



Maritime Transport Safety Control: Its Effectiveness Following Privatization in the Post-Globalization Era

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ABSTRACT

A detailed statistical analysis of the world fleet and its performance in respect of safety has been made, to study the evolution that has taken place in recent decades in the privatization or externalization of the control services. These services refer principally to the inspection and monitoring of ships performed by the Maritime Administrations of States either directly themselves or indirectly via the Classification Societies or Recognized Organizations (ROs).

On this analysis, the discussion is not controversial. The general performance of the fleet has been getting better in both aspects and a scenario of concentration in the number of important registries is drawn; those registries that have not adapted to the standards established internationally by the International Maritime Organization (IMO) are not competitive. States and Governments will have the public mission of “controlling the private controllers”, supervising the compliance of those ROs with ethical standards, so that the new IMO Code will be the final element.

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1. Introduction

Our Research Group has studied for years, the impact of Globalization on maritime structures, especially the impact on maritime safety and pollution prevention. Previous studies have been conducted on the recruitment practices and the new role of the Classification Societies (Silos et al., 2012, 2013). In this paper we analyse statistically the world fleet and its performance in respect of safety, to study the evolution that has taken place in recent decades in the privatization or externalization of the control services. These services refer principally to the inspection and monitoring of ships performed by the Maritime Administrations of States either directly themselves or indirectly via the Classification Societies or Recognized Organizations (ROs).

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This paper is organized as follows: we will address the concept of (post)-globalization, the methodological aspects and a review of the state of the art; then we present the statistical analysis, the legal framework of the ROs and finally present the conclusions centred in the added value of our study.

If the intention is to be precise, it is no longer correct to speak of a process of globalization of the structures of maritime transport, since this process now seems to have been already consolidated (Alderton and Winchester, 2002a; Egyan, 1988, 1990; Kovats, 2006; Metaxas, 1981; Silos et al., 2012). It is perhaps more correct to take it as a fact that the world economy is now in another more advanced stage - one that many authors have defined as Post-Globalization (Nayak, 2013; O'Connor, 2009; Masih, 2002). In this era of neo-globalization, what must now be done is to analyse the errors committed, and to regulate those aspects that evidently require better control, principally the control of maritime safety.

There is no doubt that the phenomenon of privatization of the maritime safety control has developed in parallel with that of the now-consolidated Open Registries; and the situation that exists presents a challenge to the Coastal States to ensure the quality of the inspections and controls which these organisa-

tions should perform. This necessary work has taken definitive shape in the proposed future Code for Recognized Organizations (IMO, 1993-2012; EC 1994-2009).

Historically States have attributed their nationality to their “own vessels”, those that fly the flag of that State. The so-called flagging of a vessel was an act of endorsement of the authority of that country, and signified that vessel was under the jurisdiction of the laws of that State. Those countries with a significant maritime tradition took care to maintain the reputation of their fleet for lawfulness in the condition and operation of their ships. However, basically since the Second World War, the phenomenon known pejoratively as “Flags of Convenience” developed (Alderton and Winchester, 2002b; Metaxas, 1981); this development demonstrated the absence of what the International Court of Justice referred to in a 1955 sentence as a “genuine link” between a State and its national -person or entity- (Bergantino and Marlow 1998; Alderton and Winchester 2002a; Li and Wonham 1999). According to this principle, a country cannot extend its laws and protection to its nationals without any kind of limitation: in addition to the formal nationality there must also exist between the State and its national a genuine connection; what constitutes the link between a State and a vessel registered in and flying the flag of that State was set out in the Convention on the High Seas of 1958 (IMO, 1958).

Many years have passed, and the “battle” to stop this process by which ship owners have increasingly abandoned the traditional maritime flags, known as “flagging out”, seems to have been lost, according to the figures that are published each year on the world’s merchant marine fleets. It must also be stated that the subsequent international measures have not facilitated the resolution of this confusion with relation to that term, neither in the wording of Article 91.1 of the United Nations Convention on the Law of the Sea, UNCLOS (IMO, 1982), nor in the failed United Nations Convention on Conditions for the Registration of Ships, UNCCROS (IMO, 1986) which remains becalmed in the list of international agreements awaiting ratification, with only twenty four adhesions to date. In this context the Port State Control policies have a vital role in the enforcement of safety law at sea worldwide (Li and Zheng, 2008).

2. Material and Methods

Methodological Aspects

The measurement of the performance of the Flag State on maritime safety matters is a difficult task. A first approach was made under the auspices of the Memorandum of Paris, which prepared a stratification of States or registries in its Black, Grey and White lists. This rather crude approach was later refined somewhat in profiles of risk; and these same selective stratifications were introduced for ROs. The procedure was extended from the Port State Control agreement of the Memorandum of Paris to other similar agreements like that of Tokyo, and to the system of control established by the US Coast Guard in the United States.

More directly immersed in the reality of the maritime industry, the International Chamber of Shipping (ICS), in association

with the International Shipping Federation (ISF) (whose members together account for more than 80% of the total world fleet) issue annually the “Shipping Industry Flag State Performance Table” (2012), based on the assessment of each Flag State or Registry according to 18 criteria (with their corresponding positive or negative indicators). It is the ICS-ISF Performance Table that has been used as the basis for the analysis presented here, since these data are considered sufficiently reliable and comprehensive to detect, not necessarily the mathematical accuracy of the parameters measured but rather the real trends in the market that is the objective of this study. The indicators include whether or not the Flag State features on the PSC black lists of the MoUs of Paris and Tokyo, and on the target list of the US Coastguard; whether or not the State has ratified the more important IMO and ILO Agreements; the application or not of the resolution A.739 (18) on ROs (IMO, 1993), mentioned previously; and various aspects of the State’s compliance with IMO obligations (STCW white list, ILO reports and attendance at IMO meetings). It is accepted that any index or ratio can be criticized, but these data appear to be the most global of all the possible assessments of Flag State performance on safety. Therefore, for this study, the two ordinal categorical variables, represented in the table with the colours green and red, have been converted into discrete (countable) variables +1 and -1, thus producing an average indicator of overall performance from the sum of all the 18 indicators, which become a continuous numerical value for each State. The zero value (0) is applied for values not positively or negatively assigned.

To measure the degree to which the Flag State cedes its role of control to the ROs, the database of the IMO “Global Integrated Shipping Information System” (GISIS) has been used, together with the data provided by the most important Classification Societies and by “The Hybrid European Targeting and Inspection System” (THETIS), which is the database of European Maritime Safety Agency (EMSA). Using these data sources, an index has been produced based on the ceding by these States to the ROs of the issuing of their statutory certificates and authorised documents (LL, Tonnage, SOLAS, MARPOL, AFS, BWMC, ILO and HSSC). Thus each Flag State would have an index value between 0 and 1, with 1 representing the highest percentage of State authority ceded to the ROs, and 0 representing the total absence of authorization by a State to the ROs for the issuing of any of these certificates. The statistical programs R and SPSS® were employed for the data treatment.

Review of the State of the Art

“Safety is not a new phenomenon. There is clearly a long history of attempts to influence or control maritime safety standards” (Everard, 2013). In the past decades considerable changes has undergone in the maritime transport safety control. Yang, Wang and Li (2013) review the challenges of maritime safety analysis and the different approaches used to quantify the risks in maritime transportation and the importance of risk quantification analysis to facilitate the transformation of maritime safety culture (term developed by Håvold, 2000). Almost twenty

years ago, Brooks (1996) alerted about the phenomenon of privatization of maritime safety control.

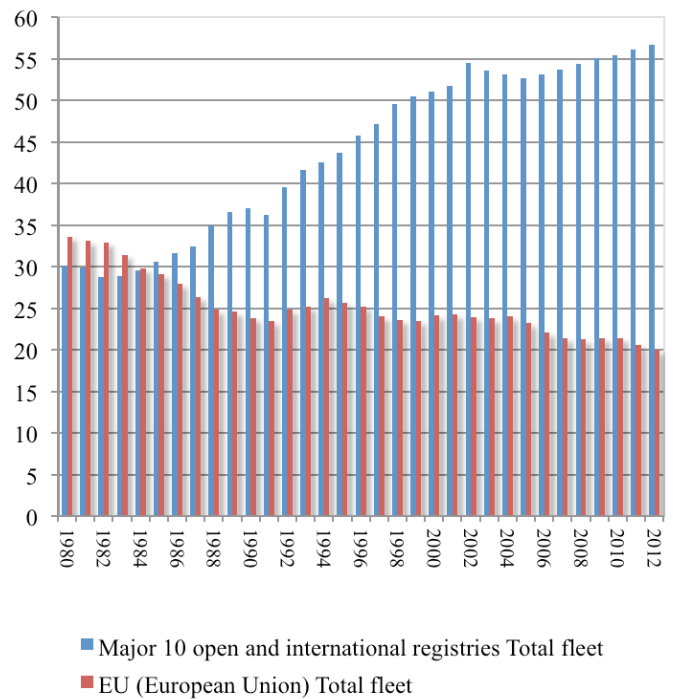
A detailed statistical analysis of the world fleet and its performance in respect of safety has been made, to study the evolution that has taken place in recent decades in the privatization or externalization of the control services. These services refer principally to the inspection and monitoring of ships performed by the Maritime Administrations of States either directly themselves or indirectly via the Classification Societies, or Recognized Organizations (ROs), as they have been defined by the International Maritime Organisation (IMO) itself. Previously authors as Li and Wonham (2001) reveal areas where IMO regulations of safety of life at sea can be improved upon. Even, more recently, Schröder-Hinrichsa, Hollnagelbc, Baldaufa, Hofmanna and Katariaa (2013) studied the possibilities of IMO in a proactive policy of responses to maritime accidents.

First Approach to Statistical Analysis

In a first approach to statistical analysis, we can say that the campaign of the International Transport Workers' Federation (ITF) to stop the proliferation of these flags has been very convincing: the data confirm that the growth of the Open Registries, as against the traditional registries, is unstoppable and has become consolidated (Figure 1): the vessels registered in Panama account for 21.4% of the total world fleet; Panama and Liberia together account for 33.8% of the total; and taking together the top five registries (the above two countries plus Hong-Kong, the Marshall Islands and Singapore) the percentage of the world total accounted for reaches 54.7%. In fact, in recent years, a process of concentration can be seen. Figures 2 and 3 show the historical evolution of this process of flagging out, and the increase that has been taking place in the registration of vessels under a foreign flag, which in 2011 reached 71.5% of the total world fleet. We are also dealing with a sector strongly centralized in a limited number of countries: according to data of the same source (UNCTAD 2013), four countries (Greece, Japan, Germany and China) effectively monopolize ship ownership, accounting for half of all vessels - a similar degree of concentration as occurs with the registries but with a completely different set of countries.

Taking a quantitative approach to shipping registry selection, Alderton and Winchester (2002a and 2002b) established what they called the Flag State Conformance Index (FLASCI); subsequently other Chinese authors worked in regional contexts: Haralambides and Yang (2003) identified ship owners' preferences in the Chinese merchant fleet based on a Comprehensive Fuzzy Evaluation Model (CFEM); and Chung and Hwang (2005) studied the registration policies of bulk-carrier companies. Kandakoglu, Celik and Akguna (2009) proceeded with a multi-methodological approach based on the systematic application of SWOT analysis, the AHP and the TOPSIS methods to support the critical decision process on shipping registry selection under multiple criteria. More recently, M. Perepelkin, Knapp, G. Perepelkin, and Pooter (2010) proposed a new framework, equally theoretical, but with a considerable improvement of the system. Those authors showed that the system of assessment of the MoU of Paris had three important

Figure 1: Percentage of total world fleet, divided between the EU and Top 10 ORs (referred to the base data in DWT)

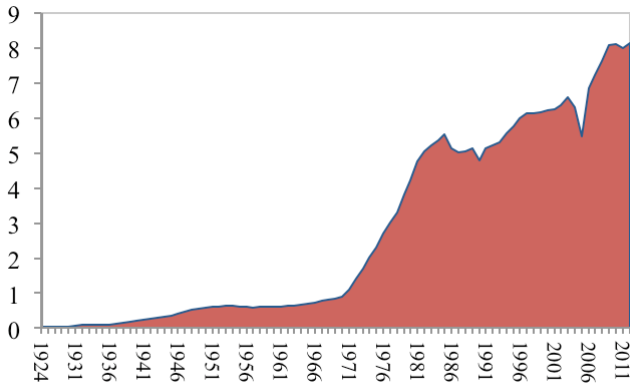


Ships registered with the Top Ten Open and international registries, as % of total fleet and ships registered with the European Union countries, as % of total fleet
Source: Authors' own elaboration from UNCTAD-Stat

faults: being a system for Flag States or ROs that conducted a large number of inspections, it excluded all those vessels that were not inspected (47% of the total) and was based only on the detentions and not on the deficiencies. For this reason they established the concept of Quality of Flag (Q) based on other considerations, not only the detentions but also the deficiencies and accidents that occurred. These appreciations had already been demonstrated in the econometrics studies realized by Cariou (2007-2009) and Knapp and Franses (2007).

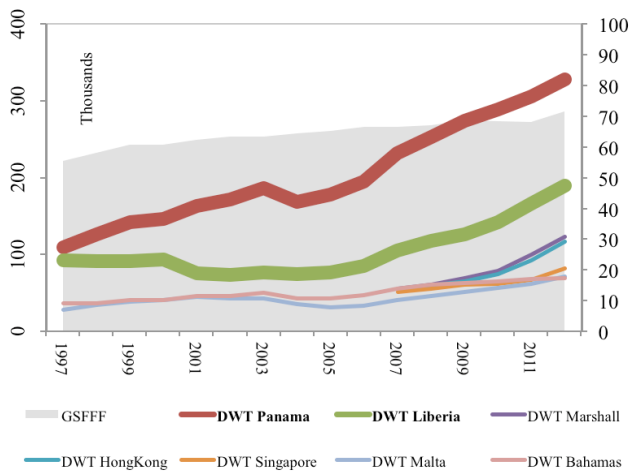
As stated in the Introduction, with the growth of the world fleet, the total tonnage of which now exceeds 1,500 million tons DWT, the international community has failed to stop the process of registering ships under foreign flags; but not only this, the practice has increased, and has become consolidated and centralized. Figure 4 shows the world's leading 35 flag states (which together account for 94.5% of the total world fleet) by total tonnage of ships registered and by percentage of the total global tonnage of ships owned by foreigners (i.e. by non-nationals of the ship's flag state). The problem, therefore, reduces down to two basic aspects: one, the performance of the flag, in terms of its record in applying (or not applying) the agreed international standards and regulations; and two, the degree to which the Flag State cedes its role of control (inspection, monitoring and sanctioning, etc.) to the ROs.

Figure 2: Number of ships (thousands) registered in Panama, 1924 to 2012)



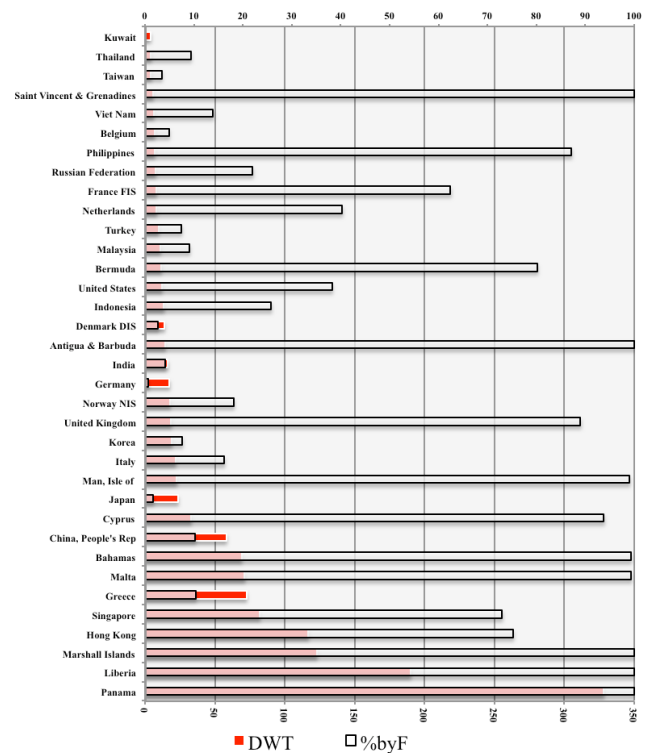
Commercial seagoing vessels of 1,000 grt and above
Source: Authors' own elaboration from UNCTAD-Stat and LR

Figure 3: Tonnage ('000 DWT) of ships registered with each of the leading Open Registries (left hand scale), and Total foreign-flagged fleet as % of total global fleet (GSFFF%) (right hand scale))



GSFFF in percentage DWT Commercial seagoing vessels of 1,000 GRT and above
Source: Authors' own elaboration from UNCTAD-Stat

Figure 4: The world's leading 35 Flag States, by total tonnage ('000 DWT- bottom scale) and by Percentage of total tonnage owned by foreigners (% - top scale)



Source: Authors' own elaboration from UNCTAD-Stat Thousands of DWT and % owned by foreigners Commercial seagoing vessels of 1,000 grt and above

3. Legal Framework of the Recognized Organisations (ROs)

Common sense tells us that most of these registries are not capable of carrying out, with their own resources, the measures necessary to control their vast fleets. Just considering physically such island States as the Bahamas, Bermuda or the minuscule Antigua and Barbuda, or Saint Vincent and Grenadines, which register thousands of ships under their flag, these countries would have to employ practically their entire population in inspecting vessels.

UNCLOS and IMO Conventions

Our first task should be to establish the legal bases by which the Flag States can authorize the delegation of competence to these ROs. These bases have already been laid down in the principal international maritime agreements, specifically in the UNCLOS (Articles 94 and 217), and in most of the more technical agreements of the International Maritime Organisation (Rule I/6 of SOLAS (IMO, 1974), Rules I/4 and II/10 of MARPOL (IMO, 1973), Article 13 of LL (IMO, 1966) and Article 6 of TONNAGE (IMO, 1969), in which the capacity for delegation of the inspection, certification and determination of the tonnage of vessels is established. But it was in 1993 when the XVIIIth Assembly of the IMO established the bases, in its Resolution 739, of some of the first Directives relating to the authorization of such Organisations to act in the name of a State's Government. The purpose of this was to formulate uniform procedures and a mechanism for the delegation of authority to the ROs; these directives were to constitute minimum standards that were already being recommended by both the (62^o) Committee for Maritime Safety and the (34^o) Committee for the Protection of the Marine Environment. Basically these first Directives stipulated minimum levels of efficiency and availability of resources; they required the drafting of a document setting down the terms of the agreement with the corresponding Government, and an independent auditing system to assess the degree of compliance of the RO with the delegated competences. This agreement had to establish in detail the level of the delegation of the functions, the juridical basis of the functions authorized, and the system for the notification of results to the Government. In effect, the intention was to impose some minimum standards and requirements on ROs that would exclude from such delegation those organisations, and certain consultants, that were lacking in technical rigour and qualified personnel. All this would flow from a necessary publication of rules, a quality control system that would be homologous with the ISO 9000 series of standards, a regime of training and improvement for the professional personnel, and principles of behaviour laid down in the Code of Ethics. In the following Assembly, in 1995, the IMO expanded these Directives to include certain specifications in respect of the functions delegated (Resolution A.789(19)) with the clear principle of regulating the spheres of interest in four modules: management, technical assessment, recognitions, and competence and training. Special emphasis was placed on determining the basic parts for the inspection and monitoring of the vessel's structure, engines and machinery, stability, lines of loading, tonnage, structural protection against fires, safety equip-

ment and the prevention of contamination, radio and electronic equipment, and special criteria for the transport of bulk chemical products and liquefied gases. The competences and minimum qualification of the RO staff who carry out the inspections were also specified in more detail (IMO, 1993-2012).

Regulation at the Level of the European Union

As early as 1994 the EU Council issued the Council Directive 94/57/EC on common rules and standards for ship inspection and survey organizations and for the relevant activities of maritime administrations, within the framework of its common policy on Maritime Safety. In the Preamble of the Directive it was admitted that "a large number of the existing classification societies do not ensure either adequate implementation of the rules or reliability when acting on behalf of national administrations, as they do not have adequate structures and experience to be relied upon and to enable them to carry out their duties in a highly professional manner" (EC, 1994). In the light of this, criteria were agreed regarding the information that ROs should provide to their corresponding State government, and these in turn to the European Commission. By this means the EU eliminated from the market those small Societies and Consultancies that did not have at least one thousand vessels classified on their books, and that lacked technical capacity both in the area of the updating of rules and in their staff, and were also deficient in respect of the Code of Ethics and the quality standards stipulated in the resolutions of the IMO.

Later, in 2001, this earlier Directive was modified by that of 2001/105/EC; this increased, in particular, the requirements for the ROs to tighten even further the existing framework, to meet the standards of the IACS. Even more recently, in 2009, with the Directive 2009/15/EC and the Ruling (EC) N^o 391/2009, more severe changes have been made in the regulation of the ROs. This has been done by the creation of a certification body intended to be independent, and the reform of the system of sanctions that should make the inspection and classification system more effective, with the necessary incorporation of these regulations in the internal legislation of the individual European States in 2010 and 2011 (BOE, 2011). There have also been significant advances in the mutual recognition of the certificates among the better ROs, provided the certificate has been issued on the basis of equivalent technical standards (EC, 1994-2009).

The New Role of the Classification Societies

As demonstrated in previous studies, following the generalized process of deregulation and globalization, the Classification Societies now have a role that carries even greater responsibility than before. Since the accidents involving bulk carriers (with the inclusion of the new Chapter XII of the SOLAS Convention) and the serious ecological disasters caused by the "Erika" and the "Prestige", the maritime transport industry has had to react by establishing constructive standards based on objectives - IMO Goal-Based Standards: common rules whose purpose is to introduce a system by virtue of which the standards are criteria that allow safety to be evaluated during the design and project phases and the construction of the vessel,

as well as during its operating life (IMO, 2005, 2007; López-Pulido, 2004, 2005). The IMO, representing the public interest, establishes the objectives to be achieved, but leaves the Classification Societies and shipyards free to decide how best to employ their professional abilities and competences in order to comply with the required regulations and standards.

In particular the work done by the International Association of Classification Societies (IACS) should be recognized: this organisation has made notable advances in recent years in relation to technical and construction aspects of the various types of vessel classified, which have contributed to improved maritime safety. This work is by no means a static achievement, since it is continually advancing with the results of the numerous investigations and studies that it carries out. Perhaps the most positive part of this reality of the globalized maritime transport industry has been the collaboration between the IMO and the more important ROs: the regulations of the Classification Societies acquire a greater value given that their development implies greater obligations with respect to the international regulation, since otherwise there would be no sense in developing their own standards and requirements when these have already been covered by international juridical instruments. The collaboration between the private entities and the international organisations represents a first step of great value for the incorporation of private standards in international regulations, given the influence of the cited private bodies that contribute their experience and technical knowledge of the various maritime sectors. On this point the example of the CAS (Condition Assessment Scheme) is especially relevant (Boisson, 1998; Gabaldon and Ruiz-Soraa, 2006; Honka, 1994, 1996; Lagoni, 2007; Lux, 1993; Posch, 2006; Vaughan, 2006).

4. Results

The first task undertaken was the calculation of the descriptive statistics of the ICS-ISF indicators (Table 1). This provides an initial picture of the fleet that, as a whole (i.e. including all the flags) does not comply with the minimum criteria of those indicators; of the 18 values, the mean appears with negative values in 3 of the variables, which also coincide with important requirements established in respect of the PSC. Then the degree of association between the variables is calculated from the Spearman's correlation, thus determining the interdependence between two variables (between -1 and +1) - in this case the 18 indicators, each correlated against the other 17: the oscillation indicates negative and positive associations respectively, while zero, or a very low value, signifies no correlation but no independence. The resulting values are given in Table 2, in which certain values are highlighted (Spearman's rank correlation coefficient or Spearman's rho, is a nonparametric measure of statistical dependence between two variables included in the ICS-ISF Flag State Performance); some of these show a strong interdependence between indicators but others have no direct association (negative values). Despite the deficiencies of certain indicators, the Cronbach's Alpha coefficient, which measures the internal consistency, presents a very high value ($\alpha = 0.833$) which indicates the degree to which a set of items

Table 1: ICS-ISF Flag State Performance variables (criteria): average and median values

	Average	Median
PSC1 - Paris MoU White List	-.24	-1.00
PSC2 - Not on Paris MoU Black List	.76	1.00
PSC3 - Tokyo MoU White List	-.44	-1.00
PSC4 - Not on Tokyo MoU Black List	.78	1.00
PSC5 - USCG <i>Qualship 21</i>	-.50	-1.00
PSC6 - Not on USCG Target List	.70	1.00
SOLAS including 88 Protocol	.52	1.00
MARPOL 1 and 2	.96	1.00
MARPOL 3 to 6	.17	1.00
LL including 88 Protocol	.43	1.00
STCW	.98	1.00
ILO 147 / MLC	.13	1.00
CLC + Fund 92	.48	1.00
A739 IMO Resolution about ROs	.65	1.00
AGE- Ship Numbers	.81	1.00
Report STCW- STCW White List	.83	1.00
Report ILO- Completed full ILO Reports	.96	1.00
IMO Attendance	.22	1.00

Source: Authors' own elaboration from ICS-ISF database

point in the same direction (Table 3). Therefore the methodology employed can be considered valid.

The next step was to analyze the dispersion of the performance variable by means of a scattergraph, utilising the Cartesian coordinates to show the values of the variable chosen against the size of the fleet, both in number of vessels and in the total tonnage (GT), for the complete set of data (flags). The data are shown in Figure 5 as a set of points, each with the value of the variable determined by the position on the vertical axis, and the value of the other two variables determined by the position on the horizontal axis. The points that correspond to the flags with most weight, both in the number of vessels and in the tonnage of the fleet, have been highlighted and the median lines have been indicated in order to situate these highlighted points. As can be seen, the performance of these countries with relation to the ICS-ISF indicators is very positive: there is only one point below the median in the first diagram, by number of vessels (Indonesia, the only red point). Indonesia is a country characterized by a numerically large fleet, but one not very representative in terms of total fleet tonnage in GT. What is significant is that practically all the countries representative of the bulk of the world fleet present a surprisingly high performance, given the level of criticism to which the open registries are customarily subjected.

On the point of Recognised Organisations, the dispersion is very much greater when all the flags are compared, as can be appreciated in the scattergraph of Figure 6, since the interests

Table 2: ICS-ISF Flag State Performance criteria analyzed by the Spearman's rank correlation (ρ) coefficient

ρ	PSC1	PSC2	PSC3	PSC4	PSC5	PSC6	SOLAS	MARPOL1and2	MARPOL3to6	LL	STCW	ILO	CLC	A739RO	AGE	ReportSTCW	ReportILO	IMOAttendance
PSC1		.289	.665	.277	.430	.004	.351	.107	.545	.454	.076	.494	.419	.311	.250	.236	.107	.428
PSC2	.289		.229	.231	.148	.246	-.009	-.051	.207	.080	-.036	.134	.171	.203	.373	.403	.160	.289
PSC3	.665	.229		.219	.454	-.032	.301	.085	.398	.348	.060	.378	.273	.232	.198	.187	.085	.495
PSC4	.277	.231	.219		.204	.018	.008	-.049	.120	.036	-.034	.343	.194	.146	-.011	.213	.170	.322
PSC5	.430	.148	.454	.204		.241	.225	.079	.271	.272	.056	.334	.195	.267	.184	.174	.079	.329
PSC6	.004	.246	-.032	.018	.241		-.113	-.057	.018	-.207	-.040	.002	-.128	.081	.047	.157	.136	.042
SOLAS	.351	-.009	.301	.008	.225	-.113		.083	.403	.792	-.054	.336	.161	.195	.343	.144	.083	.217
MARPOL1and2	.107	-.051	.085	-.049	.079	-.057	.083		.163	.216	.704	.018	.232	.117	.193	.456	-.019	.172
MARPOL3to6	.545	.207	.398	.120	.271	.018	.403	.163		.336	.114	.432	.314	.251	.313	.153	.023	.482
LL	.454	.080	.348	.036	.272	-.207	.792	.216	.336		.152	.310	.185	.191	.221	.179	.065	.250
STCW	.076	-.036	.060	-.034	.056	-.040	-.054	.704	.114	.152		-.085	.163	-.045	-.031	.321	-.013	.121
ILO	.494	.134	.378	.343	.334	.002	.336	.018	.432	.310	-.085		.333	.281	.171	.141	.156	.334
CLC	.419	.171	.273	.194	.195	-.128	.161	.232	.314	.185	.163	.333		.115	.321	.280	-.081	.265
A739RO	.311	.203	.232	.146	.267	.081	.195	.117	.251	.191	-.045	.281	.115		.524	.389	.117	.330
AGE	.250	.373	.198	-.011	.184	.047	.343	.193	.313	.221	-.031	.171	.321	.524		.482	-.044	.335
ReportSTCW	.236	.403	.187	.213	.174	.157	.144	.456	.153	.179	.321	.141	.280	.389	.482		.207	.378
ReportILO	.107	.160	.085	.170	.079	.136	.083	-.019	.023	.065	-.013	.156	-.081	.117	-.044	.207		.031
IMOAtt	.428	.289	.495	.322	.329	.042	.217	.172	.482	.250	.121	.334	.265	.330	.335	.378	.031	

Source: Authors' own elaboration from ICS-ISF database

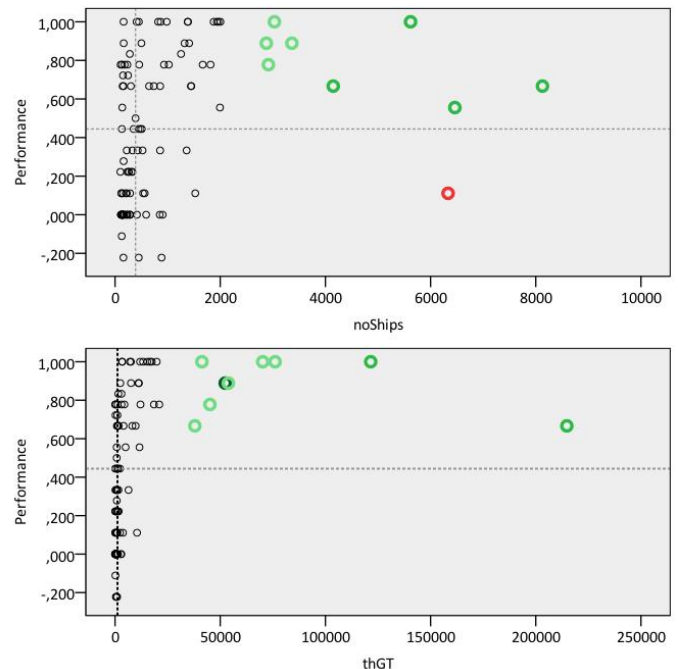
Table 3: Cronbach's alpha of the "ICS-ISF Flag State Performance" criteria

Reliability Analysis	
Cronbach's alpha	No. of items
α .833	18

Item-Total Statistics				
Criterion	Scale Mean if item deleted	Scale Variance if item deleted	Correlations item-total correlation	Cronbach's alpha if item deleted
PSC1	8.44	39.688	.708	.806
PSC2	7.44	45.782	.354	.828
PSC3	8.65	41.632	.594	.814
PSC4	7.43	46.359	.300	.830
PSC5	8.70	42.977	.492	.821
PSC6	7.50	48.533	.030	.843
SOLAS	7.69	43.451	.455	.823
MARPOL1and2	7.24	48.427	.223	.833
MARPOL3to6	8.04	41.008	.579	.815
LL	7.78	42.829	.478	.821
STCW	7.22	48.997	.114	.835
ILO	8.07	41.452	.538	.818
CLC	7.72	43.847	.405	.826
A739RO	7.56	44.324	.435	.824
AGE	7.39	45.343	.467	.823
ReportSTCW	7.37	45.619	.455	.824
ReportILO	7.24	48.727	.143	.834
IMOAttendance	7.98	41.009	.588	.814

Source: Authors' own elaboration from ICS-ISF database

Figure 5: Scatter plot of the variable Performance versus no. of Ships and the volume of the Fleet in thousands of GT



Lines: medians

Source: Authors' own elaboration from ICS-ISF database

of the various flags depend to some extent on whether the flag corresponds to a traditional registry, an international (second) registry, or to an open registry. In this last case practically all the flags are situated in the upper part of the diagram, close to 1, as can be seen in the cases of Panama, Liberia, the Marshall Islands and Hong-Kong, marked in red, or those in orange - the Bahamas, Malta and Cyprus. The only important national fleets, of States that cede the issue of very few of their statutory certificates to the ROs, are China, Italy and Germany, which are marked in green.

The world fleet is concentrated in a limited number of Flag States; therefore its analysis must start from a general picture where the overall performance can be evaluated but, for purposes of a more realistic and rigorous analysis, study must be focused on the performance of a limited number of registries. For this a progressive stratification has been made, in three levels: (A) the total fleet; (B) the fleet comprised of Flags that each, have at least 1 million tons (GT) of ships registered; and (C) the five most important Flags. Then the two basic criteria analyzed in this study have been applied to these three stratifications. The first criterion is the index calculated from the ICS-ISF data, considering the performance of the vessels (PSC) and the role of the Flag State in complying with the corresponding international standards and regulations (IMO Agreements). The second criterion is the degree to which the Flag State cedes or delegates to Recognised Organisations the issue of the various statutory certificates required for the operation of the vessel. The results of this are illustrated in Figures 7 and 8, where it can be seen that, as the filter becomes finer, there is a concentration to more optimum values with respect to performance, and to higher values with respect to the ceding of State authority to the ROs. In other words, the largest and most successful Open Registries, the top five, actually perform better than the mean of all the flags of the total world fleet, and so do not really deserve all the criticism of their performance and their resulting “demonization”. Applying this analysis to the two largest registries, Panama and Liberia, it can be confirmed that both are included in the white lists of the Paris and Tokyo MoUs, and both have ratified all of the important Agreements of the IMO.

Similar arguments can be made regarding the ROs, on the basis of that majority concentration of countries. Analysing the list of ROs to which the ten principal Open Registries delegate their authority for the issue of necessary documents, it can be seen that most of these ROs are Classification Societies belonging to the IACS. But a serious negative point is reflected here: the world’s largest and most successful Flag State/Open Registry, Panama, uses a large, perhaps excessive, number of ROs, many of whom are not IACS members. Even worse, three of those ROs have been evaluated as having low or very low performance by the MoUs of Paris and/or Tokyo.

The last question that needs to be examined is whether this situation that is so favourable in terms of the results obtained corresponds with the objective data of the maritime accidents. For this, as shown in Figure 9, a comparison is made, over the last fifteen years, between the total foreign-flagged fleet, as a proportion of the total global fleet, and the data of the International Union of Marine Insurance (IUMI) on total losses of

vessels, and with the data of the International Tanker Owners Pollution Federation (ITOPF) on average spills and those larger than 700 Tonnes. On this last analysis, the discussion is not controversial. The general performance of the fleet has been getting better in both aspects. However, to be a little more accurate in this conclusion, the Pearson product moment correlation coefficient and p-value have been calculated, and found to be very significant ($p < 0.005$).

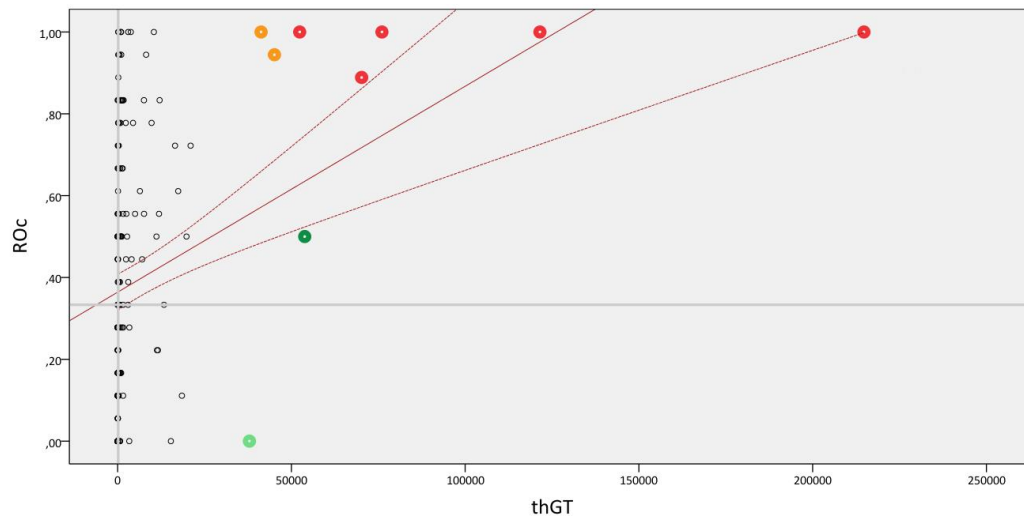
5. Concluding Discussion

As noted at the beginning of this article, the process of globalization (or “mondialisation”, as the French say) in the maritime transport industry, can be considered now to be practically completed. Consequently, accepting that the present time is the new era of post-globalization, an adjustment of the initial analysis is required. Therefore the world fleet is concentrated in a limited number of Flag States. We have tried to show with the above statistical analysis, that these main Flag States comply with the corresponding international standards and regulations accordance with the ratio of ICS-ISF data; that the largest Open Registries perform better than the mean of all the flags of the total world fleet; and delegate their authority for the issue of necessary documents in ROs, which are Classification Societies belonging to the IACS.

Now that the world economy has survived into the second decade of the 21st century, the maritime transport industry is facing the big political and economic realities created by Globalization: the irresistible shift of global power to the East; conduct of the huge and growing international trade in goods through a network of large and sophisticated ports around the world; a substantial world fleet of ships constituting the essential element for the movement of merchandise, for which the open or international registries are the norm, with the only exception being the particular types of traffic controlled or captured by particular States; and the existence of a few small countries where the tax regime is especially favourable to non-resident citizens and companies that are domiciled in those countries for legal purposes (eligible for total exemption or a very significant reduction in respect liability to the principal taxes).

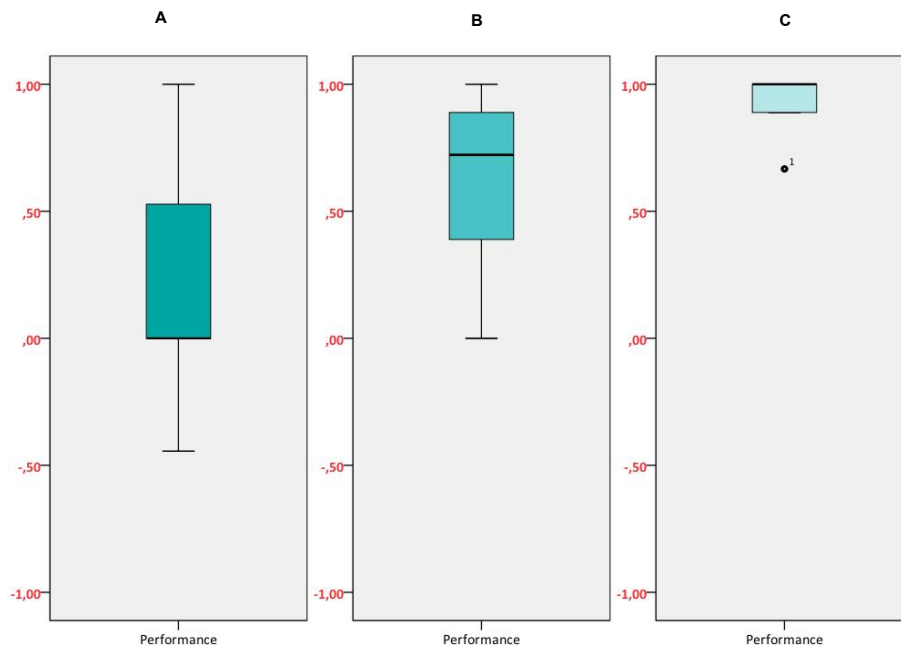
Perhaps, for these reasons, it is necessary now to think of the so-called Post-Globalization era, and to analyze how it has come about that key fundamentals such as the regulation of safety in the transport chain have been progressively privatized. From the data presented earlier, and from the subsequent analysis and discussion, it is evident that this industry is presenting a scenario of concentration in the number of important registries. Those registries that have not adapted to the standards established internationally by the IMO are not competitive. For ship-owners this would be reflected in the increased financial risks resulting from the detention of a vessel by a Port State, based on the mechanisms put into practice in most ports of the world, principally through the MoUs of Paris, Tokyo and the USA. Shipowners using these less rigorous Open Registries would also be at risk, given the increasing value attached to the concept of corporate social responsibility in respect of maritime transport companies, as already stated by Goss in 2008.

Figure 6: Scatter plot of the variable Countries Delegating Statutory Authority to ROs and the size of the Fleet in thousands of GT

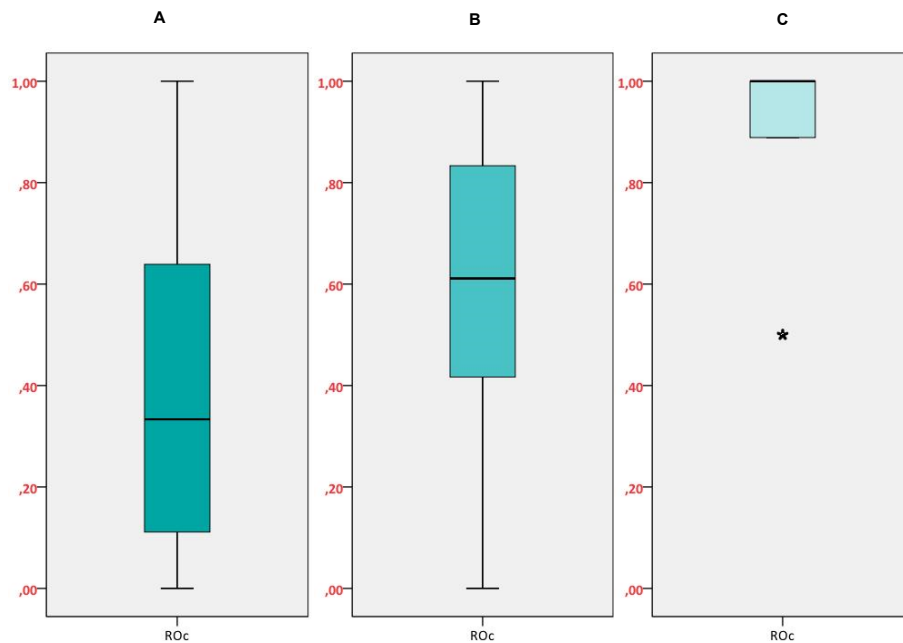


Lines: Least squares, Confidence interval, and medians
 Source: Authors' own elaboration from ICS-ISF database

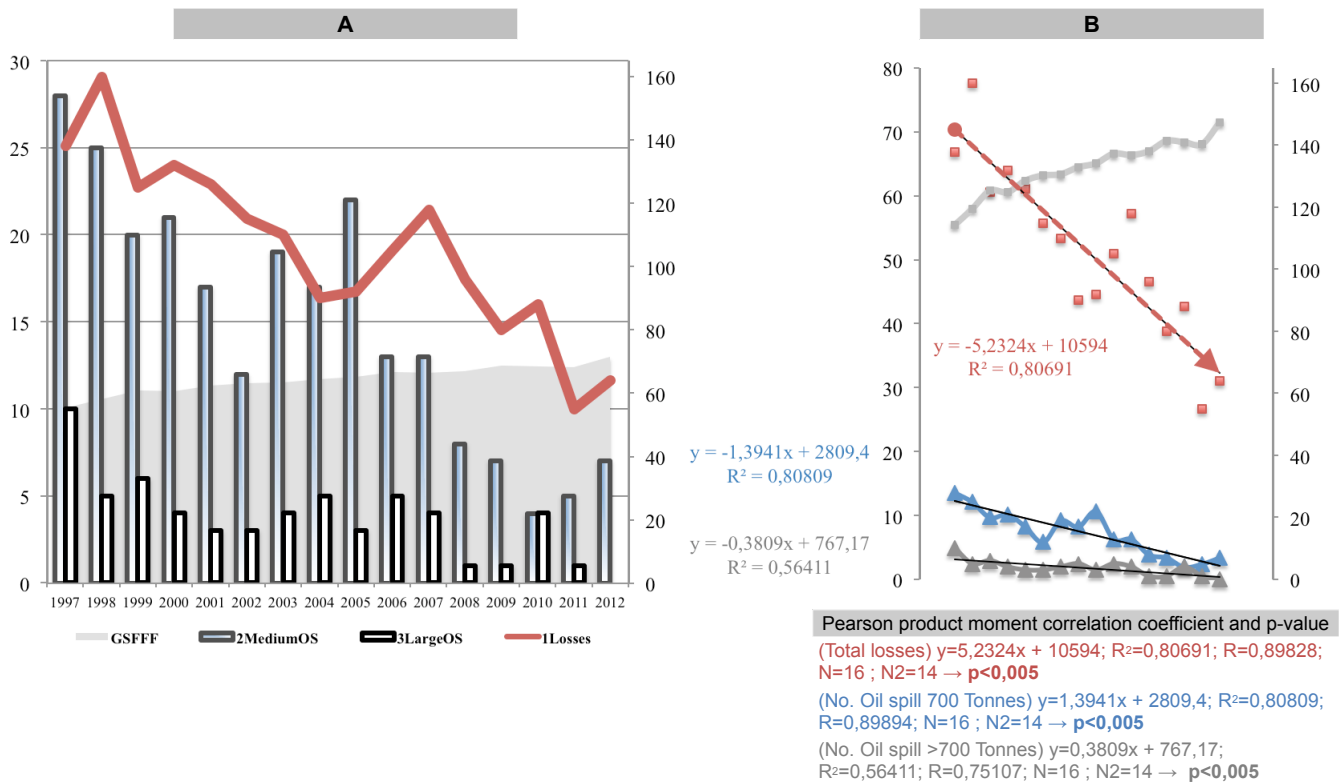
Figure 7: Box-Plot of the ICS-ISF Flag State Performance index and the size of the Fleet in tonnage (thousands of GT)



a) All the flags
 b) Flags above 1 million GT
 c) Top Five flags: Panama, Liberia, Marshall Islands, Hong-Kong and Singapore
 Source: Authors

Figure 8: Box-Plot of the variable *Countries Delegating Statutory Authority to ROs* and the size of the Fleet in thousands of GT

- a) All the flags
 b) Flags above 1 million GT
 c) Top Five flags: Panama, Liberia, Marshall Islands, Hong-Kong and Singapore
 Source: Authors

Figure 9: Total losses and no. of Oil Spill versus Global share of foreign-flagged fleet (GSFFF%)
 Statistics (A) and lineal regression analysis with R^2 Coefficients of determination (B)

Source: Authors

The Classification Societies have played a decisive role in this process. They have a vital interest in ensuring that their inspection and monitoring of ships is up-to-standard, and that their name is not associated negatively with deficient vessels listed in the rankings of Port State detentions, not only for criteria of efficiency but also for the social responsibility that they themselves should assume, given their important role in the maritime transport industry. States and Governments will have the public mission of “controlling the private controllers”, supervising the compliance of those Recognised Organisations with ethical standards, so that the new IMO Code will be the final element that definitively blocks the way to those ship-owners and operators that are not sufficiently rigorous in the maintenance of agreed standards in respect of safety at sea. We do not finish without indicating that improvement of maritime safety conditions is more likely to come from effective on board inspection than from any new regulation imposed by flag States on their shipowners and operators. This will become clear in the coming years: Who is going to exert the IMO Code control on the RO?

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