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# EXPANSION OF THE CONTAINER TERMINAL (PIER 6) IN THE PORT OF THESSALONIKI

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# Abstract

This dissertation is a study concerning the expansion of the container terminal at the port of Thessaloniki and accomplishes the following objectives:

1. Identification of the factors which are significant in the development of the container terminal.
2. Examination of the factors in order to identify those which create problems to the expansion.
3. Analysis of the problems and establishment of solutions.
4. Evaluation of solutions.

At first a presentation of the port of Thessaloniki and the container terminal is given and, also, some details are given about the expansion project. With the help of literature review the relevant factors involved are identified and in the following pages they are analyzed in order to identify the problems concerning the expansion. After identifying and analyzing the problems, some solutions will be established in order to deal with those problems or limit them to a minimum. Last but not least, those solutions will be evaluated in order to understand whether or not they are satisfactory.

**Keywords:** Container terminal, expansion, terminal capacity, port of Thessaloniki.

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# CHAPTER ONE

# INTRODUCTION

## 1.1 Background

Nowadays technology advances in a very rapid pace and this includes the maritime industry as well. The vessels that are constructed now are much larger than the ones that used to be and more technologically advanced. However, the problem is that in order for those vessels to be able to visit the port, the port itself should be technologically advanced so that it could be able to accommodate the vessels, load and discharge the cargo and so on. Also, the size of a port plays a huge role as many ports are too small nowadays compared with the size of the newly-constructed vessels and are unable to accommodate large vessels.

Another issue is the fact that the demand for cargo that is transported via containers is increasing, new ways and methods are found in order for the vessels to be able to carry more. Again, the size of the port is very important as it should not only be able to accommodate the vessel but also have enough capacity in order to store the containers that come in and out of the port's area on a daily basis keeping in mind any congestion problems that may occur.

So the solution to the rapid growth of the size of the vessels and the demand is for the ports to develop as well in order to be able to follow the developments and needs of the industry and the society today. Ports need not only to expand their area in order to have more capacity but also keep up with technological advances and equip themselves with new and more equipment.

### 1.1.1 Port of Thessaloniki

However, before getting into many details it is wise to give an overview of the port of Thessaloniki in general and then get more specific concerning the container terminal and begin working on the dissertation.

The port of Thessaloniki is the second largest port in Greece and is operated by Thessaloniki Port Authority S.A. (Th.P.A. S.A.) since 1999. It is a natural gateway for the economic activities of the inland markets beyond Greece as it plays a significant role in exports and imports and, also, it plays a substantial role in the effort concerning the establishment of Northern Greece and the city of Thessaloniki as the economic centre of the Eastern Mediterranean. Its main advantage is its location as it is connected with major land transportation networks such as the Egnatia highway, the P.A.Th.E.[1] highway and two major European road networks (corridors IV and X). Also, the port has rail infrastructure in all its sections which are connected to the national rail network.

The port consists mainly of three sections which are the container terminal, the passenger terminal and the zone which deals with conventional cargo. The port all together has a quay length of 6,200 m and a maximum sea depth of 12 m. It covers an area of 600,000 $m^2$ where it has outdoor and indoor storage area and modern equipment for the proper handling of all kinds of cargo such as containers, bulk cargo etc. The port currently has a workforce of more than 600 people while over 2,000 people work daily on its premises[2].

The port hosts at its area the following offices and services[3]:

- Harbour Master's Office
- Customs Control Offices
- Sanitary and Veterinary Control Station
- State Chemical Laboratory
- Hellenic Railways Company offices
- Fire Brigade Station
- Pilotage (VHF Channel 12, Range 16-24 kms)
- Towage (Radiophone communication and VHF Channel 8)
- Lashing/Unlashing companies

[1] Patra Athens Thessaloniki Evzoni.
[2] *General Information*, Available: http://www.thpa.gr/index.php?option=com_content&view=article&id=241&Itemid=981&lang=en (Accessed on 18th July 2014).
[3] *General Information*, 4th February 2014, Available: http://www.thpa.gr/index.php?option=com_content&view=article&id=254&Itemid=987&lang=en (Accessed on 18th July 2014).

The port, also, consists of a free zone which is operating since 1925 and facilitates international trade and in transit cargo. Its main advantages are that there are not any dues of taxes paid and, also, the custom formalities are limited and there is a possibility of unlimited duration of storage. Other advantages that the port has to present for itself are the following[4]:

- The container terminal operates all day long, all the year with flat rates.
- Conventional port operating in two shifts, at flat rates.
- Storage exemptions for transit cargoes.
- Transhipment, directly or through the quays, without customs formalities.
- RO/RO facilities in the conventional port and the container terminal.
- Hazardous cargo handling (IMO Table) in accordance with the current legislation requirements.
- ISO 9002 accredited port personnel, trained in accordance with the ILO PDP program.
- Integrated Management Information System of the container terminal.
- Discount is made to customers moving large quantities of cargo.
- Possibility of a vessel to have immediate access to berth.
- Full security condition concerning not only the cargo but also the port itself.
- Environmental certification by the ECOPORTS Foundation.
- Security conditions which are in compliance with the ISPS Code and a Security Department which has the task of guarding the port all day long and all year round.

### 1.1.2 Container Terminal

After having briefly discussed about the port of Thessaloniki in general it is time to concentrate on the container terminal which is the topic of the current dissertation.

The container terminal is located in the western area of the port at pier 6. Its dimensions consist of 550 m length, 340 m width and up to 12 m depth. It covers an area of 254,000 $m^2$ with a storage section which can accommodate up to 4,696 TEUs on ground slots. The container terminal uses four cranes for the loading and/or discharging of containers to and from vessels

[4] *Comparative Advantage*, Available: http://www.thpa.gr/files/general/thpa_4p_en.pdf (accessed on 18th July 2014).

which consist of one of 40-tonne lift capacity, one of 45-tonne lift capacity and two of 50-tonne lift capacity for post-panamax vessels. Moreover, the terminal is equipped with a large number of special equipment used for cargo handling, storing and stowing which is the following:

- 17 straddle carriers
- 4 tractors
- 5 front lifts
- 20 trailers and
- 6 forklifts

The container terminal is, also, connected with the rail network by a double track railway. So, in order to load and/or discharge the containers from the rail wagons, the terminal is equipped with one transtainer of 50-tonne lifting capacity. Last but not least, the container terminal disposes of 380 sockets for reefer containers. On an annual basis the container terminal at the port of Thessaloniki handles more or less 370,000 TEUs containers. The container terminal, also, has established a management information system which is a significant tool in developing technological applications that not only optimize the existing services of the company but also improve its competiveness.

The terminal infrastructure and operation upgrading thanks to the system is achieved through[5]:

- The installation and use of advanced telecommunication networks.
- The securing of an automatic and safe control of movements to and from the terminal from the land and the sea.
- The optimization of container receipt/delivery time and space.
- The control of collection/stowage in the stowage area.
- The graphic surveillance of container position (GIS-GSP).
- The automatic integration of relevant actions.
- The provision of alternative communication systems.
- The electronic submission of official documents.

[5] *Container Terminal Total Management System*, 29th January 2014, Available: http://www.thpa.gr/index.php?option=com_content&view=article&id=306&Itemid=1180&lang=en (Accessed on 18th July 2014).

- The electronic information of customers with regard to the position and state of the containers in the container terminal.

There are three major reasons why the container terminal is so successful which are the following:

- Provision of services round the clock, all year round at flat rates.
- High productivity in ship loading/unloading and provision of services.
- The presence of customs officers for a prompt service of customers and cargoes.

## 1.2 Methodology

The current dissertation is a discussion and an evaluation concerning the expansion of the container terminal at the port of Thessaloniki.

The first stage of the dissertation includes the literature interview which will be consisted of other peoples' sayings and statements and, also, there would be interviews taken from a number of people working at the port of Thessaloniki. What is more, after having collected all the information necessary there will be an examination of those data in order to understand which are the ones that create the problems regarding the expansion of the container terminal.

The third step will be to analyze all those problems concerning the expansion in order to establish appropriate and realistic solutions which will be eventually evaluated.

Concluding, at the end of the dissertation and after having examined and analyzed all the data and having evaluated all the possible solutions to the problems, a brief discussion will be conducted in order to understand the findings and state whether the aim of the dissertation was achieved or not.

## 1.3 Aims and Objectives

In order to prepare and present a proper and successful project there should be a number of aims and objectives that will work as guidelines. This dissertation has one aim and that is to examine the development of the container terminal at the port of Thessaloniki.

The first objective of this dissertation is to identify the factors that are significant in the development and expansion of the container terminal at the port of Thessaloniki. The next objective is to examine those factors in order to identify those that create problems to the expansion of the container terminal. The third objective is to analyze those problems in order to establish a number of solutions to them. The final objective of the dissertation is to evaluate those solutions so that there could be a clear view of both the problems and how they can be dealt with.

## 1.4 Structure of Dissertation

The dissertation is initiated by literature review on the main topic of the project which is the expansion of the container terminal in Chapter 2, continued with the factors that are significant in the development and the expansion of the container terminal. After having identified the factors the dissertation will continue with Chapter 3 where the factors will be examined into more details in order to identify those that would probably create any problems in the expansion of the container terminal. In order to accomplish that, a comparison will be discussed presenting the condition of the container terminal before and after the expansion. The examination and evaluation of those probable problems will be included in Chapter 4. Also, possible solutions will be established in order to confront those problems. Finally, a brief conclusion and some discussion of the dissertation will be presented in Chapter 5.

# CHAPTER TWO

# LITERATURE REVIEW

## 2.1 Container Terminal Operational Areas

A container terminal is separated based on its operational areas. The two main operational areas of a container terminal are the quayside and the landside operation area as shown in the figure below.

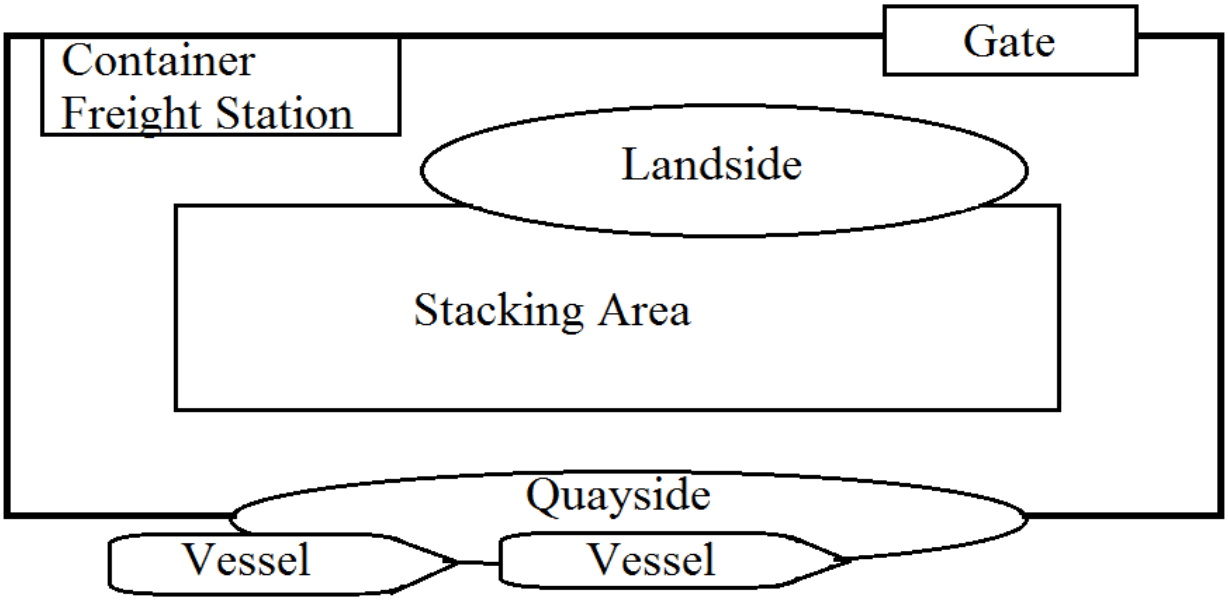


**Figure 2.1 Schematic diagram of a container terminal. Source: *Theory of Container Terminal Operations* by Dr. Steve Bonsall (2006 personal notes).**

Of course, there are, also, other operations such as freight station, customs/gate operations, etc. However, those operations can be included in the landside operation. The quayside operation (or shipside operation) deals with three sections which are the loading and/or discharging containers of the vessels, the stacking of the containers inside the container terminal and the transportation that is performed between those two sections. When talking about quayside operation there are various aspects that need to be taken into consideration such as the equipment used, the sequencing of the containers, the productivity of the terminal and the labour requirements. On the other hand, the landside operation has to do with the receipt and the delivery of the containers to and from the area of the container terminal using either the road network or the rail network.

More specifically, the containers are received and delivered at the gate of the terminal. Inside the gate the containers are transferred to the stacking area where, with the use of proper equipment and proper information, they are stacked in the appropriate location or discharged from one. Appropriate equipment for container handling is essential for this process. The most common handling systems that are used are the straddle carriers (SC) and the gantries which are separated into rail mounted gantries (RMG) and rubber-tyred gantries (RTG).

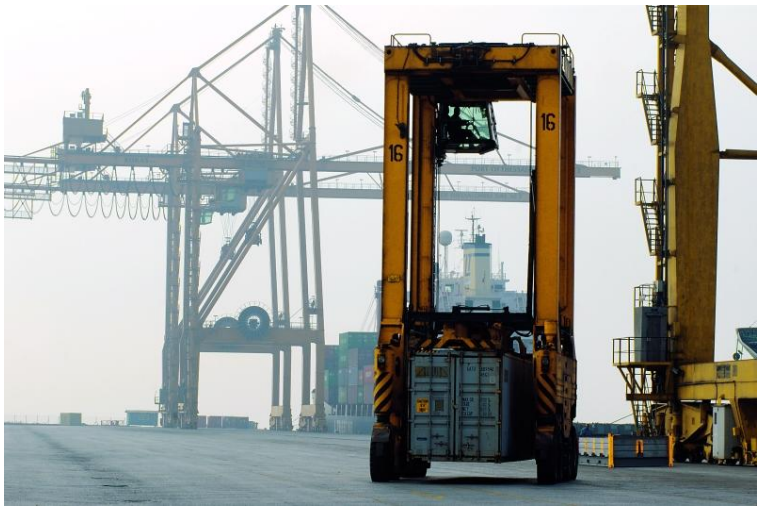


**Photo 2.1 Straddle carrier at the port of Thessaloniki. [Available: http://www.thpa.gr/images/sempo/ct01.jpg (accessed 28th July 2014)].**

The difference between those two handling systems is that the straddle carriers are most effective in accessibility of containers but lack in the process of stacking them; while the gantries are more effective in stacking containers but have restrictions concerning the accessibility.

Stacking is very important in a container terminal and many things need to be considered when containers are stacked. To begin with, in order to minimize traffic and/or congestion inside the terminal, the containers which are exported are usually stacked near to the quayside of the terminal, while the ones that are imported are stacked close to the landside of the terminal. Also, containers that are exported are stacked higher than the ones that are imported. Sometimes there are movements of containers in order to access some particular containers. Those moves are called shuffles and they result to a decrease in productivity. That is why the terminal planning operation tries to keep those moves to a minimum.

Another very significant issue is the appropriate design and planning of a container terminal. Some things that need to be taken into account in order to accomplish a successful design and planning of a container terminal are described below. First, the terminal land area needs to be properly estimated in order to avoid inefficient handling. Moreover, a suitable shape has to be adopted in order to avoid interference-prone flows patterns and bottlenecks. Last but not least, when designing the container terminal layout, the location of the facilities has to be appropriate in order to avoid interference between activities and poor operation process[6].

**Photo 2.2 Example of traffic bottleneck. [Available: http://www.matanyahorowitz.com/images/a/a0/Congested_traffic.jpg (accessed on 24th September 2014)].**

## 2.2 Expansion of the Container Terminal at the Port of Thessaloniki (Pier 6)

During the last twenty years the rate of growth concerning the container vessels' industry is extremely rapid. This is a result of the huge demand that has appeared and is increasing day by day concerning the transport of cargo using containerization. Considering the fact that the vessels grow larger with rapid pace and that they are capable of transporting much more containers than they used to two decades ago, it is important to take into consideration the ports and the container terminals. There are many ports nowadays that are not in a position to accommodate a

[6] Lawrence Edward Henesey, *Multi-Agent Systems for Container Terminal Management*, 2006, Available: http://www.sea-mist.se/fou/forskinfo.nsf/all/8db2e55374d0d79ec1257237005c4855/$file/Henesey_diss.pdf (Accessed on 28th July 2014).

vessel because of her huge size due to the fact that her length and draft are not supported by the port's characteristics. What is more, due to the fact that the trend towards containerization is increasing, container terminals will have to keep up with this increase in demand and in order to do that they will need to expand their capacity in order to accommodate even more containers.

Another issue is the fact that container terminals need to equip themselves with more technologically advanced equipment. So, in other words, container terminals need to follow the demand concerning larger container vessels and the only way to accomplish that is to expand its capacity and be technologically developed.

The issue concerning the expansion of the container terminal at the port of Thessaloniki has been discussed for over 15 years; however, due to the fact that capital and fund for the specific project could not be found, the realization of the project was impossible. In 2005 the Ministry of Mercantile Maritime with collaboration with the Th.P.A. S.A. and after much discussion, finally, came up with a plan to accomplish the expansion of the container terminal at the port of Thessaloniki. In 2006 the Th.P.A. S.A. had already made all the appropriate measurements and contracts concerning the expansion of the terminal.


**Photo 2.3 Future extension of 6th Pier. [Available: http://www.thpa.gr/files/general/thpa_4p_en.pdf (accessed on 24th September 2014)].**

The expansion of the container terminal has one and only objective; to increase the existing capacity of the terminal in order to be able to deal more efficiently and effectively with the growing demand concerning containerization. The technical description that concerns the expansion of the terminal is as follows. The project includes not only the expansion of the container terminal but also the purchase of appropriate equipment for the proper operation of the terminal and dredging operations concerning the existing quays of the terminal. More specifically, the project will consist of the expansion of the west section of the quays of the terminal which will be in total 500 meters so that the whole length of the quays of the terminal will reach 1000 meters. The depth of the new quay will be 15 meters and it will be a construction based on piles. What is more, the project includes the accomplishment, the banking up and the overlay of 150,000 $m^2$ of the pier behind the quays of the terminal so that the terminal was capable of stacking containers up to 3 high. It was estimated that after the completion of this project the terminal would be able to handle almost the double containers as it is now which is approximately 800,000 TEUs. A number of other works will include the construction of an area for reefer containers, a substation and lighting networks and a workshop for the maintenance of the equipment.

The equipment that will be purchased for the operation of the container terminal after its expansion will be the following[7]:

- 4 post-panamax cranes;
- 12 straddle carriers;
- 2 reach stackers and
- 2 tracktors.

Initially the project was expected to start in 2007 and to have been finished and put into action until the end of 2011. This project was an investment of 100 million euro. In 2006 the Th.P.A. S.A. had signed a contract with the European Investment Bank (E.I.B.) so that the half of the expenses was covered by the E.I.B. and the rest by the company's capital or by loans. More specifically, the contract stated that the loan given by the E.I.B. would be paid off during a

[7] *Port of Thessaloniki, Expansion of Pier 6, TECHNICAL OUTLINE*, Available: http://www.yen.gr/media/29394/texn_perig.pdf (accessed on 6th August 2014).

period of 20 years and that there would be a period of 5 years were no payments are needed to be done[8].

However, until 2011 and after many delays and misfortunes, no much had been done. From 2006 to 2010 there was a worldwide interest concerning the container terminal at the port of Thessaloniki. Eventually, in 2011 the project was auctioned and a company named "Mochlos S.A." was assigned as the construction contractor for the completion of the current project. At that time there were some changes concerning the technical details of the project. More specifically, the quays are to be expanded by 550 meters in length and by 365 meters in width. The revised depth will reach up to 16 meters which will make it easier to accommodate larger container vessels. Once the expansion is complete, the container terminal will cover 550,000 $m^2$ and will be capable of handling 1.2 million TEUs a year. Initially, the cost for the expansion of the terminal was expected to reach the amount of 150 million euro but after the auction it decreased to half. After the completion of the project an improvement in the equipment is required and is now estimated to be approximately 84.8 million euro. Even though the project is expected to be completed by the year of 2015, there are updates on the specific project almost every day[9].

It is worth mentioning that until 2009 the quay wall foundation works, which include the 600 meters in length, have been completed as well as a number of other complementary works directly related to the quay's foundation and were covered with the Th.P.A. S.A. own funds[10].

[8] *Contract between Th.P.A. S.A. – European Investment Bank for the 6th Pier*, 31th August 2006, Available: http://www.reporter.gr/Eidhseis/Epicheirhseis/Auxiliary-transport-activities/item/20632-%CF%83%CF%8D%CE%BC%CE%B2%CE%B1%CF%83%CE%B7-%CE%BF%CE%BB%CE%B8-%CE%B5%CF%85%CF%81%CF%89%CF%80%CE%B1%CF%8A%CE%BA%CE%AE%CF%82-%CF%84%CF%81%CE%AC%CF%80%CE%B5%CE%B6%CE%B1%CF%82-%CE%B5%CF%80%CE%B5%CE%BD%CE%B4%CF%8D%CF%83%CE%B5%CF%89%CE%BD-%CE%B3%CE%B9%CE%B1-%CF%84%CE%B7%CE%BD-6%CE%B7-%CF%80%CF%81%CE%BF%CE%B2%CE%BB%CE%AE%CF%84%CE%B1 (accessed 6th August 2014).
[9] *The expansion of the 6th Pier begins*, March – April 2012, Available: http://www.thpa.gr/files/portthess/portthess11.pdf (accessed on 22nd August 2014).
[10] *Thessaloniki Port Authority: Announcement*, 17th February 2009, Available: http://english.capital.gr/news.asp?id=678473 (accessed on 24th August 2014).

## 2.3 Factors significant in the development/expansion of a Container Terminal

### 2.3.1 Functions of a Container Terminal

The main and basic function of a container terminal is the transfer and storage of containers. In simple words this means that a container terminal needs to be operated in such a way that it is efficient and effective, without presenting any cases where there are problems caused by inappropriate operation of the terminal. However, the proper operation of the terminal is not the only need that a container terminal has to present. Another need of a container terminal is for it to be able not only to accommodate the vessels that visit the terminal on a daily basis but also to be able to accommodate, store and transfer within the terminal area the great numbers of containers that are loaded and discharged every day. What all container terminals try to accomplish is to optimize all the operations involved with the flow of containers so that maximum productivity will be achieved. Also, container terminals try to accomplish efficient container handling because it is of great significance when talking about transportation costs, which are reduced and shipping schedules, which are stable. Concerning all of the above, it can be said that container terminals even though have to consider the fact that they need to be expanded in order to be able to keep up with the new developments, there are a lot of issues that need to be kept in mind. There are a great number of factors that contribute in the development of a container terminal and have to be taken into account before beginning any development of expansion at the terminal at all.

### 2.3.2 Separation of Factors

To begin with, the factors can be separated into two groups; internal and external factors. The internal factors include terminal configuration and layout, capital resources and labor productivity. On the other hand, external factors include trade volumes, shipping patterns and ration of import to export containers.

The terminal configuration and layout is very significant and should be considered very thoroughly before an expansion because it can be used as a guide for the expansion. In other

words, the layout of the terminal can be examined and show how the expansion should be developed in order to avoid future mistakes. Obviously, capital resources are very important as such a project will be a huge investment and will cost a lot of money. Concerning the external factors it is clear that trade volumes and shipping patterns are the ones of most importance. It is due to the fact that the terminal has to show some prospective in order for a great project as an expansion to take place.

### 2.3.3 Size and Capacity of a Container Terminal

The size of the container terminal plays a significant role but more specifically the terminal capacities are the one factor that needs to be kept in mind. In "Factors affecting seaport capacity" (2011) Islam and Olsen stated the factors that influence the terminal's capacity, which are the following[11]:

- The ratio of loaded to empty containers. Even though, the loaded and empty containers take up exactly the same surface area, loaded containers are much heavier and cannot be stacked as high as the empty ones.
- Average stacking period per container.
- Stacking high.
- Ratio of non-refrigerated containers to refrigerated containers.
- Ratio of import to export containers.
- Planned utilization factor (for management reasons some space capacity may be required).

The terminal's yard capacities are very important in the way that from one point the demand concerning container transportation has increased but from the other point the terminal is unable to handle or store such a great number of containers due to capacity restrictions. When talking about the capacity of the terminal a number of other factors have to be considered as well. The traffic and congestion are such factors. When the capacity of the terminal is not sufficient and everyday thousands of containers are handled then it is very likely that problems such as

[11] S. Islam & T.L. Olsen, *Factors affecting seaport capacity*, 2011, Available: http://www.mssanz.org.au/modsim2011/A5/islam.pdf (accessed on 22nd August 2014).

congestion will occur. Containers are discharged from the vessels and then stacked in the storage area and, also, they are carried to the terminal and again stacked until they are to be loaded to a vessel. The movements that are done by the terminal's equipment and by the tracks and trains that visit the terminal daily can result to congestion if the capacity of the terminal cannot afford for example, two or more vehicles at the same time at a narrow road. Consequently, traffic and congestion result into delays which with their turn lead to fees and additional costs. That is why all those discussed above are important and can possibly lead to a decision concerning an expansion of a terminal.

### 2.3.4 Characteristics of the vessels

Another factor is the size of the vessels that are accommodated by the terminal. As mentioned before, the container vessels' industry is developing rapidly and much larger container vessels are constructed each year. In order for the container terminals to be able to accommodate such large vessels they need not only to have large quays in length and depth but also to have the proper equipment in order to be able to deal with the requirements that such a vessel present. So, a very vital factor that can lead to the expansion of the terminal is the fact that the terminal, in order to increase its profits and its operational efficiency, has to keep in mind that there are large vessels; and in order to keep up, the terminal should increase its quays by increasing their length and depth. However, there is, also, another issue concerning all mentioned above. If a vessel is very large, the terminal will be able to accommodate only one single vessel within its berth and use all its equipment (cranes) just to work on one single container vessel.


**Photo 2.4 A container vessel being accommodated at the container terminal at the port of Thessaloniki. [Available: http://www.thpa.gr/images/sempo/ct06.jpg (accessed on 23rd August 2014)].**

Of course, this is not productive and profitable concerning the fact that other vessels wait to be discharged and loaded as well. It is obvious now that this will cause many problems to the container terminal such as delays, unless they decide to expand the terminal's quays and equip them with more cranes so that more than one vessel, even large ones, could be accommodated. It is very important to mention that even though the terminal can be supplied and equipped with more cranes for the convenient handling of containers, those cranes must meet the characteristics and requirements of the new vessels and the containers that they transport. For example, the cranes can be of 45-tonne lift capacity or 50-tonne lift capacity (which is used for post-panamax vessels).

### 2.3.5 Rail and Road Networks

Another significant factor is the performance of intermodal rail and road networks. It is very important for a terminal to provide access to both trains and trucks in order to import and/or export containers. However, just to provide access is a very simple task to accomplish. The difficult part is to develop such a wide rail and road network so that problems such as congestion, which may result into delays in the terminal's operation and decrease productivity, will be restricted to a minimum or completely be avoided.

All of the above are factors that have to be taken into account when discussing about development and/or expansion of a container terminal and they apply to all container terminals without exception.

### 2.3.6 Factors concerning the Container Terminal at the Port of Thessaloniki

In the following, some additional factors will be identified but this time those factors will have to do more specifically with the container terminal at the port of Thessaloniki.

#### 2.3.6.1 Location of the Container Terminal and Dwell Time

Firstly, it is wise to mention that the container terminal at the port of Thessaloniki is not a large terminal so it does not meet the requirements for accommodating large vessels. That can be stated as the most significant factor in the expansion of the terminal. The length of the quay of the container terminal, which is currently 550 meters long and after the works will reach the length of approximately 1000 meters long, is not enough in order to accommodate large vessels. What is more, due to the fact that the terminal is located at a bay (Thermaikos Bay) the depth of the waters is only 12 meters which is not sufficient as larger vessels can reach greater draughts. Another vital factor concerning the location of the terminal is the fact it has great potentials in becoming a transit hub concerning the markets of Northeastern and Central Europe. In addition, the container terminal is not equipped with the appropriate number of handling and stacking equipment and as a consequence the terminal's operation does not present any increasing productivity. One important factor is the fact that the terminal is lacking concerning the number of the cranes. As mentioned before the container terminal is equipped with four cranes, two of which are for post-panamax vessels. This means that only one or occasionally two (smaller) vessels can be accommodated at the same time in the quay for loading and/or discharging of containers. This leads to another factor which is the dwell time of the container vessels. In other words, this is the period of time that a vessel spends waiting for her turn so that she could be accommodated in the quay. The period when the decision concerning the expansion of the container terminal was taken, the terminal had been already presenting many cases where vessels had to wait for days before being able to moor at the quay and commence discharging and/or

loading operations. Of course, the cost for a vessel on a daily basis is very high, especially for large ones, so for a vessel just to be in anchorage waiting for her turn is not profitable at all.

### 2.3.6.2 Economical Factors

Another factor, which mostly played a great role in the final decision concerning the expansion of the 6th pier at the port of Thessaloniki, was the fact that year by year the port authorities and specifically the container terminal's personnel witnessed that the seaborne containers throughput was increasing with a very rapid pace. The table below shows clearly how the throughput of the containers occurred since 1995.

| Year | Loaded | Empty | Total | % Difference |
|---|---|---|---|---|
| 1995 | 112,968 | 30,449 | 143,417 | 0 |
| 1996 | 124,991 | 36,344 | 161,335 | 12.5 |
| 1997 | 129,633 | 38,073 | 167,706 | 3.9 |
| 1998 | 144,530 | 37,572 | 182,102 | 8.6 |
| 1999 | 172,533 | 44,378 | 216,911 | 19.1 |
| 2000 | 175,783 | 53,962 | 229,745 | 5.9 |
| 2001 | 176,878 | 57,026 | 233,904 | 1.8 |
| 2002 | 182,781 | 57,658 | 240,439 | 2.8 |
| 2003 | 207,597 | 61,955 | 269,552 | 12.1 |
| 2004 | 250,641 | 85,455 | 336,096 | 24.7 |
| 2005 | 273,506 | 92,419 | 365,925 | 8.9 |
| 2006 | 259,015 | 84,712 | 343,727 | -6.1 |
| 2007 | 313,830 | 133,381 | **447,211** | **30.11** |
| 2008 | 186,064 | 52,876 | **238,940** | **-46.57** |
| 2009 | 196,341 | 73,840 | 270,181 | 13.07 |
| 2010 | 209,560 | 63,722 | 273,282 | 1.15 |
| 2011 | 220,425 | 75,445 | 295,870 | 8.27 |

| | | | | |
|---|---|---|---|---|
| 2012 | 233,198 | 84,702 | 317,900 | 7.45 |
| 2013 | 243,833 | 78,477 | 322,310 | 1.39 |

**Table 2.1 Seaborne Containers Throughput at Th.P.A. S.A. Area in TEUs [*Container traffic until 2007*, 17th February 2008, Available: http://www.thpa.gr/files/statistics/containers2007en.pdf (accessed on 23rd August 2014) and *Statistical Data 2013*, 03rd February 2014, Available: http://www.thpa.gr/files/statistics/statistics2013en.pdf (accessed on 23rd August 2014)].**

As it is shown on the above table, since 1995 the throughput of containers at the port of Thessaloniki had already begun blooming and each year it was increasing. From 1995 until 2005 the throughput increased from 143,417 TEUs to 365,925 TEUs. In just one decade the throughput had grown much more than 50%. In 2006 a drop occurs but not of much significance as the year 2007 appears to be very successful for the container terminal as it reached a total throughput of 447,211 TEUs and once again greatly increased. Unfortunately, the year of 2008 can be described as the worst ever as the total throughput decreased almost to half just in one year. The specific occasion is not much of a surprise and can be easily explained as 2008 was the year when the economical crisis began not only in Greece but also world widely with many container vessels becoming idle. Furthermore, it was the time when the container terminals at the ports of Piraeus and Thessaloniki were supposed to become private and because of that there were many objections and riots from the local communities in order to prevent the above. (Eventually, the container terminal at the port of Piraeus was passed to a Chinese shipping company named Cosco). Since 2009 and until today the container terminal is showing signs of improvement and the total throughput of TEUs is slowly but steadily increasing even though those years were very difficult for Greece due to the economical crisis. Of course, such figures cannot be simply ignored as they indicate how significant the container terminal is at the port of Thessaloniki and shows its great role and contribution not only to the local but also to the national economy. Last but not least, according to the Director of the Container Terminal, Mr. Athanasios Nazlidis, the shipping companies that collaborate with the Th.P.A. S.A. notified the terminal authorities that they are going to increase even more their ship calls to the port of Thessaloniki; something which is very promising and indicates that the port of Thessaloniki is very important for the transportation of containers as well as that it is a very vital hub and junction in the Balkans.

## 2.4 Summary

To sum up, in order to decide a big project such as the expansion of a container terminal it is necessary to identify and analyze the factors that lead to such a decision. All the factors mentioned above are very important as they show how the terminal used to be operated and handled and they emphasize the need for an expansion in order to be able to keep up with the times and the technological advances. Generally, all the factors have to do with the demand for cargo transported inside containers and in order for a container terminal to continue being productive and profitable, it has to adapt to those needs.

## 2.5 Interviews

Since this chapter had to do with the main objective of this dissertation, which is to identify the factors that are significant in the expansion of the container terminal, and since it included the literature review, which is basically what other people have said and stated about the specific project of the container terminal expansion, it is wise to mention at this point that all the factors were identified during a couple of interviews that were conducted by two members of the staff at the port of Thessaloniki. The first person that was interviewed was Mr. Savvas Sismanis. Mr. Sismanis was appointed as Director of Estate, Civil Engineering Works and Development Division in 2008 and was of much help concerning all the technical details about the expansion of the container terminal. Mr. Athanasios Nazlidis, who from 2008 was appointed as Director of the Container Terminal, was the second person to be interviewed and was of much help in describing all the operations that are conducted in the container terminal and how important those are as well as in identifying a number of the factors that are significant to the expansion.

# CHAPTER THREE

# EXAMINATION OF THE DATA COLLECTED

## 3.1 Introduction

In the previous chapter with the help of literature review and by using the knowledge and opinions of other people, the identification of the different factors, that are significant in the development of the container terminal, was successfully completed. In this chapter those factors will be examined in a more detailed way and thoroughly analyzed which will help in the identification of the different problems that may arise and affect the works of the expansion of the container terminal and those that will probably occur after the completion of the project. Before beginning it is wise to mention that the factors will be separated into a number of sections and sub-sections so that they could be easily understood and further examined. Moreover, this will be of great help in precisely identifying all the possible problems concerning the expansion of the container terminal at the port of Thessaloniki.

## 3.2 Analysis of the factors in order to identify problems

### 3.2.1 Size and Capacity of Container Terminal

As mentioned in Chapter 2, the size and the capacity of the container terminal plays a very important role in the operation of the terminal. If the given size of the terminal is properly taken advantage of, then the terminal can turn out to be very efficient and productive. The same thing goes for the terminal's capacity. If the operations inside the terminal are properly conducted, then the capacity of the terminal will be utilized and it will be productive. That is why the size and the capacity of the terminal are very important factors in the expansion of the terminal. Due to the fact that the demand is growing, terminals need to adapt to the needs of the market and make the necessary steps in order to improve their productivity. When talking about the size and capacity of the container terminal it is wise to make it clear that many areas are involved with this issue such as handling of containers, transportation of containers inside the terminal yard,

stacking of containers and storage or containers. Another issue that has to be cleared off is that the container terminal will just be expanded including an area which until now was not used and as a result will get bigger in both size and capacity.

#### 3.2.1.1 Existing Problems

As mentioned above the works, concerning the 6$^{th}$ Pier, have not only begun but also a significant part of them, which is the expansion of the quays, has been already completed. The works are anticipated to be completed until 2015 which means that until then inside the container terminal there will be taking place a lot of traffic concerning the equipment that will be needed in order to work, the space that those equipment will occupy and the workforce that will conduct those works. In order for the project to be on schedule and the works to be productive, it is not efficient and effective for the equipment and the machines to leave the workplace at the end of each day. The equipment should remain on the site which means that space will be needed for it and thus the capacity of the container terminal will decrease to a degree. On the other hand, there will be a lot of movement inside the terminal yard because of the works, which will not only create problems to the container terminal's workforce such as delays in the transportation of a container but also can cause confusion resulting from minor to major mistakes which can lead to great economical damage to the terminal. In other words, during the expansion of the container terminal the capacity of the terminal will be lowered which will cause the terminal to be less productive during that period. Of course, this is a short-term problem which will disappear after the completion of the expansion, but still should be taken into account and some actions and measures should be taken in order to limit this problem as much as possible.

#### 3.2.1.2 Future Problems

Concerning the completion of the expansion, something that should be considered is the fact that the terminal's capacity will be larger and so it will be able to handle and store a much greater number of containers. What should be kept in mind is that the container terminal at the moment is productive, however, after the expansion the larger capacity will lead to handling of more containers and so the terminal should find a new operational plan in case the old one will not be

efficient and effective. In this scenario, the problem is caused after the completion of the expansion project. Another problem included in this scenario is the use of both the existing equipment and the ones that are going to be purchased later on. Again the terminal should have a traffic plan that would be effective so that the traffic and congestions are limited to a minimum. More equipment means more movement inside the terminal and as a result more chances that there would be a problem concerning traffic which may lead to delays and make the terminal operations less productive. But what if the productivity will not be the same after the expansion? There is always the risk that productivity will decrease either due to the expansion or due to a wide variety of reasons. After the completion of the terminal's expansion, there is a possibility that the existing operational plan will not be as productive as it is now; this means that the operations inside the terminal will be conducted more slowly than used to and as result they will not be as productive as anticipated. What is more, the expansion project includes purchase of new equipment which will probably be more advanced than the ones used now. So, until the personnel of the container terminal acquire the knowledge and training of how to properly and productively use the new equipment and adapt to them, the productivity of the terminal might show a slight decrease. Moreover, the possible training that the personnel will need will not only cost a great deal of money but also will require a lot of time. The point is that the terminal's operations after the expansion of the terminal may present a decrease in their productivity, efficiency and effectiveness and the reason is that new things need new ways of handling.

Another issue concerning the capacity of the container terminal is whether it will be utilized or not when completed. It is pretty clear that the expansion is taking place because there is great demand and the terminal needs to adapt to it and take advantage of it. What is more, according to the director of the container terminal, Mr. Athanasios Nazlidis, the shipping companies reassured the Th.P.A. S.A. that they will support the port of Thessaloniki and not only keep sending their vessels to the port but also increase the number of calls. All that sounds promising, but what if things turn ugly and eventually the container terminal will lose a great number of the vessels it used to accommodate? What if things turn out not as they were initially estimated? The result would be that the terminal will end up with much unused space and be unprofitable which in simple words means loss of a great deal of money. This is not an existing problem but could very easily become one in the near future.

This leads to another question which can be considered as a problem. The idea concerning the project of expansion is for the terminal to be able to accommodate more vessels and handle more containers which will lead to a rise in profitability of the terminal. However, even though the works will eventually be completed, by the time of completion the demand may present a rise much more than anticipated and so the new terminal will on one hand be more profitable than it used to be but on the other hand it will still not be able to cope with the new demands of the market.

To sum up, the main problems presented here are the ones having to do with the works of the expansion of the container terminal, their completion and the terminal's operations after the expansion. The first problem concerns directly the works due to the fact that they may have a negative impact on the terminal's operations. The other problems that have been identified have to do with the completion of the expansion of the terminal and how productive and profitable it will be after the expansion.

### 3.2.2 Economical Factors

The second subsection of the factors, and more specifically subsection 2.3.6.2, identified and described the economical factors that have to be taken into account concerning the expansion of the container terminal at the port of Thessaloniki. When the economical factors were identified the first thing that was discussed was the fact that until 2007 the container terminal was at its best and was very productive and profitable as the annual throughput of containers reached the number of 447,211 TEUs. This alone is good proof that the container terminal was being operated in a very productive and profitable way. However, the statistical data between 2007 and 2008 present a huge negative difference. In 2008, there is a sudden decrease which was very worrying to the further development of the container terminal. In 2008 was the year when the economical crisis began in Greece and it continues till nowadays, but despite the crisis the container terminal managed and still manages to be slightly productive. In the table and the diagram below the data are shown clearly.

| Year | Loaded | Empty | Total | % Difference |
|---|---|---|---|---|
| 2003 | 207,597 | 61,955 | 269,552 | 12.1 |
| 2004 | 250,641 | 85,455 | 336,096 | 24.7 |
| 2005 | 273,506 | 92,419 | 365,925 | 8.9 |
| 2006 | 259,015 | 84,712 | 343,727 | -6.1 |
| 2007 | 313,830 | 133,381 | **447,211** | **30.11** |
| 2008 | 186,064 | 52,876 | **238,940** | **-46.57** |
| 2009 | 196,341 | 73,840 | 270,181 | 13.07 |
| 2010 | 209,560 | 63,722 | 273,282 | 1.15 |
| 2011 | 220,425 | 75,445 | 295,870 | 8.27 |
| 2012 | 233,198 | 84,702 | 317,900 | 7.45 |
| 2013 | 243,833 | 78,477 | 322,310 | 1.39 |

**Table 3.1 Seaborne Containers Throughput at Th.P.A. Area in TEUs**

As shown above after the sudden drop in TEUs handled in 2008, the throughput of containers steadily increases until 2013 but it still does not reach the level it was until 2007. The total throughput for the year of 2013 was only 322,310 TEUs compared to the year of 2007 when the total throughput reached 447,211 TEUs[12].

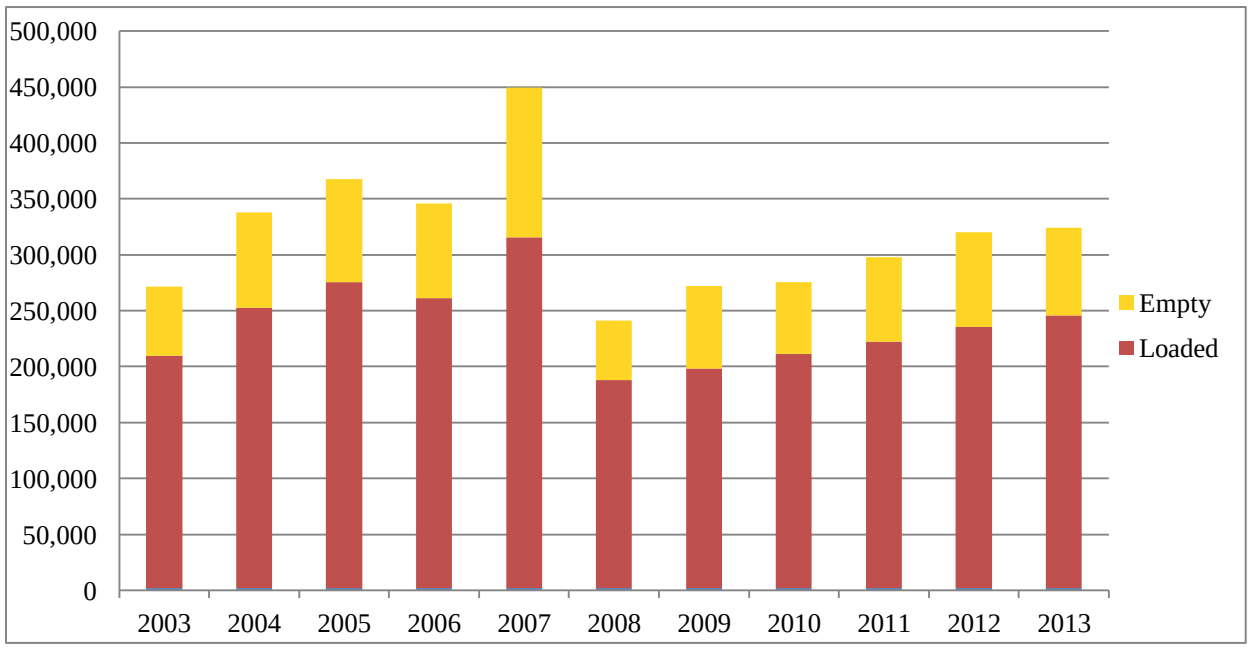


**Diagram 3.1 Seaborne Containers Throughput at Th.P.A. Area in TEUs**

[12] *Container traffic until 2007*, 17th February 2008, Available: http://www.thpa.gr/files/statistics/containers2007en.pdf (accessed on 23rd August 2014) and *Statistical Data 2013*, 03rd February 2014, Available: http://www.thpa.gr/files/statistics/statistics2013en.pdf (accessed on 23rd August 2014).

Of course, the poor throughput during 2008 was just a result of the fact that in 2008 the container terminal was visited by a very low number of vessels as shown in Table 3.2 below.

| Year | 2008 | | | 2007 | | | Difference % |
|---|---|---|---|---|---|---|---|
| | International | Domestic | Total | International | Domestic | Total | -76.67 |
| | 161 | 0 | 161 | 690 | 0 | 690 | |

**Table 3.2 Ship arrivals in 2007 and 2008**

The container terminal was very productive and profitable in 2007 when in total it accommodated and handled 690 vessels which as a result lead to the handling of a large number of containers. However, in 2008 the number of vessels that arrived at the container terminal was critically reduced to 161. Table 3.2 depicts that the total difference is much higher than 50% and reaches 76.67%.

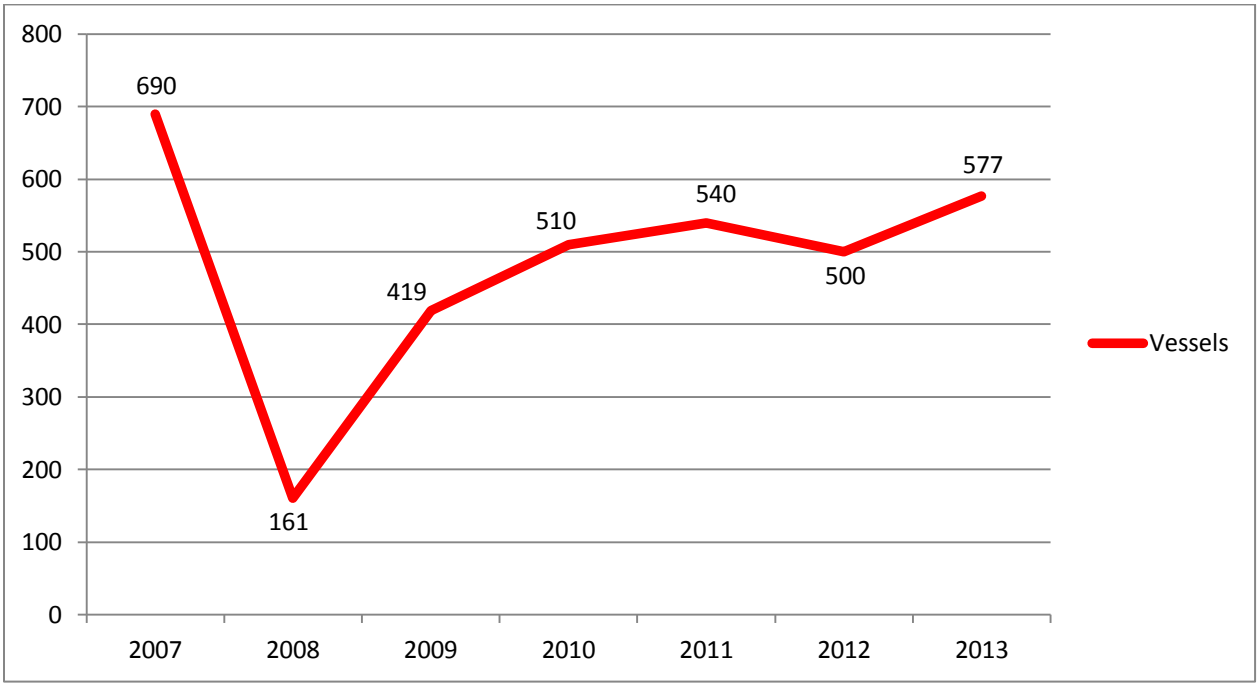


**Diagram 3.2 Ship arrivals since 2008 till 2013**

On the other hand, after just one year in 2009 the number of vessels that arrived and were accommodated by the container terminal increased significantly to 419 which means that there was an incredible rise of 160.25%. Since 2009 until 2013 the number of vessels that included the port of Thessaloniki in their port of call lists steadily increased on an annual basis with an

exception in 2012 when there was a slight drop that did not continue the year 2013 when the total vessels that visited the container terminal were 577. After having witnessed how the course of ship arrivals had evolved from 2008 to 2013, it is wise to compare these two years in order to have a better and clearer understanding concerning the data and the figures presented. The following table shows the great increase in ship arrivals between 2008 and 2013.

| Year | 2013 | | | 2008 | | | Difference % |
|---|---|---|---|---|---|---|---|
| | International | Domestic | Total | International | Domestic | Total | 258.39 |
| | 577 | 0 | 577 | 161 | 0 | 161 | |

**Table 3.3 Ship arrivals in 2008 and 2013**

It can be said that the container terminal had become a victim of the economic crisis for a short period of time. Probably the recent economic crisis is the most important problem at the moment as it can cause many changes to the market which means that things will be different and far from what is anticipated.

The demand in the market and its needs plays an important role in the productivity of the container terminal; so issues concerning it, such as sudden increases or decreases, should never be neglected and always thoroughly examined and analyzed. The first scenario is that the demand decreases which is very realistic as shown from the figures above. A decrease in demand for containerized cargo means fewer containers and from the moment the main operation of the container terminal is to handle containers it means that the terminal will end up being unprofitable and have more costs than revenues. On the other hand, if an increase in demand occurs then for a period of time the terminal will be very productive and profitable. But, because of the increased (and probably non-anticipated) demand the terminal's capacity will end up being inadequate and the operations of the terminal will be unproductive. The expansion of the terminal will result into high productivity and profits for the company in the short run, however, in the long run neither the expanded territory nor the extra equipment will be enough for the terminal to continue to be as productive as it used to.

One more issue that should be taken into consideration is the fact that there is a possibility that after the expansion of the container terminal the costs will be much higher than firstly anticipated and budgeted. For example, an increase in prices could take place which means that things such

as the new equipment and its handling and maintenance would cost more. This would lead to lower return than estimated and so the container terminal would end up with losses instead of profits.

Just for history it is worth mentioning that in 2008 the container terminal was put on a contest so that it could be purchased by a private company. There were a lot of interested companies with the main ones to be consisted of the Hutchison Port Holdings, the COSCO Shipping Co. and the Dubai World Port. Initially the Hutchison Port Holdings placed the highest offer but after a short period of time withdrew its interest in the container terminal at the port of Thessaloniki. At that time the reasons for withdrawal were believed to be due to the economic crisis and the difficulty of the banks to finance Hutchison's ambitious plans[13].

Another problem that appeared during the period that the container terminal was auctioned was the fact that the personnel of the port and more specifically the dockers and stevedores showed their dissatisfaction concerning the privatization of the container terminal by organizing strikes that lasted for many days. Those long-lasting strikes made the whole situation even worse and were the major reason for the poor performance of the container terminal in 2008. The whole situation became calm only after the withdrawal of the Hutchison Port Holdings[14].

### 3.2.3 Environmental and Safety Issues

Environmental issues are very important and can easily become a problem and that is why they should be taken into consideration. In this case due to the fact that the terminal will be able to accommodate larger vessels, it, also, means that those vessels will produce water pollution and air pollution to the local area. After all, the port's location is inside the city of Thessaloniki and so much more attention is needed to be addressed to environmental issues. On the other hand, because of the expansion of the quays it is important to consider whether it is appropriate to construct the quays in the specific location or not. The port of Thessaloniki is aware of the environmental issues concerning not only any potential hazards such as noise, waste and spillage

[13] *Hutchison pulls out of Thessaloniki port tender*, 24th December 2008, Available: http://www.investing.com/news/forex-news/hutchison-pulls-out-of-thessaloniki-port-tender-16463 (accessed on 26th August 2014).
[14] *Stevedores: Other P.P.A S.A., other Th.P.A. S.A.*, 16th November 2009, Available: http://www.makthes.gr/news/reportage/47140/ (accessed on 26th August 2014).

but also the works of the expansion of the container terminal. All over the world there are laws and regulations concerning the environment and specifically pollution that are very strict and need to be understood and followed.

Concerning the safety issues it is wise to say that safety is very important not only when talking about people but also about property and that it should never be neglected. Two possible problems may arise; one during the works of the expansion and one after the completion of the expansion. During the works there may be cases of injuries or damage to the containers or equipment because of negligence. After the completion of the expansion those problems may remain as there would be more equipment and vehicles inside the terminal yard and that will increase the probability of injuries. What is more, due to new equipment new safety regulations and measures will probably be in need.

## 3.3 Summary

To sum up, in this chapter, after looking at the factors one more time, the problems that have an impact or will have in the future relative to the expansion of the container terminal were identified. The most important ones and the ones that need to be mostly noticed are the ones having to do with the capacity of the container terminal, the demand for transportation of cargo via containers and a number of economical issues. Those problems have to do with the productivity and profitability of the container terminal and that is why they are so important to be restricted. Some other problems identified were those of environmental and safety matters. However, environmental and safety issues have a lot of laws and regulations which are already followed by the majority of the ports worldwide.

At last, it should be mentioned that a major project such as an expansion of a container terminal is a great investment and as in all investments there are risks. Consequently, in this one there is, also, the risk of failure meaning that in the end the container terminal will not be as productive and profitable as initially anticipated.

# CHAPTER FOUR

# ESTABLISHING SOLUTIONS TO THE PROBLEMS

## 4.1 Introduction

In the previous chapter all the problems (or most of them) were identified and analyzed in order to fully understand them and have an idea concerning how they are or may be created and what result they have or might lead to. In this chapter a number of possible solutions will be established in order to deal with or limit as much as possible the foresaid problems. The next step will be to evaluate those solutions in order to understand whether they are realistic and have a probability of success or not. The way the solutions will be established and evaluated will be by re-examining the problems, which were identified earlier, more closely. By accomplishing that, it will be easier to come up with possible solutions that would be more appropriate regarding each case.

## 4.2 Evaluation of Solutions

### 4.2.1 Size and Capacity Problems

In chapter 3, sub-section 3.2.1.1, the first problem that was identified was one of the present and directly affected the terminal's works. The problem is that even though the works of the expansion have begun, the negative part is that the terminal's productivity will drop. This occurs due to the fact that there is a lot of traffic at the terminal yard due to the different equipment used for the expansion works which result to delays at the handling of containers or other operations inside the container terminal. Moreover, the capacity of stacking area and the space in the storage facilities are going to be slightly decreased due to the fact that all the equipment and the resources and materials needed for the expansion works have to be stored inside the terminal. All that lead to only one conclusion; that the container terminal will not be as productive as it used to be for a period of time until the expansion reaches its completion. So, in this particular case the problem is short-term and a temporary one and will disappear on its own as soon as the works are completed. Concerning this specific problem there is no need for harsh actions to be taken.

On the other hand, one can say that some measures could be taken and maybe a new temporary operational plan could be presented in order to deal with that problem or at least limit it as much as possible.

The next couple of problems that were identified basically have to do with the operation of the container terminal after the expansion and whether it will be able to be as productive and profitable as it was before the expansion. The first one describes the case whether the container terminal will be able to handle the great number of containers that will be stored inside its yard. After the completion the terminal is supposed to almost triple its capacity which means that a much bigger number of containers will be handled annually by the terminal. The container terminal has an operational plan which is very successful actually, but will it come handy when talking about more than 1,000,000 TEUs? That is definitely a problem that needs to be taken seriously as that is the main reason the expansion takes place, so that the container terminal will become larger, accommodate larger and more vessels and handle a greater number of containers. According to Dr. Kiriakos Loufakis, who is the chairman of Northern Greece Exporters Association, the container terminal at the port of Thessaloniki substantially serves only the flows inside/outside and transit[15]. From the above statement it can be assumed that a large number of containers will leave the area of the terminal towards their final destination as soon as they will be discharged or will be stowed for a short period of time and as result the terminal yard will be able to overcome any problems concerning capacity and operation issues. Moreover, there is a pilot program in progress concerning the port of Thessaloniki and TrainOSE, which is developed by FUTUREMED[16]. Its aim is to develop an electronic interface between the two mentioned above for the management of requests concerning transportation of containers in the corridor Thessaloniki – Sofia. In combination with the statement made by Dr. Loufakis, it can be easily

[15] Inside/outside flows are relating to imports and exports of a country. Transit concerns cargo which is intended for other countries; it is discharged in Greece and transported to its destination via inland transport.
*The proposals of SEVE for the port of Thessaloniki*, 3rd September 2014, Available: http://www.capital.gr/News.asp?id=2099816 (accessed on 7th September 2014).
[16] Freight and passengers sUpporting infomobiliTy systems for a sUstainable impRovEment of the competitiveness of port-hinterland systems of the MED.

assumed that the above project is of vital significance as it can become a major link for the port of Thessaloniki connecting it with other inland countries[17].

The second one has to do with the equipment that will be purchased as part of the expansion project. What has to be considered is the fact that more equipment means more traffic which can cause congestion and delays. Again the equipment will need to be handled in a proper way and an effective plan should be made so that the problems will be limited or even better solved. Of course, the container terminal has already a very productive plan concerning the handling of the containers and equipment. To be more precise, the container terminal has adapted a system which has turned out to be very effective and productive as all the proceedings are done without any delays or mistakes. All the containers that are imported or exported from the container terminal are identified by a unique number (seal number). At the gate of the terminal the drivers of the trucks get all the information concerning a specific container and so they know exactly from where to pick up a container or where to deliver it. At the container terminal there is the Planning and Control Operations Department through which the planner is capable of knowing every detail about the containers and with the help of the Geographical Information System (GIS) the exact location of a container can be identified as long as it is inside the terminal yard. The new container terminal gate operates automatically. Two gates remain open in order to improve the services provided to the trucks. The drivers should follow a number of specific instructions that are the following[18]:

- Check if the container number and the size inscribed on the license agree with those inscribed on the incoming/outgoing container. In the case of an error, the corresponding correction must be applied prior to your entrance into the Container Terminal.
- At the Container Terminal Gate, sweep your license barcode through the automatic machine and press OK.
- Receive the ticket that will bear the parking space in which you must park your truck for the receipt/delivery of the container.

[17] *Press Release – System Interface between Th.P.A. – TrainOSE,with the aim of enhancing the visibility of intermodal*, 25th May 2014, Available: https://www.thpa.gr/files/general/futuremed_dt_062014.pdf (accessed on 7th September 2014).
[18] *Container Terminal Total Management System*, 29th January 2014, Available: http://www.thpa.gr/index.php?option=com_content&view=article&id=306&Itemid=1122&lang=en (accessed on 2nd September 2014).

- Upon your exit you must show your entrance ticket.
- In case the entrance ticket bears the inscription INVERSION, you must exit the terminal immediately.

Another issue concerning the new equipment is the fact that they will probably be more technologically advanced compared to the ones that the terminal has now. So the problem is that the personnel will need time to adapt to them and maybe some training will be needed which will be not only costly but also time-consuming. The good news is that the equipment that the container terminal has in its disposal is already technologically advanced so that they could keep up with the whole operational plan of the terminal. All the equipment have implanted touch screens that can inform the person in charge about the exact location of a container either it has to be delivered and loaded on a vessel or stacked in the terminal yard and wait to be picked up later on. At that point it is wise to mention that the container terminal has a very strict policy concerning quality as it wants to keep its customers satisfied. There are a number of things that the container terminal keeps in mind so that the quality of the services provided is at a high standard. One very important thing is that the suppliers of the container terminal are ranked each year in order to compare them and check if they are reliable concerning matters such as deadlines etc. The list of the suppliers is revised annually.

Last but not least, the container terminal has to consider the case where a change in productivity takes place. Due to the fact that the capacity of containers will be almost tripled after the expansion, it is logical to consider that the productivity will not be the same. However, it is due to the terminal whether the productivity increases or decreases. The container terminal may need to come up with a new operational plan in order to make the terminal's operation productive again. The container terminal has a very successful operational system at the moment and according to the official web page of Th.P.A. S.A., it is certified as per the standard ISO 9001:2008 for the Management of the container terminal. But even before that, the container terminal was awarded with a certificate in 2008 concerning its management system by the

Bureau Veritas, which according to the container terminal Director, Mr. Athanasios Nazlidis, is very important and should not be taken lightly[19].

Concerning the terminal's operation it is worth to give a brief description in order to understand how it works. According to CALINF (Vessel Call Information Message) the vessels have to send by electronic means to the terminal a list with all the containers that are going to be discharged and/or loaded and all the relevant information. After that the agents, that represent the corresponding vessels, have to inform the container terminal about the loadings and discharges that have to be done many hours before the operations commence at the vessel according to COPRAR (Container Discharge/Loading Order Message). The Planning Department designates the locations of the deposition of the containers that are either discharged from vessels or brought by trucks. To sum up, it looks like the container terminal has adapted a very good operational system. However, in different conditions and occasions it may turn out not to be as productive as it used to be. The container terminal should be very cautious and at the end some alternations may be needed to be done so that the operation of the terminal will be productive again. On the other hand, it is wise to prepare an alternative plan or two, which with the combination of the new characteristics of the terminal, will be anticipated to be productive.

### 4.2.2 Economical Problems

It is known that at the moment an economic crisis takes place almost all over the world. Many people are left without a job because many companies, both small and large ones, are shut down or are forced to fire a number of people in order to cope with the crisis. In the shipping industry things are no different than the rest of the industries and the same goes for the port of Thessaloniki.

A very important problem that was identified earlier was the one concerning any alterations in the demand (increase or decrease) by the time of the completion of the expansion of the container terminal. As it is shown in Table 3.1, at the moment what is happening is that the

[19] *General Information*, 4th February 2014, Available: https://www.thpa.gr/index.php?option=com_content&view=article&id=254:2014-02-04-08-31-44&catid=111:company-en-gb&Itemid=1168&lang=en (accessed on 2nd September 2014).

terminal presents a slow but steady increase after having experienced a sudden drop concerning the throughput of containers and vessel arrivals in 2008. It is clearly understandable that the company had made a number of calculations about future trends in order to predict what the figures could be like, however, the economic crisis happened very quickly and suddenly and no one could have foreseen it until it was too late. The question is what can the terminal do now in order to deal with the crisis? According to the statistical data in 2008 there was a great decrease in both the vessels that visited the container terminal and the throughput of the containers. The difference between 2007 and 2008 reached almost to 50%. At that period the shipping companies preferred to send their vessels to another ports at the nearby countries such as the port of Durres in Albania, the port of Varna in Bulgaria and the port of Bar in Montenegro and as a result the port of Thessaloniki had suffered great economic damage[20].

On the other hand, even though the statistical data in 2008 were very disappointing just the next year the tables turned and the container terminal quickly presented an increase in both the throughput of containers and vessel arrivals with the next years until now showing a slow but steady increase as well. This is a very significant and promising fact and it shows that even though the container terminal lost much of its vessel and freight traffic in 2008, in 2009 it came back into business. Despite the fact that it is still early to tell whether the expansion will be eventually beneficial to the container terminal because of the economic crisis, it is surely of great importance not to neglect such promising data and figures.

Another problem that was identified is the possibility that by the time of the completion of the specific project, the costs will be much higher than anticipated and as a result the container terminal may have greater costs. In other words, the costs may be higher than the budget that was initially invested, for instance there would be an increase in prices, equipment, maintenance etc., and so the return would be lower than what was anticipated. Fortunately, the Th.P.A. S.A. has a very successful plan when it comes to suppliers. As mentioned before, the company has set high standards concerning the quality of its services and tries to keep them at that level and that is why it chooses its suppliers very carefully. Moreover, it evaluates them each year in order to witness the levels of reliability.

[20] *The "storms" at the Th.P.A. S.A. have cleared 47% of freight traffic*, 28th February 2009, Available: http://www.tovima.gr/finance/finance-news/article/?aid=257287 (accessed on 3rd September 2014).

Finally, according to Mr. Stelios Aggeloudis, who is the president and CEO of Th.P.A. S.A., the year of 2013 was a very successful year for the port of Thessaloniki from all aspects. More specifically, only the first nine months of 2013 the revenues without tax reached 18,000,000 euro, while the company had not taken any loans and with a remarkable reserve of almost 90,000,000 euro. Concerning the quality of the services provided and the customer service, the company, understanding the difficulties of the market due to the economic crisis, kept the prices steady for third continuous year while there were announced rate reductions to specific categories of cargo. It is worth mentioning that in 2013 the port of Thessaloniki was awarded not only with the business award "XRIMA", but also by ICAP[21] as one of the leading companies in the market[22].

**Photo 4.2 Stelios Aggeloudis, the President and CEO of Th.P.A. S.A. [Available: http://www.toxrima.gr/wp-content/uploads/2014/01/aggeloudis-stelios.jpg (accessed on 5th September 2014)].**

On an operational level 2013 had shown an increase of about 2% in container traffic, while the first figures from 2014 are, also, promising. In the period January – June 2014, the throughput of

[21] ICAP Group is one of the most successful regional Business Services Groups in South Eastern Europe. It provides a wide range of services that are grouped in the following 4 Service Lines: Credit Risk Services, Marketing Solutions, Management Consulting and People Solutions. Available: http://www.icap.gr/Default.aspx?id=927&nt=19&lang=2 (accessed on 5th September 2014).

[22] Stelios Aggeloudis, *Another successful year for the Th.P.A. S.A.*, 28th December 2013, Available: http://www.karfitsa.gr/2013/12/28/mia-akomi-epityximeni-xronia-gia-tin-o/ (accessed on 5th September 2014).

containers in TEUs was 161,640, a figure which is increased by 12.63% compared to the corresponding period of 2013[23].

### 4.2.3 Environmental and Safety Issues

As already mentioned above, environmental issues are very important not only due to the fact that the port is in close proximity to the city of Thessaloniki but also concerning the environment in general. That is why the Th.P.A. S.A. has put much attention and focus on this specific matter. The company has an environmental policy and in order to achieve environmental performance consistent with this policy, it makes use of a number of principles which are described in the following:

- Environmental improvement. Taking into consideration the environment concerning port's plans and decision-making procedures.
- Environmental management system (EMS). The port has to implement appropriate EMS procedures so that the operations and functions of the port result in improving the port's and nearby environment.
- Legal compliance. The port has to establish procedures that will comply with the international and national legislation.
- Natural conservation. Concerning any development procedures the port tries to sustain natural resources and enhance natural conservation.
- Communication and consultation. Through communication the port is able to enrich its knowledge. Also, when the company makes a plan that would possibly have an effect on the environment, it consults with port stakeholders and the community in general.
- Training, awareness and skills. The port personnel receive training in order to raise awareness of the importance of environmental issues and to develop the appropriate skills to fulfil their environmental responsibilities.
- Safety, health and environment. The company tries to provide high standards of health and safety within the workplace for those who work, visit or live near the port's facilities.

[23] *Record of profits for the port of Thessaloniki*, 28th August 2014, Available: http://www.naftemporiki.gr/finance/story/849971/rekor-kerdon-gia-to-limani-tis-thessalonikis (accessed on 5th September 2014).

- Energy use and technology. The port makes effort to make improvements in its energy efficiency and resource consumption.
- Pollution prevention. The port tries to develop further management techniques in order to protect water, air and land from pollution and to recycle waste from the port's operations and vessels.
- Recycling. The port recycles all the waste produced in its installations.
- Environmental monitoring. The port monitors, evaluates and reviews both its environmental management performance and the environmental quality of its area.
- Emergency response. Providing effective management of accidents and incidents with significant environmental impacts through an Environmental Emergency Preparedness and Response Plan.
- Publishing. The port publishes periodically an environmental report that reflects the Th.P.A. S.A. commitment and progress to improving the port's environmental performance.

The company is fully environmentally aware and that is why the port's EMS is regularly revised and updated according to legislation and technological advances. More specifically, the periods 2002 – 2003 and 2005 – 2006 the Th.P.A. S.A. supported a research project conducted by the Aristotle University of Thessaloniki which had an aim to set up an environmental policy framework and face specific environmental issues. In 2003 the port of Thessaloniki was issued with the PERS Certificate (Port Environmental Review System), which is basically a guide to assist ports in the implementation of the recommendations set by the ESPO (European Sea Ports Organization). The port of Thessaloniki is the first port in the Mediterranean to receive the PERS Certificate. The PERS Certificate was re-issued in 2008 and 2011[24]. Recently, the port of Thessaloniki was awarded with the "GOLD AWARD" in the category of port management and eco port concerning the Environmental Awards 2014 organized by the magazine "Plant Management"[25].

[24] Eva Vafaki, *Gradual transformation of a port to a "green port". The case of Thessaloniki port*, 21st February 2012, Available: http://www.seinemaritime.net/suports/uploads/files/Eva%20Vafaki.pdf (accessed on 6th September 2014).
[25] *Gold Award for Th.P.A. S.A,*, 19th December 2013, Available: http://www.portnet.gr/component/content/article/14903-gold-award-gia-tin-olth-ae.html (accessed on 6th September 2014).

The second issue concerns the safety of personnel and cargo and their security. During the few past years there has been a very significant decrease in accidents and severities which reflects all the efforts that the Environment, Health and Safety Department is doing in order to improve the safety conditions of the port. What is more, the port's aim is to rely on international standards when it comes to security issues and that is why it has implemented a security plan and is operating in accordance to the ISPS Code (International Ship and Port Facility Security Code) requirements. The Security Policy of the port of Thessaloniki consists of ensuring a secure working environment and of measures that avert illegal actions against people, the vessels and all the facilities and equipment within the port limits. The main objective of the company is to comply with the security regulations that are foreseen by the national and international legislation and by the European Union. Also, the port does its best to implement all measures necessary in order to limit the risks as far as there are inside the port's area. The knowledge of the personnel on safety and security issues and the creation of emergency plans are of great importance to the port authority. The above objectives are met with a number of actions that are taken by the company. Both the Security Assessment and the Security Plan have to be approved by the Ministry of Mercantile Marine and, also, they have to be updated and improved with the help of constant controls and evaluations. Moreover, the constant training of the personnel in needed.

## 4.3 Summary

In this chapter all the problems, which were identified in the previous chapter, were examined so that possible solutions could be established followed by the evaluation of those solutions. It seems that the economic crisis has a huge part in many problems and affects many decisions. On the other hand, the container terminal at the port of Thessaloniki seems to have overcome a part of the crisis as the figures till now are very promising. Concerning the environmental and safety issues it seems that the port has already some plans that have been proved to be very successful. However, even so the port must continue to search for other methods of environmental and safety management due to the fact that technology is developing and so it has to follow the trends. Even though the container terminal is a very successful and promising terminal with a

great operational plan, it should not rest assured but always try to find new ways and methods in order to develop even more and become even better.

# CHAPTER FIVE

# DISCUSSION AND CONCLUSION

The basic aim of the current dissertation is to discuss and examine the expansion of the container terminal at the port of Thessaloniki and all the issues that are included. More specifically, a number of objectives are presented in order to make it more understandable. The main objective is to identify all the factors that are significant in the expansion of a container terminal. This is achieved in the second chapter with the help of literature review and a couple of interviews. The main factor that leads to the decision about the expansion of the container terminal is the fact that that demand is increasing and the port has to follow the new trends in order to become a successful hub for the Balkans. The terminal is already productive and in order to keep being productive or even increase its productivity, it has to expand its capacity and quay. By achieving that the terminal will be able to accommodate more and larger vessels and will be able to handle a much greater number of containers. The expansion project, also, includes the purchase of new equipment which will increase the productivity concerning the handling of the containers. Another factor is that the new vessels are getting larger and larger and need more space concerning their docking and the characteristics of the container terminal today are not adequate for the accommodation of such vessels. The container terminal has to expand both in length and depth so that larger vessels could visit it in the future. There are, also, other factors which are of lesser importance but should be taken into consideration such as road and rail networks.

The second objective is to examine the factors that were earlier identified in order to identify the problems that may arise before, during and after the expansion of the container terminal. The main problem identified is the one having to do with the economic crisis and how it will affect the terminal. Based on the statistical data from 2008 the terminal had already been significantly affected by the crisis and there was a major decrease in the arrival of vessels and the throughput of containers. Another problem, that is already visible, concerns the negative impact that the works of the expansion will have on the container terminal operations. Other things that should be considered are the productivity and profitability of the container terminal after the expansion project is completed. What should be given additional thought is whether or not by the time of

completion of the expansion, the container terminal will be productive and profitable and if there is an increase in the productivity, will the terminal be able to deal with it properly. On the other hand, if the productivity decreases then the larger capacity of the container terminal will be unused and this will probably result to unprofitability. To continue with the economical problems, it should be mentioned that by the time of completion the costs may be higher than those initially budgeted and so the return will be much lower than anticipated. One major problem of the past had to do with the tender for the concession of the container terminal not only due to the fact that the leading bidder withdrew at the last moment but also that the personnel of the port of Thessaloniki decided to go on continuous strikes in order to show their unpleasantness concerning the privatization of the port. Furthermore, environmental and safety issues are examined and a number of problems are identified.

The next objective concerns establishing and evaluating the solutions to the problems that were earlier identified. One problem identified was the fact that the terminal's productivity decreased due to the expansion works. Even though it has to be taken into consideration, this is a short-term problem and will disappear as soon as the expansion is completed. One serious problem is the fact that if, after the completion of the expansion, the operations of the container terminal will still be productive due to the fact that not only a greater number of containers will be handled but also there would be more equipment inside the terminal and they should be properly operated and used. Even though the terminal could consider developing a new operational plan, the existing one is very successful and really well operated. Moreover, the container terminal has been awarded with Bureau Veritas Certificate for its management system. What is more, the container terminal has developed a system for tracking and delivery of containers which is very efficient and productive and keeps flaws to a minimum. One issue that was discussed is about the purchase of new equipment and the fact that they will probably be more technologically advanced and that the personnel will need time to adapt to them. On the other hand, the existing equipment of the container terminal is already very advanced and so the personnel have the appropriate knowledge to use them. Other issues that were examined were the economical ones and more specifically the great decrease that occurred in the throughput of containers in 2008. Fortunately, the data from 2009 since nowadays are very promising as a very significant increase took place. Also, there could be higher costs than anticipated but the container terminal has developed a quality policy which evaluates the suppliers concerning their reliability and is

revised on an annual basis. Concerning the environmental and safety issues the Th.P.A. S.A. has developed an environmental policy which presents a great number of principles that are followed and which result in a successful environmental management system inside the terrain of the port of Thessaloniki and, also, the company has been given the PERS Certificate. What is more, the company has implemented a security plan and operates in accordance with the ISPS Code requirements.

Last but not least, it is very important to mention that the decision taken about the expansion of the container terminal is very crucial due to the fact that as long as the demand is increasing and the vessels getting larger and more advanced, the container terminal has to keep up with the new advances in the shipping industry and the market. In order to continue being productive and profitable, it has to become more technologically advanced and expand its characteristics, such as length and depth. Of course, this is a very large investment and as in all investments there are risks such as whether or not after its completion the container terminal's operation plan will still be productive and profitable.

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# PHOTOS and TABLES

- Cover image, The container terminal at the port of Thessaloniki. [Available: http://admin.terconmed.info//Images/Terms/Term_19.jpg (accessed on 24th September 2014)].

- Figure 2.1 Schematic diagram of a container terminal, *Theory of Container Terminal Operations* by Dr. Steve Bonsall (2006 personal notes).

- Photo 2.1 Straddle carrier at the port of Thessaloniki. [Available: http://www.thpa.gr/images/sempo/ct01.jpg (accessed 28th July 2014)].

- Photo 2.2 Example of traffic bottleneck. [Available: http://www.matanyahorowitz.com/images/a/a0/Congested_traffic.jpg (accessed on 24th September 2014)].

- Photo 2.3 Future extension of 6th Pier. [Available: http://www.thpa.gr/files/general/thpa_4p_en.pdf (accessed on 24th September 2014)].

- Photo 2.4 A container vessel being accommodated at the container terminal at the port of Thessaloniki. [Available: http://www.thpa.gr/images/sempo/ct06.jpg (accessed on 23rd August 2014)].

- Photo 4.2 Stelios Aggeloudis, the President and CEO of Th.P.A. S.A. [Available: http://www.toxrima.gr/wp-content/uploads/2014/01/aggeloudis-stelios.jpg (accessed on 5th September 2014)].

- Table 2.1 Seaborne Containers Throughput at Th.P.A. S.A. Area in TEUs, *Statistical Data 2013*, 03rd February 2014. [Available: http://www.thpa.gr/files/statistics/statistics2013en.pdf (accessed on 23rd August 2014)].

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