

Research on Inspection Trend of PSC Organizations based on Typical Indicators

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Abstract

On the basis of the typical indicators, the Port State Control (PSC) inspection trend in different Memorandums of Understanding (MoU) was evaluated. Paris MoU and Tokyo MoU are the most influential PSC organizations in the world. The in-depth research on their inspection particularities will help relevant shipping companies to well prepare for the PSC. This paper analyzes the inspections during recent 8 years and digs up the underlying relations of relevant data based on indicators such as inspection quantity, deficiency category and detention particularity etc. It turned out that the two MoUs shared some universalities but also possessed their own individualities which are closely associated with the characteristics of shipping industries within their own regions. This research would facilitate the improvement of the ship safety management performance.

Keywords

PSC, MoU, Typical Indicators, Ship Safety.

1. Introduction

In March 1978, the M/V AMOCO CADIZ ran aground in France and spilled 230,000 tons of crude oil off the coast, which devastated the local ecological environments. The incident alarmed the whole world and impelled the Paris Memorandum of Understanding (MoU), first MoU on Port State Control (PSC), to be signed which entered into operation in July 1982[1].

Nowadays, Paris MoU and Tokyo MoU are the most influential PSC organizations with the most inspections in the global maritime industry. This paper conducted a research on typical indicators including inspection quantity, deficiency category and detention particularity via PSC data of Paris MoU and Tokyo MoU in recent years. The in-depth analysis of recent updates in the two MoUs was conducted as well. The underlying universalities and individualities found will contribute to research on the PSC's development.

2. Overview of Worldwide PSC Organizations

The PSC is the safety inspection conducted by Port State Authorities on vessels calling their own ports to ensure ships' safety navigation at sea and prevent marine pollution[2]. With the development of the PSC regime, except for USCG who independently conducts inspections in USA, 9 PSC MoUs came into force one after another covering most of the important ports around the world.

As shown in [Table 1](#), since shipping is worldwide, different PSC MoUs were founded due to diversified geographic features in their own regions. Among all these PSC organizations, Paris MoU and Tokyo MoU, being the "senior" MoUs with relatively active regional shipping industry, are far ahead of others in keynote indicators including inspection quantity, professional level and detention number etc. Meanwhile, the two MoUs are bellwether for the

industry and usually take the leadership in special activities, e.g. inspection on new regulations recently entered into force, concentrated inspection campaign (CIC) and transnational combined PSC inspections.

On January 1, 2011, Paris MoU adopted the New Inspection Regime (NIR) and three years later, Tokyo MoU also introduced the similar regime. They changed in their criteria for selection scheme in order to target more on high risk vessels. This paper extracted the dominant inspection data[3, 4] of the two PSC organizations from 2011 to 2018 and carried out research mainly on inspection typical indicators.

Table 1: Worldwide PSC MoU

No.	PSC MoU	Established Time	Region
1	Paris MoU	1982	Europe-Atlantic
2	Vina del Mar MoU	1992	Latin American
3	Tokyo MoU	1993	Asia-Pacific
4	Caribbean MoU	1996	Caribbean
5	Mediterranean MoU	1997	Mediterranean
6	Indian Ocean MoU	1998	Indian Ocean
7	Black Sea MoU	1998	Black Sea
8	Abuja MoU	1999	Africa
9	Riyadh MoU	2004	Arabian Sea

3. Research on Deficiency Data

A comparison between the two MOUs in inspection quantity and quantity of inspection with deficiency has been made. As shown in Figure 1, Paris MoU slowly fluctuated down in inspection data. Tokyo MOU steadily fluctuated up in inspection quantity and generally kept stable in quantity of inspection with deficiency relatively. As to inspection quantity, Paris MoU touched bottom of 17687 in 2013 from the peak of 19058 in 2011 at a decrease rate of 7.19%, while Tokyo MoU climbed up to the summit of 31678 in 2016 from the valley of 28627 in 2011 at an increase rate of 10.66%. In terms of quantity of inspection with deficiency, the former decreased to 9368 in 2018 from 10731 in 2011 at a rate of 12.7% and the latter decreased from 18650 in 2011 to 18091 in 2018 at a rate of 3.0%. From this point of view, it shows that Tokyo MoU has fully surpassed Paris MoU and confirms itself as the most active PSC organization in the world which also matches with the rapid development of shipping economy in Asia-Pacific region.

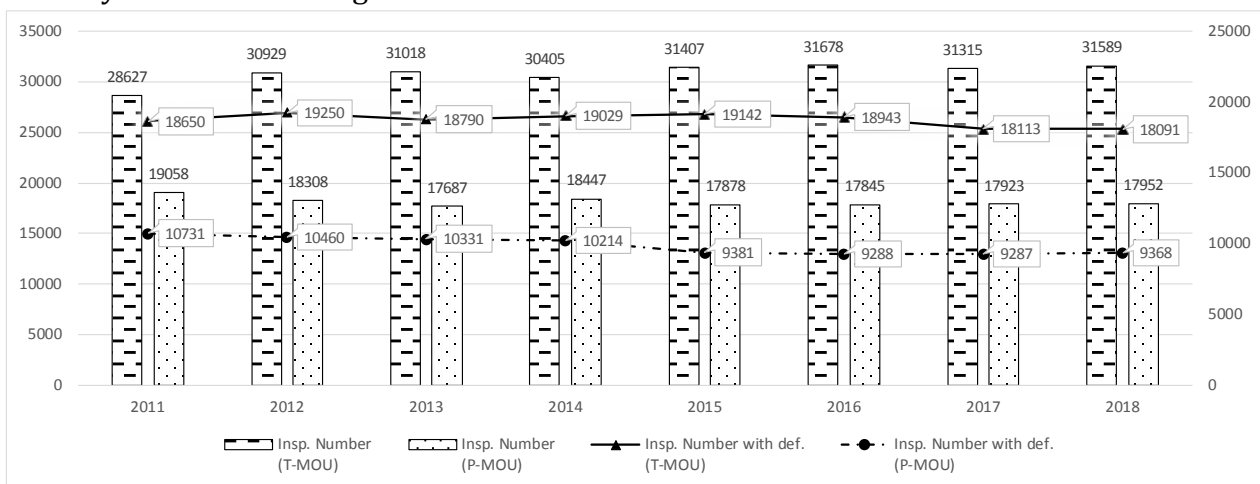


Figure 1: Inspection Number (P-MOU vs T-MOU)

A comparison between the two MoUs in total deficiency quantity and average deficiency quantity per vessel has been made. As shown in [Figure 2](#), total deficiency quantity for both MoUs declined and for average deficiencies quantity per vessel, Paris MoU slowly fluctuated down while Tokyo MoU plummeted. With regards to total deficiency quantity, Paris MoU touched bottom of 40368 in 2018 from the peak of 50738 in 2011 at a decrease rate of 20.58% while Tokyo MoU dropped to bottom of 73441 in 2018 from the summit of 103549 in 2011 at a decrease rate of 29.08%. In terms of average deficiency quantity per vessel, the former decreased to 2.249 in 2018 from 2.662 in 2011 at a rate of 15.51% and the latter fell from 3.617 in 2011 to 2.325 in 2018 at a rate of 35.72%. From the point of view of deficiencies, the total and average quantity are both declining, indicating that vessels' PSC performances are generally improving as a result of enhancement of shipbuilding techniques and vessel maintenance level.

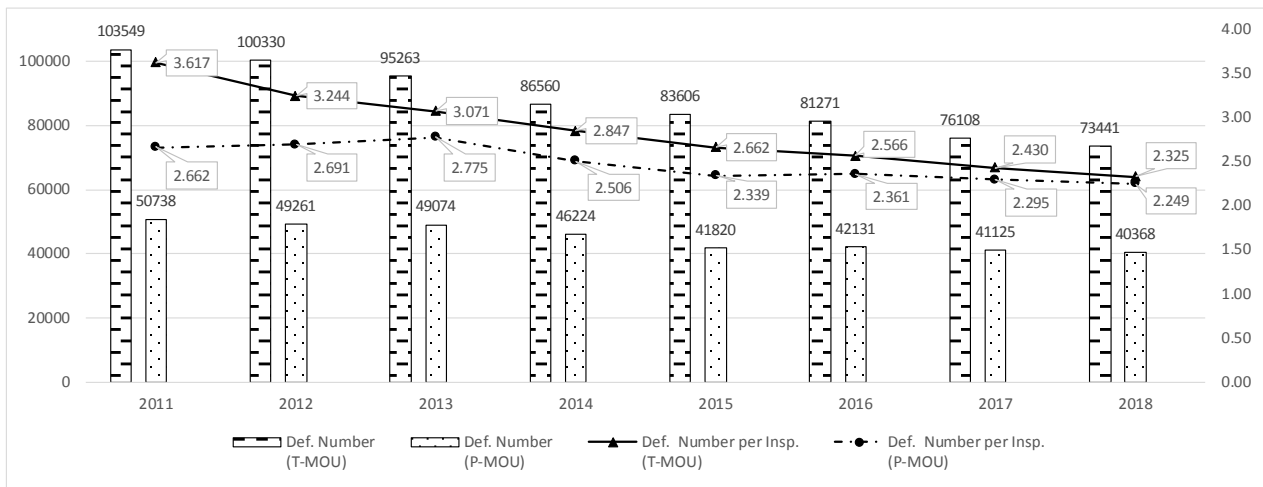


Figure 2: Deficiency (P-MOU vs T-MOU)

A comparison between the two MoUs in deficiencies frequently found has been made. As shown in [Figure 3](#), the ranking for relevant deficiencies held stable for recent 8 years wherein Fire Safety, Safety of Navigation and Life-saving Appliances have been the top 3 deficiencies the whole time. It indicates that although being the focuses in all kinds of inspections, there are still issues in these 3 deficiency items due to poor operation environment and human element etc. For Paris MoU, MLC Title 4, Documents and Ship Certificates were the other 3 deficiencies frequently found of top 6, which apparently shows that it cares more about working conditions and environments of crew onboard, and the maintenance of statutory documents including ship certificates etc. It should be noted that the MLC, 2006 convention didn't come into force until August 2013 and therefore no inspection in this regard were carried out which explained no data situation. For Tokyo MoU, Load Lines, Stability & Structure and ISM were the ones followed top 3, clearly indicating that it pays more attention on the hull related issues like reserve buoyancy, structural stability, and the performance of ISM code in practice. From the point of view of deficiency type, the two MoUs shared universality yet also owned their individuality respectively. In the meantime, quantity of relevant deficiencies was slowly fluctuating down which also matches with the result in [Figure 2](#).

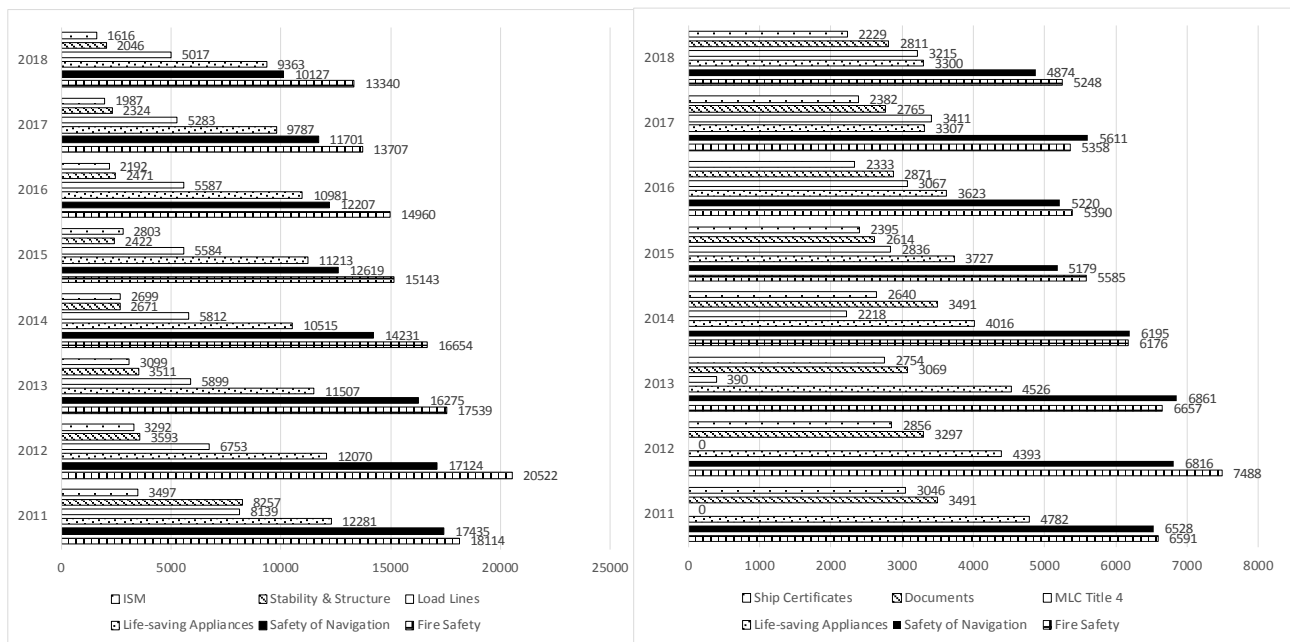


Figure 3: Top Deficiency (P-MOU vs T-MOU)

4. Analysis of Detention Trend

A comparison between two MoUs in detention quantity and detention ratio has been made. As seen in Figure 4, detention quantity in Paris MoU was slowly fluctuating down while same slumped in Tokyo MoU. In terms of detention quantity, Paris MoU decreased to the lowest of 566 in 2018 from the highest of 688 in 2011 at a rate of 17.73% and Tokyo MoU dropped to the bottom of 934 in 2018 from the crest of 1562 in 2011 at a rate of 40.2%. With regards to detention ratio, the former decreased from 3.61% in 2011 to 2.957% in 2018 at a rate of 18.09%, while the latter fell from 5.456% in 2011 to 3.153% in 2018 at a rate of 42.21%. From the point of view of detentions, Tokyo MoU was way higher than Paris MoU yet the number itself also sharply decreased and the two MoUs were approaching to each other in the detention ratio. This confirmed that through long term efforts, vessels in Paris MoU were more stable in operations. High-risk vessels in Tokyo MoU, after repeated PSC inspections, were improved to reach a better and stable status.

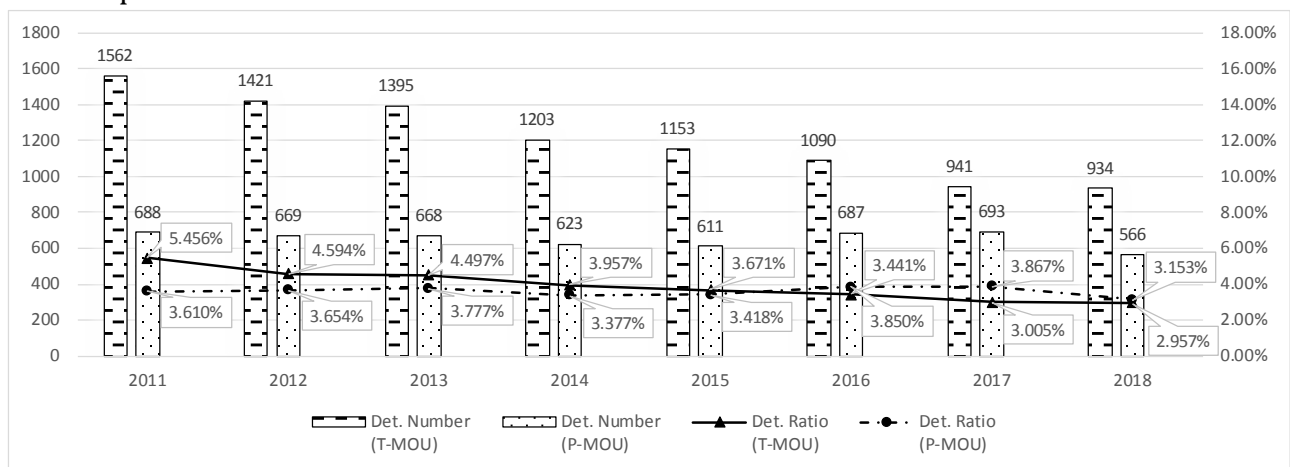


Figure 4: Detention (P-MOU vs T-MOU)

A comparison between two MoUs in detention number of main vessel types has been made. As seen in Figure 5, two MoUs shared the same top 5 vessel types in this regard as General

Cargo Ship, Bulk Carrier, Container ship, Oil Tanker and Chemical Tanker which demonstrates that the cargo transportation structure for international shipping industry holds stable. For Paris MoU, except that Oil Tanker and Chemical Tanker took turns in ranking based on the relatively close detention number, detention number and ranking for all vessel types were relatively and generally stable. For Tokyo MoU, detention number on General Cargo ship dropped sharply and got near to the number of Bulk Carrier. In addition, Tokyo MoU has the same situation in Oil Tanker and Chemical Tanker like Paris MoU does as well. From the point of view of detentions, Paris MoU was more stable yet Tokyo MoU had a clear change which matches with result in [Figure 4](#) as an evidence of improving performance of vessels in Tokyo MoU.

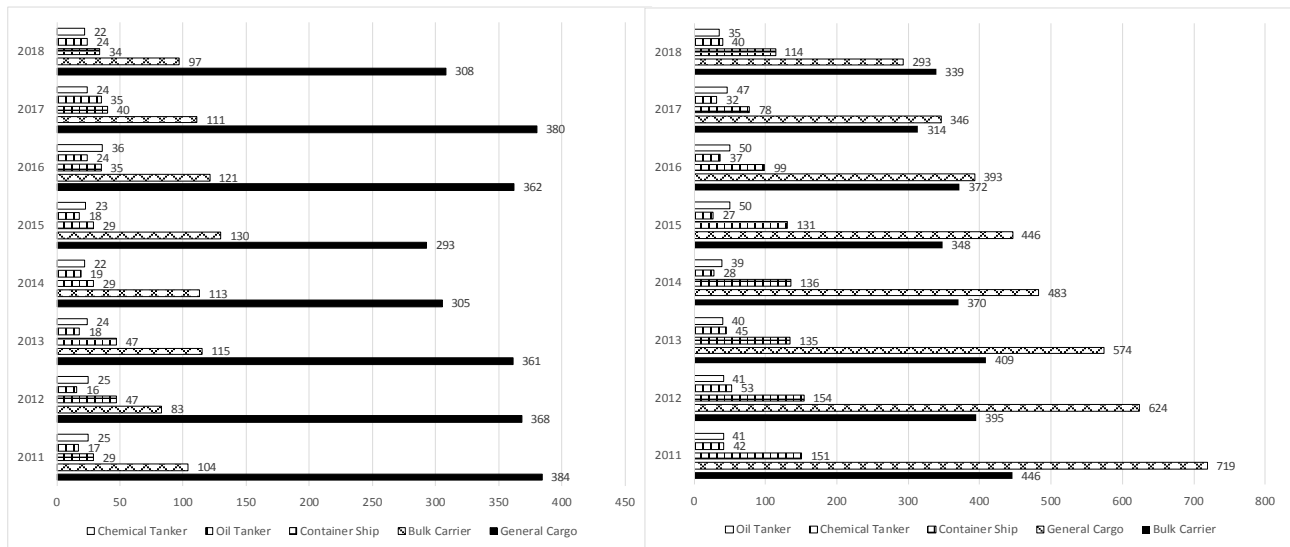


Figure 5: Top Detention per Ship Type (P-MOU vs T-MOU)

5. Conclusion

Except for USCG carries out PSC in USA independently, Paris MoU and Tokyo MoU are the most influential PSC organizations in the maritime industry worldwide[5]. Analysis of relevant typical indicators in PSC inspections helps to find out the trend and updates of the same which facilitates the improvement of vessel safety performance. The research on inspections between 2011 and 2018 will be a useful reference to shipping companies to well prepare for incoming inspections in advance. The findings obtained from the analysis are:

(1) With shipping industry in Asia-Pacific region being more and more active, Tokyo MoU has fully surpassed Paris MoU in all typical indicators. Taking the data of 2018 as example, Tokyo MoU was 1.76 times over Paris MoU in inspection quantity, 1.82 times in deficiency quantity as well as 1.65 times in detention quantity respectively;

(2) After years' efforts, main typical indicators in Paris MOU were basically in stable order. Tokyo MoU instead had a relatively big change in all areas including deficiency quantity per vessel, detention ratio and detention quantity per vessel type etc. However, with the improvement of vessel quality to a stable condition, Tokyo MoU was catching up with Paris MOU in general;

(3) The two MoUs shared surprising consistency in top 3 typical deficiencies frequently found. But for the following 3 deficiencies, Paris MoU emphasized more on working and living environment of crew, maintenance of ship documents and certificates while Tokyo MoU lay emphasis on hull structure and operating of ISM code.

The universality and individuality are concluded from analysis of typical indicators in PSC inspections of two MoUs. The results are helpful reference for research on development of the

PSC regime around the world. For the good sake of facilitating continuous enhancement of maritime safety, further research via big data will be conducted to find out the inherent correlation between typical deficiencies and detentions etc.

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