

<https://doi.org/10.31217/p.38.1.1>

Port State Control of Offshore Supply Ships, MODU and FPSO Units – A Case Study

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ARTICLE INFO

Review article

Received 8 December 2023

Accepted 2 May 2024

Key words:

Paris MoU

Port State Control

Inspection

Offshore

The Adriatic sea

ABSTRACT

The Port State Control system aims to ensure that all ships are subject to regular inspections, with particular attention to the ships of insufficient quality. To this end, during the inspection, priority is given to ships that are considered risky. Thetis database is an information system that contributes to the implementation of the Port State Control within the EU (European Unit). It contains data on inspections performed in the EU ports and the Paris Memorandum area. The Paris Memorandum has 27 member states and covers the waters of European coastal states and the North Atlantic basin from North America to Europe. The main goal of the Paris MoU (Memorandum of Understanding) is to eliminate substandard ships through a harmonized Port State Control system. Namely, inspections should ensure that ships meet international safety standards, are safe for the environment, and provide adequate living and working conditions for workers. The primary responsibility for ensuring these standards rests with the ship owner/shipper while the responsibility for ensuring such compliance rests with the flag state. The aim of this analysis is to determine the number of inspections performed in the ports of the Republic of Croatia and the Republic of Italy, to identify the cause of ship detentions and the most common deficiencies of offshore supply vessels, MODU (Mobile Offshore Drilling Units) and FPSO (Floating Production Storage and Offloading) Units. In the observed period, the impact of the crisis caused by the COVID-19 pandemic was significant, resulting in the decline in the numbers of inspections performed in 2020 and 2021. In 2022, the number of inspections increased, but it still has not reached its pre-pandemic level. During the period that was the subject of research, port state inspections in the Republic of Croatia and the Republic of Italy revealed 241 deficiencies. Five areas with the largest number of deficiencies are: Certificate & Documentation, Safety of Navigation, Fire Safety, ISM, and Life-saving appliances, which follow the trend of the lack in the areas of the Paris Memorandum. The greatest increase in deficiencies was recorded in the areas of Labor Conditions-Health protection, Certificate & Documents (Crew Certificate, Documents), Emergency System and Fire safety area, which led to an increase in the number of offshore supply ships retention during the first half of 2022.

1 Introduction

The Adriatic Sea is part of the Mediterranean Sea, and is located between the Eastern Europe continent and the Apennine peninsula extending to the Otranto Gate. In relation to the Mediterranean Sea, the Adriatic Sea is a relatively small ecosystem, but it is also a system of great biodiversity which has been exposed to negative influences in recent decades. Namely, the exploitation of hydrocarbons may lead to great danger and have negative consequences resulting in the death

of workers, damage to the marine environment and great economic loss. "The majority of oil and gas production in Europe takes place offshore. In 2021, the EU countries reported 347 installations in European waters." [1] The production of natural gas from the Adriatic Sea in the continental shelf of the Republic of Croatia has been taking place for more than 20 years through a system of 52 wells and 18 production platforms, two of which are permanently manned and from which the other so-called satellite offshore facilities/platforms have been managed [2].

According to Ribotti and colleagues “The seas that surround Italy are subject to oil spill emergencies due to their hydrocarbon exploration, extraction, as well as the transport within them. In particular, in the Sicily Channel and the low/middle Adriatic Sea there are seven operating oil extraction sites which might be potential sources of pollution through accidental oil spills [3] (p. 2).”

By analyzing the data from DNV'S WOAD database (Det Norske Veritas Word Offshore Accident Database), Christou et al. [4] (p. 8) state that “main hazards in offshore incidents include:

- Fire, after ignition or released hydrocarbons
- Explosion, after gas release, formation and ignition of fan explosive cloud
- Oil spill on sea surface or subsea.”

Past incidents show that, among others, accidents are caused by failures in risk identification and risk assessment, failures in incident response, and those related to safety management.

As there is an ongoing requirement for the port states to take effective measures in preventing substandard ship operations, the Maritime Authority of a European coastal state and a North Atlantic basin coastal state spanning from North America to Europe have entered into an agreement known as the Paris MoU. “Thetis inspections database is an information system that contributes to the implementation of the Port State Control system within the European Community, and contains data on inspections performed in the Community and in the area of the Paris Memorandum.[5]”

The Port State Control system aims to ensure that all ships are subject to regular inspections, paying special attention to ships of insufficient quality. To this end, during the inspection, priority is given to risky ships. “The Paris Memorandum has 28 member states and covers the waters of European coastal states and the North Atlantic basin from North America to Europe. [6]” The main goal of the Paris MoU is to eliminate substandard ships through a harmonized Port State Control system. Inspections ensure that ships meet international safety standards, are safety for the environment, and provide adequate living and working conditions for workers. The primary responsibility for ensuring these standards rests with the ship owner/shipper, while the responsibility for ensuring such compliance rests with the flag state.

2 The role and importance of Paris Memorandum inspections

By analysing The New Inspection Regime of the Paris MoU on Port State Control, Rodríguez et al. [7] (p. 13) conclude “that the PMoU would have rated 90% of all ships involved in the most serious accidents in recent

history as Standard Risk Ships. Therefore, it can be concluded that the category of flag state should be considered an important indicator for potential safety of risk, in the NIR (New Inspection Regime).”

According to the “Paris MoU”, types of inspections to which ships are subjected are: initial, detailed and extended. The initial examination involves boarding a ship to verify certificates and documents, assess the general state and cleanliness of the vessel Further inspection checks if the aforementioned comply with generally accepted international rules and standards. Furthermore, the examination ensures that any shortcomings identified by an Authority during a prior inspection have been addressed within the specified timeframe outlined in the inspection report.

“A more detailed inspection includes an in-depth examination in areas where clear grounds are established, areas relevant to any overriding or unexpected factors, and other areas at random from the following risk areas: Documentation, Structural condition, Water/Weather-tight condition, Emergency systems Annexes to Memorandum Paris MoU, Radio communication, Cargo operations, Fire safety, Alarms, Living and working condition, Navigation equipment, Life-saving appliances, Dangerous Goods, Propulsion and auxiliary machinery, Pollution prevention. The more detailed inspection takes into account human elements covered by ILO (international Labour Organization), ISM (International Safety Management Code) and STCW (International Convention on Standards Training, Certification and Watchkeeping for Seafarers). Also, it includes operational controls. [8]”

The objective of the Port State Control is to reduce the number of ships of insufficient quality in order to effectively improve safety, living and working conditions on board, and to increase protection against pollution. The obligation was mandated by the United Nations Convention on the Law of the Sea (1982). Following this mandate, if a state determines, either upon request or independently, that a vessel in one of its ports or at an off-shore terminal is breaching international regulations and standards concerning the seaworthiness of vessels (posing a threat to the marine environment), the state is required, to the extent feasible, to implement administrative measures preventing the vessel from departing.[9]” Effective application of the conventional rules imposed by SOLAS (International Convention for Safety of Life at Sea), MARPOL (International Convention for Prevention of Pollution from Ships), TONNAGE (International Convention on Tonnage Measurement of Sips), MLC (maritime Labour Convention), STCW and of the international codes/standards by port state authorities help to identify any deficiencies on foreign ships classifying them as substandard.

According to data of the European Maritime Safety Agency in the Annual Overview of Marine Casualties

and Incidents 2021. [10] (p. 108) navigational issues related to collision, contact, grounding/stranding comprise 53.64% while fire or explosion comprise 6.6% of the casualty events in which offshore supply ships were involved.

Any basis for ship detention is a serious deficiency that has to be removed and inspected by the port state officer before the ship is given permission to depart. Such deficiencies are considered a major threat to safety, health and environment. As a result, the ship has to be detained until the deficiencies are rectified.

Recognized organizations play a key role in the safety of the ships they inspect and issue certificates to. Also, following their rules certainly leads to higher maritime safety and can prevent pollution and accidents at sea. To this end, these organizations are an important element of ship classification and their general parameters are used to determine the ship risk profile. "Classification societies recognized by the European Union are: American Bureau of Shipping (ABS), Bureau Veritas SA (BV), China Classification Society (CCS), Croatian Register of Shipping (CRS), DNV GL AS, KR (Korean Register), Indian Register of Shipping (IR-CLASS), Lloyd's Register Group LTD (LR), Nippon Kaiji Kyokai General Incorporated Foundation (ClassNK), Polish Register of Shipping (PRS), RINA Services S.p.A. [11]"

3 Materials and Methods

The method used in this paper is descriptive statistical method; the Thetis database (EMSA THETIS – The Hybrid European Targeting and Inspection System) was used for the analysis. The data refer to the inspections performed in the ports of the Republic of Croatia and the Republic of Italy in the period from 01-01-2017 to 30-06-2022 in relation to offshore supply vessels, MODU and FPSO units.

In total, 62 inspections were analyzed and 240 deficiencies were identified during these inspections. Consequently, 6 ships were detained, and none was banned. Out of a total of 20 flag states, 16 were 'White-listed', and 4 were on the 'Grey List' of the Paris MoU. The obtained data have been summarized and classified regarding the ports that conducted the inspection, the number and type of performed inspections, the age of a ship, the inspection area, the cause of detention, flag state status, and classification society on the valid list of the Paris MoU. The aim of this analysis is to determine the number of inspections performed in the ports of the Republic of Croatia and the Republic of Italy, to identify causes of ship detentions and the most common deficiencies of offshore supply vessels, MODU and FPSO units.

The age of a ship is one of the elements of the Port State Control system. Other criteria used to determine the ship risk profile are: the type of a ship, the result of

the flag state, the result of the recognized organization, and the result of the company. Pursuant to Directive 2009/16/EC of the European Parliament and Council on Port State Control [O] L 131/57 from 28/5/2009], ships older than 12 years are considered risky. The age of a ship can be an indicator of its possible impact on the marine environment, pollution and on the safety of navigation since newly built ships are technologically more advanced. "According to the data from the United Nation Conference on Trade and Development, presented in the Review of Maritime Transport 2021, 10% of ships of the world merchant fleet that belong to the "other types of ships" group, including offshore vessels, are ships aged 0-4, 17% are 5-9, 17% of them are 10-14, 9% are 15-19, and 47% ships are older 20. The average age was 23.6 [12] (p. 32)."

The ship's flag state is one of the criteria for ship's individualization and represents the jurisdiction with laws to be followed for ship registrations. The duty of a flag state is to ensure compliance with relevant international rules and standards, as well as compliance with

Table 1 Paris MoU 2021 flag ranking

Flag	Flag performance List in Paris MoU (valid 01-07-2022 to 30-06-2023)
Netherlands	White list – rank 2
Norway	White list – rank 3
Bahamas	White list – rank 4
Greece	White list – rank 6
Singapore	White list – rank 9
Italy	White list – rank 10
Cyprus	White list – rank 13
Marshall Islands	White list – rank 15
Liberia	White list – rank 16
Malta	White list – rank 17
United Kingdom	White list – rank 19
Russian Federation	White list – rank 23
Gibraltar, UK	White list – rank 29
Luxemburg	White list – rank 31
Germany	White list – rank 32
Panama	White list – rank 36
Palau	Grey list – rank 48
St. Vincent and the Grenadines	Grey list – rank 49
Mongolia	Grey list – rank 54
Vanuatu	Grey list – rank 56

Source: Processed by Authors according to "Paris MoU"

White-listed flags comprise 90% and Grey-Listed flags 10% of the Flag performance list; Black-Listed ships did not occur on the list.



Figure 1 Presentation of exploitation fields and mining facilities in the continental shelf of the Republic of Croatia

Source: https://mingor.gov.hr/UserDocImages//UPRAVA-ZA-PROCJENU-UTJECAJA-NA-OKOLIS-ODRZIVO-GOSPODARENJE-OTPADOM/Opuo/OPUO_2022//14_09_2022_Elaborat_Sanacija_eksploatacijske_platfome_lvana_D.pdf



Figure 2 Map of offshore platforms in the territory of the Republic of Italy

Source: <https://oilgasnews.it/assomineraria-pubblica-la-mappa-delle-118-piattaforme-offshore-italiane/>

laws and regulations in order to prevent, reduce and monitor the pollution of the marine environment by ships. The flag state is also required to enact laws and regulations and take necessary measures for their implementation. In their Annual Report, The Paris MoU publishes a “White-listed”, “Grey-listed” and “Black-listed” flags based on the total number of inspections and detentions over a 3-year period for flags with at least 30 inspections during that period. “According to UNCTAD (United Nations Conference and Development) data presented in the Review of Maritime transport 2021 [13] (p. 39), leading flags of registration ranked by value of total tonnage in 2021 (a million US dollars) for offshore supply ships are: Bahamas (22.781), Panama (14.056), Marshall Islands (12.787), and Liberia (10.520).”

According to the Paris MoU Annual Report 2021, flags entering the ports of the Republic of Croatia and the Republic of Italy are on the White list and the Grey list [14] (p. 29, 30).

4 Research Results

Number of ships and performed inspections

In the Paris MoU area, 2,032 offshore supply vessels were inspected in the period from 01-01-2017 to 30-06-2022. In total 2,104 inspections were performed (142 on MODU and FPSO units). For the purpose of this article, 62 port state inspections of offshore supply vessels, MODU and FPSO units, which were carried out in the port authorities of the Republic of Croatia and the Republic of Italy in the period from 01-01-2017 to 30-06-2022, were analyzed. Figures 1 and 2 present the map of exploitation fields and mining facilities in the continental shelf of the Republic of Croatia and the map of offshore platforms in the territory of the Republic of Italy, showing that most of them are located in the area of the northern part of the Adriatic Sea.

The data in Figure 3 show that the number of inspected offshore supply ships, MODU and FPSO units in the Republic of Croatia decreased after the start of the COVID-19 pandemic, and that it reached pre-pandemic values in the first half of 2022, while in the Republic of Italy the number of inspected ships and performed inspections still has not reached its pre-pandemic values.

The results of this research show that out of the total number of inspected offshore vessels in the area of the Paris MoU, those inspected in the territory of the Republic of Croatia and the Republic of Italy, MODU and FPSO, make 2.83%.

The impact of COVID-19 pandemic is still visible in the Paris MoU area showing a slightly increasing trend, but it is still not at the pre-pandemic level. According to the Paris MoU Annual report from 2021, the number of inspected ships in 2019 was 15,447; in 2020 it decreased to 12,092 ships, while in 2021 a slight increase

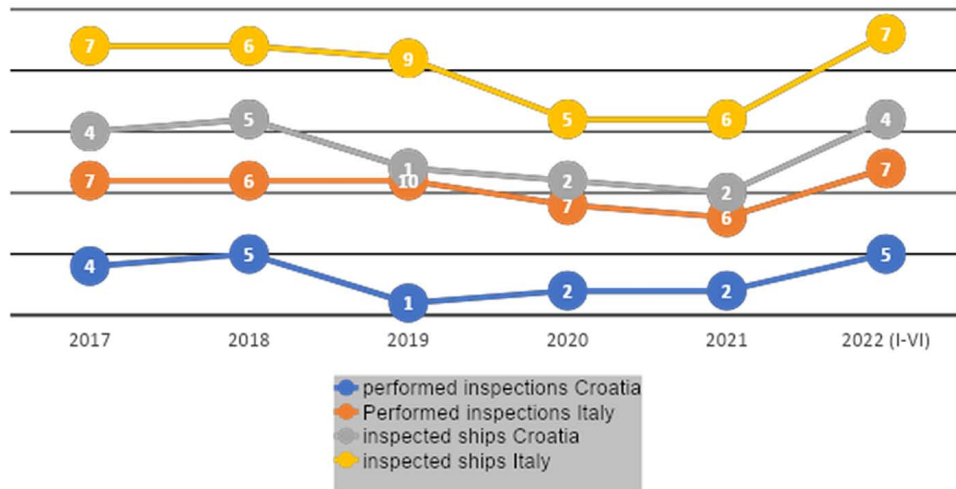


Figure 3 Number of inspected ships and number of performed inspections in the ports of the Republic of Croatia and the Republic of Italy in the period 2017-2022 (I-VI)

Source: Processed by Authors according to Thetis database

to 13,797 inspected ships was recorded. An even greater decrease can be seen in the number of performed inspections, falling from 17,916 in 2019 to 13,168 in 2020, whereas the number of inspections which were conducted in 2021 is 15,387.

In the Paris MoU area, since the onset of the COVID-19 pandemic, the number of inspected ships has decreased by 10.68%, while the number of inspections has decreased by 14.11%. This downward trend is the result of the impact of the pandemic on the entire shipping industry and on the safe organization of port State inspections on board. Nevertheless, despite the impact of the COVID-19 pandemic, by analyzing Port State Con-

trol at European Union under pandemic outbreak, Akyurek & Bolat [15] (p. 11) “state that further analysis with Entropy-based Grey Relational Analysis, Port State Control detention remarks indicate that even if the pandemic outbreak affects the number of ships inspected, the inspection quality remains the same.”

Age of inspected ships

The average age of inspected offshore supply ships in the period from 01-01-2017 to 30-06-2022 in the Republic of Italy range from 21.2 to 29.14 years, while in the same period the average age of offshore supply

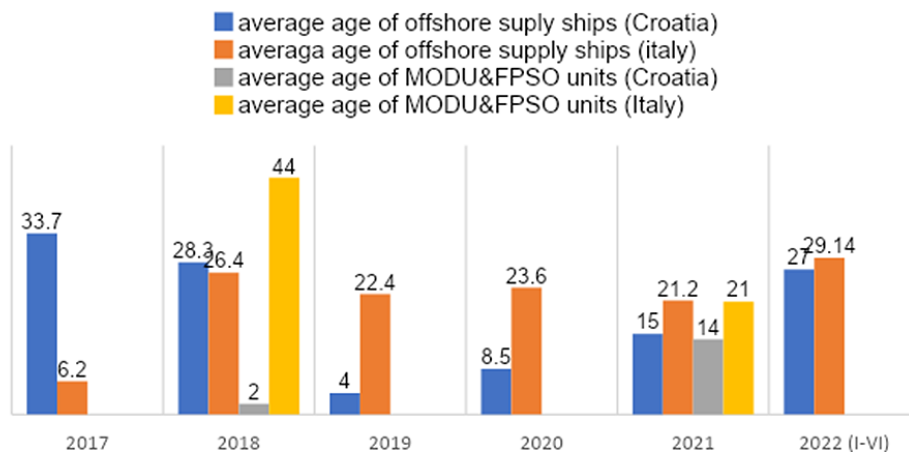
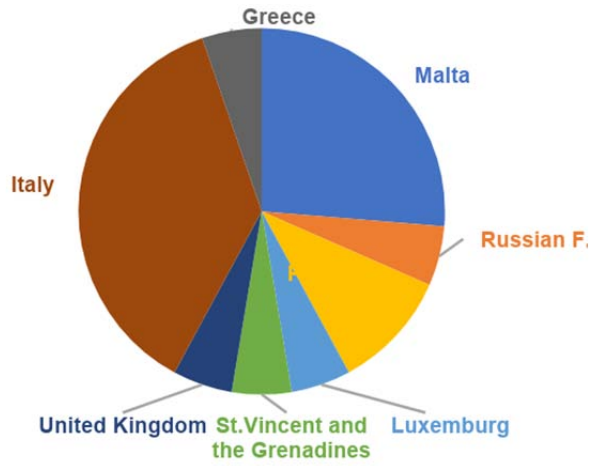
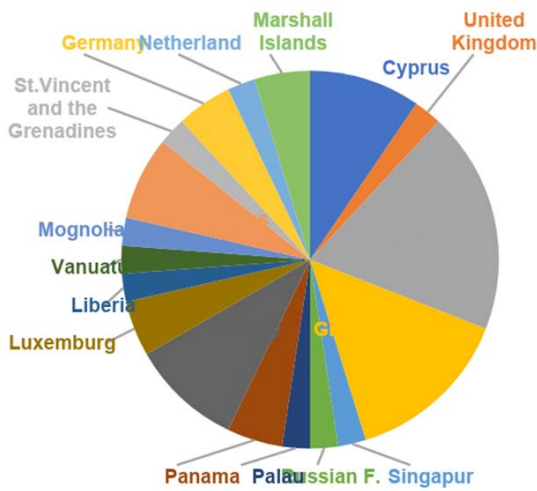


Figure 4 Average age of offshore supply ships, MODU&FPSO units that have undergone inspections in the Republic of Croatia and the Republic of Italy

Source: Processed by Author according to Thetis Database



(a) Flag state of ships in Croatian Ports



(b) Flag state of ships in Italian Ports

Figure 5 Flag state of ships in Croatian and Italian ports

Source: Processed by Author according to Thetis Database

ships inspected in the Republic of Croatia range from 4 to 33.7 years. By analyzing the data, we can conclude that the majority of ships inspected in these countries are over 20 years old; in general they belong to this category. The MODU and FPSO units in the Republic of Croatia were built more recently (4 and 14 years), while the MODU and FPSO units in the Republic of Italy are significantly older (21 and 44 years).

Flag States

In the Republic of Croatia, the largest portion of the flags of inspected ships are those of Italy (7), Panama (2) and Malta (5), while in the Republic of Italy the largest portion of them are Malta (8), Gibraltar, UK (6) Cyprus (4), and Norway (4). Apart from the aforementioned, inspected ships carried the flags of the Netherlands (1), the Bahamas (3), Greece (1), Singapore (1), the Marshall Islands (2), Liberia (1), United Kingdom (2), Russian Federation (2), Luxembourg (3), Germany (2), Palau (1), St. Vincent and the Grenadines (2), Mongolia (1), and Vanuatu (1).

Types of performed inspections

In the observed period, a total of 27 initial inspections and 35 extended inspections were performed on offshore supply ships, MODU and FPSO units in the ports of the Republic of Croatia and the Republic of Italy. Figure 5 shows the type and number of inspections performed in Croatia and Italy.

Figure 6 shows that in the Republic of Croatia there is a larger number of initial inspections, while in the Republic of Italy there is a larger number of detailed inspections. A possible reason for this might be the average age of the inspected ships, since the inspected ships in the Republic of Croatia belong to a lower-aged group.

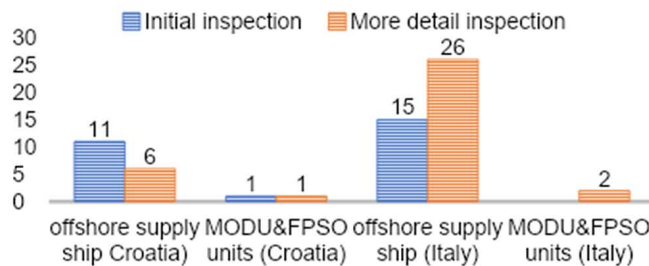


Figure 6 Number of performed inspections according to the type in the period from 01-01-2017 to 30-06-2022

Source: Processed by Author according to Thetis Database

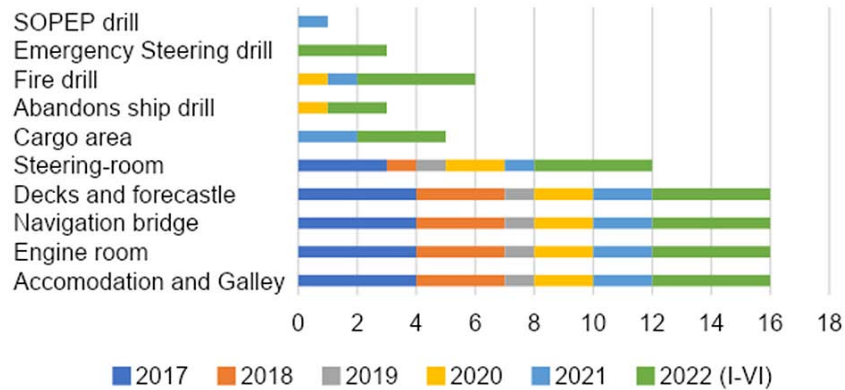


Figure 7 Inspections according to the area and operational control of offshore supply ships and MODU&FPSO units in the Republic of Croatia

Source: Processed by Author according to Thetis Database

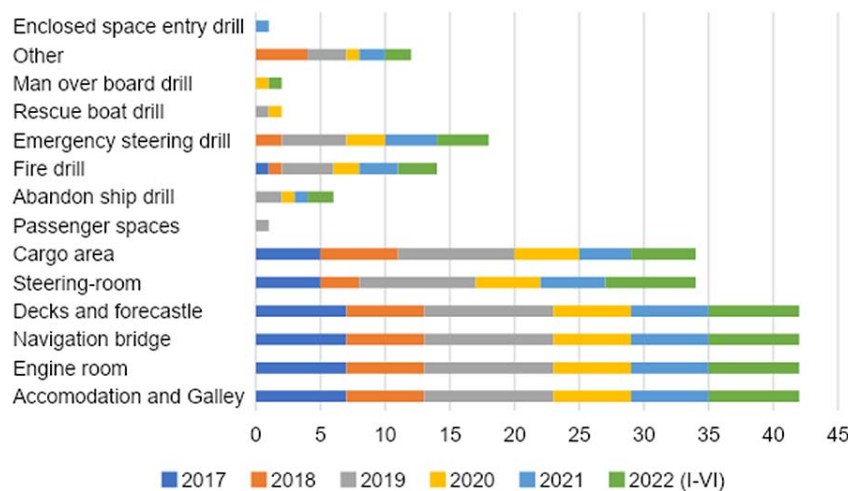


Figure 8 Inspections according to the area and operational control of offshore supply ships and MODU&FPSO units in the Republic of Italy

Source: Processed by Author according to Thetis Database

Areas of inspection

In the observed period, the most frequently inspected areas in the Republic of Croatia and Italy are: accomodation and galley, engine room, navigation bridge and deck and forecastle, which were included in all inspections. Fewer inspections were conducted in the steering-room and the cargo area. In the Republic of Italy, these areas were inspected 16.05% less compared to the most frequently inspected ones; in the Republic of Croatia this percentage was 25% compared to the steering room, and 68.75% compared to the cargo area.

When it comes to the operational control, the figures are approximately equal: 18.18% in Croatia and 18.55% in Italy. Fire drill and Emergency Steering drill are the most frequent operational controls in both port states.

Deficiencies in inspection controls

In the observed period in the Republic of Croatia, inspections of offshore supply ships detected a total of 19 deficiencies, while there were no deficiencies on MODU and FPSO units. In the Republic of Italy, a total of 215 deficiencies were found on offshore supply ships and 7 deficiencies (including accidental damage) on MODU and FPSO units.

By analyzing the data from Figures 9 and 10, we can conclude that in the first half of 2022, there was an increase in detected deficiencies in the supervision of offshore supply ships in both Croatia and Italy. The average number of detected deficiencies per inspection was steadily increasing since 2018. The average number of deficiencies per inspection has also increased compared

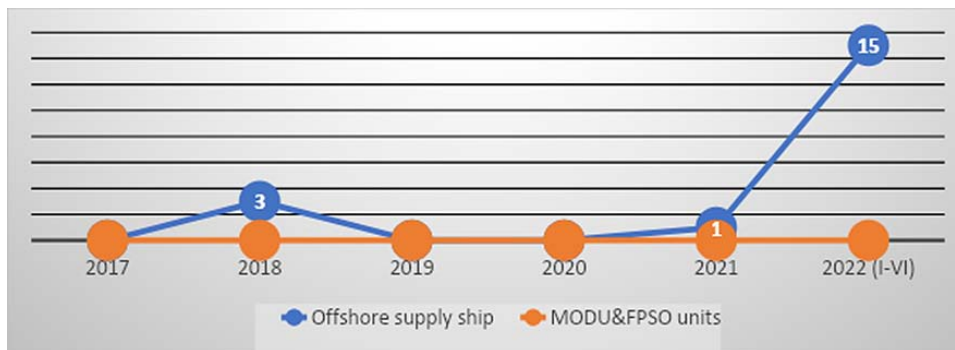


Figure 9 Number of deficiencies on inspected ships in the Republic of Croatia from 01-01-2017 to 30-06-2022

Source: Processed by Author according to Thetis Database

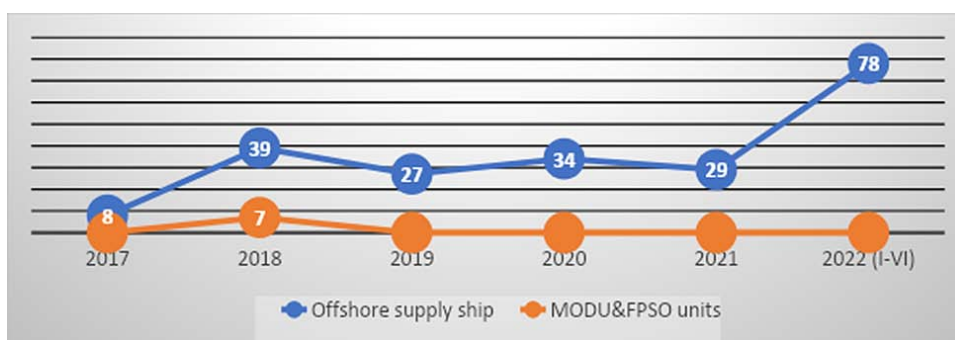


Figure 10 Number of deficiencies on inspected ships in the Republic of Italy from 01-01-2017 to 30-06-2022

Source: Processed by Author according to Thetis Database

to previous years. In the Republic of Croatia, the average number of detected deficiencies per inspection was 0.5, while in the first half of 2022, that number increased to 2.14. In the same period, the number of detected deficiencies per inspection in the Republic of Italy was 5.8 in 2021, and 11.14 in the first half of 2022.

Stated results coincide with the results of the European Maritime Safety Agency in the Annual Overview of Marine Casualties and Incidents from 2021 indicating that the causes of accidents most frequently occur within the areas with highest numbers of recorded deficiencies.

The largest number of deficiencies in the observed period was found in the area of Certificate & Documentation (64), Life-saving appliances (20), Safety of Navigation (18), Emergency system (18), Fire safety (18) and Labour conditions – Health protection, medical care, social security (14). Deficiencies in these areas make 71% of all deficiencies detected during inspections in the Republic of Italy. In the Republic of Croatia, the majority of deficiencies were detected in the area of Certificate & Documentation (4), Safety of Navigation (4), Emergency Systems (3), ISM (3) and Fire safety (2). Deficiencies in these areas make 84% of all deficiencies

in the observed period. In the area of the Paris MoU in 2021, the largest number of deficiencies were also recorded in these areas (Fire safety 13%, Safety of Navigation 10%, Labour conditions – Health protection 10% and Certificate & Documentation 6%, according to the data presented in the Paris MoU Annual Report in 2021.

In the areas with the largest number of deficiencies ISM makes 15.2%, Emergency, lighting, batteries and switches 8.2%, Seafarer's employment agreement (SEA) and Continuous synopsis record makes 5.8% of them. Charts, Cargo Ship Safety Equipment (including exemption), Records of seafarers' daily hours of work or rest, On board training and instructions, Muster list, Fire-fighting equipment and appliances, Fire doors/openings in fire-resisting divisions comprise 4.7%, and SOPEP, Ship specific plans for the recovery of persons from the water, Fire safety operational booklet, Electrical, Cleanliness of engine room, Food segregation, Rescue boats, Maintenance of Life Saving Appliances, Operational readiness of lifesaving appliances 3.5% of the number of deficiencies.

In other inspected areas, deficiencies in the observed period do not show major deviations in either countries. In the Area of Pollution Prevention – Marpol

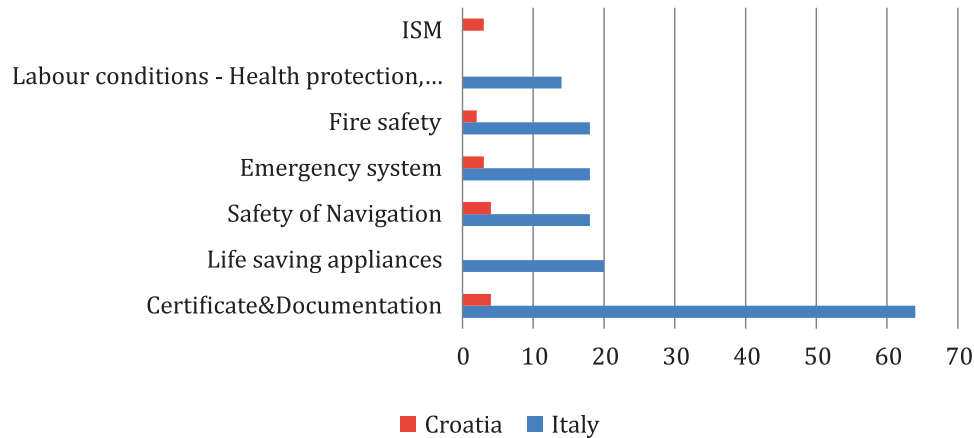


Figure 11 Areas with the largest numbers of deficiencies

Source: Processed by Author according to Thetis Database

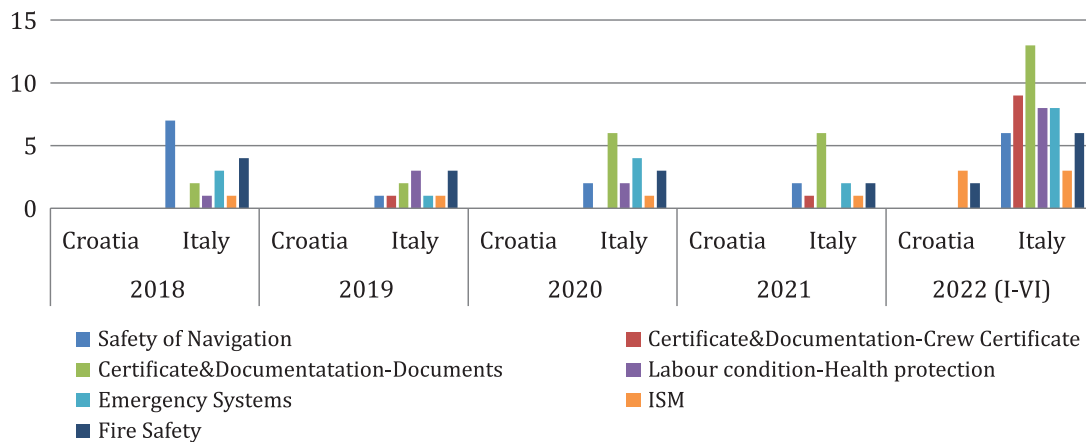


Figure 12 Areas with the largest deficiencies in the Republic of Croatia and the Republic of Italy

Source: Processed by Author according to Thetis Database

Annex VI and Propulsion and auxiliary machinery, in the territory of the Republic of Italy, no deficiencies were found since 2018, and in the area of Water/Weather-tight, no deficiencies were found since 2019. Comparing these results with the results of the Port State Control Paris MoU for 2021, we can see that the trends in the most common deficiencies are similar. According to data from the Paris MoU Annual Report 2021, the five most common deficiencies in the area of the Paris MoU for 2021 are: ISM, fire doors/openings in fire-resisting divisions, Seafarers' Employment Agreement, auxiliary engine, and cleanliness of engine room.

In the first half of 2022 an increase in the number of deficiencies was detected in comparison with previous years in the areas of: Safety of Navigation, Certificate & Documentation (Documents & Crew Certificate), Labour

condition, Health protection, Emergency Systems, ISM and Fire Safety. In comparison with 2021, the most significant deviations in 2022 are present in the following areas: Certificate & Documentation – Documentation (increase of deficiencies from 1 to 9), and Certificate & Documentation – Crew Certificate (increase from 6 to 13). In the area of Labour condition-Health condition, which had no deficiencies in 2021, an increase to 8 deficiencies was recorded.

Measures and the basis for ship detention

There were zero ship detentions in the Republic of Croatia during the observed period; in the Republic of Italy there were 6 detentions resulting from 294 deficiencies. The detained ships were carrying the following

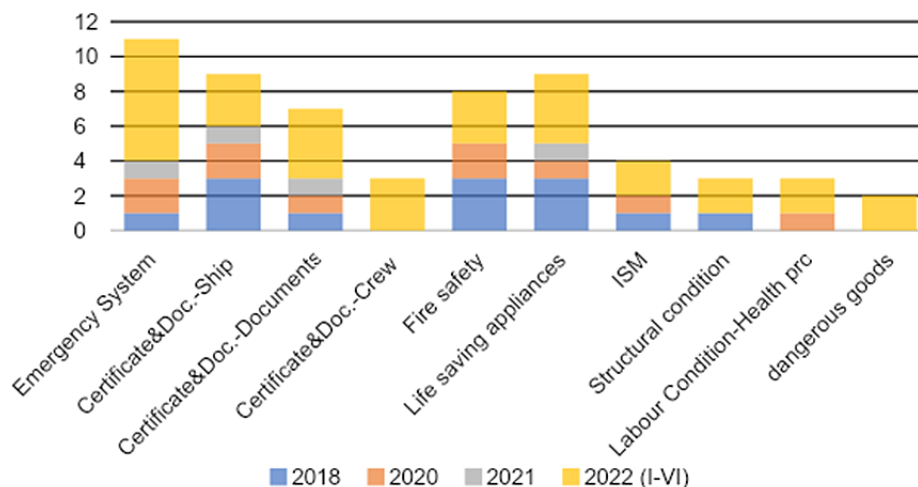


Figure 13 Areas with the largest increase in detention deficiencies of offshore supply ships – Italy

Source: Processed by Author according to Thetis Database

flags: Panama (2), Norway (2) and Germany (2). The Panamanian flag had the largest number of deficiencies (45), followed by Germany (23), and Norway with the fewest (18). The aforementioned detained flag states are on the Paris MoU White List for 2021.

The average age of the detained ships was 38.83 – the average period of the detention is 49 days. Deficiencies were found in the following areas: Safety of Navigation (11), Emergency System (11), Certificate & Documents-Ship Certificate (9), Life-saving appliances (9), Fire safety (8), Certificate& Documentation-Documents (7), Radio communication (5), ISM (4), Marpol I (3), Structural condition (3), Marpol V (3), Labour Condition-Health protection (3), Certificate & Documentation-Crew Certificate (3), Marpol IV (2), Dangerous goods (2), Propulsion and auxiliary machinery (1), Cargo operations including equipment (2), and Labour Condition-Accommodation (1).

The number of deficiencies that caused detentions significantly increased in the first half of 2022. In 2017, there were no detentions of offshore supply ships; in 2018, 1 offshore supply ship was detained. There were zero detentions in the following year (2019), while one was recorded in 2020 and in 2021. In the first half of 2022, 3 detentions of offshore supply ships were recorded. There were no detentions for MODU and FPSO units in the observed period. Along with the increase in the number of detentions, there was also an increase in the number of deficiencies that caused the ships to be detained. In total 27 detention deficiencies occurred in 2018, 13 in 2020, and 7 in 2021. It can be concluded that after the decrease of deficiencies in the first half of 2022, the number of deficiencies that led to ship detentions increased (39).

Although the number of detentions increased, the number of inspections still did not reach the pre-pandemic values. As a result, average detention rate increased by 42.8% in the first half of 2022 (compared to 20% in 2021 and 14.3% in 2020).

The largest increase in the number of deficiencies is in the following areas: Emergency System, Certificate & Documentation (Ship, Document and Crew Certificate), Fire safety, Life-saving appliances, Structural condition, Labour Condition-Health protection, dangerous goods, and ISM. These areas comprise 68.60% of the areas with deficiencies that caused ship detentions. Trends in the areas with recorded deficiencies resulting in ship detentions follow the trends in the area of the entire Paris MoU where, according to the Annual Report 2021, those with most detentions are: Certificate & Documents, Safety of Navigation, Fire Safety, Pollution prevention, Safety Management, Working and living conditions.

Recognized organizations

In the territory of Croatia and Italy, 59 inspected offshore supply ships and MODU and FPSO units were given class-10 by recognized organizations: RINA Service S.p.A. (RI-NA), Lloyd's Register (LR), DNVGL, Bureau Veritas (BV), Phoenix Register of Shipping (PHRS), International Naval Surveys Bureau (INSB), American Bureau of Shipping ABS, Polski Rejestr Statkow (PRS), DNV, Quaitas Register of Shipping S.A. (QRS).

The obtained data show that offshore supply ships and MODU and FPSO units in the territory of the Republic of Croatia and Italy mostly had RINA (22), Bureau Veritas (11), ABS (7) and DNV (7) classes. These recognized organizations classified 47 out of 59 inspected

Table 2 Recognized organizations in the territory of Croatia and Italy

	RINA	LR	DNVGL	BV	PHRS	INSB	ABS	PRS	DNV	QRS
RO inspected offshore supply ship (Croatia)	7			5			1	1	2	
RO inspected MODU&FPSO unit (Croatia)						1	1			
RO inspected offshore supply ship (Italy)	15	2	3	6	1	1	3	2	5	1
RO inspected MODU&FPSO unit (Italy)							2			
Total	22	2	3	11	1	2	7	3	7	1

Source: Processed by Author according to Thetis Database

offshore supply ships and MODU and FPSO units (they belong to the group of recognized organizations that have a high performance level, according to the Annual Report 2021 of the Paris MoU).

Table 3 Performance level of Recognized organization – Paris MoU 2021

Recognized organization	Performance level – Paris MoU 2021
American Bureau of Shipping	High
DNV	
Lloyd's Register	
Bureau Veritas	
RINA Service S.p.A.	
Phoenix Registrar of Shipping	Medium
Polski Rejestr Statkow	
Quaitas Register of Shipping S.A.	
International Naval Surveys Bureau	

Source: Processed by Authors according to Paris MoU

According to the Paris MoU from 2021, RINA recorded the highest performance level (4 detentions), compared to INSB (1) and QRS (1).

5 Discussion

The number of inspected ships and performed inspections of offshore supply ships, MODU and FPSO units in the Republic of Croatia and the Republic of Italy shows a growing trend compared to the periods of the crisis caused by the COVID-19 virus. The age of the inspected ships is the highest in the category to which the ships belong, i.e. the group of ships that are 20 and older. The majority are flags which are on the White List of the Paris MoU 2021. Most of the ship inspections carried out in Croatia were initial, whereas the majority of those performed in Italy were detailed.

During the period of observation, a total of 241 deficiencies were detected through inspections. The largest number of deficiencies are found in these areas: Certifi-

cate & Documentation, Safety of Navigation, Fire Safety, ISM, Life-saving appliances, Emergency System, Labour Conditions-Health protection, which correlates with the trends in the field of deficiencies in the area of the Paris MoU in 2021. In the first half of 2022, there was an increase in the number of detained offshore supply ships as well as an increase in ship deficiencies which resulted in detention. There were no banned MODU and FPSO units in the observed period.

The largest increase in the number of deficiencies that led to ship detentions during the first half of 2022 was recorded in Labour Conditions-Health protection, Certificate & Documents (Crew Certificate, Documents), Emergency System and Fire safety area. Therefore, target inspections of the aforementioned areas are proposed. What is more, more inspections should be performed in order to protect the living and working conditions of seafarers, increase the safety of navigation and protect the marine environment.

By summarizing the results of the research, we can conclude that there is no doubt that the imposed restrictions owing to the COVID-19 pandemic had a negative impact on the organization and number of inspections in the ports in the Republic of Croatia and the Republic of Italy. The year 2020 was marked by a decrease in the number of inspections in both countries compared to previous years due to measures and restrictions introduced by both countries with the aim of protecting people and suppressing the spread of the COVID-19 virus. Lockdown measures, free movement and travel restrictions have contributed to difficulties in the organization of inspections because port state inspections require a personal inspector present on board and his communication with the crew. The number of inspections in the Republic of Croatia shows a slightly higher growth trend, which could be based on somewhat milder restriction measures adopted by the authorities of the Republic of Croatia to prevent the spread of COVID-19. The reduced number of inspections was reflected in the increase in the number of deficiencies discovered during inspections already in the first half of 2022, mostly relating to the area of Certificates & Documents. The reason for this may be the fact that, due to the limitation of the number of in-

spections and the reduction in the number of inspected ships, some of the ships from group P1 (Priority I) and part of P2 (Priority II) were not subjected to inspections. What is more, the validity of certificates and documents as well as inspection intervals for renewal of certificates and documents were extended by flag states for pragmatic reasons.

6 Conclusion

Undoubtedly, since maritime navigation has an international character, the pandemic of the COVID-19 virus had an impact on the number of ship inspections performed. The consequences of the reduction in regular inspections of ships by the port state are also visible in the increase in the number of deficiencies that were detected during the period of gradual increase in the number of inspections. The increased number of deficiencies represents the potential for an increase in the number of incidents and accidents at sea, which leads to the endangerment of human lives, cargo and the marine environment, and thus endangering maritime safety. Due to the negative impact that may arise as a result of an insufficient number and regular performance of inspections for all participants of the maritime system, port state inspections and the data collected by these inspections represent an important and efficient mechanism in preserving maritime safety, environment and nature. In the upcoming period, there is a need for increased inspection of P1 ships and targeted inspections in the areas where the greatest increase in the number of deficiencies has been detected.

Funding: The research presented in the manuscript did not receive any external funding.

Author Contributions: Conceptualization, Lj.P. and L.G.; methodology, Lj.P.; software, L.G.; validation, L.G.; formal analysis, Lj.P.; investigation, S.M.; resources, X.X.; data curation, S.V.; writing—original draft preparation, Lj.P.; writing—review and editing, I.G.; visualization, S.V.; supervision, S.M. All authors have read and agreed to the published version of the manuscript.

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