will may arise.

WO Strategies

In WO strategy there is an attempt of defeating the weaknesses by taking advantage of opportunities. The fact that the Canal is being expanded at the moment, will give the advantage to the Panama Canal Authority (ACP), to exploit the economies of scale and to increase its revenues by accommodating bigger vessels. Moreover, if the hinterland connection will be integrated, then the Canal will be able to compete the U.S. Intermodal System in the same scale, despite the fact of the hours of navigation which are more. In addition, it has been announced by the ACP that the 4th set of locks is being studied in order to run to the third set of locks at the same time in the future. According to Rodolfo Sabogne, executive president of commercial planning and development for the canal authority, mentioned that "we are looking at the demand and demand is what (will) rule (the project); size will matter" (The Journal of Comerce, 2013).

WT Strategies

In WT strategy is trying to be achieved, the reduction of threats, overcoming the weaknesses. The expansion of Panama Canal may have two possible options, either the container trade between East and Gulf Coast will be boosted or the expectations of acquisition more cargo will be ruined (The Journal of Commerce, 2013).

The most encouraging thing is that from 2015 and onwards that the third set of locks will start its operation, boosting prospects for more exports to Asia from U.S. Gulf ports of LNG, grain and coal cargos, is being expected (The Journal of Commerce, 2013). By the completion of the project, one thing can be sure; by doubling the capacity of the Atlantic and Pacific oceans will change the way the world's shipping lines ply their global routes (The Journal of Commerce, 2013). By doubling the Canal's capacity, the opportunity is presented for shippers to transfer their Asian goods to the Eastern and Gulf Coasts for less money. This is because the new locks will be able to handle larger ships which will carry three times as many containers (The Journal of Commerce, 2013). Finally, by the completion of the project, Panama will be considered as a transshipment hub and business center for much of Central and South America (The Journal of Commerce, 2013).

According to the SWOT analysis, it can be seen that the Panama Canal is competitive enough to attract the new Post-Panamax vessels by the completion of the third set of locks in 2014 to 2015. The strategies that can be adopted by the Canal were mentioned on Figure 5. The suitable solutions are the SO and WO strategies in contrast to the other two, where are more appropriate in order to minimize the threats. The following step of performing a SWOT analysis is to implement and monitor the strategy. Nonetheless, this can be done only at a later stage, when the new Post-Panamax vessels will start transiting the new locks.

5.2 Conclusion of SWOT Analysis

The SWOT analysis illustrates Panama Canal's potential to increase both its revenues and its market share, demonstrated by the strengths as mentioned above. On the other hand, there are threats and weaknesses which have a strong impact and can influence it; by the end of the expansion works, the Canal will be able to denote its competitive position by accommodating the new Post-Panamax vessels.

The following chapter summarizes the findings and points out recommendations for further research which is related to this project.

6. Conclusions

6.1 Introduction

The overall aim of this research was to advance an understanding of the expansion of Panama Canal and the implications for increased competitiveness. The expansion of the Canal is now a reality; by 2015 the third set of new locks will be able to handle and accommodate the new generation of Post-Panamax vessels. Despite the economic recession which broke out in 2008, the ship building activity of past 5 years reveals that the orders for new ships have the tendency to increase, in contrast to the demand which has decreased. The specific research objectives were, within the context of the Panama Canal expansion, to:

1. Identify the competing routes that are threatening the competitiveness of the Panama Canal.
2. Distinguish the major cargo volumes transiting the Canal.
3. Explore the ship building activity, where evidence demonstrates an increase in order book for the new generation of Post-Panamax vessels.
4. Investigate the infrastructure of most of the ports, concerning the bigger size of vessels and the adjustments that they will have to comply with, in order to be able to greet the new generation of ships.
5. Formulate recommendations and conclusions

The purpose of this chapter is to review the research objectives mentioned above, outline the findings of this research work and provide conclusions adapted from the findings. Due to expansive content in the previous chapter, a summary is all that is deemed necessary in this section. Finally, recommendations for future research will be given, regarding the progression of this study (Biggam, 2008).

Moreover, there is an attempt in this research to clarify the ship buildings statistics which show growth, in spite of the decreased demand. This structure gives the opportunity for the reader, to decide if the conclusions of this dissertation, comply with the objectives stated at the beginning of the research.

6.2 Research Objectives: Summary of Findings and resulting Conclusions

The chapter of literature review identifies the background information in order to give a clear description of how the expansion of the Panama Canal can affect its competitiveness. There is concentration on the increased order book of new Post-Panamax vessels within the last 5 years, despite the economic recession which broke out in 2008. The Post-Panamax fleet is growing rapidly; estimated at around 7 to 8 times faster than the global economy. Ship size has increased because operators want to exploit the economies of scale to compete in an ever more challenging market.

Furthermore, there is depiction of the new generation of vessels and how they have attributed to the Canal adjusting its dimensions to accommodate them. As a consequence, the Canal's Operators need to follow industry trends as much as possible, so as to be more competitive.

The second chapter reveals the cargo capacity of a New–Panamax vessel which is closely related to the cargo carried onboard. This feature has a major impact on the Economies of Scale. Moreover, the Maritime Industry is characterized by cyclicality (a shipping cycle lasts approximately 7 years), for which there is an index showing a major reduction on the Panama Canal route during the years of economic recession. In addition, the reader will observe that containerized and Dry-Bulk cargos appear to be the two principal shipments currently transiting Panama Canal.

According to the secondary data retrieved by the author, the number of transits, the PC/UMS net tonnage (thousands) and the cargo (thousands of long tons) shipped through the Panama Canal between the years of 2007 to 2012, a critical analysis and evaluation is depicted. In such a way, the reader can have a better image of the traffic of the Canal in the two different segments mentioned before.

Thanks to the interviews which were conducted with different people from different backgrounds, the author could use the primary data to support the literature review information.

According to the primary data obtained, the author was able to explain what may be the reasons behind the increased order book in container fleet, the surprisingly high contracting of new buildings in dry-bulk segment and, how it can be correlated to the expansion of the Canal; what are the major causes for this growth are also depicted. Moreover, it was really helpful for the author to describe the effects on the ship owners concerning their revenues, and how the competitiveness of the Canal can be affected from this growth. Finally, an approach to understanding the consequences to top ports is given.

Due to the answers of the interviewees, it can be said that despite the current sluggish situation, the industry does believe that the demand will increase for container ships. And, this is the main reason for ordering larger vessels. Larger ships require greater width and depth to pass the Canal. This is a must to minimize transit times between Asia and East Coast of the U.S. Moreover, the main reason laying behind the increased order book of dry-bulk segment was the dramatic boom observed in China during the past decade. As a result every ship owner wanted to cater for the Chinese market. Additionally, bigger vessels (especially Capesize) result in economies of scale, reducing the average costs. Notwithstanding, the Canal probably will not be able to facilitate the Cape market. Overall, it has to be mentioned that new orders in dry-bulk segment are driven by market sediments, rather than market fundamentals. In other words, it can be said that the new orders depend on the markets' needs of the specific period; the shipping market has the leading role. In addition, new orders are attributable to replacement demand. Finally, the latest ordering spree is mainly driven by the form of fuel efficient eco design vessels, claiming fuel efficiency to the tune of 15-25%. Moreover, it can be said that most of the ship owners and ship operators are unhappy with their bottom line; overcapacity creates a lot of adverse effects.

As far as the competitiveness of the Canal is concerned, the only thing that can be said is that the canal operators have to follow the industry trends as much possible. Improving the hinterland connections and logistics services, Panama Canal will add reasons for shipping lines to use the Panama Canal option more. Finally, larger vessels (15,000TEU and above), to make them economical, are not meant to call at many ports around the world. Only the Mega ports that have invested in deeper channel and alongside berth draughts, having the storage space and handling equipment for them, will be able to confront the growing capacity.

At this point, it is necessary to remind readers that the interviewees are come from different backgrounds. Thus, the replies are depending on their point of view where most of the answers result in the same outcome.

At the end, there is an attempt from the author to understand and analyze the Canal's advantages and to evaluate the competitiveness of it, by conducting a SWOT Analysis. The major purpose of the Analysis is to achieve an objective; to increase the Canal's market share and viability. The outcome that arises from the analysis is that by the completion of the third set of locks, the Canal will have the opportunity to increase its efficiency and potential profitability. The major advantage of the Canal can be considered its strategic location, as far as the increased Asia-U.S. East Coast trade is concerned. A suitable strategy that occurs is the securing of long term contracts with shipping lines. This is because the hours of navigation may be more via Panama Canal but, a major benefit prevails due to fewer costs and high reliability. As a consequence, the traffic will be higher and this can result positively in the Canal's revenues. Moreover, with integrated hinterland connection the Canal will be able to compete with the U.S. Intermodal System on the same scale, due to the fact that hours of navigation of the U.S. Intermodal System are more.

The main conclusion and lesson that can be deduced from this research on the issue regarding the expansion of the Panama Canal and the implications for increased competitiveness, is that from 2015 and onwards the third set of locks will start its operation, boosting prospects for more exports to Asia from U.S. Gulf ports.

Once the Panama Canal expansion is complete, the global shipping lines will need to revise their trade routes. This is because the Canal will not only become a way of transit, but also a transshipment hub and business centre for Central and South America, doubling the capacity of the Atlantic and Pacific oceans (The Journal of Commerce, 2013).

6.3 Recommendations

From the study which was conducted, some recommendations that the Panama Canal may apply in the future in order to be more competitive have excluded. On completion of the third set of locks in 2014-2015, when the traffic of the Canal will be doubled, Atlantic and Pacific oceans will change the way the world's shipping lines ply their global routes (The Journal of Commerce, 2013).

As far as the short term recommendations are concerned, due to the increased order book in container and dry-bulk segments, ship owners invest their money in bigger vessels in order to take advantage of economies of scale. The bigger the capacity of the ship, the less the costs per TEU. A suggested way is the securing of long term contracts with shipping lines. In this way, not only the ship owners will be benefited, but also the Canal. Once, the revenues of the Canal increase, there will be funds available to invest in further expansion works in the future enabling the Canal to respond to Shipping trends. There is a prediction that during the following 10 years, the global trade will have an increase of 4-5% range, as a result the needs of the market, constantly change. The better the adjustment of the Canal to the Shipping trends, the better the competitiveness of it. Moreover, with the increased revenues, the Canal will be able to provide a good maintenance service to its current facilities. In such a way, the Canal will always be in a dominant position.

In addition, the new locks shall force the Canal to reduce the tariffs in order to attract more vessels. Improvements in hinterland connection and logistics fronts and the use of a pioneering navigational system shall be adopted, in order for the Panama Canal to attract more vessels in the short-run and hence, improve its competition in the long-run.

Finally, if the shipping lines choose the Panama Canal route instead of Suez Canal (another major competitor of the Canal, which can accommodate Post-Panamax vessels), especially between South and Southeast Asia-U.S East Coast trade routes, the Operating Costs of the vessels will be reduced. This is because, a vessel in order to transit the Suez Canal, has also to come across India in order to arrive at its final destination (South and Southeast Asia), therefore, the operating costs are double. Additionally, the option of transiting the Suez Canal can be considered as more dangerous. Many times, ships which transit the Gulf of Aden are confronted with Piracy in Somalia; this means that the personnel working onboard put their lives in danger.

As the expansion works of the Panama Canal will be completed in the near future, the Panama Canal could be considered as a safer and more economical trade route, especially between South and Southeast Asia-U.S East Coast.

This study reveals the great potential of the Panama Canal due to expansion works under construction at present. Due to the diverse nature of Canal's operation, there are further aspects that are open to investigation. Apart from the Canal's side, it is suggested that further studies should be performed of other aspects, like the economics and routing of the ship, liner shipping companies, feeder ships transshipment operations, etc.

At the end, this study can be considered as a modest initiative for further research in the field of the Canal's operation and management. It is recommended further investigation be conducted in the future, in order to develop and test appropriate models and tools of analysis.

15.015 words

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8. Appendices-List of Interviewees

Ravindra Galhena, DPSA, MSc, FICS, FCILT, 'Chartered Shipbroker'

Lecturer in the MSc of Maritime Operations and Management Marketing of Maritime Services Module. He possesses over 30 years experience in Maritime and general management. From 2006 to 2011 he was functioning as an Analyst for 'Containerisation International' magazine before he left to pursue his career in consultancy/research and training in the field of logistics.

Mr. Alexandros Georgiadis

Exmar Shipping Company

Deputy Chartering Director

Chartering Department

Antwerp, Belgium

Mr. John Fossey

John Fossey takes a keen interest in liner shipping supply/demand economics, ocean carrier strategies, logistics, ports/terminals investments. He was Editorial Director of the Containerisation International (CI) group of products from June 2005 until 2012, covering a broad range of issues. Previously he worked as a research director at Drewry Shipping Consultants, specialising in the container, general cargo and reefer shipping sectors.

Mr. Jayendu Krishna

Drewry

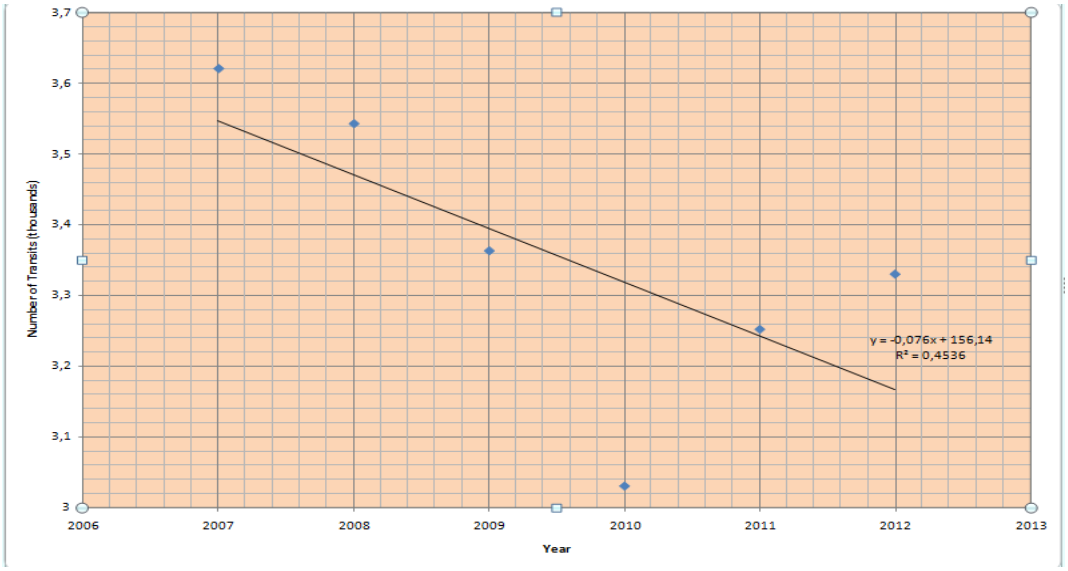
Senior Manager

Singapore

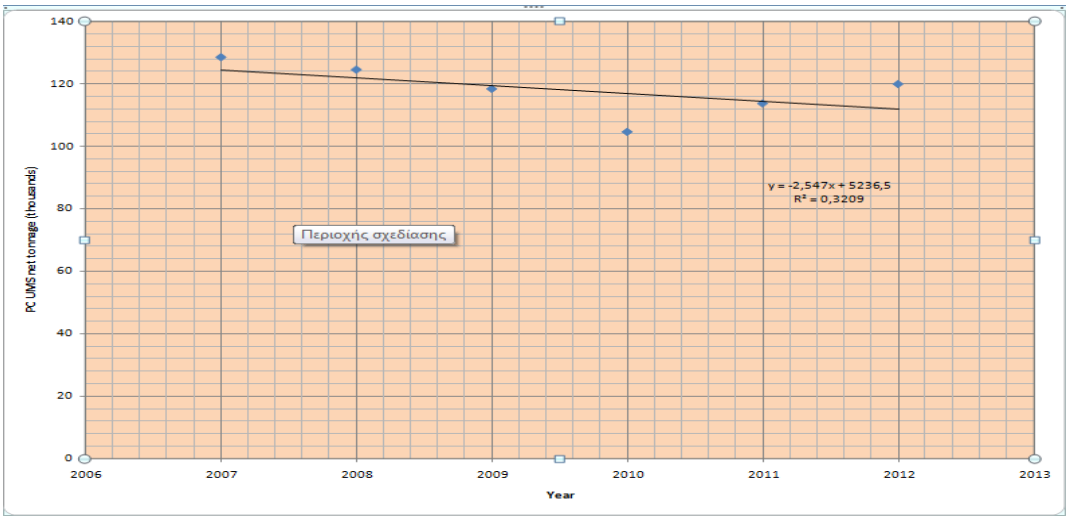
	Helpful (to achieving the objective)	Harmful (to achieving the objective)
Internal Origin	• Strategic Location • Value of some traffic categories really high • "Waterfront redevelopments and environmental improvements" (Eddy Van De Voorde, 2009) • "Space available from industrial relocation" (Eddy Van De Voorde, 2009) • Experienced in handling large volume	• "Increasing environmental impact and congestion" (Eddy Van De Voorde, 2009) • Hinterland connection limited • "Decreasing payback for local factors" (Eddy Van De Voorde, 2009) • "Lowering catalytic effect" (Eddy Van De Voorde, 2009)
External Origin	• "Potential for expansion for operators" (Eddy Van De Voorde, 2009) • Post-Panamax vessels coming in near future • Additional containers have a major impact to the revenues • "Steadily increasing demand" (Eddy Van	• Growing competition between the U.S. Intermodal System and the Suez Canal • "Decreasing bargaining power of most ports" (Eddy Van De Voorde, 2009)

	De Voorde, 2009) • Increasing Asia-U.S. East Coast trade	• Need for continuous dredging and deep waters • “Economic integration of ports in international networks or vertically with the carriers and, the consequent loss of control at local level” (Eddy Van De Voorde, 2009)

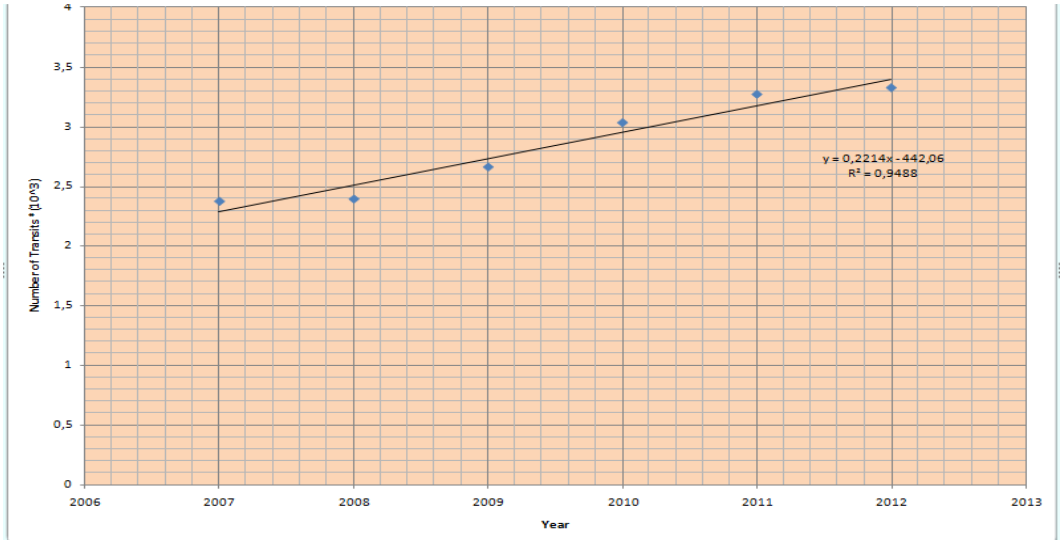
Figure 17: SWOT Matrix for the Panama Canal (Eddy Van De Voorde, 2009)



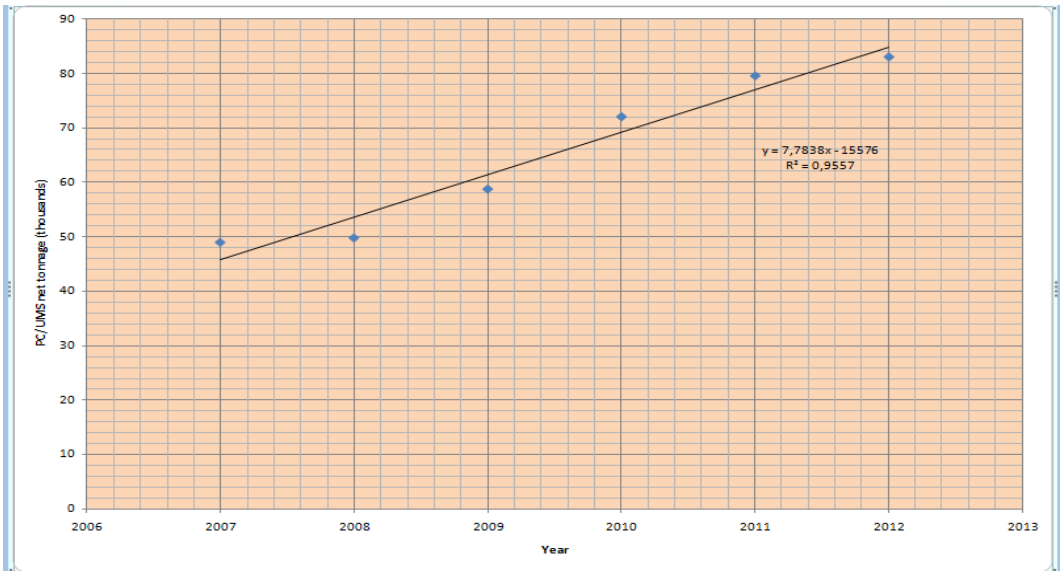
Appendix Number 19: Numbers of Transits in Full-Containership



Appendix Number 20: PC/UMS net tonnage (thousands) in Full-Containership



Appendix Number 21: Numbers of Transits in Dry-Bulk Carrier



Appendix Number 22: PC/UMS net tonnage (thousands) in Dry-Bulk Carrier

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Dissertation's Questionnaire

Form Description

According to ISL (Shipping Statistics and Market Review), the order in new containerships between 20) s increased. The container fleet expanded on average by 9.2% per year in terms of TEU and the number of Container Ships by 4.1%. In 2011, 194 new deliveries of Post-Panamax vessels delivered. The capacity of these Post-Panamax vessels was exceeded the 10,000TEU. Based on the current order book the container fleet capacity was increased by 10% in 2012 and is estimated at around 9% in 2013 – if ships are delivered as planned. What are the reasons behind this and how can it affect the Panama Canal which is being expanded at the moment?

According to ICL, in bulk tonnage there is a strong and steady growth. The supply growth in available capacity exceeds the demand growth for new materials by far. The future supply / demand balance in the bulk market is determined by a surprisingly high contracting of new buildings: 941 new orders totaling 16.9 million cgt were ordered in 2011. It seems to be an inclination of ordering Capesize vessels (>85.000 dwt). Firstly, what are the main reasons behind this and secondly, what might be the consequences? How this can be correlated to the expansion of Panama Canal?

Despite the Economic Recession which broke out in 2008, it can be seen a steadily growth in the new orders, in both segments (Dry bulk and Containerized cargo). What are the major causes of this growth?

What might be the effects on the Ship Owners, concerning their Revenues?

How can the competitiveness of the Canal be affected from your point of view?

Post Panamax fleet is growing rapidly, the growth is estimated at around 7 to 8 times faster than the Global Economy. According to fleet grows, it is assumed that only 86% of the Top ports will be able to be expanded and handling the growing capacity in a percentage of 95%. What might be the consequences?

Add item

Figure 23: Dissertation's Questionnaire