

## **DEFINING THE MOST IMPORTANT PORT PERFORMANCE INDICATORS: A CASE OF ALBANIAN PORTS**

**Osman Metalla** 

“Aleksander Moisiu” University, Durres, Albania

[o.metalla@gmail.com](mailto:o.metalla@gmail.com)

**Eli Vyshka**

“Aleksander Moisiu” University, Durres, Albania

**Drakuli Lumi**

“Aleksander Moisiu” University, Durres, Albania

### **Abstract**

*Measuring the port performance indicators is not an easy exercise. Many authors have investigated on defining port performance indicators. The weight of these indicators varies from port to port, its location, the nature of cargoes that this ports usually handles, port infrastructure, facilities and equipment and so on. The aim of this paper was to define the most important port performance indicators, in order to address the port operators and administration efforts to improve the overall port performance. The methodology used in this study includes questionnaires, which are compiled in such a way as to obtain clear information on the weight of the performance indicators. For this purpose, questionnaires included questions on main performance categories such as port condition, operational condition, port equipment, quality of services offered, management quality, as well as subsequent questions for each category. A total of 105 questionnaires were handed out and only 82 were handed in. The random sampling method was used. The filled forms (questionnaires) were then elaborated in the SPSS program, in order to analyze the data. It was found that port of Durres has some limitations and difficulties, which are reflected in the respondents' answers. Port conditions, and management qualities are some of the issues port has to better address in the future.*

*Keywords: Performance indicators, port management, port operators, Albania*

## INTRODUCTION

### Overview of Albanian Ports

Albania has four main ports, which are: Durres, Vlora, Shengjini and Saranda. Port of Vlora is the second biggest port of Albania. Even though, it is the second biggest port, situated in a very favorable geographical and navigational position, its cargo handled annual volume is far behind Durres port and there is no competition among them. On the other side, the port of Shengjini which is situated in the northern coast line of the country and the port of Saranda, which is situated in the southern part of Albanian coast line, do not represent any interest in the annual cargo volumes in a country level. Port of Shengjin, has a pier which is only 79 m long, and the water depth is up to 7m. In this port is accommodated the fishing fleet as well. Port of Saranda is more a touristic port than a commercial one. There is a short wharf and just e 5 tones electrical crane. The number of the merchant ships visiting this port is very low, and the port serves only the region of Saranda.

The main and the biggest port of Albania remains Port of Durres. This port is situated in the central part of Albanian coastline, very close to the capital, Tirana. It has very good road connections, rail connections, but the later is in very poor conditions and the volume of cargo transported via rail from/to the port represent only a very small percentage of the overall cargo volume.

Port of Durres itself has a total wharf length of 2200m, with water depth which varies from 7,5m up to 11,5m. The total land area is 80 ha. Being the closest port to the country and regional markets and having good road connections, this port is the most preferred one for cargo transportation among all Albanian ports.

The port has undergone a number of studies, regarding the improvement of equipment, pier rehabilitation and restructuring and deepening the port. Some of these studies include:

- Privatization of stevedoring services
  - Actually there are three stevedoring companies operating in the port
  - Privatization supporting mechanical sector
  - Privatization of the terminals (container terminal, ferry terminal and bulk cargo terminal are being operated by private concessioners)
- Investments in the port infrastructure
  - Reconstruction and rehabilitation of wharfs 5, 6 of the port
  - Reconstruction and rehabilitation of areas behind wharfs 4,5,6,7,11 of the port
  - Reconstruction of the area behind the former shipyard
  - Establishment of the safe areas

- Investments in the port superstructure
  - Procurement of the MHC 200 (120) tons, and MHC 115 (63 tons) mobile cranes (2)
  - Procurement of container handling facilities such as reach stackers, container chases, spreaders, etc.
- Investment in the human resources
  - Training of the port administration personnel in the country and abroad
  - Participation in international conferences and workshops
  - Restructuring of the training center
  - The project of the developing of human resources.

These and other studies and investments have been made in the port, but again, the performance of the port remains the permanent concern of port Administration.

## METHODOLOGY

For the study purpose a descriptive research design was adopted. A cross section survey was planned. In order to weigh the importance of the port performance indicators, questionnaires were compiled. In these questionnaires we included a number of questions and we asked the respondents to make an evaluation of the weight of each factor starting from 1 = less important up to 9 = seriously more important.

Figure 1. Questionnaire of evaluation of factors that weigh in port competitiveness

### PYETËSOR I VLERËSIMIT TË PESHËS SË FAKTORËVE QË KANË NDIKIM NË KONKURUESHMËRINË E PORTIT

Honourable z/znj.....

For studying purposes, I kindly ask to fill the beloë form according to the given evaluation scale /Për qëllime studimore, ju lutem plotësoni formularin e mëposhtëm sipas shkallës së vlerësimit të dhënë në këtë formular për të gjithë faktorët e renditur më poshtë.

PLEASE MAKE THE EVALUATION ACCORDING TO THE FOLLOËING MARKS /JU LUTEM BËNI VLERËSIMIN NGA 1 NË 9 TË FAKTORËVE TE MËPOSHTËM SIPAS KËTIJ KODI

1 - Important /I rëndësishëm	1/3 - not important /I parëndësishëm
3 - slightly more important /pak më i rëndësishëm	1/5 - less important/ më pak i rëndësishëm
5 - more important /më i rëndësishëm	1/7 - more less important / shumë më pak i rëndësishëm
7 - much more important / shumë më i rëndësishëm	1/9 - seriously less important/ seriozisht më pak i rëndësishëm
9 - seriously more important/ seriozisht më i rëndësishëm	

Values/vlerat: 2,4,6,8, represent intermediate values of/perfaqesojne vlerat e ndermjetme te: 1,3,5,7,9

### PORT CONDITION/KUSHTET E PORTIT

1. – SHIP’S CARRYING CAPACITY/KAPACITETI MBARTËS I ANIJES

2. – HANDLED CONTAINERS/KONTAINERËT E PËRPUNUAR

3. – NATYRAL CONDITIONS OF PORT/KUSHTET NATYRORE TË PORTIT

**OPERATIONAL CONDITIONS/KUSHTET OPERACIONALE**

- 4. CALL FREQUENCY / DESTINATIONS   
/FREKUENCA E PREKJEVE/DESTINACIONET
- 5. OVERALL COSTS/KOSTOT E PËRGJITHËSHME
- 6. TRANSPORT FUNCTIONS OF INTERNATIONAL TRADE/  
FUNKSIONET E TRANSPORTIT TË TREGTISË NDËRKOMBËTARE

**EQUIPMENT/NIVELI I PAISJEVE**

- 7. BERTHING CAPACITY / KAPACITETI AKOSTUES
- 8. STORING CAPACITY/KAPACITETI DEPOZITUES
- 9. LOADING UNLOADING EQUIPMENT/PAISJET E NGARKIM SHKARKIMIT
- 10. FLOOR SIZE / MADHËSIA E SHESHIT (SHESHEVE)
- 11. NUMBER OF GATE LANES/  
NUMRI I KORSIVE DHE PORTAVE HYRËSE DALËSE
- 12. EQUIPMENT EFFICIENCY / EFICIENCA E PAISJEVE

**SERVICES QUALITY/CILËSIA E SHËRBIMEVE**

- DELAYES OF VESSELS/VONESAT E ANIJES NË HYRJE/**
- 13. AVERAGE WAITING TIME/KOHA MESATARE E QËNDRIMIT TË ANIJES
  - 14. INFORMATION LEVEL/NIVELI I SHËRBIMIT TË INFORMIMIT

**MANAGEMENT QUALITY/CILËSIA E MENAXHIMIT**

- 15. EDI SYSTEMS / SISTEMI EDI
- 16. SAFETY MONITORING SYSTEMS/SISTEMI I MONITORIMIT TË SIGURISË
- 17. MANAGEMENT INFORMATION SYSTEMS/  
SISTEMI I MANEXHIMIT TË INFORMACIONIT
- 18. GPS NAVIGATION SYSTEMS / SISTEMET E LUNDRIMIT GPS

Filled in / Plotësuar në \_\_\_\_\_ on/më ...../ ...../..... Name \_\_\_\_\_  
Surname \_\_\_\_\_

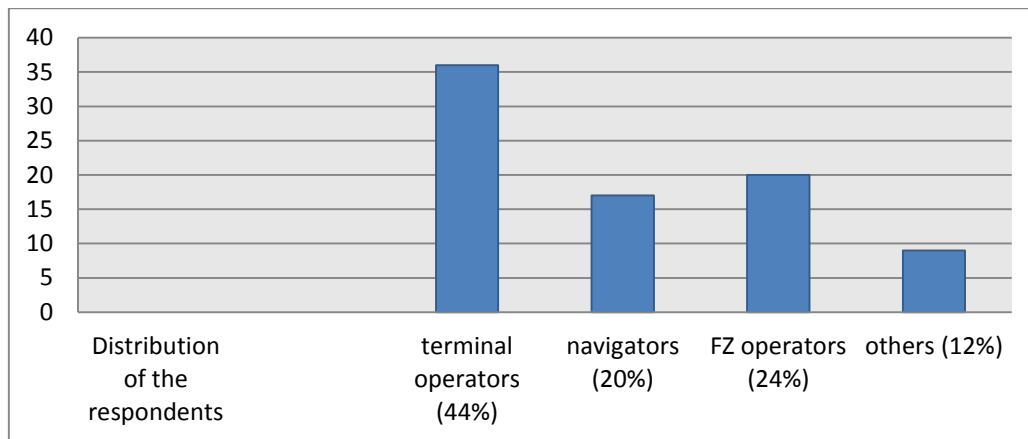
There were 105 questionnaires handled out and we could take back only 82 filled questionnaires. The questionnaires asked information regarding 5 categories of data as follows:

- 1. Port conditions
- 2. Operational conditions
- 3. Equipment
- 4. Services quality
- 5. Management quality

## ANALYSIS AND FINDINGS

Questionnaires were handed to different port operators in order to obtain feedback from people from different operational fields. Therefore 36 of the respondents were terminal operators (44%), 17 were navigators (20%), 20 were free zones operators (24% and the rest (12%) were “others”. The following graph. 1, shows the distribution of the respondents.

Figure 1. Distribution of the respondents



All forms were collected and analyzed in order to weigh the importance of each of the factors on port performance. All filled forms were tabulated and descriptive analyzes were run in order to determine the weight of each factor on the bases of the evaluation given by the respondents. The evaluation started with 1= important up to 9 = seriously more important. We analyzed all five categories of performance indicators as follows:

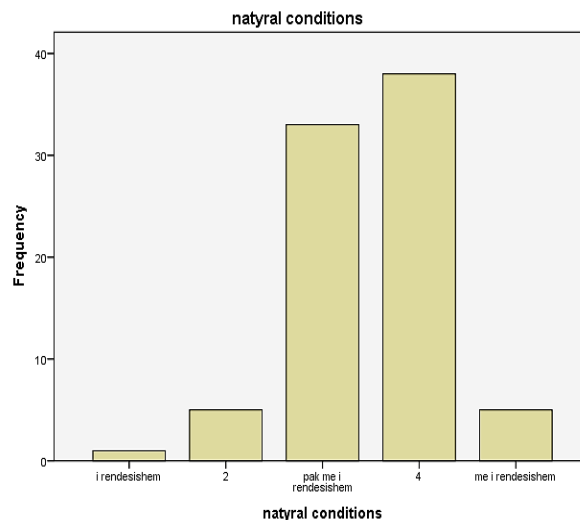
### Port condition

According to the statistics shown in table 1, referring to questions regarding “port condition” the respondents have evaluated the “ships carrying capacity” factor with a 2,09 average, container’s handled with 2,82, and natural conditions with 3,50. Therefore in this group of performance indicators, the one that weigh more according to the respondents is “natural conditions”. In fact, this is an important factor and what make the Port of Durres the most important port of Albania are the natural conditions. This port is situated in a very favorable natural position, close to the markets, close to the capital, and accessible from all regions of Albania. Good road connectivity of this port increases its captivity from all markets. As it can be observed from the Figure 2, the most (72 – 87%) of the respondents valued this factor with 3 and 4, meaning that this factor is of importance to them.

Table 1. The statistics of Port Condition

		Ships carrying capacity	Container's handled	Natural conditions
N	Valid	82	82	82
	Missing	0	0	0
Mean		2.09	2.82	3.50
Median		2.00	3.00	4.00
Std. Deviation		.892	.687	.758
Variance		.795	.472	.574
Percentiles	25	1.00	2.00	3.00
	50	2.00	3.00	4.00
	75	3.00	3.00	4.00

Figure 2. Responses on port conditions



**Operational Conditions**

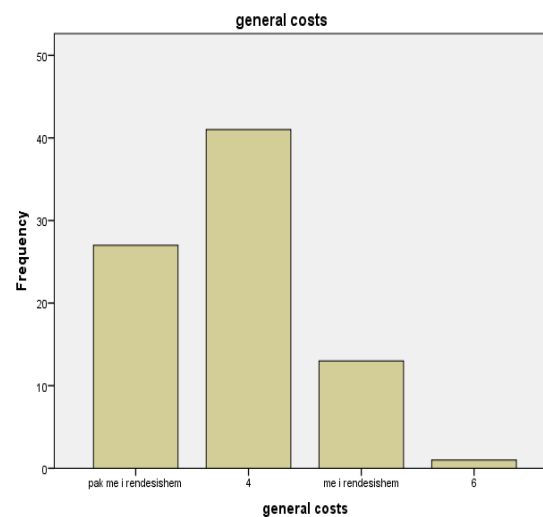
In this category of Port performance indicators a number of factors were evaluated. These factors were: Call frequency, overall costs, Transport functions of international trade and their mean evaluation was respectively 3.50, 3.34, 4.02, and 3.85. The most important factor among all these performance indicators, the factor named “general costs” was given more weight by the respondents. The mean was 4.02, reflecting the level of the tariffs of the port. Since the services offered in the port are considered “expensive” by the respondents, (mainly port users like ship owners or shippers), they have given more weight to this factor, letting port

administration understand that being more flexible in defining port tariffs will make the port more competitive and attract more cargo.

Table 2. Operational Conditions Statistics

		natural conditions	call frequency	functions of international market	general costs
N	Valid	82	82	82	82
	Missing	0	0	0	0
Mean		3.50	3.34	4.02	3.85
Median		4.00	3.00	4.00	4.00
Std. Deviation		.758	.878	.785	.722
Variance		.574	.771	.617	.522
	25	3.00	3.00	3.00	3.00
Percentiles	50	4.00	3.00	4.00	4.00
	75	4.00	4.00	5.00	4.00

Figure 2. Responses on operational conditions



According to figure 3, “general costs” we can realize that 43 respondents (52.4%) have evaluated this indicator with 4, and 14 respondents (17%) have evaluated with 5 = more important.

## Equipment

This category of performance indicators is very important because it includes all facilities, infrastructure and equipment that are available in the port to handle the cargo, as well as their efficiency. These performance indicators include: berthing capacity, storing capacity, loading/unloading equipment, floor size, number of gate lanes, equipment efficiency. All these factors have great influence in the overall performance of the port and the evaluation obtain from respondents show the same. Table 3 below shows that the mean of the evaluation given by respondents to each of the factors is as follows: berth capacity 3.85; storing capacity 6.66, loading/unloading equipment 4.83, efficiency of equipment 6.33, number of lanes 4.00. it is obvious that area size (storing capacity) and efficiency of equipment have the highest evaluation respectively 6.66, and 6.33, which means that these indicators are of much more importance than the other indicators. The storing capacity (or the port area available for storing cargoes such as containers or bulk or whatever cargo that needs to be stored) was given more weight. 10 of the respondents (9.7%) have evaluated this factor with 8 (seriously more important), 40 respondents (48.7%) with 7 (much more important) and 26 respondents (31.7%) have evaluated this factor with 6.

Table 3. Equipment statistics

		berthing capacity	handling equipment	area size	number of lanes	efficiency of equipment
N	Valid	82	82	82	82	82
	Missing	0	0	0	0	0
Mean		3.85	4.83	6.66	3.96	6.33
Median		4.00	5.00	7.00	4.00	7.00
Std. Deviation		.803	1.245	.789	1.116	1.441
Variance		.645	1.551	.623	1.246	2.075
Percentiles						
	25	3.00	4.00	6.00	3.00	6.00
	50	4.00	5.00	7.00	4.00	7.00
	75	4.00	5.25	7.00	5.00	7.00

The efficient of the equipment, which is another very important performance indicator, is evaluated as follows: the number of respondents that evaluated with 7 (much more important) was 36 (or 43.9%), 12 respondents (14.6%) evaluated this indicator with 8 (seriously more important), 17 respondents (20.7%) evaluated with 6 (more important).



Figure 4, and 5 show the weigh that the respondents have given to these two most important performance indicators.

Figure 4. Area size

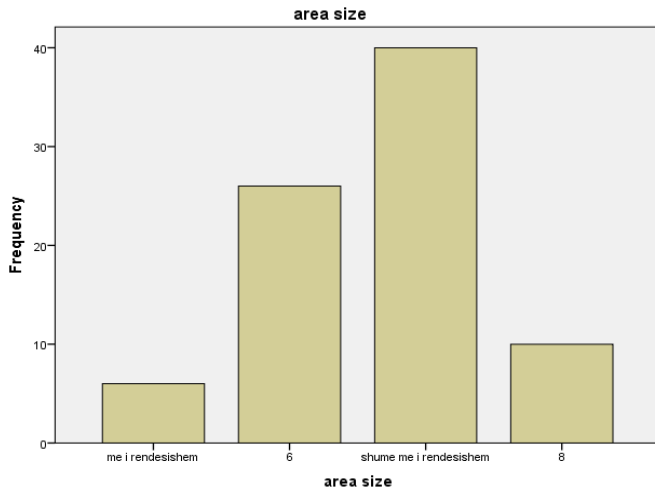
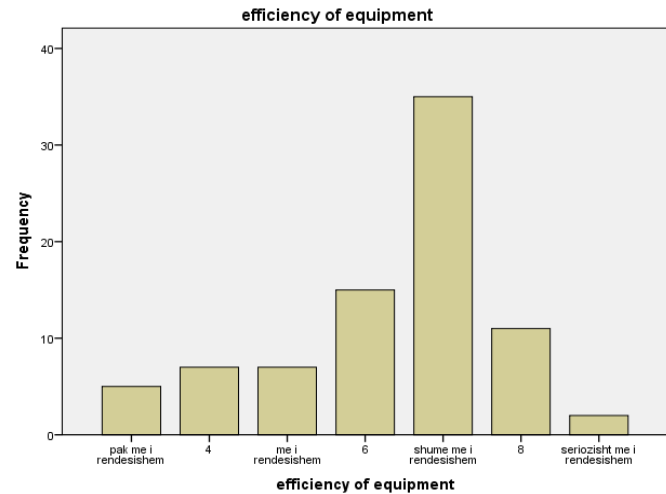


Figure 5. Efficiency of equipment



### Services quality

This group of factors includes delays of vessels; average waiting time and information level. All these three performance indicator factors have respective means as follows: delays in port access 4.43; average staying time in port 4.37; and level of information 4.10. Out of these factors, “delays in port access” is given more weight from respondents. This was due to delays caused mainly from port authorities because of timely procedures. The adoption of the FAL Convention will facilitate procedures and help authorities standardize all documentation making it possible for the procedures to be more time saving, therefore contributing in cutting out the time needed for the procedures.

Table 4. Services quality statistics

		delays in port access	average staying time in port	level of information
N	Valid	82	82	82
Mean		4.43	4.37	4.10
Median		4.00	4.00	4.00
Std. Deviation		.982	.839	.811
Variance		.964	.704	.657
	25	4.00	4.00	4.00
Percentiles	50	4.00	4.00	4.00
	75	5.00	5.00	5.00

### Management quality

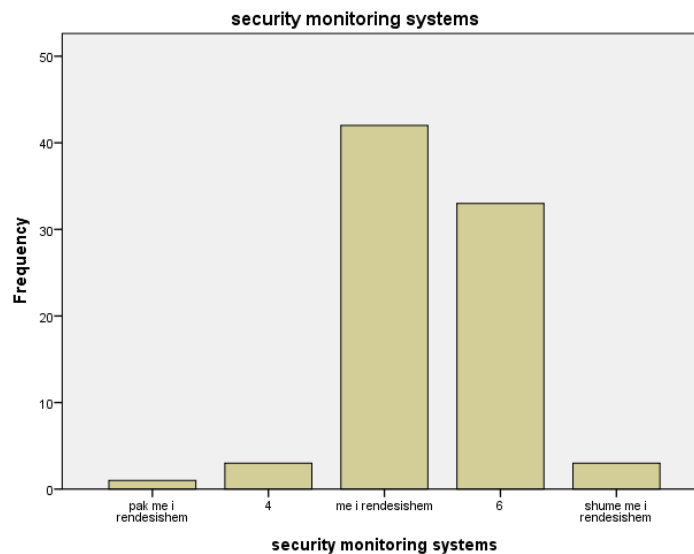
In this category of performance indicators, we have grouped Electronic Data Interchange (EDI) Systems, safety monitoring systems, management information systems and GPS navigation systems. According to table 5, each of these performance indicator factor is valued as follows: EDI systems has a mean value of 4.35; security monitoring systems 5.41, management information systems 3.77 and GPS navigation systems 4.22. it is obvious that the most important factor among the indicators in this category is “security monitoring systems” which is mostly weighted by the respondents. Out of 82 respondents, 33, (40.2%) valued this factor with 6 (much more important), 42 respondents (51.2%) with 5 (more important), 3 (3.6%) respondents with 7 (much more important) 4 (4.87%) with 3 (slightly more important) and 1 (1.2%) with 2 (less important).

Table 5. Management quality statistics

		EDI systems available	security monitoring systems	management information systems	GPS navigation systems
N	Valid	82	82	82	82
	Missing	0	0	0	0
Mean		4.35	5.41	3.77	4.22
Median		4.00	5.00	4.00	4.00
Std. Deviation		.894	.684	.865	1.277
Variance		.799	.468	.748	1.630
Percentiles					
	25	4.00	5.00	3.00	3.00
	50	4.00	5.00	4.00	4.00
	75	5.00	6.00	4.00	5.00

Security issues are given more importance in the framework of ISPS Code and this reflects the weight the operators and port users attribute to this factor. The other two factors, EDI systems and GPS navigation systems which is given almost the same importance (respectively 4.35 and 4.22). The next figure 6 shows the ranking of these factors according to the respondent's answers.

Figure 6. Management quality ranking of factor



## CONCLUSIONS

This paper studied five categories of port performance indicators. According to the respondents view, the most important performance factor from the first group “port conditions”, was valued natural conditions of the port. Being a shallow port this reflects one of the most important concerns for port users and operators.

Functions of the international markets, is another performance indicator that respondents weighted more. Port of Durres is struggling to become a more regional port and focusing on these functions will make this port more competitive.

Area size is another very important performance indicator. This is the performance indicator that respondents gave the most importance. Port of Durres as the biggest port of the country is requiring more area in order to handle the cargo traffic. The port is “surrounded” by the city and there is no more room for port expansion. Therefore, other alternatives such as free zones or on the distance terminals should be considered.

Security monitoring systems as a request of the International ISPS Code, is another performance indicator that was highly valued from the respondents. Security remains a permanent concern for port operators and Port Administration.

## LIMITATIONS OF THIS STUDY

This study gives a view of the persons questioned regarding the weight of the port performance indicators based on their answers. Anyway this study has some limitations, which need to be addressed in future studies. These limitations include but are not limited to:

- The number of respondents is not distributed evenly in all four ports of Albania but the majority of respondents are from port of Durres (66- 80.48%). This due to the fact that Port of Durres is the biggest port of Albania.
- This study reflects the view of operators and port users of only one port (mainly Durres Port). If the population of the study should have included other port operators and users from other ports, the results could have been different.
- Different categories of operators see the performance indicators from different point of view. Port operators are more interested in port equipment and infrastructure, navigators on the other side, or ship-owners, are more focused on Management quality. The distribution of the respondents could affect the results of the study as well.
- This study needs to be expanded and combined with other methods of measuring port performance in the future, in order to draw more accurate conclusions and recommendations.

## REFERENCES

- Balk, B. M. (2001) Scale Efficiency and Productivity Change. *Journal of Productivity Analysis*, 15, pp. 159-183.
- Fried, H. O., Lovell, C. A. K. and Schmidt, S. S. (1993) *The Measurement of Productive Efficiency, Techniques and Applications*. Oxford University Press
- Metalla O. Koxhai A. Port spaces and their effect in Durres Port *Indian Journal of Research* pp. 42-44
- Metalla O. Vyshka E. Risto. S, Land infrastructure and ports, *International Journal of Economics, commerce and Management*, Vol III, Issue 8, pp 319-322
- Notteboom, T. E., Coeck, C, and van den Broeck, J. (2000). Measuring and Explaining the Relative Efficiency of Container Terminals by Means of Bayesian Stochastic Frontier Models. *International Journal of Maritime Economic*.
- Rodriguez – Alvarez, A., Tovar, B and Trujillo, L. (2007) Firm and Time Varying technical and Allocatove Efficiency: An Application to Port cargo Handling Firms. *International Journal of Production Economics*. 109. Pp. 149-161.
- Trujillo, L., and Tovar, B (2007) *The European Port Industry: An Analyses of its Economic Efficiency*. *Maritime Economics and Logistics*, 9(2), pp. 148-171