PERFORMANCE MEASUREMENT: THE CASE OF DURRES PORT

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ABSTRACT

Nowadays the most important studies for a port are developed in the field of performance. Performance measurement it is not an easy task, and generally the question "How to measure it" is one of the crucial questions. The aim of this paper is the identification and the measurement of the main key performance indicators for the Port of Durres. This study will take in consideration the data's for three different years and each year will be divided in three different periods. The first performance indicator taken in consideration is the berthing delay for incoming vessels. For this we have observed the data of ship arrival times at pilot station and the berthing time in the port. Data refer to ships calling port of Durres during year 2012, 2013 and 2014. The second indicator is berth occupancy rate which will be will be evaluated and calculated for each of the three years and will be compared to investigate the berth productivity each year. And the last but not least important, is the indicator that will be measured specifically for the containers terminal will be crane rates per hour. Number of ship visits (calls) in the port of Durres during the each of the three years under the study will be evaluated and compared in order to observe the traffic tendencies in years. Size of the ship and tonnage trend of the ships calling port of Durres will be evaluated. The conclusions of this paper will be based on the findings for this indicators and the impact they have on the port performance

Keywords: Key performance indicators, container terminal, Port of Durres, crane rate.

INTRODUCTION

Durres Port is situated in the western part of Albanian coast, 36 km far from the capital Tirana, and well connected with national and regional markets. Because of its strategic position, this port is becoming a very important transit point. Durres port is handling the 77% of imports and 89% of Albanian exports, and this presents 78% of all cargoes that are being transferred by sea nationwide. Its infrastructure is composed of 11 berths with water depths varying from 7,5m up to 11m. The main commodities handled in this port are general cargoes, grains, minerals, and containers and ferry boats.

On the framework of the reforms undertaken in the course of years in the port of Durres, transforming the port from a public port into a landlord one, the port has been specialized and divided in different dedicated terminals. This specialization of terminals has improved the overall performance of the terminals, therefore increasing the overall handling capacity of the port.

This port is divided in four main terminals such as dry bulk cargo terminal, containers terminal, general cargo terminal, and ferry terminal. All the three first terminals are being operated by concessionaries, and the last one is being administered from Durres Port Authority.

- The first terminal or the terminal of the general cargoes and grains has an overall wharf length 600 – 900m and a complex of silos.
- The containers terminal is situated in the northern part of the harbor. The overall length of the wharf is 450m and there is a back up area of around 55.000m^2
- The ferry terminal is situated in wharf No. 8 and 9 and has a square of 10 ha.
- The terminal of the dry bulk cargoes is situated in the eastern part of the harbor and has an overall length of 250m. This terminal is mainly handling the exports of cement and clinker, the imports of coal and the exports of different minerals, as well as the import of scrap. This terminal is well connected with a rail line, and is the only terminal in the port with such a connection.

The overall infrastructure of the port is in very good condition due to the intensive investments performed during the last years. All terminals are reconstructed and that has had a positive impact on the overall performance of the port. During 2014 the port handled 3,4 million tons of cargoes. The most new development in Durres port is the containers container. Up to 15 years ahead, containers were almost unknown for Durres port. Only a few boxes could be seen once in a while. Today the port has a small containers terminal with an area of 55.000m^2, and well equipped with mobile rubber cranes, reach stackers, tractors, chases for containers, dedicated slots for refrigerated containers. This new development has changed the way goods are being transported through this port, turning containers as one of the primary cargoes handled here.

The general cargo terminal is the only terminal still under the administration of the Port Authority, for all other terminals are being operated by concessioners. This is due to the reforms that the port has undergone during the last years. According to these reforms, the aim of the Port Authority (Eylul 2008) is to transform the port from a public port into a landlord port, where all terminals, and port services will be privatized. The overall performance of the port has been improved during the course of the years, and the aim of this paper is to evaluate the performance improvements during the last three years.

METHODOLOGY

Measuring port performance is not an easy issue. First of all we should define which are the port performance indicators. Depending on the nature of the port, kind of cargoes that are being handled, volumes, infrastructure, connections, types of operations etc., varies the number and the type of port performance indicators. Some of the port performance indicators are:
- Total traffic handled (containers, general cargo, bulk cargo, passengers) (Metalla.O Oct 2015)
- Waiting time
- Ships dwell time in port
- Size of vessel calling the port
- Tonnage per ship
- Ratio of full and empty containers

- Average productivity per hour per gang
- Terminal area productivity
- Equipment productivity
- Labor productivity
- Quay utilization rate
- Storage utilization

This list can continue with different indicators depending on the scope of survey, in this list for example we have not included the financial performance indicators.

In this paper we have not evaluated all the performance indicators, instead we are concentrated in first five port performance indicators namely: total traffic handled, ship's waiting time, ship's dwell time in the port, size of vessel calling the port and tonnage per ship. We have taken into account data from four main port terminals respectively: general cargo terminal, containers, passengers and the bulk cargo terminals. The period of time under our survey starts from January 1st 2012, up to December 31st 2014. We have performed comparative analyses to better understand the trends of port performance indicators and according to the results of this survey, advise port authority on these findings.

Total traffic handled

In order to review trends of the traffic volumes in port and in different terminals we refer to the statistics of Port of Durres. The overall port volumes handled in the port during the three years 2012 – 2014 are shown in the following table 1. This table shows the exports and imports of goods handled in port during the above-mentioned period, followed by a comparison graphic. As it can be observed from the chart and the table, there is a slight traffic growth. Comparing to 2012, during 2013 the port has experienced a slight growth of 1.015%, and in 2014 the port has experienced a traffic growth of 1.026%. This traffic growth rate is the lowest in the course of the 10 years, and this do to the general economic situation of the country and the economic crises that Albania and the region is going through.

Table1. Annual port traffic (2012 –14).

	2012	2013	2014
Exports	1.341.531	1.665.841	1.640.099
Imports	2.174.914	1.903.881	2.023.529
Total	3.516.445	3.569.772	3.663.628

Graph. 1. Annual port traffic (2012-14)
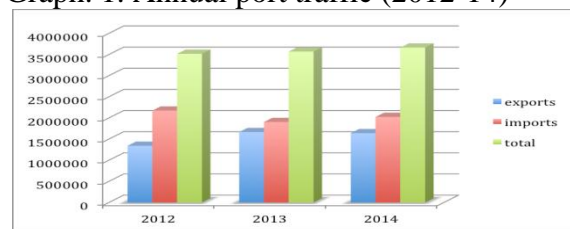
Another element to be observed here is the growth of exports during 2013-2014 comparing to 2012 and the fluctuation of exports. In 2013 we observe an export growth of about 20%compared to 2012, and a reduction of imports of 12.5%. In 2014 we have a slight reduction of exports and a slight growth of imports comparing to 2013.

Waiting time

In order to study the average ships wait time we have gathered data from Harbor Master's office, were are the records of ships movements. Once the ship arrives at the pilot station she has to advise the above office and inform on the time and coordinates of anchorage. When the ship is free to get access into the port, the harbormaster's office advices her to take the anchor and proceed into the harbor. The difference of time between the time the ship drops the anchor and the time the ship finishes her mooring maneuvers to be tied up in the loading/unloading berth, composes the waiting time of the ship.

The following table 2 offers data on ships waiting time for all 12 months of the surveyed years. The figures represent the average waiting time for each month of the year. As it can be realized from this table, months with bigger waiting time are January and November.

Table 2. Ships waiting time

Year	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
2012	7,83	6,32	5,47	6,56	6,64	3,44	4,25	4,73	3,7	8,3	9	5,74
2013	6,43	9,03	4,5	3,85	7,27	2,92	2,99	4,86	4,21	6,49	5,93	3,79
2014	8,91	5,06	4,07	2,66	2,66	4,34	2,36	12,75	4,47	6,64	12,4	2,83
Mean WT	**7,72**	6,8	4,68	4,36	5,52	3,77	3,2	**7,45**	4,13	7,14	**9,11**	4,12

This is due to the fact that January is the first month of the year and there are the New Year celebrations, as well as the work starts on the first Monday of the year. This might create a little congestion and increase the waiting time of the ships. If a ship arrives during the vacation, there is a high probability she will wait at the anchorage due to these festive days.

Graph 2 clearly shows that the waiting time during these months is higher that the rest of the year. In January the average waiting time is 7,72 hours, which is significantly higher compared to the other months of the year apart of November. There is another period of the year when the waiting time is higher. Referring to the figures of the table 2 as well as graphic 2, we can observe that August is another time of the year with an increased waiting time. August is known as a holiday period where a number of officials take their annual leave, and this explains the increase in the waiting time.

Graph 2. Ship waiting time
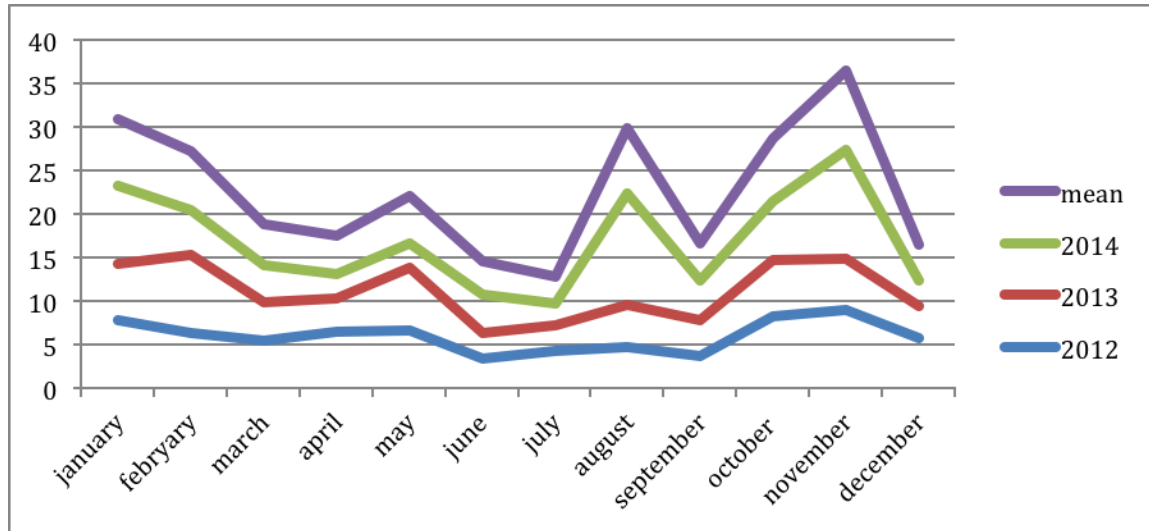
Another factor that affects the waiting time apart from holidays and celebrations is the congestion of traffic in the port. Normally there is a correspondence of the number of ships with the waiting time. In periods when we have a greater number of ships, there is an increase of the waiting time.

Table 3.

|	Jan	Feb	March	April	May	June	July	Aug	Sep	Oct	Nov	Dec
2012	28	37	29	16	24	28	34	32	31	29	35	34
2013	28	32	32	31	25	36	29	34	32	30	28	27
2014	21	23	30	22	22	18	24	23	23	19	19	24

Graph 3.
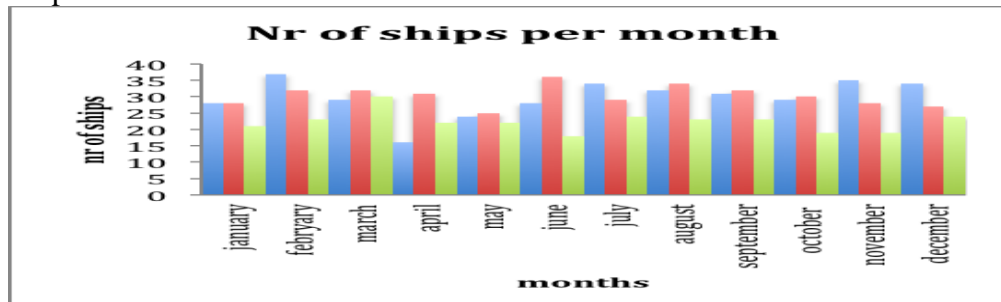
Ship's dwell time in the port

Ship's dwell time in port is considered the time ship stays at the berth from time of mooring until she leaves the berth. We have referred to the same period of times and have calculated the time

ships have stayed in port during years 2012, 2013 and 2014. The data were taken from the statistics sector of the Durres port Authority and are shown in table 4 below. In this table we have presented the dwell time of ships and observe how this time is changing according to the size of the ship, quantity of the cargo to be handled and the periods of the year. We have also calculated the time the ship stayed at the berth and the working time for the ships is order to define the effective working time or berth efficiency rate. The following table 4 shows the data of the ship's dwell time in the port of Durres.

Table 4 Ship's dwell time   Graph 4. Time of the ship in port

| Year	N. of ships	DWT	WT	TTSHP	EFT
2012	129	289,56	216,09	488,51	44,23 %
2013	377	739,76	612,77	1075,06	56,99 %
2014	280	606,22	483,89	803,97	60,18 %
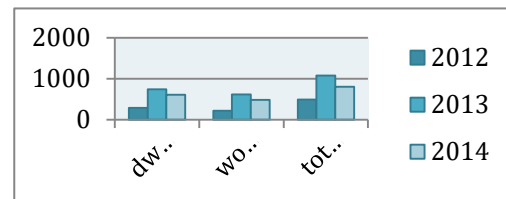
As it can be observed from Table 4 and graph 4, we can observe that the in three different years we have different number of ships calling the port. In 2012 we have 129 ships calling the port, in 2013, there are 377, and in 2014, we have 280 ships calling the port. The total number of days that these ships spend in the port is given in table 5 and graph 5 below.

Table 5. Total days of ships in port   Graph 5

Year	No. of ships	Dwell time	Working time	Total time
2012	129	2,25	1,67	3,79
2013	377	1,96	1,63	2,85
2014	280	2,16	1,73	2,87
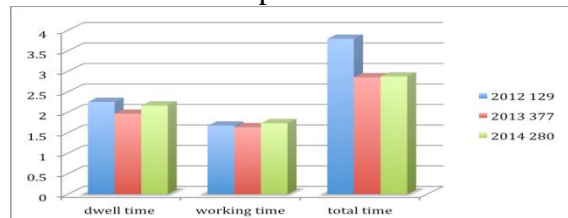
In this table we can observe that the number of total days the ship spend in the port (total time of ship from time it arrives the pilot station until she leaves the port) has been reduced from 2012 up to 2013 and 2014. The average staying time of a ship in port of Durres during 2012 has been 3,79 days, a figure relatively high, considering that even the tonnage of ships in the following years has been increased. In 2013 this time has been cut from 3,79 days in 2012 to 2,85 days in 2013. In 2014 we can observe a subtle difference with 2013, but in reality the average tonnage of the ships that have called Durres Port has been bigger. The average tonnage of the ships during 2012 has been 2728 GT, and in 2014 the average tonnage as gone up to 3924 tons (Eylul 2008). That has been reflected in the reducing the number of calls but the quantity of cargoes that has been handled in port has been increased. Therefore we have an increased of the effective working time of ships (table 4, column 6th). During 2012 only 44,23% of the total time a ship spent in Durres port was effective time or working time. The rest, 55,77% of the total time was spent for access procedures, maneuvers, and clearance. The rate of the effective time versus the

time spends for other issues, stands on favor of the latest. This performance indicator has been improved in the two coming years. During 2013 the effective time has been increased to almost 57% of the total time improving this performance indicator significantly. This improvement has continued during 2014 as well increasing the effective time to 60,18% of the total time. That has improved the efficiency of the port in general and has avoided the traffic congestion as well. Downsizing the waiting time of the ships and increasing the effective working time increases the utility rate of berth, and makes the port more competitive. This is very important for all terminals of the port, but in particular for containers and passenger terminal where time is very important issue. Container ships have to be on schedule otherwise they will loose the market. The same is valid for passenger vessels.

Average tonnage of vessels and tonnage per ship

Another performance indicator we have taken into account is the tonnage of the vessel and the average tonnage loaded/unloaded in the port. Referring to the figures of the port statistics, we observe that during 2012 there were 381 ships calling port of Durres. This number dropped down to 349 calls during 2013, and during 2014 there were only 281 ships calling this port or 100 ships less than 2012. The size of the vessel did not have any significant change. In 2012 the average GT of the ship was 2859T, DWT was 3907T and the average length was 91,81m. These dimensions remained more or less the same during the two consecutive years. Respectively, during 2013 the average GT was 2835T, DWT 3953T and the average length was 93.63m and during 2014 these dimensions were slightly decreased. Therefore, the average gross tonnage of the ships was 2624 T, DWT 3790T and average length 92,79m. The following table and graph 6 shows these dimensions.

Table 6 ship characteristics 2012-14   Graph 6 ship characteristics 2012-14

|	2012	2013	2014
GT	2859	2835	2624
DWT	3907	3953	3790
Cargo	2799	2782	2872
length	91,81	93,63	92,79
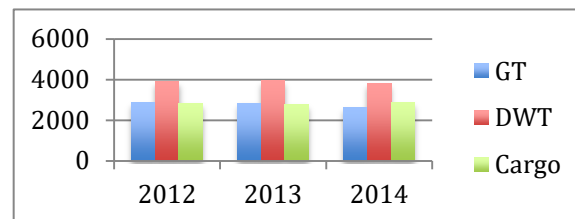
Even the average cargo loaded on the ships that have called port of Durres remained more or less the same. In 2012 an average cargo was 2799T, in 2013 this cargo was 2782T, and during 2014 this average loaded cargo was 2872 tons exactly the same as in the previous year. These statistics show that the characteristics of the ships have not changed during the course of the three years but the number of the ships calling the port has been reduced. This is due to the fact that the general cargoes are being substituted with containerized cargoes.

The figures of the container ships calling the port of Durres shows that the number of ships calling the container terminal and the number of TEU per voyage has been continuously increasing. During 2012 there were 130 ships calling this terminal and the average number of TEU's was 357/ per ship. During 2013 the number of ships was 147 and the number of TEU's increased to 552 TEU/per ship. The third year the number of ships calling the terminal was 154 and the average of TEU's transported was 632 TEU/ship. This explains why the tonnage of the

general cargoes was reduced. The following graph 7 shows the number of container ships, and the average of the TEU per ship.

Graph7. Number of ships and average TEU transported.
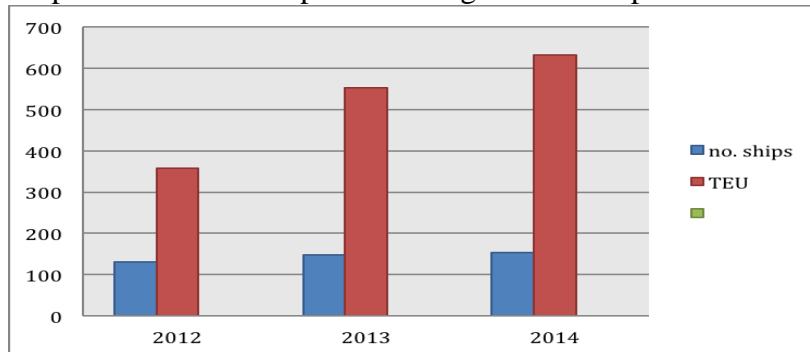
CONCLUSIONS

Port of Durres is the main port of Albania. During the last decade the infrastructure of the port has been improved significantly and that has positively affected the port performance. This has been directly reflected in the cargo volumes the port has handled during the last years. The volume of the cargo has been increased; therefore the performance port indicators have been improved as well.

There seems to be a reduction of ship's waiting time and ship's dwell time and there is a significant improvement of the effective working time of the ship. That has improved berth utility rate, making the port more competitive and attracting more cargoes.

The port is shifting from general cargoes to containers and this is reflected in the number and size of the ships. Even though the size and tonnage carried from ships has not changed significantly, the number of the ships calling the port has. This number has been reduced, therefore reflecting the reduction of the tonnage of the general cargoes. This reduction has been substituted by the increase of the containers traffic which is becoming the primary mode of goods transport to/from port of Durres.

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