

## CONTRIBUTIONS TO THE ANALYSIS OF SAFETY NAVIGATION IN THE BLACK SEA - VIEWS ON PORT STATE CONTROL ACTIVITIES

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**Abstract:** *The issue of maritime safety is the attribute of national regulators, with a well defined status and responsibilities established by international conventions (Romanian Naval Authority including Port State Control). The management of effects and implications in the medium and long term on the sustainable development of maritime transport and other related activities associated with this field carried in the Black Sea have so far not been subject to any scientifically based analysis and published in our country. The thesis contains the analysis of maritime safety in the Black Sea region on Port State Control inspection data from the BS MOU and refers, in a broader sense at the approach of the target factor in terms of selecting ships for inspection. Descriptive statistics and analysis are structured on 5 indicators and evaluating inspections conducted on ships transiting the region, and the findings are interpreted and visualized.*

**Keywords:** *safety, navigation, inspection, deficiencies, Port State Control*

### 1. INTRODUCTION

The prime scope of this thesis, besides giving a regional analysis of the maritime safety regime in the Black Sea MOU region, is to deliver the necessary scientific arguments that demonstrate the need to improve the target factor system used by the Black Sea Memorandum of Understanding (BS MOU) on Port State Control by incorporating the most important factors related to

nonconformities in this field. This paper is a useful and unique tool that can be used nationally and helps decision-makers from shipping (regulators, PSC personnel, economic and political factors, etc.) to base decisions on short and medium term issues of maritime safety.

For the purposes of the above, the issues that will be presented below are structured on five indicators.

Indicator	The objective of analysis
1. Analysis of the inspection port activity	The performance of authority
2. Analysis of inspection results by ship type	Ship type that registered the highest detention percentage
3. Analysis of inspection results by flag state	The performance of flag states
4. Analysis of inspection results by classification societies	The performance of classification societies
5. Analysis of inspection results by deficiencies type	The most frequently type of deficiency observed

### 2. ANALYSIS OF THE INSPECTION PORT ACTIVITY

Analyzing the volume of goods carried through shipping and the analysis of the main shipping routes in the Black Sea provides a complete picture on the number of ships in transit through the ports in this area. In the context associated to maritime security analysis, the goal was focused on assessment of ships inspections and on the information related to inspections. As can be seen from figure 1, in 2009 the largest number of ships visits in the BS MOU region was

registered by Ukraine, 3695, followed by Romania and Russia with 1987, respectively 1842, therefore it presents a certain relevance in terms of how the commercial flow is divided. Although Ukraine is the most throughput of the Black Sea riparian countries, conducted a small number of inspections as opposed to Russia which had a number of ships visits two times smaller and the number of inspections was almost twice.

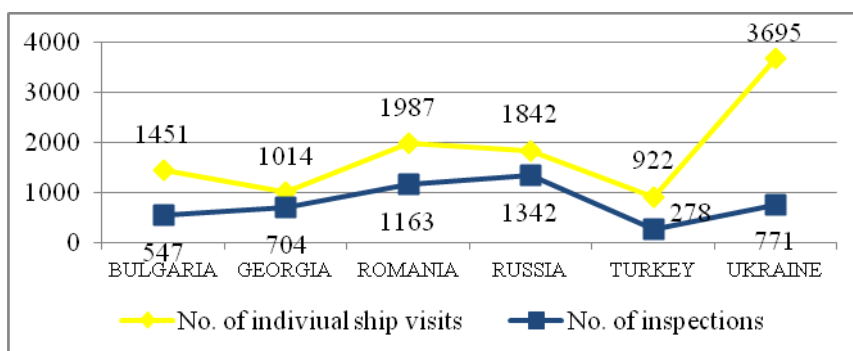
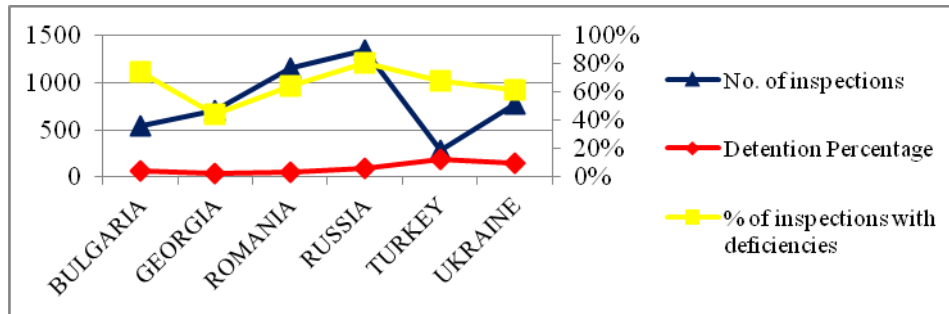


Fig. 1 The performance analysis of port authorities – number of individual ship visits, number of inspections

Figure 2 shows the relationship between the number of inspections, the percentage of inspections with deficiencies and detentions percentage, we can indicate the quality of ships

inspected in the control framework of respective port authorities.



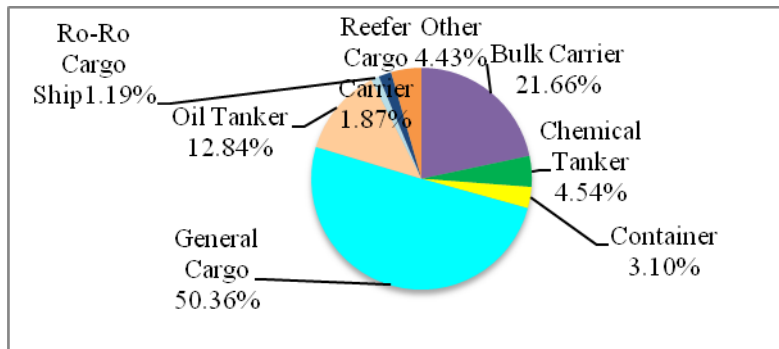
**Fig. 2 Criteria for evaluation of safety at sea (number of inspections, the detention percentage, the percentage of inspections with deficiencies)**

For example, Turkey has carried out 278 inspections of which 67.99% represents the inspections with deficiencies and there were 35 detentions, causing a detention percentage of 12.59%, the highest percentage of BS MOU region in 2009. In contrast, Bulgaria has carried out 547 inspections after which there were recorded 2484 deficiencies, leading to a 74.77% percentage of inspections with deficiencies and a percentage of detention of 4.39%. This high percentage of inspections which were found deficiencies in relation to the small percentage of detentions under the regional average of

detention percentages of 5.79%, we also highlights that the nature of the deficiency counts, not only the number of nonconformities.

**3. ANALYSIS OF INSPECTION RESULTS BY SHIP TYPE**

Dividing the number of inspections by ship type, in 2009 the largest number of inspections has been registered by general cargo ships 2420 (50.36%), followed by bulk carriers 1041 (21.66 %) and oil tankers 617 (12.84%), figure 3. This reflects the target factor since the targeted criteria, either by ship type or by age, are this categories.



**Fig. 3 Number of inspections per ship type**

These percentages have changed little over the time period analyzed 2007 - 2009; in 2007, 2008 inspections of general cargo ships were 49.83% respectively 50.84% of the total number of inspections; for the bulk carriers the percentages were 20.24% respectively 21.78% and oil tankers in 2007 were 13.89% and in 2008 had decreased, reaching 12.03%.

Out of the total number of inspections carried out in the BS MOU, 3216 representing 66.93% were inspection with deficiencies. As shown in figure 4 the highest percentage of inspections with deficiencies appertain to general cargo ships.

Figure 5 presents the inspection share per ship type representing the number of inspections per ship type compared to the total number of inspections in the BS MOU region and detentions share, representing the number of detentions per ship type (which registered more than one detention) reported to the total number of detentions registered in the Black Sea region. Figure 5 reflects the fact that most ships detained were general cargo ships recording 209 detentions and bulk carriers with 41 detentions representing 89.93% of all detentions.

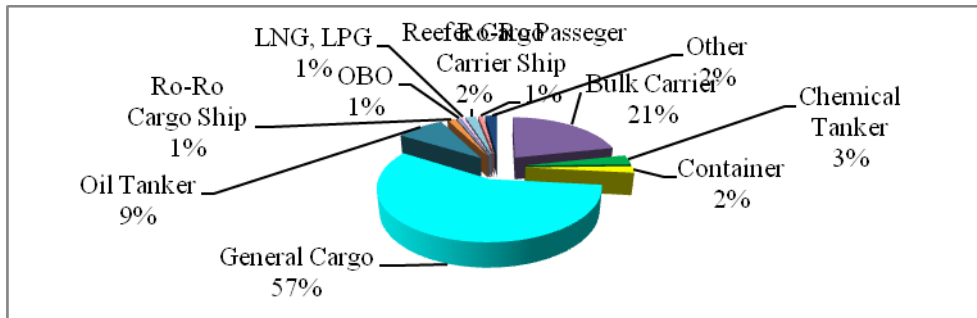


Fig. 4 Inspections with deficiencies per ship type

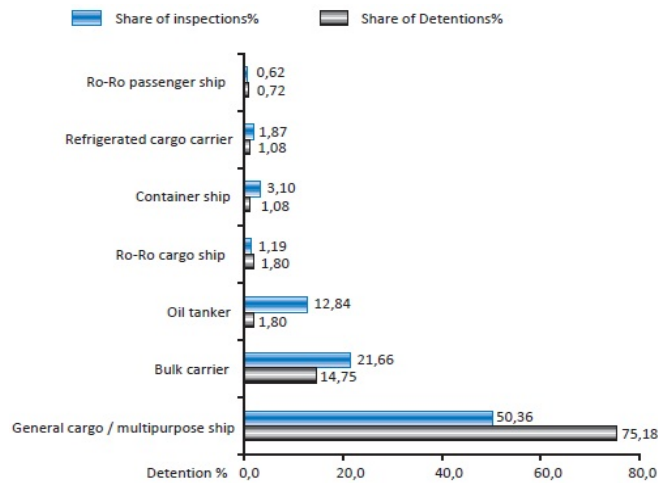


Fig. 5 Comparison of inspection share and detentions share for ship types with more than one detention, source: [5]

Although general cargo ships have the largest number of inspections and often after an inspection are found deficiencies, the highest percentage of detentions per ship type (detentions as a percentage of the inspections number

per ship type) belongs to Ro-Ro cargo (8.77%), followed by general cargo ships with a percentage of 6.67% and bulk carriers (3.94%), figure 6.

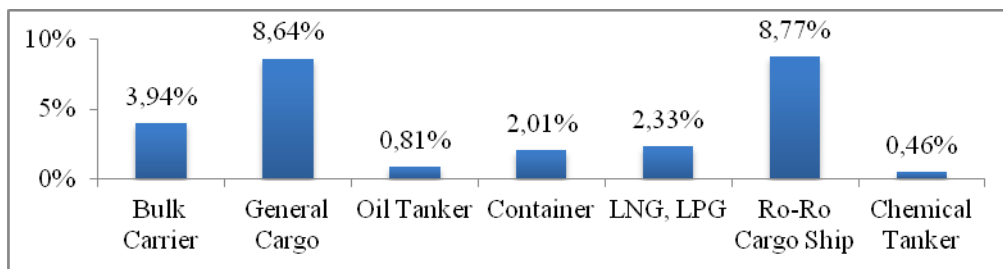


Fig. 6 The detention percentage per ship type

As can be seen in Figure 7, the highest inspection percentage for general cargo ships, 30% belongs to Romania, which recorded a total of 747 inspections. Interesting to note

that most of the ships inspected in the port state control of Romania and Georgia are general cargo ships, but they have a low detention percentage of 3.53% and 2.31%.

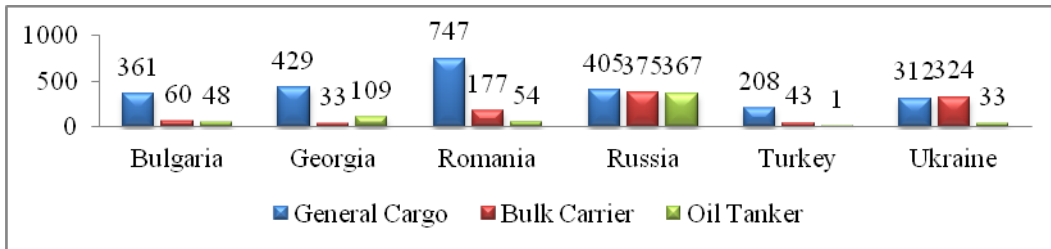


Fig. 7 Number of inspections by the port authority per ship type after having registered the highest number of inspections

Figure 8 presents the number of detentions of general cargo ships which fell gradually from 2007 to 2009.

These data lead us to conclude that BS MOU members efforts in the elimination substandard ships, work.

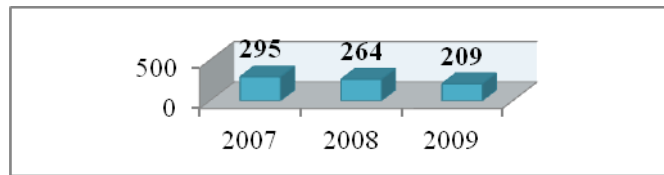


Fig. 8 The number of detentions for general cargo ships (2007 - 2009)

Figure 9 shows the relationship between detention, deficiencies and the average age of the ship which provides an indication of the quality of maintenance resulting that an older ship with good maintenance, depending on the category of the ship, may have a lower detention or deficiency rate. Also, this

relationship shows that the target factor method is effective for the ship type as one of the criteria for selecting ships for inspection. For example, container ships have an average age smaller than oil tankers but have a detention percentage of 2.01% compared with 0.81% of oil tankers.

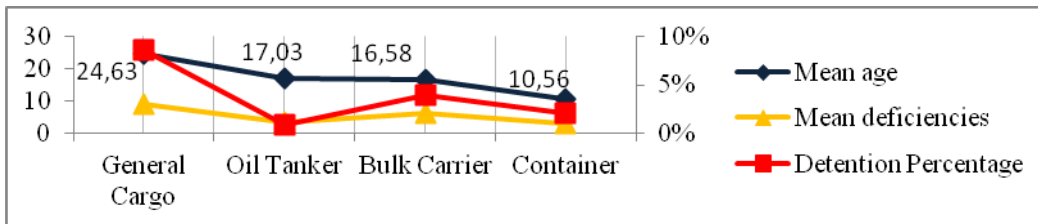


Fig. 9 Criteria for evaluation of safety at sea (deficiencies, age, detentions)

#### 4. Analysis of inspection results by flag state

Inspections in 2009 were made on ships registered under 84 flags, most of them were Turkey (12.92%), Panama (11.43%), Malta (10.74%), Russia (5.33%) and Liberia

(4.52%) representing 44.93% of all inspections, amounting to 2159 inspections, figure 10 expressing the total number of inspections depending on the inspected ships flags.

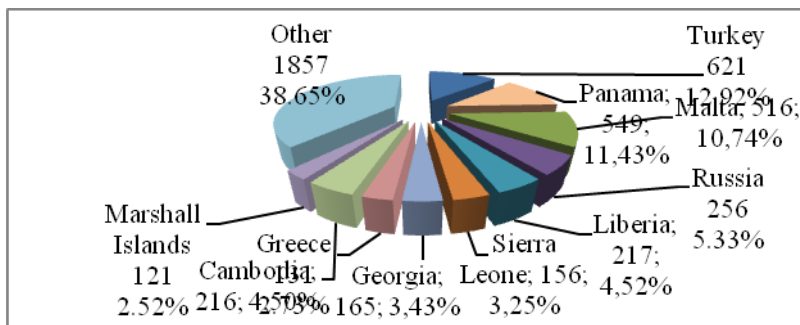
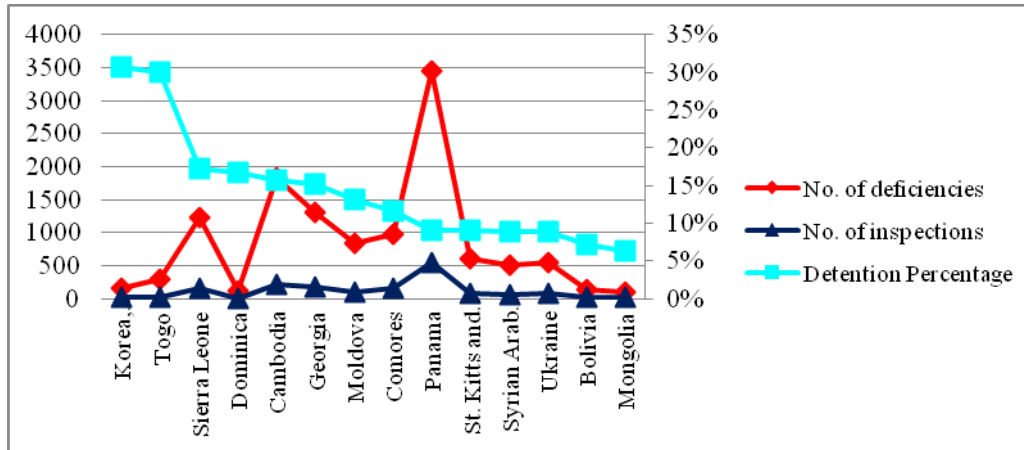


Fig. 10 Number of inspections in the BS MOU region by flag state

Ships registered under 38 foreign flags have shown serious deficiencies affecting the seaworthiness and justifying their detention. The highest percentage of detentions were observed on Democratic Republic of Korea (30.77%), Togo (30.00%), Sierra Leone (17.31%) and Dominica (16.67%) flagged ships.

Figure 11 shows the relationship between the inspection number, number of deficiencies and detentions percentage. If the number of deficiencies follows more or less the inspection number, the detention percentage does not

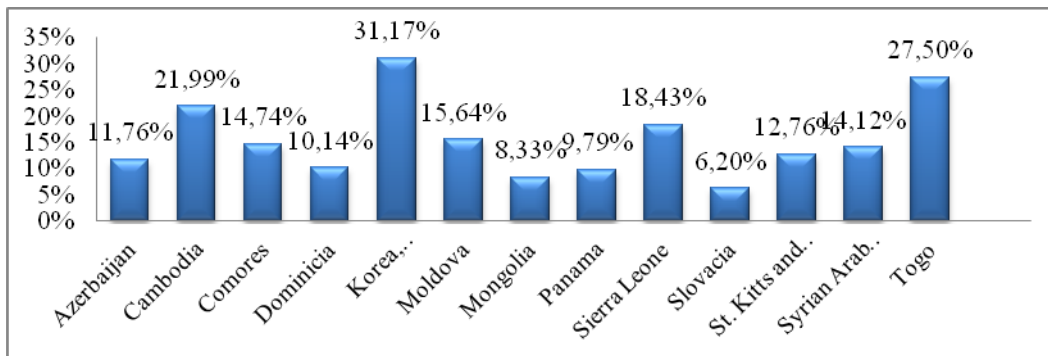
confirm this relationship indicating that deficiency type is important for detention, not only the number of deficiencies. For example, the Panama flag which is on the grey list has the largest number of inspections performed on ships registered under its flag, 549 and the highest number of deficiencies in 3461, but recorded one of the lowest percentages of detentions 9,11%, and on Democratic Republic of Korea flagged ships, flag that is on the black list have had a total of 13 inspections which were found 155 deficiencies that caused a high detention percentage of 30.77%.



**Fig. 11 Flag States performance level**

In fig. 12. are the average detention percentages registered in the BS MOU region, of some flag states over the years from 2007 to 2009. It is interesting to note that although Mongolia has a higher average detention percentage than

Slovakia in BS MOU region, in accordance with the black list of Paris MoU, Mongolia is at medium risk category and Slovakia is in medium to high risk.



**Fig. 12 Average of detention percentages in the BS MOU region by flag (2007 - 2009)**

In Romania, most inspections were on ships registered under the flag of Turkey, 193 inspections representing 16.60% of all inspections conducted in 2009 (1163), succeeded by ships registered under flags of Panama

and Malta occupying a percentage of 9.46% respectively 7.82% of the inspection number in the Romanian Port State Control, figure 13.

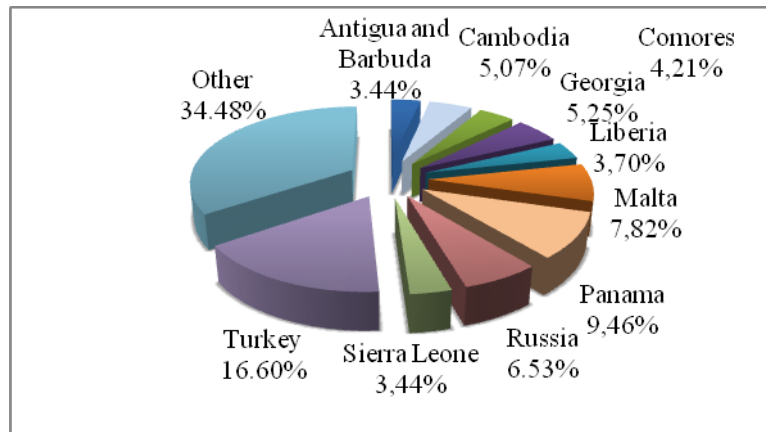


Fig. 13 Inspection percentage in Romania by flag

Correlating figure 7. with figure 13 we can draw conclusions about the quality of the Turkey flag state, due to the high number of inspections performed on ships registered under this flag and high number of inspections on general cargo ships in the Romanian port state control and the low detention percentage that Romania it holds.

#### 5. ANALYSIS OF INSPECTION RESULTS BY CLASSIFICATION SOCIETIES

In total, around 68% of the total number of inspections was conducted on ships that are certified by classification societies.

Tab. 1 The quality of EU recognized classification societies (personal processing of information presented in [1])

	Inspect number	Number of detentions	Detention percentage
No class	5	2	40.00%
EU not recognized CL	1533	197	12.85%
EU recognized CL	3267	79	2.41%
<b>TOTAL (Regional)</b>	<b>4805</b>	<b>278</b>	<b>5.79%</b>

Ships certified by EU not recognized classification societies have been withholding a percentage five times higher than that of the EU recognized classification societies, in 2009, as shown in Table 1. It also notes that the ships that are not certified by any classification society have a detention rate of 40%. This indicates that there is a marked difference in the

ship quality level and the relevance of classification societies in calculating the target factor.

Most ships inspected in 2009, are in class with the Russian Maritime Register of Shipping (14.48%), Bureau Veritas (10.74%) and Lloyd's Register of Shipping (Lloyd Register of Shipping - 7.72% ) as visualized in figure 14.

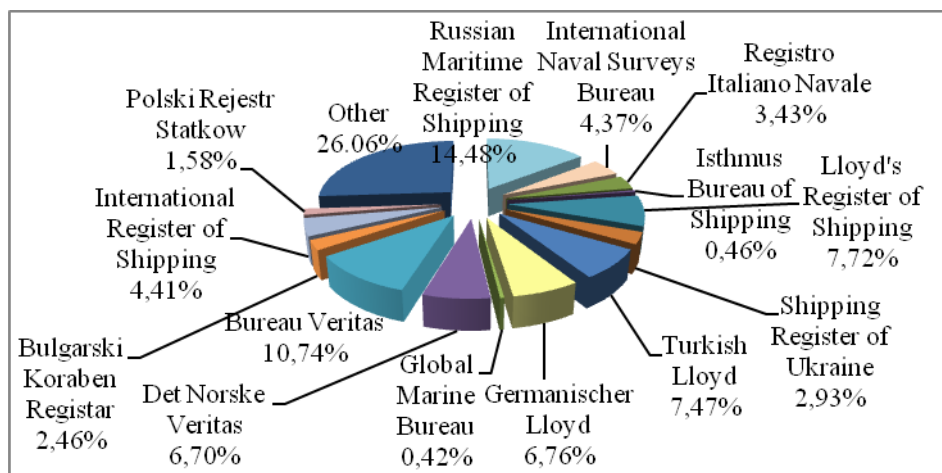
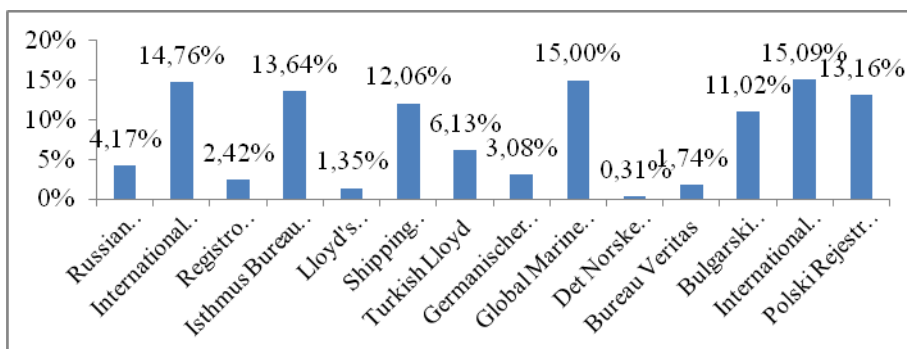


Fig. 14 Percentage of inspections by the classification society

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The highest percentage of detentions, figure 15 was referred to ships that are in class with the International Register of Shipping (17.89%), Global Marine Bureau (15.84%), Shipping Register of Ukraine (16.19%), International

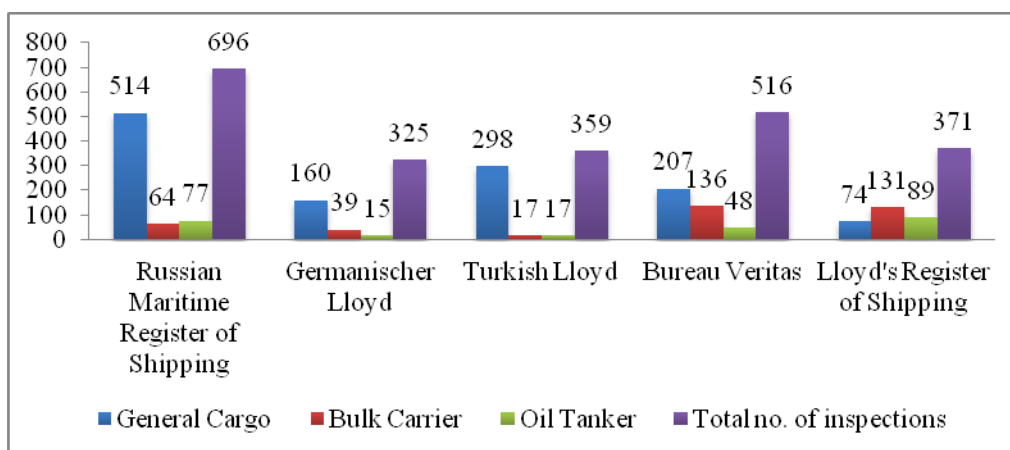
Naval Survey Bureau (15.29%) and Isthmus Bureau of Shipping (12.90%) (ships on which were performed more than 30 inspections).



**Fig. 15 Detention percentage per classification society**

Correlating the information presented in figure 15 and that of figure 16 it is interesting to note that for example, Russian Maritime Register of Shipping, Germanischer Lloyd, Bureau Veritas and Lloyd`s Register have a lower detentions

percentage contrary to the large number of inspections carried out on general cargo ships and on bulk carriers. This has a particular relevance in terms of quality.



**Fig. 16 Inspection number per classification societies by ship type**

**6. ANALYSIS OF INSPECTION RESULTS BY DEFICIENCIES TYPE**

This section highlights the main deficiencies detected in the analysis of BS MOU region. According to the Paris MoU, the deficiencies are grouped by convention or relevant codes and sub-codes.

During the PSC inspections in 2009 were identified 22885 deficiencies. Most deficiencies were related to safety of navigation (15.63%), lifesaving appliances (13.31%), stability, structure and related equipment (12.98%) and fire safety

measures (9.59%). These four categories represent 51.52% of all deficiencies.

MARPOL - Annexes II-VI (0.78%) and SOLAS (1.77%) related operational deficiencies percentages decreased compared with non-conformities recorded on marine pollution, non-compliance of MARPOL Annex I (3.83%). The number of deficiencies associated with the ISM Code was 619 representing 2.70% of the total number of deficiencies, figure 17.

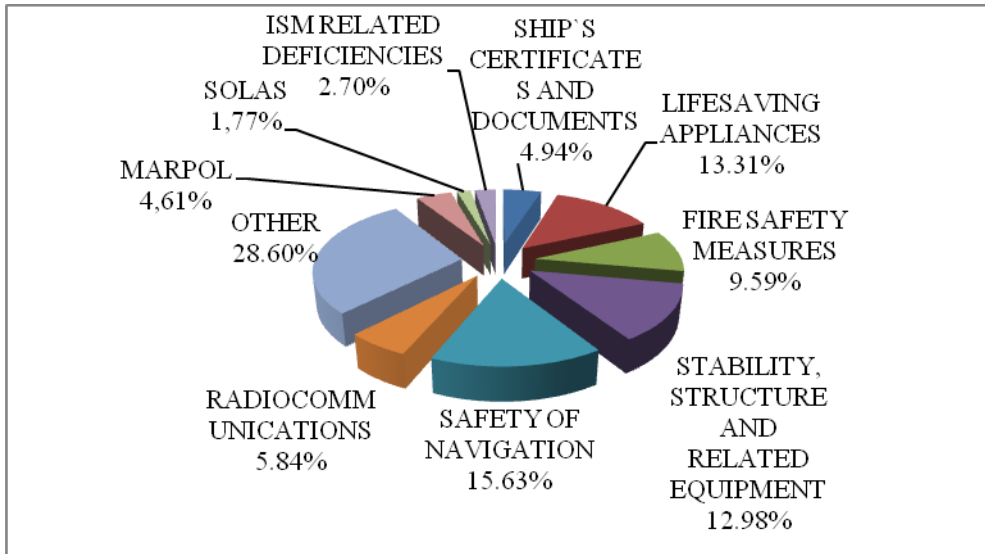


Fig. 17 Deficiencies percentage by non-compliance nature

Also, were found 1134 deficiencies that lead to detention, representing 4.95% of the total number of nonconformities and 122 deficiencies associated with recognized organizations (RO) representing 10.76% of the deficiencies leading to detention, figure 18.

Most deficiencies leading to detention, found during inspections in 2009 in the BS MOU region are the non-

conformities on fire safety measures (22.75%), stability, structure and related equipment (13.40%), lifesaving appliances (11.29%) and deficiencies related to ship's certificates and documents (9.79%). These four categories constitutes 57.23% of the deficiencies leading to detention as can be seen in figure 19.

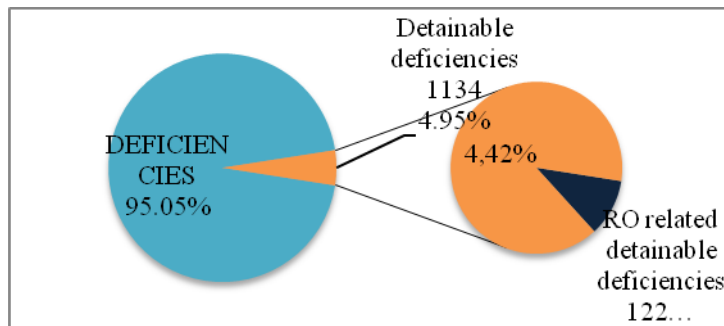


Fig. 18 Classification of deficiencies

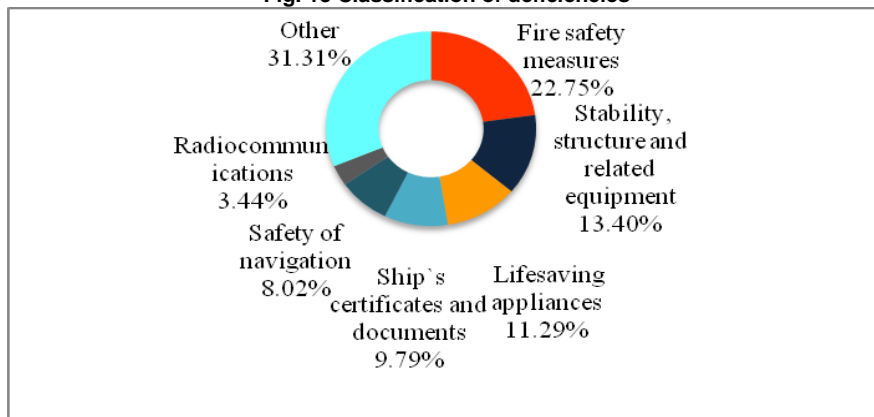


Fig. 19 Percentage of deficiencies leading to detention by deficiency type



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## **7. CONCLUSIONS**

Descriptive analysis showed that vessel age, type of ship, classification societies and flag state have their influence on safety quality. Some older ships but with good maintenance can have better performance than newer vessels that have a poor maintenance.

Analysis by major deficiencies type shows that some of them have a higher frequency, such as safety of navigation, lifesaving appliances, Stability, structure and related equipment, fire safety measures, radiocommunications and ship's certificates and documents. Most inspections were carried out on general cargo ships (50%) which recorded the highest percentage of detention (9%), bulk carriers (22%) and oil tankers (13%).

There is a considerable difference in the variation between the port detentions, detention rates ranging from

2.3% to 13%. This difference in port authorities contributions may reflect the quality of inspections in Member States.

That flag states listed on the blacklist are performing poorly in practice is confirmed.

Objectives imposed by the concept of maritime safety is an field of great interest to conduct further research. The burning question is whether the regime will improve the desired effects. In essence this can be investigated through a comparative analysis of results of inspections conducted by the port authorities of the Member States in the BS MOU PSC inspection.

It would be interesting to track the number of detentions carried out by the Romanian Naval Authority, which registers the largest inspection number of general cargo ships in the BS MOU region, since they were placed on the list of vessels which may be banned.

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