The Riyadh MoU on Port State Control and Environmental Security in the GCC Region: State Commitment and Legal Gaps

Gerasimos Rodotheatos and *Vasiliki Alexandra Politi*

Structured Abstract

Article Type: Research Paper

Purpose—The Riyadh Memorandum of Understanding on Port State Control is based on participating states' commitment to inspect vessels calling at their ports to verify compliance with relevant IMO and ILO Conventions. The article assesses the Riyadh MoU's institutional and operational effectiveness and investigates ways to further improve these aspects.

Design, Methodology, Approach—The article aims to assess the Riyadh MoU's (a) institutional effectiveness by examining the level of its members' participation in relevant instruments and their willingness to expand this list and (b) its operational effectiveness based on the results of the regimes' Annual Reports.

Practical Implications—The article highlights gaps and priorities on regulatory and operational levels concerning the conduct of Port State inspections in the Riyadh MoU area.

Findings—This research suggests significant progress has been made among its members. While several actions can improve the MoU's overall effectiveness, establishing a harmonized inspection system, updating the selection process, and promoting international cooperation are among the most influential variables supporting the regime's evolvement.

Originality, Value—Although maritime activities in the region are significant on a global scale, relevant research on this MoU has been limited. This research paper is based on primary data and aims to showcase the importance of international cooperation in the GCC area and the progress recorded by its participants.

American University in the Emirates, Dubai: gerasimos.rodotheatos@aue.ae;
Panteion University: vasilikipoliti@hotmail.com

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I. Introduction

The Riyadh Memorandum of Understanding (MoU) on Port State Control (PSC) (est. 2004) is the youngest in a series of nine relevant agreements. It applies to 55 ports located in the western Arabian Gulf, the Strait of Hormuz, the Oman Gulf, the western Arabian Sea and the eastern Red Sea (only ports on the coastline of Saudi Arabia), and across the six countries that are members to the Gulf Cooperation Council (GCC), namely Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates.

Indeed, among parties to the MoU, the GCC appears to serve as a more cohesive organizational framework connecting those countries. Apart from the overlap between the MoU and GCC members, all the Riyadh MoU annual reports state that the MoU pertains to "port state control activities in the Gulf Cooperation Council Region"; on top of this, the GCC also holds observer status in the MoU's annual meetings.[1] However, there is no mention of the GCC in the MoU text,[2] which sets its area of application as the Gulf region. The GCC endorses the MoU by including it in its achievements, under the Cooperation in the Field of Sea Transportation.[3]

Shallow waters, limited freshwater input, high salination, and the tropical to subtropical climate that characterizes the Arabian Gulf have caused great interest in the area's preservation of the marine environment.[4] Beyond the domestic environmental laws of the countries bordering the Arabian Gulf, the Strait of Hormuz, and the Gulf of Oman, this general area is also considered a "semi-enclosed sea" under the Law of the Sea Convention (LOSC) (1982, art. 122). This legal designation requires border states' efforts to cooperate on issues such as the management and conservation of marine resources, the preservation of the marine environment, and scientific research (LOSC [1982, art. 123]). Accordingly, most of the engaged states participate in the Kuwait Regional Convention for Cooperation on the Protection of the Marine Environment from Pollution (ROPME 1978), which is also stipulated in the preamble of the MoU. Finally, the area's ecological significance is reflected in the designation of two "Special Areas" under the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 (MARPOL 73/78),[5] namely the "Gulfs area" and the "Oman area of the Arabian Sea," by the International Maritime Organization (IMO).

PSC MoUs have been the subject of academic scrutiny since the inception of the Paris MoU in 1982. Still, although there is a body of scholarly literature that addresses the environmental security challenges associated with shipping in the Riyadh MoU area—such as oil and gas exploitation, fishing, and maritime transportation,[6] there remains limited English-language research regarding the contribution of PSC measures to strengthening environmental security in the area. Among the limited literature available, two publications are particularly noteworthy: (a) Xiao et al. 2021, which calculates the efficiency and productivity of PSC MoUs worldwide over a period of 11 years, and (b) Mantoju 2021, which carries out a global comparative analysis related to MARPOL 73/78 related deficiencies

between 2009–2019. However, no publication addresses the legal dimension of the Riyadh MoU. Therefore, this article aims to highlight how international obligations and cooperation contribute to the region's environmental security, analyze the need for adherence to an updated international legal framework, identify potentially alarming legal gaps, and propose ways and actions to improve PSC measures in the region. It also aspires to assess the operational effectiveness of the regime, based on the data provided by the MoU's annual reports of the last 11 years (2012–2022).[7]

Based on our findings, the Riyadh MoU has indisputably contributed to establishing a PSC regime that was previously absent. Notably, it has facilitated an increase in the number of inspections conducted by its members on an annual basis, leading to an increase in detected deficiencies. The MoU has achieved this by urging its members to ratify important international conventions that are relevant to PSC procedures, while also introducing new instruments over the years, aiming to fortify member states' ability to safeguard the area's environmental security.

II. Theoretical Framework

While security has traditionally been understood by political scientists and policymakers as stemming from outside threats and inter-state power struggles, a growing number of challenges—including climate-related threats, biodiversity loss, and, more recently, the global Covid-19 pandemic—highlight that insecurity can also stem from environmental risks within a nation's own borders.[8] As the environment has gradually become a determinant of prosperity—or its absence—the concept of environmental security expanded traditional notions of security. This broader understanding recognizes that environmental challenges can affect populations in ways resembling traditional security challenges, such as war, by constraining economic growth and undermining people's and communities' needs.[9]

According to Barnett,[10] environmental security is, "the assurance that individuals and groups have that they can avoid or adapt to environmental change without critical adverse effects." This concept extends beyond just land issues to include the seas and oceans. Although land-based sources are considered the most prominent cause for the degradation of the marine environment, oil spills, waste transportation and dumping, as well as the introduction of invasive species, pose serious risks that must be addressed as comprehensively as possible.[11]

In the GCC area's case, the fragility of the marine environment and the close economic relationship between Gulf countries and marine resources establish the need to ensure its protection. Considering the additional pressure that the Arabian Gulf is facing from the shipping and oil industries, with an estimated 53,000 ships passing through the Strait of Hormuz and into the Gulf each year,[12] the threats to both the environment and marine resources in the area cannot be overlooked.

Port states conducting inspections on ships voluntarily entering their ports is not a new notion. Such measures were implemented by port states as early as 1929, through the second edition of the International Convention for the Safety of Life at Sea (SOLAS Convention).[13] Despite that, the LOSC awards the primary responsibility for

inspecting and enforcing ship standards to the flag state.[14] It also gives jurisdiction to the port state to undertake investigations into illegal activities when within a port or at an offshore terminal of that state.[15] Additionally, several IMO Conventions—including MARPOL 73/78 and the SOLAS Convention—recognize that authority, with the IMO referring to PSC as "the inspection of foreign ships in national ports to verify that the ship and its equipment's condition comply with the requirements of international regulations and that the ship is manned and operated in compliance with these rules."[16]

However, port states realized that coordinating their efforts on a regional level is much more effective than conducting individual inspections, in order to avoid wasting time and resources on repetitive inspections, and to prevent the emergence of Ports of Convenience—also known as "Ports of Non-Compliance."[17] As a result, they took it upon themselves to enhance the efforts of flag states and classification societies to make shipping safer, both for the people and the marine environment.[18] It was that idea, driven by the major oil spill caused by the grounding of "Amoco Cadiz" a few years earlier, in 1978, that led to the creation of the first Memorandum of Understanding on Port State Control, the Paris MoU, that was signed among several European states in 1982.[19] In the following years, several incidents of marine pollution of varying severity and impact cemented the usefulness of such regimes around the world.[20]

Despite that MoUs do not constitute binding treaties under international law, they are widely used instruments in international relations. Unlike treaties, which entail legal obligations upon ratification, MoUs are typically political or administrative agreements that express mutual intentions. In fact, MoUs are intentionally not legally binding, since they are often used by states when they prefer flexibility or wish to avoid formal treaty processes.[21] As a result, MoUs serve as cooperation instruments without the legal consequences of treaties.[22]

Nonetheless, MoUs are crucial in fostering international collaboration. Participation in an MoU demonstrates a state's political commitment and willingness to align its actions with others to pursue shared objectives. Especially in domains like environmental protection or maritime governance, where signatories may already be parties to binding multilateral treaties. In such cases, MoUs become mechanisms to operationalize or enhance the implementation of existing obligations. Subsequently, non-binding agreements can act as complements to treaties, helping states to coordinate policy, share information and know-how, build trust, and respond more dynamically to emerging challenges.[23] Thus, while not enforceable in court, MoUs can be instrumental in promoting coherence, cooperation, and compliance with the goals of binding international frameworks.

Currently, approximately 120 countries are involved in PSC regimes, established through the signing of relevant Memoranda of Understanding with the blessings of the IMO [Resolution A.682(17)], motivated by major shipping accidents around the world.[24]

PSC measures have since played a significant role in the prevention of maritime accidents and incidents,[25] thus contributing largely to the environmental security of oceans and seas. The logic behind these MoUs is that each of the participating states assumes the duty to annually inspect a suggested number of vessels calling their ports in order to verify compliance with IMO environmental and safety regulations, as well as ILO labor regulations. Hence, vessel inspections serve various purposes: among them, the prevention

of violations, enforcement of international regulations, and the promotion of maritime awareness.[26]

However, the provision of authority to the port states not only enhances international standards and regulation implementation, but it also protects the rights of coastal states. Especially regarding environmental security, LOSC clearly states, "States have the obligation to protect and preserve the marine environment" (Art. 192), further stating that activities should "not cause damage by pollution to other States and their environment" (Art. 194). While the right to undertake investigations against a vessel that is voluntarily within a port is given to a port state unreservedly (Art. 218), Article 220 explicitly recognizes, "the prevention, reduction, and control of pollution from vessels" as grounds for a coastal state to institute proceedings against a vessel that is voluntarily within a port. Recognizing the significance of protecting the marine environment for coastal states, the right to physically inspect a ship is conditionally granted even for ships outside its port, so long as it is believed that it has committed a violation, "resulting in a substantial discharge causing or threatening significant pollution of the marine environment" (Art. 220, par. 5).

In practice, considering that port states generally have the necessary assets, personnel, and time to conduct inspections, they are often in a better position to detect substandard ships.[27] If we also take into account the existence of flags of convenience, the marine insurance industry's inadequacies, and the presence of ineffective ship classification societies,[28] one could argue that PSC plays a significant role as an extra layer of precaution regarding seaworthiness, marine environment protection, and seafarers' rights.[29]

III. Results

3.1. The Riyadh MoU Commitments

Following in its predecessor's footsteps, the Riyadh MoU aims to increase maritime safety, protect the marine environment, and improve seafarers' living and working conditions. To accomplish these goals, the MoU builds upon the fulfillment of four commitments (Articles 1.1. to 1.4.):

- Implementation and Ratification: Members are to enforce the provisions of the MoU and its annexes, taking necessary steps to ratify or accede to the relevant instruments.
- Establishment of a PSC system: Each member shall ensure that foreign merchant ships in its ports comply with relevant standards and avoid committing flag discrimination.
- Inspection Targets. Within three years of the Memorandum's effect, each state's relevant port authority will aim for annual inspections covering 10% of the foreign merchant ships entering its ports. The MoU's Committee will monitor and adjust inspection targets based on experience and progress.
- Collaboration and Information Exchange. Members' Authorities will consult, cooperate, and share information to further the Memorandum's goals.

The wording of the MoU is standard among similar pre-existing regimes, with the Paris MoU as the primary reference in terms of typology and terminology.[30] Therefore, little needs to be said on these fronts. In terms of implementation, the establishment of a PSC system is self-evident, given that all member states provide information on the inspections conducted by their authorities, which are included in the regime's annual reports. Moreover, several training sessions are organized and conducted annually by the MoU's Secretariat, enhancing cooperation and coordination of member states' efforts, as mentioned in the annual reports, while a database has been created to ensure the exchange of information among the members' authorities.

Taking those commitments into consideration, to assess the Riyadh MoU's success, this article will examine its members' actual engagement and the agreement's implementation. This assessment will be based on two factors: (a) the institutional commitment of the members, determined by the status of ratification of the relevant instruments, and (b) the inspections' volume and effectiveness, based on the information provided in the MoU's annual reports.

3.2. Assessment of Institutional Commitment

One of an MoU's most important elements is establishing common criteria and standards among member states, both regarding the selection of ships to be inspected and the inspection process.[31] The significance of this harmonization lies in the fact that states participating in a PSC MoU have to consider the results of other members' inspections as equivalent to their own to avoid repetitive inspections and ensure that the maximum number of ships entering the MoU's area have been inspected, with the aim of protecting the marine environment.

Section 3 of the Riyadh MoU fulfills the first part of this equation, the selection of ships, by laying the ground rules for which vessels should be prioritized for inspections. The second part, harmonization of inspection standards and procedures, is a little more complicated.

The MoU also provides a specific series of international instruments that member states are instructed to follow in order to achieve coordination of the inspection standards and procedures. These so-called "relevant instruments" are explicitly listed in Section 2.1. of the Riyadh MoU and are listed as follows, along with any protocols, amendments, or mandatory codes related to them:

1. The International Convention for the Safety of Life at Sea, 1974 (SOLAS 74);
2. The International Convention on Load Lines, 1966, as amended by the Protocol 1988 (LL 1966 & LL Protocol 88);
3. The Protocol of 1978 relating to the International Convention for the Safety of Life at Sea, 1974 (SOLAS Protocol 78);
4. The International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL 73/78);
5. The International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978 (STCW 78);
6. The Convention on the International Regulations for Preventing Collisions at Sea, 1972; (COLREG 72);

7. The International Convention on Tonnage Measurement of Ships, 1969; (TONNAGE 69);
8. The Merchant Shipping (Minimum Standards) Convention, 1976 (ILO No.147);
9. The International Convention on Civil Liability for Bunkers Pollution Damage, 2001 (BUNKERS 2001);
10. Protocol of 1992 to amend the International Convention on Civil Liability for Oil Pollution Damage, 1969 (CLC Protocol 92).

However, Section 2.3 states that the applicable relevant instruments are those that have been ratified and are, thus, in force for the authority of each member state. This establishes potential for a significant difference among the rules applied by MoU members. To determine whether this is cause for concern for the Riyadh MoU, we looked at the ratification status of each state for every listed relevant instrument.

While one may argue that MARPOL deficiencies are what relate directly to marine environment protection and, therefore, that this is the main instrument related to environmental security, there is a strong correlation between marine pollution and shipping accidents,[32] whether caused by technical issues or the human factor.

Indicatively, several provisions related to marine environment protection are included in the SOLAS Convention, with Regulation 2 stating that ships shall be, "safe and environmentally friendly," which means that they "shall have adequate strength, integrity, and stability to minimize the risk of loss of the ship or pollution to the marine environment." Furthermore, there are several mentions of the marine environment and pollution prevention measures throughout the treaty. Similarly, the STCW 78 states that members of the convention must ensure that "from the point of view of safety of life and property at sea and the protection of the marine environment, seafarers on board ships are qualified and fit for their duties" (Article 1). Moreover, according to the COLREGs, seafarers in charge shall "be aware of the serious effects of operational or accidental pollution of the marine environment and shall take all possible precautions to prevent such pollution" (Section 1.13). Even the CLC Protocol, which is designed to address the liability deriving from loss or damage, requires "compensation for impairment of the environment other than loss of profit" (Article 2.6 [a])—a phrase that has been identically adopted by the BUNKERS Convention (Article 1.9 [a]), introducing the concept of reparations to help rectify environmental damages.

Moving on to the human factor, the ILO has highlighted the correlation between accidents involving merchant ships by stating that these accidents may result in the loss of life and ships, as well as damage to the marine environment.[33] In the same guidelines, the ILO also quotes that one of the primary goals of the Merchant Shipping (Minimum Standards) Convention (No. 147) is to "enhance measures to protect the marine environment."

Accordingly, the treaties listed in the Riyadh MoU should be considered important to the protection of the marine environment of the GCC area. Therefore, the status of participation in all of these conventions is considered relevant to the region's environmental security. Table 1 showcases that status, displaying the year of entry into force for every member state regarding each instrument, with dashes used to indicate instruments that have not

been ratified as of April 2025. Since the objective of this section is to examine the extent of harmonization during the MoU's implementation period (i.e., after 2004), this display aims to showcase any relevant irregularities.

	Bahrain	Kuwait	Oman	Qatar	Saudi Arabia	UAE
SOLAS 74	1986	1980	1985	1981	1985	1984
LL 1966	1986	1968	1975	1980	1975	1984
LL Protocol 88	2015	2019	2000	2019	2019	2017
SOLAS Protocol 78	-	1981	1985	-	1990	1984
MARPOL 73/78	2007	2007	1984	2006	2005	2007
STCW 78	1996	1998	1990	2002	1991	1984
COLREG 1972	1985	1979	1985	1980	1978	1983
TONNAGE 69	1986	1983	1990	1986	1982	1984
ILO No.147	-	-	-	-	-	-
BUNKERS 2001	2017	-	2020	-	2019	2021
CLC Protocol 92	1997	2005	1996	2002	2006	1998

Table 1. Status of ratification of relevant instruments to the Riyadh MoU and the year of entry into force by member state (ILO and Status of IMO Treaties, as of 24 July 2024).

Starting with the IMO treaties, member states were already adhering to some of the major maritime conventions prior to signing the Riyadh MoU, such as SOLAS 74, the Load Lines Convention of 1966, the Convention on the International Regulations for Preventing Collisions at Sea of 1972 and more. However, there are other, equally significant conventions that were ratified much later or not at all to this day.

More prominently, MARPOL 73/78, the most important international instrument aiming at marine environment protection, was one of the later additions for all member states except for Oman. Saudi Arabia and Qatar eventually joined in 2005 and 2006, respectively, but three more states remained unmoved during the 3-year grace period provided by the Riyadh MoU. Ultimately, it was the GCC Council's Supreme Council[34] urging its members to accede to the convention in 2006, which seems to have motivated the remaining states to complete the ratification process.

As such, one would expect that by 2007, all members' authorities were following harmonized processes when it comes to MARPOL 73/78. However, close inspection reveals that there remain discrepancies regarding the Protocol of 1997 to amend MARPOL 73/78, which introduces Annex VI on the Prevention of Air Pollution from Ships. Except Saudi Arabia (2005), Kuwait (2007), and eventually, the United Arab Emirates, which joined much later in 2019, the three remaining member states have yet to accede to that instrument, allowing for inconsistencies during inspections on relevant matters.

Similarly, early on, the member states decided to harmonize their processes regarding the Protocol of 1992 that amended the International Convention on Civil Liability for Oil Pollution Damage, with the two remaining states, Kuwait and Saudi Arabia, joining in 2005 and 2006, respectively. For a long time, Oman was also the only MoU member

that complied with the Protocol to the International Convention on Load Lines of 1988, which significantly contributed to harmonizing the convention's survey and certification requirements with those of SOLAS and MARPOL.[35] It took Bahrain 11 years after signing the Riyadh MoU to follow suit, with the remaining members following as late as 2019. Progress has been even slower regarding the International Convention on Civil Liability for Bunkers Pollution Damager, which covers a critical regional issue. Four member states joined the convention between 2017 and 2019, while Kuwait and Qatar are still abstaining.

Finally, there is the issue of the Merchant Shipping (Minimum Standards) Convention of 1976 (No. 147), the single ILO treaty included on the list. As provided by Table 1, none of the Riyadh MoU member states have ratified this instrument. However, Annex 2 of the MoU provides that the authorities should apply the "Inspection of Labour Conditions On Board Ship: Guidelines for Procedure," which are guidelines to facilitate the application of the ILO Convention itself. Clearly the MoU members adhere to the guidelines, particularly when it comes to implementing the Conventions outlined in ILO No. 147 (Appendix), which they have individually ratified.[36] The presence of documented deficiencies reported by the states in the MoU's annual reports (Table 4) confirms that the GCC countries agree regarding the criteria and procedures pertaining to certain minimum labor standards during inspections at their ports.

In general, the MoU appears to have triggered or at least encouraged some level of harmonization among members, a fact that is also highlighted on an operational level by capacity-building initiatives organized under its auspices. The notion of joint training programs and seminars has been introduced by the MoU under Section 6, which has resulted in several sessions, workshops, and seminars being organized annually, aiming to educate and train the PSC officers. However, there are still institutional shortcomings and variations that allow for discrepancies in the inspections carried out by MoU member states.

3.3. Operational effectiveness of the MoU

After signing the Riyadh MoU in June 2004, the participating maritime authorities agreed to a three-year grace period to achieve "an annual total of inspections corresponding to 10% of the estimated number of individual foreign merchant ships […] which entered the ports of its State during a recent representative period of 12 months."[37] Therefore, since the MoU became effective in late 2004, no inspections were reported prior to 2007, with some rudimentary data available from that year. After a slow start of less than 100 documented inspections in all member states during 2007 (Figure 1), the numbers remained low for the next 2 years (2008–2009), with reported inspections and ships marked with deficiencies being fairly limited (1002 and 364 cases, respectively).

The first comprehensive inspection data available are from 2012, with the report of 2022 currently being the latest available, providing an 11-year period to examine the MoU's progress.[38] Examination of the collected data showcases an undoubtedly significant rise in both the number of inspections conducted and the deficiencies detected during the MoU's implementation period.

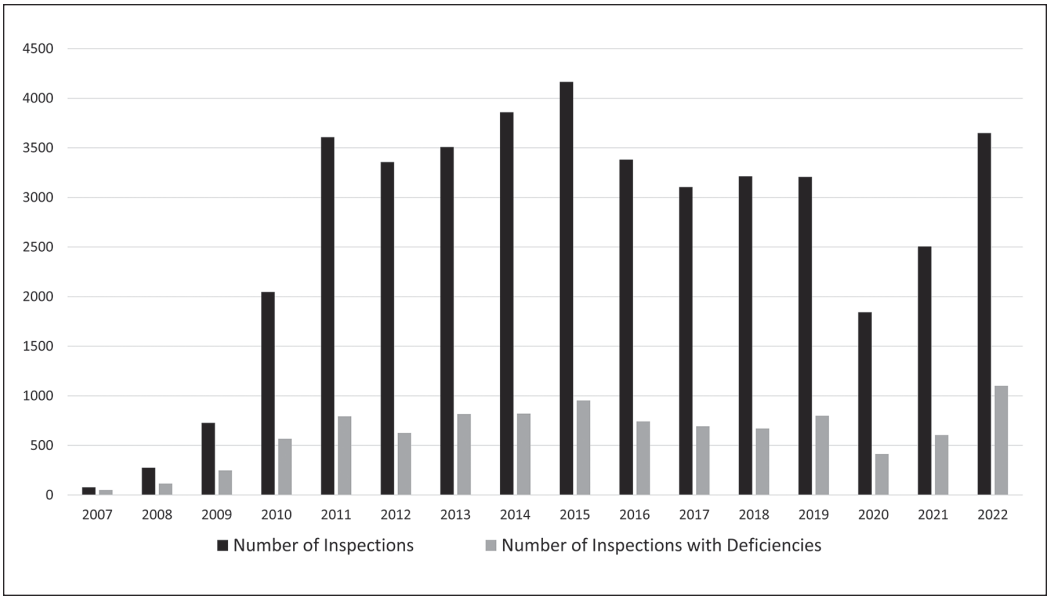

Figure 1. Total Inspections and Inspections with Deficiencies (Riyadh MoU Annual Reports, 2012–2022).

According to Figure 1, the number of inspections significantly rose after 2011 and stabilized at around 3,000–3,500 inspections per year (peak year: 2015–4,165 inspections), while the number of inspections with deficiencies rose accordingly, ranging from about 600 to more than 1,000 cases per year (peak year: 2022–1,100 cases).

In general, when compared to other MoUs, the Riyadh MoU is not only the youngest but also among the smallest, at least in terms of participating states. With the exception of the US Coast Guard PRC regime, only the Black Sea MoU has as few members as the Riyadh MoU, each counting six members. It is also on the lower side of the total conducted inspections, given that during the 2009–2019 period, the Riyadh MoU member states managed to surpass only the Caribbean and the Abuja MoU efforts.[39] However, these numbers make sense when taking into account the number of ports under an MoU's area, the number of ships entering those ports, and, subsequently, the inspection quotas set by its members.

With these factors in mind, a more precise assessment of the regime's efficiency can be conducted, thereby facilitating a clearer determination of its comparative standing among existing PSC regimes. Based on Xiao et al.,[40] who calculated the efficiency of all existing PSC regimes based on the number of inspections conducted, the number of ships with detected deficiencies, and the number of detained ships between 2009 and 2019, the Riyadh MoU could definitely do better. Notably, during the 11-year period, the Riyadh MoU maintained a low-efficiency position, ranking it second to last based on its average score.

Still, over the last 11 years (2012–2022), the states participating in the Riyadh MoU have conducted more than 35,000 inspections, detecting 8,240 ships with deficiencies (see Figure 1). Thus, it is apparent that they have gradually stepped up their efforts, even though there is always room for improvement.

Signs of progress: achieving more with unrelenting effort. While the Riyadh MoU does not rank particularly high when compared to other MoUs, relative efficiency does not define the

progress made among its own members. In fact, data included in the annual reports indicate that the PSC system of the GCC area has, in fact, become significantly more effective.

As mentioned, the number of inspections conducted under the MoU has been relatively stable, with a median of 3,253 inspections for the period 2012–2022. This stability can be attributed to several reasons, one of them being that this number could correspond to the aforementioned selection quota designated by the MoU.[41]

Moreover, even though inspections leading to the detection of deficiencies fluctuate in both absolute numbers and as a percentage of the inspected ships [Figure 2.(a)], they too are relatively stable, with a significant improvement noted in 2022. More specifically, during the last 11 years, the rate of ships inspected with at least one detected deficiency has ranged from 17% (2016) to 25% (2019) of the overall inspections, with 2022 recording an outstanding 30% of inspected ships having at least one deficiency. This results in an average 23% ratio of ships with deficiencies for inspected vessels over the 11 years reviewed.

While those numbers present a certain stability regarding the number of inspections carried out on a yearly basis, there is a very prominent rise in the number of detected deficiencies reported after 2017 (Figure 2.[b]). According to the data available from the Annual Riyadh MoU Reports, an average of 697 detected deficiencies was recorded between 2012 and 2016, with the median reaching 2,729 deficiencies from 2017 to 2022, almost four times higher than the previous period.

Considering that more than one deficiency can be detected on the same ship, this signifies that either the quality of ships entering the area's port has deteriorated or, more likely, there has been a significant improvement in the quality of inspections and the ability of PSC officers to detect those deficiencies. While this article does not assess the quality or quantity of the PSC officers, a suggestive association can be established between workshops conducted under the Riyadh MoU's auspices and a rise in related detected deficiencies. For instance, there was a significant rise in MARPOL-related deficiencies in 2016 after a Workshop on MARPOL Rules and Regulations conducted in April 2015—from 8.14% in 2015 to 22.17% of total detected deficiencies in 2016, which has been maintained to the latest report. Similarly, consecutive workshops conducted on the IMO International Safety Management Code in 2015 and 2016 have also been followed by a noteworthy increase in related deficiencies since then—from around 3% in those first years to 7%–8% in the two following years.

Member States' Commitment: Lopsided Devotion. Like every memorandum of understanding, the Riyadh MoU was founded on the belief that its participants can achieve more together than separately. Nevertheless, that belief does not necessarily imply equal or proportional efforts among its member states, a fact affirmed by their individual performance.

When focusing on the number of conducted inspections (Figure 3), three GCC countries are carrying the heaviest load: Saudi Arabia (KSA), the United Arab Emirates, and Qatar have conducted 94.55% (33,842 out of 35,792 inspections) of all Riyadh MoU inspections since 2012. Despite the reduction in the number of inspections by both KSA and the UAE during the years affected by Covid-19, these two countries alone still carry out 83.44% of the inspections in the region, while Qatar's contribution has been declining (from ~18% in 2012 to an average of less than 6% over the last three years—2020–2022). The fourth contributor is Oman, but it should be noted that the number of

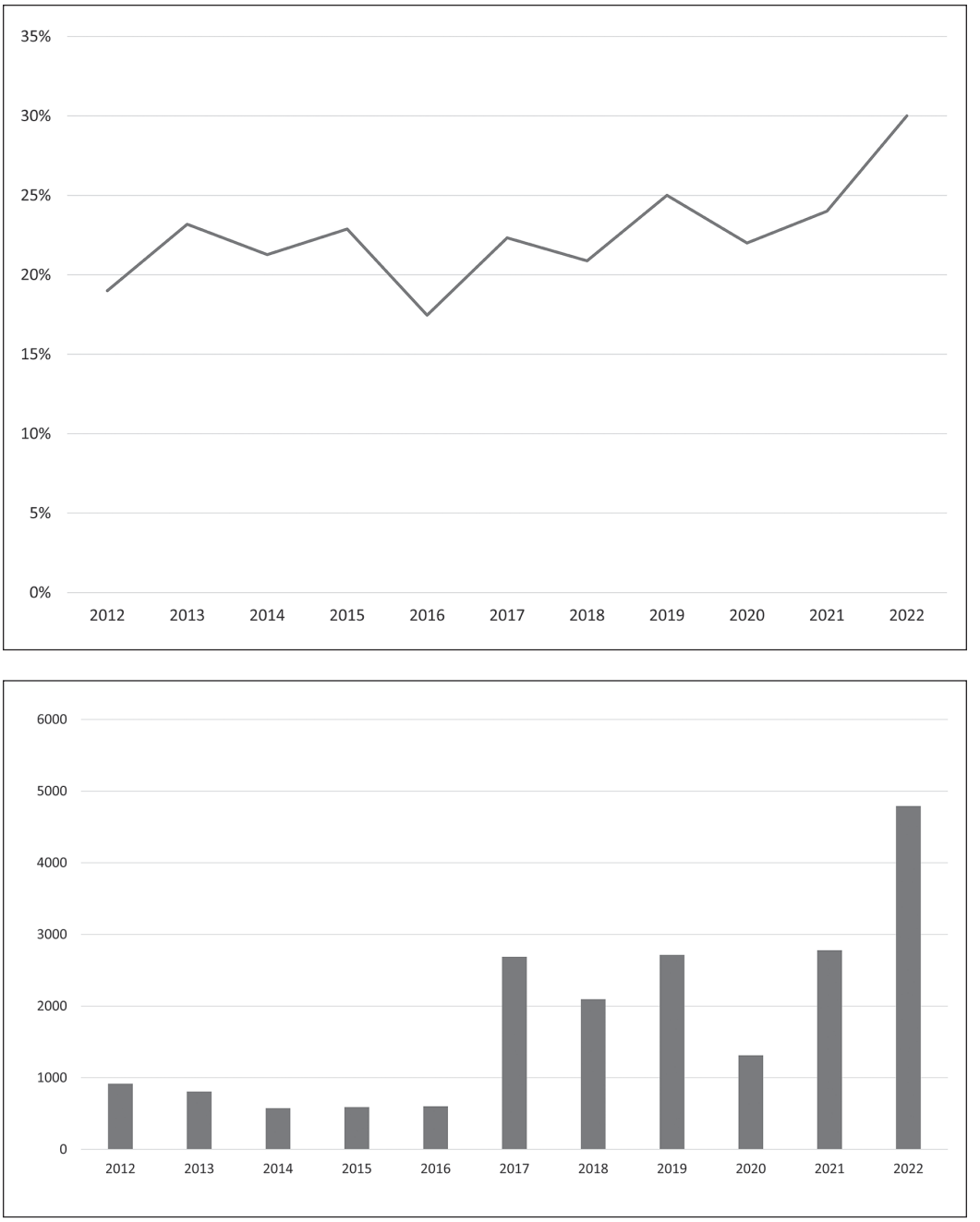

Figure 2. ***top:*** **(a) Percentage of inspected ships with deficiencies;** ***below:*** **(b) Number of total deficiencies detected (Riyadh MoU Annual Reports, 2012–2022).**

inspections the Sultanate reports is highly unstable (average: 153 inspections per year, ranging from 25 to 300). The remaining two countries have a very limited contribution to the MoU's performance, with Bahrain carrying out an average of 20 inspections per year and Kuwait approximately two.

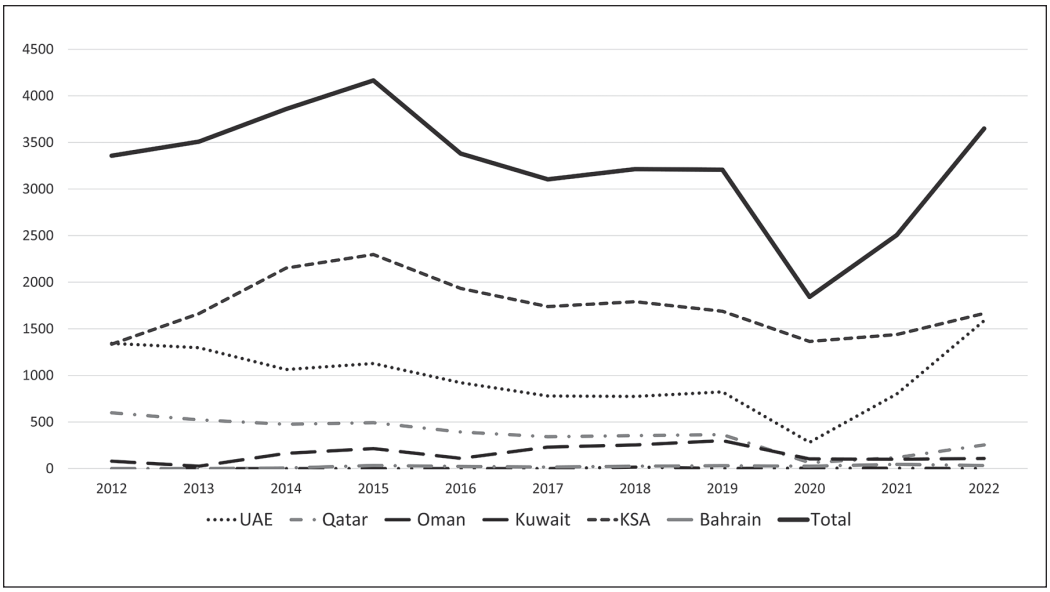

Figure 3. Number of inspections conducted per State (Riyadh MoU Annual Reports, 2012–2022).

Of course, it is understandable that the number of inspected ships will vary per state for reasons including, but not limited to, its coastline; the number of its ports; its population, which defines its import needs; its trade relations; and even hosting important events, like the World Cup hosted in Qatar in 2022 or the construction boom expected in Saudi Arabia over the next few years. On that basis, even a minimum number of inspections could be considered acceptable, but zero conducted inspections—which is the case for some members over the years—indicate inactivity. Still, all participating states are expected to adhere to the quantitative target set in the Riyadh MoU since joint effort and burden-sharing are considered high priorities for this kind of agreement.

While the number of inspections per state is one thing, one more relevant parameter worth considering when examining individual members' contributions is each state's level of efficiency. To that end, Table 2 showcases the number of conducted inspections and the percentage of inspected ships found with at least one deficiency.

	UAE		Qatar		Oman		Kuwait		KSA		Bahrain	
	Inspections No.	Ships with deficiencies %	Inspections No.	Ships with deficiencies %	Inspections No.	Ships with deficiencies %	Inspections No.	Ships with deficiencies %	Inspections No.	Ships with deficiencies %	Inspections No.	Ships with deficiencies %
2012	1344	20.9%	599	17.5%	79	27.9%	0	0%	1335	16.3%	0	0%
2013	1297	26.4%	523	24.7%	25	24%	0	0%	1663	20%	0	0%
2014	1063	27.6%	475	30.3%	163	52.8%	0	0%	2152	13.7%	6	16.7%
2015	1128	33.7%	492	27.2%	215	47.9%	0	0%	2297	14.9%	33	39.4%

	UAE		Qatar		Oman		Kuwait		KSA		Bahrain	
	Inspections No.	Ships with deficiencies %	Inspections No.	Ships with deficiencies %	Inspections No.	Ships with deficiencies %	Inspections No.	Ships with deficiencies %	Inspections No.	Ships with deficiencies %	Inspections No.	Ships with deficiencies %
2016	922	34.7%	393	33.1%	110	33.6%	0	0%	1933	12.7%	23	39.1%
2017	779	34.3%	341	31.1%	230	40%	0	0%	1738	12.9%	16	18.7%
2018	774	34.4%	354	33.3%	254	32.3%	16	43.8%	1791	10.8%	25	20%
2019	823	30.4%	365	27.4%	300	43.7%	1	100%	1688	18.1%	30	43.3%
2020	281	26.3%	63	22.2%	104	37.5%	4	50%	1364	20.5%	26	23.1%
2021	801	35.3%	118	32.2%	100	35%	3	0%	1439	16.7%	45	15.6%
2022	1588	42%	254	29.9%	109	25.7%	0	0%	1665	19%	33	0%

Table 2. Number of conducted inspections and percentage of ships with deficiencies (Riyadh MoU Annual Reports 2012–2022).

It should be noted that, in the case of states reporting a very small number of inspections, percentages are not indicative or have minimal impact on the overall PSC performance of the area. For instance, while Kuwait had a 100% success rate in 2019, that year, it conducted a single inspection. Similarly, Bahrain had a 16.7% success rate in 2014, which amounts to one ship with detected deficiencies.

There are several factors that could be responsible for such inconsistencies in performance, with the number of PSC officers per state and their ratio to that state's ports being the easiest to access (Table 3). As it turns out, discrepancies among the Riyadh MoU members cannot be attributed solely to the insufficient number of PSC officers. This is because, while the ratio of officers per port in two of the higher-performing states (Saudi Arabia and Qatar) exceeds one person per port, so does the ratio for the two lowest-performing states (Kuwait and Bahrain). Even Oman, which has the lowest ratio among members of the Riyadh MoU, can, despite its aforementioned variation on a yearly basis, boast a better effectiveness ratio than half of its fellow states. That said, Qatar, which has as many as 4.2 officers for each port within its territory, is still vastly behind Saudi Arabia, with almost half the number of officers per port.

	Number of Ports	Number of PSC Officers	Officers / Ports ratio
UAE	19	14	0.73
Qatar	5	21	4.2
Oman	11	5	0.45
Kuwait	4	10	2.5
KSA	12	32	2.66
Bahrain	4	6	1.5

Table 3. Number of Ports, PSC Officers, and Officers/ Port ratio per state[42] (List of the Riyadh MoU Register of Port State Control Officers, 2022).

Even among the top two performers, there is a noticeable difference in the rate of effectively detecting ships with deficiencies. More specifically, the UAE presents a much higher percentage of deficiencies with a lower number of inspections than Saudi Arabia. Indicatively, in 2022, despite having a far smaller officers-to-port ratio (see Table 3), and conducting fewer inspections than Saudi Arabia, the Emirates recorded more than double the number of ships with detected deficiencies.

This difference in performance can be attributed to reasons such as implementing a more sophisticated selection process—in accordance with the selection criteria included in Section 3.6 of the MoU—better trained or more PSC officers per inspection, better use of the data provided by the MoU's database, and more.[43] The fact is that the UAE has managed an overall better effectiveness percentage and a very close actual number of detected deficiencies to its southwestern neighbor.

Nevertheless, it is important to acknowledge that such differences in performance are anything but unexpected and have been detected among different MoUs, member states of the same MoU, and even PSC officers of the same state and, sometimes, the same port.[44]

The effects of the Covid-19 pandemic. While examining the effectiveness of the Riyadh MoU, it is crucial to consider the discrepancies observed during 2020–2021 due to the particular circumstances related to Covid-19. As it is widely known, the Covid-19 pandemic significantly affected not only the volume of maritime traffic,[45] but also the volume and quality of port state inspections worldwide.[46] Indeed, it has been noted that during the pandemic, surveys and services were difficult to organize due to the in-person element of inspections, while at the same time, ports, the shipping industry, and the supply chain faced significant challenges.[47] Moreover, seafarers faced difficulties with certificate extensions, while port restrictions complicated the boarding and repatriation of crews.[48]As a result, special measures were agreed upon and implemented with the guidance of the IMO.[49]

Despite general restrictions on the movement of people, maritime transportation of essential goods and merchandise remained essential throughout the pandemic but was undoubtedly severely affected. According to UNCTAD,[50] cargo ship port calls alone decreased by -5.1% starting from week 12 of 2020 compared to 2019, with the percentage deteriorating throughout the second and third quarters of the year, at some point reaching -8.3%. Eventually, the drop decreased to -4.7% during the final quarter, when lockdowns started to be replaced with more relaxed measures, but these percentages range widely among different types of cargo vessels.

Unexpectedly, vessels calling at ports saw an overall increase for the two most active members of the Riyadh MoU during 2020, namely Saudi Arabia (0.8%) and the UAE (1.8%).[51] At the same time, the West Asia area, where the six MoU member states are included, fared much better than the rest of Asia and the world.[52] However, the operations of the Riyadh MoU did not remain unaffected by the pandemic, with some members opting to close their ports completely to passenger vessels during 2020, while cargo ships continued calling under restrictions.[53]

Even so, the extraordinary measures dictated by the IMO and the obstacles posed during in-person inspections took their toll; both the number of physical inspections and detected deficiencies dropped drastically in 2020: -42.55% and -48.25%, respectively, compared to 2019.[54] Still, the MoU managed to preserve its efficiency, given that the percentage of inspected ships with deficiencies remained at 22%, which is not so far from the 23.8%

median of the period under investigation, a fact that reveals the devotion and professionalism of the maritime authorities to carry out their tasks under challenging circumstances.[55]

The situation showed some improvement in 2021 (2,506 inspections, 604 cases of deficiencies, and 24% of ships with detected deficiencies), but the numbers still lacked comparison to the 2012–2019 period (see Figures 1 and 2[a]).[56] However, they seem to have been rectified in 2022, with 3,649 inspections and 1,100 ships with deficiencies.

Another interesting observation over the Covid-19 pandemic (2019–2022) was the drastic rise reported in crew-related detected deficiencies, as shown in Table 4. More specifically, the average of those deficiencies for this period amounted to 18.27% of total detected deficiencies (peak year: 2022–26.21%), almost triple the performance of the previous four-year period (2015–2018, average: 6.55%).

	Crew Certificates*	Living Conditions**	Working Conditions**	Total crew-related deficiencies %
2012	-	2.37%	3.88%	6.25%
2013	-	2.71%	4.55%	7.26%
2014	-	-	1.27%	1.27%
2015	-	0.55%	0.11%	0.66%
2016	-	0.61%	1.46%	2.07%
2017	5.58%	1.75%	4.43%	11.76%
2018	3.80%	2.20%	5.70%	11.70%
2019	3.32%	2.03%	6.75%	12.10%
2020	2.06%	2.82%	6.33%	11.21%
2021	3.85%	7.48%	12.23%	23.56%
2022	3.84%	10.73%	11.64%	26.21%

Table 4. Crew-related detected deficiencies under the Riyadh MoU, as a percentage of all detected deficiencies (Riyadh MoU Annual Reports, 2012–2022).

***The code referring to the crew certificates was only introduced in 2017, so no deficiencies were reported before that year.**

****Over the years, multiple codes have been used by the MoU members to register deficiencies related to seafarers' rights. Specifically, from 2012 to 2014, the codes used were: (a)** *0300–Crew and accommodation (ILO 147)*, **(b)** *0400–Food and catering (ILO 147)*, **(c)** *0500–Working spaces (ILO 147)*, **(d)** *0800–Accident prevention (ILO 147)* **and (e)** *1300–Mooring arrangements (ILO 147)*. **For the period 2015–2016, code 1300 was maintained, while all codes related to the crew's living conditions were included under the newly introduced code** *18300—Labour Conditions—Accommodation, recreational facilities, food and catering*. **Finally, since 2017 and up to this date, three new codes have replaced all preexisting codes, namely: (a)** *1200–Certificate & Documentation–Crew Certificates*, **(b)** *9100–Working and Living Conditions–Living Conditions*, **and (c)** *9200–Working and Living Conditions–Working Conditions*. **For the purposes of Table 4, all deficiencies related to living conditions (0300, 0400, 18300, and 9100) will be listed under "***Living Conditions***," while all deficiencies related to working conditions (0500, 0800, 1300, and 9200) will be listed under "***Working Conditions***."**

The percentage has started to rise since 2017, with a slight rise recorded during 2019, the first year of the pandemic. However, the years accounting for the outbreak's aftermath—notably 2021 and 2022—showcase a significantly higher percentage of crew-related deficiencies, 23.56% and 26.21%, respectively. These findings are consistent with results based on other MoU reports, which, according to Yan et al.,[57] are the product of the fact that port

states became more focused on seafarers' well-being due to the adverse effects of the pandemic, both on their living conditions and their repatriation and on their mental health and stress levels. However, a broader timeframe is necessary to decide whether this shift is here to stay or a passing trend.

IV. Discussion

When assessing the impact of the Riyadh MoU on the region's environmental security, it is important to consider its geographical coverage. This is especially significant since pollution often transcends national borders, particularly in the marine environment. In the GCC area, a semi-enclosed sea that includes two Special Areas under MARPOL and is home to the top crude oil-producing countries of the Middle East, the stakes are even higher.[58] As a result, the absence of two littoral states—Iran and Iraq—from the Memorandum has not gone unnoticed.

Even though ROPME is serving as an institutional link between the MoU's participants and the two remaining Gulf states, the latter's absence clearly creates a gap in the MoU's spatial implementation. And, while Iraq only accounts for 66 km of coastline, Iran boasts a significant 2781 km of coast, making it the state with the longest coastline in the region. Nevertheless, the differences between the two states and the impact of their absence go far beyond the trivial matter of coastline length, actually translating into a series of inconsistencies in inspection protocols, lack of institutional harmonization, and, most importantly, lack of cooperation and exchange of information.

Out of the two, Iraq's contribution to the region's marine environmental protection is less evident. However, the state has started showing institutional commitment. Although it is still not a party to two international regimes listed under the Riyadh MoU, it proceeded to ratify the rest of the instruments related to PSC regulations, though only recently, signing the treaties between 2018 and 2025.[59] Considering that it does not participate in any PCS regime, there is also no accessible record of any inspections conducted in its ports or deficiencies detected.

Iran, on the other hand, is presumably more active in matters related to PSC inspections, having ratified all relevant instruments included in the Riyadh MoU. The fact that it is a member of the Indian Ocean PSC MoU also substantiates that the state occupying the eastern shores of both the Arabian Gulf and the Gulf of Oman is indeed implementing a PSC system. However, any findings that might be of interest to safeguard the region's environmental security are of limited use to the rest of the states in the area since, up to this date, PSC data has been mostly available to the members of a certain MoU,[60] with different MoUs showcasing diverse levels of transparency when publicly sharing inspection results outside their auspices. When combined with the differences in used terminology among MoUs, it is almost impossible for authorities to benefit from the results of inspections conducted by port states outside their MoU.[61]

On that note, and since Annex 10 clearly allows for new additions, the Riyadh MoU could benefit from extending its membership to Iraq and Iran. This would improve both efficiency and harmonization in the MoU's implementation area, especially since the former is currently not participating in any of the existing MoUs. As for the latter, membership in more than one MoU has occurred before.

Institutional cohesion is a more straightforward issue, with the member states' different statuses and ratification dates on several relevant international regimes creating gaps in the harmonized conduct of inspections and threatening the MoU with dissimilar inspection outcomes. This situation also implies that a port authority has to accept that the inspections conducted by other states' authorities are equal to its own or are of adequately high quality, at least for ships that have not been detected with any deficiencies.[62] This is a prerequisite to fulfill the goals of the MoU, which, apart from ensuring that international standards are adhered to by ships entering the area, also entails avoiding unnecessary inspections on the same ship. This is not a problem solely acknowledged in the Riyadh MoU; it is a source of concern in many PSC regimes since inconsistent inspection practices can undermine the effective implementation of regulations and create unfair competition within the region,[63] which could eventually lead to the establishment of Ports of Convenience.

Expanding the list of relevant instruments is also a strategy that could ameliorate the outcomes of the Riyadh MoU efforts to maintain the safety and security of navigation and the environment in the GCC region. The issue has come up at quite a few annual PSC Committee meetings, leading to the addition of three more instruments to the original list.[64] However, several significant conventions already endorsed by other PSC MoUs have still not made the official Riyadh MoU's relevant instruments list.

Among them, the ILO Maritime Labour Convention of 2006 (MLC 2006) stands out. The long-awaited convention, which aims at securing both seafarer's and ship-owners rights and obligations, is an international legal instrument that applies to labor conditions of one of the biggest globalized industries in the world.[65] It also provides Regulation 5.2, which aims at further defining the rights and obligations of port states during inspections. According to Fotteler et al.,[66] as of 2017, the level of ratification of this instrument among the members of the nine MoU regimes operating in the world is quite diverse. Three MoUs have 70% or more of their members who have adopted the Convention, four regimes show medium levels of acceptance, and two, including the Riyadh MoU, have minimal acceptance (50% or lower). Due to the importance of the MLC 2006, there have been efforts under the MoU since 2012 to encourage its members to ratify the Convention, including a workshop offered by the Director of International Labor Standards at the ILO, aiming to present the benefits of the newest treaty.[67] However, as of today, only Oman has ratified the MLC 2006, enforcing it since March 2023.

The MoU has also been encouraging its members to ratify the IMO International Convention for the Control and Management of Ships' Ballast Water and Sediments of 2004 (BWM), an essential instrument for fragile ecosystems such as the Gulfs Area. After the entry into force of the convention for Saudi Arabia, the UAE, and Qatar, the MoU even organized a Workshop on the Ballast Water Management Convention in 2018. Oman also recently proceeded to ratify the BWM (May 2022). However, because the convention is of utmost importance to the marine environment, aiming to control and prevent the transfer of harmful aquatic organisms and pathogens that can significantly impact semi-enclosed seas where water circulation is usually limited,[68] efforts to encourage the two remaining member states to accede should continue.

Additionally, the International Convention on the Control of Harmful Anti-Fouling Systems on Ships of 2001 (AFS 2001) and the Nairobi International Convention on the

Removal of Wrecks (Nairobi WRC 2007) could complete the list. Currently, only Oman and Saudi Arabia have ratified those instruments.

Finally, the Riyadh MoU could also benefit from expanding the regime's spatial implementation to include permission to conduct inspections on ships calling at offshore installations operating in the member states' continental shelf or their EEZ, correspondingly to the EU Directive 95/21/EC of 19 June 1995, which extends that right to its members. According to Article 60 of the LOSC, the coastal state has exclusive jurisdiction over such installations, including on matters regarding customs, fiscal, health, safety, and immigration laws, while a safety zone can be established around the installation that cannot exceed 500 meters in breadth. Applying the right to inspect ships voluntarily calling at those installations could significantly increase the number of inspected ships and reduce the possibility of ships with deficiencies traveling through the area uninspected.

Moving on to the MoU's operational effectiveness, several good practices that are applied by the regime can be credited for impacting the quality and quantity of inspections conducted in the GCC area. More specifically, the MoU has been known to consistently conduct training sessions and workshops for its members' authorities, while there is also evidence throughout the years that PSCOs from the Riyadh MoU were invited and attended training sessions organized by other MoUs. Even during Covid times, the MoU Secretariat continued conducting its training workshops virtually,[69] following the IMO guidelines to eliminate unnecessary risks related to the pandemic, by promoting remote procedures whenever possible.[70]

Additionally, the regime organizes Concentrated Inspection Campaigns (CICs), a coordinated strategy adopted across most PSC MoUs to enhance the focus of inspections thematically. CICs are usually carried out over a fixed three-month period and target specific areas of concern, such as fire safety, compliance with MARPOL, or working and living conditions. These campaigns serve two purposes: raising awareness among ship operators and crews and generating regionally comparable data on compliance in these crucial areas. Inspection officers follow a mutually agreed-upon standardized checklist, ensuring consistency and enabling statistical comparison. Thus, CICs have become instrumental in improving the overall effectiveness of port state inspections by highlighting recurring deficiencies and facilitating future policy adjustments across MoU regions.

Recent academic work has sought to further optimize CICs by applying advanced data analysis tools to better target inspection priorities. Notably, the use of grey relational analysis and TOPSIS (Technique for Order Preference by Similarity to Ideal Solution) could be used as decision-making aids to identify high-risk ships and concentrate inspection resources more effectively.[71] Such models highlight the potential of CICs not only as tools of coordination among MoU participants but also as proactive mechanisms that can help bridge enforcement gaps and maximize the impact of limited resources.

In the case of the Riyadh MoU, while its annual reports confirm participation in CICs—often in coordination with other regional MoUs—it does not appear to publicly disclose detailed strategies or checklists. This contrasts with practices observed in regimes such as the Paris MoU, which not only publishes its annual CIC topics in advance but also shares overall results and evaluation documents after its campaign's conclusion, contributing to greater transparency and data sharing.[72] As such, the Riyadh MoU could benefit from adopting similar practices, which would not only strengthen inspection outcomes but also increase the validity of the regime, regionally and internationally.

One interesting suggestion that has been introduced by the IMO during the Covid-19 pandemic—but shows prospects of becoming a more solid process—is the application of remote procedures by PSC authorities. What began as a guide to implementing safety control measures and reducing risk by conducting inspections remotely when possible,[73] has the potential to become routine with the aid of digitization and technological advancements.[74] This would allow better real-time communication between all interested parties—including classification societies, shipping companies, the vessels' crew, flag states, and port states.[75] It could also enhance accountability of PSC officers, thus lessening the subjective element of individual officers, since all proceedings and results of an inspection would be available online and accessible for review. Finally, it could promote efficiency, by eliminating the time needed to board and physically inspect a vessel or—in the case of PSCOs that are appointed to more than one facility—the time to travel from one port to another. And, while on-site inspections cannot be completely eliminated, remote inspections could be introduced as an alternative to follow-ups—for example, to check certificate renewals—or as a preliminary procedure to determine whether further investigation is required.

Applying a different selection regime could also benefit the Riyadh MoU's contribution to the area's environmental security. Currently using a risk-based selection system to carry out inspections on a specific percentage of all ships calling at their ports, Xiao et al. suggest that the New Inspection Regime (NIR)—originally introduced by the Paris MoU in 2011—might increase the Riyadh MoU's effectiveness in overall detected deficiencies, a notion that its members are presently in the process of developing.[76]

Practically, the NIR readapts the way port state inspections are prioritized. Rather than relying on inspection quotas or random selection, it uses a data-driven ship risk profile to determine inspection frequency and targeting. Ships are categorized as high, standard, or low risk based on multiple parameters including flag performance, company history, prior inspection information, and ship type.[77] The regime then instructs member states to inspect ships according to their risk profile in time intervals that ensure regular and proportionate coverage. As a result, the NIR is designed to maximize the use of inspection resources by focusing the participants' efforts on ships posing the highest risk to the purposes of the MoU.

Such a system could substantially increase both the efficiency and deterrent effect of inspections in the Gulf region. Additionally, it would support creating a banning mechanism whereby persistently high-risk vessels could be denied access to the area, a tool that is currently being implemented in the Paris, Indian Ocean, and Black Sea MoUs.[78]

However, transitioning to the NIR system would entail enhanced efforts by all member states, since, unlike quota-based systems, it primarily requires that every vessel entering the area of application has been inspected by any member state during a specific period of time. It also relies on timely data-sharing and accurate updating of inspection records across port state authorities. These requirements raise challenges for non-legally binding regimes like the Riyadh MoU, which do not impose enforceable obligations on their members. Subsequently, it is ultimately the participating states that will decide whether the new selection regime is a reason to enhance their efforts or not.

Regarding the exchange of information and the harmonization among member states and among different PSC MoUs, the IMO has initiated discussions to create an overarching database with related web services to bolster coordination efforts. The international

organization has also proposed to standardize inspection procedures among all nine MoU regimes, effectively solving the matter of dissimilar standards and processes applied among different ports.[79] The Riyadh MoU has agreed in principle on both of these topics,[80] but it is unknown how long it would take for the database to become operational or to what extent the harmonization is possible when it comes to operational processes, since institutional inconsistencies are still at play. Until then, the Riyadh MoU has proceeded to finalize agreements for data exchange with EQUASIS and IHSM, which has since merged with S&P Global,[81] two independent databases that could vastly enhance information on ships entering the MoU's ports.

It is clear that the IMO initiative would solve the problem of the lack of cooperation with bordering states that participate in other PSC regimes and enhance the existing cooperation among MoUs in general, especially those in neighboring regions. In the case of the Riyadh MoU, apart from the Indian Ocean MoU, the Med MoU is also of interest due to its proximity and the complexity of marine ecosystems, but further cooperation with MoUs in other regions can also be beneficial.

This process has been initiated by giving and obtaining observer's status to other MoUs,[82] which has already resulted in the exchange of know-how in the form of PSCOs attending training sessions organized by other regimes and could escalate to sharing detailed inspection data, a process that would undoubtedly optimize the PSC processes across different regimes.[83] The observer status has also been extended to relevant organizations other than the IMO and ILO, such as ROPME, and could be supplemented by the Regional Organization for Conservation of the Environment of the Red Sea and Gulf of Aden (PERSGA). Such organizations that focus on protecting the marine environment can contribute by sharing scientific knowledge and information with the MoU's members.

If all the IMO's plans consolidate efficiently, especially regarding the harmonization of standards and processes, it is only logical to assume that existing PSC regimes will have less of an institutional role but will definitely maintain the role of coordinating and training their members' authorities. This is a critical aspect of PSC MoUs because the environmental particularities of each area may call for focused efforts and specific CICs in order to be effective and efficient.

V. Conclusions

The analysis above highlights the advancements and ongoing challenges faced by the Riyadh MoU. Operational performance has, indeed, improved over the years and there are signs of alignment regarding the institutional frameworks. However, disparities in member state engagement, capacity, and effectiveness continue to hinder the overall impact of the regime. More specifically, although significant progress has been made on the enhancement of the Riyadh MoU's institutional harmonization, with member states having ratified several relevant instruments since 2004, there are still actions that could be taken on that front. To this end, the 19th annual meeting of the Riyadh MoU Committee, held in February 2022, announced its intention to harmonize inspection standards and processes among member states' authorities,[84] an endeavor that is still in progress.

When examining the Riyadh MoU's operational effectiveness, it is crucial to recall that it is the youngest and one of the smallest PSC regimes established to enhance the enforcement of international regulations regarding safety in the shipping industry, the protection of the marine environment, and the rights of seafarers across the world. With only six member-states, 55 ports, and a combined coastline of approximately 7,200 km,[85] the MoU covering the GCC area has come a long way since its inception, both in operational and institutional effectiveness.

Making a slow start, with no inspections reported during the grace period provided to its members (2004–2006) and limited inspections conducted from 2007 to 2009, the numbers have risen significantly over the following years, seemingly stabilizing around 3,000–3,500 inspections across all members, on an annual basis, between 2012 and 2022. More importantly, the member states seem to have become much better equipped to detect deficiencies in ships entering their ports (see Figure 1), which is one of the main goals of any PSC MoU, and the reason why these regimes are considered central to the environmental security of the area in which they operate.

However, progress has not been proportional among the participating states, with two members, Saudi Arabia and the United Arab Emirates, carrying out the majority of inspections and recording the most deficiencies detected in the region. This uneven distribution may be interpreted as a free-rider problem, an issue that is anything but uncommon in international agreements and is closely associated with environmental regimes.[86] Traditionally associated with the provision of public goods, the free-rider problem arises when actors benefit from the efforts or contributions of others without proportionately contributing themselves.[87] In the context of the Riyadh MoU, this manifests in certain member states—most notably Kuwait and Bahrain—conducting significantly fewer port state control inspections than others, despite formally committing to a shared target, namely inspecting at least 10% of ships calling at their ports.

While the Riyadh MoU is not a legally binding treaty, it does establish a framework for cooperation. However, in the absence of formal legal enforcement mechanisms, compliance relies heavily on mutual trust, political will, and peer accountability.[88] When some states fail to meet their commitments—whether due to limited capacity, lack of prioritization, or other challenges—they nonetheless reap the collective benefits of the regime, which include safer shipping conditions in the region and reduced environmental risks from substandard vessels.[89] Meanwhile, the burden of upholding the regime's credibility and effectiveness falls disproportionately on the more active members. Eventually, this dynamic illustrates a core tension in voluntary regimes such as MoUs: they aim to foster cooperation in the absence of binding enforcement but remain vulnerable to asymmetries in effort and results.

In the context of the Riyadh MoU, while the PSC officers-to-port ratio is one measurable parameter, outcomes resulting from Table 3 show that there are more important aspects that can affect a state's effectiveness. Indicatively, the UAE has the second lowest officers-to-port ratio (0.73) among the MoU members but had the highest inspections with deficiencies ratio in 2022, based on the annual report. At the same time, Saudi Arabia, an equally, if not more, active member, has the highest ratio of officers per port (2.66), which is only slightly higher than that of Kuwait (2.5), one of the lowest performers.

This observation helps remind us that, similarly to the number of inspections, quantitative data are helpful and telling, but there are qualitative aspects that should also be

considered. Apart from the established institutional discrepancies, evidence from other MoUs suggests that differences in the ship selection process, the level of the country's overall development, the professional profile of individual PSC officers, and even the number of officers present per inspection can all differentiate the inspection outcomes among members of the same MoU, or even different ports of the same member.[90] Specifically, in the case of the Riyadh MoU, complexities in harmonization, both institutional and practical, have been identified as a significant problem for its overall effectiveness,[91] making it apparent that the regime would benefit greatly from addressing them.

Oman, in particular, is an indicative example of the need to enhance regional cooperation to ensure the protection of the marine environment of the GCC region. The southern member of the MoU is operationally fairly active, conducting varying numbers of inspections over the years, and is one of the most active participants on an institutional level, being among the first to ratify relevant instruments. However, it has not effectively established the second Special Area recognized since October 15, 2004, under MARPOL (MEPC.117[52]), the Oman area of the Arabian Sea.[92] This struggle stems from the fact that, despite the recognized sensitivity of the area regarding oil contamination, Oman faces challenges in providing port facilities equipped to manage wastes generated by ships, a fact that was accentuated by the Supreme Council's Closing Statement of the Twenty-Seventh Session.[93]

Regarding the impact of the Covid-19 pandemic, this was found to be similar to other regimes around the world, with no calls from passengers' ships at the MoU's ports for a significant part of 2020 and seafarer's rights gaining attention and importance during inspections. However, the region covered by the Riyadh PSC MoU was found to have performed better than other areas in Asia and globally in terms of the number of ships calling ports,[94] a fact that was attributed to the higher demand for goods transferred by cargo ships. The MoU has also managed to maintain a stable effectiveness ratio in terms of the total inspections to ships with deficiencies percentage, indicating that, despite the difficulties faced, the members were able to adapt and rise to the occasion.

Overall, despite the fact that the MoU has been deemed relatively ineffective when compared to its peers,[95] the significance of establishing cooperation in the Gulf area, which has been plagued by discord and mistrust among states for years, is imperative. The importance of strengthening regional cooperation and facilitating further coordination on matters of common interest, such as the environment, is a trait that is much needed in the region and should not be underestimated.

Notes

1. Mentions of the connection and Observer status of the GCC can be found in the *"Forward"* and *"Chairman's Message"* sections of the Riyadh MoU, *Annual Reports, 2012–2022*, https://riyadhmou.org/annual-report/, accessed April 25, 2025.

2. Riyadh MoU, *Annual Report 2004*, Riyadh Memorandum of Understanding (2004), https://riyadhmou.org/annual-report/, accessed April 25, 2025.

3. "Sea Transportation," *The Cooperation Council for the Arab States of the Gulf*, n.d., https://www.gcc-sg.org/en-us/CooperationAndAchievements/Achievements/EconomicCooperation/CooperationintheFieldofTransportationandCommunications/Achievements/Pages/SeaTransportation.aspx, accessed August 20, 2024.

4. Grace O. Vaughan, Noura Al-Mansoori, and John A. Burt, "The Arabian Gulf," in Charles

Sheppard (ed.), *World Seas: An Environmental Evaluation*, 2nd ed., vol. 2, (Amsterdam, NL: Academic Press, 2019), pp. 1–23, https://doi.org/10.1016/B978-0-08-100853-9.00001-4.

5. The Gulfs area—including the Arabian Gulf and the Gulf of Oman—was the first to be established and designated as Special Areas under MARPOL Annexes I (Oil) and V (Garbage). during the adoption of the 1973 MARPOL Convention on November 2, 1973. Annex I entered into force on October 2, 1983, and Annex V on December 31, 1988. Stricter measures were applied to the area after August 1, 2008 (MEPC.168(56)). The second Special Area, the Oman area of the Arabian Sea, was added under Annex I on October 15, 2004 (MEPC.117(52)), but it has not yet entered into force due to the lack of appropriate reception facilities provided by Oman.

6. International EMECS Center, *Environmental Guidebook on the Enclosed Coastal Seas of the World 2015* (Japan: EMECS, 2016), pp. 36–43.

7. Riyadh MoU, *Annual Reports 2012-2022*, Riyadh Memorandum of Understanding, https://riyadhmou.org/annual-report/.

8. Simon Darby, *Rethinking Environmental Security* (Northampton, MA: Elgar, 2022), pp: 1–53, https://doi.org/10.4337/9781800375857; Ken Booth, *Theory of World Security* (Cambridge, UK: Cambridge University Press, 2007), pp. 31–95, 127–148.

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Biographical Statement

Gerasimos Rodotheatos (corresponding author) is an assistant professor of international law and security at the American University in the Emirates, where he also serves as department chair of the BA in security and strategic studies. He received his doctorate in international law and institutions from Panteion University. His writings appear in the *International Hydrographic Review*, the *NMIOTC-MIO Journal*, Oxford University Press, Springer, Routledge and Emerald. His current research interests include law and policy relevant to areas beyond national jurisdiction, international organizations & diplomacy, security, and sustainability & environmental issues.

Vasiliki Alexandra Politi is an ESG communications specialist and PhD candidate at Panteion University, Department of Economic and Regional Development. Her dissertation focuses on sustainability in the real estate sector and the application of ESG frameworks. She holds an MA in international and European environmental law and governance, where she focused her research on the marine environment protection. Her work bridges academia and industry, emphasizing sustainable development and ESG integration in the markets.

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