

**Evaluation of Port State Control (PSC) Performance of Turkish Flagged Merchant Ships in Paris Memorandum of Understanding (MoU) on PSC**

**Türk Bayraklı Ticaret Gemilerinin Paris MoU'daki Liman Devleti Kontrolü (PSC) Performansının Değerlendirilmesi**

Türk Denizcilik ve Deniz Bilimleri Dergisi

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**ABSTRACT**

Today, about 90% of the world commodity trade is carried out by sea and merchant ships are the most important elements of the international logistics, supply and transportation chain. The primary responsibility for ships' safety standards rests with the flag State but PSC provides a "safety net" to catch identify sub-standard ships. Many studies in the literature show that the PSC is a very important tool not only to improve the safety of ships but also to enhance the maritime safety and marine environmental protection. To date, there have been nine regional agreements established on PSC and one of the most important of those is the Paris MoU. In this study, it is aimed to carry out an evaluation of PSC performance of the Turkish flagged merchant ships in the Paris MoU. With this aim, "Excess Factor (EF)" and "Detention

Rate" indicators have been used for carrying out an overview of PSC performance of the Turkish flagged merchant ships in the Paris MoU.

As a result, it has been observed that the Turkish flagged ships have EF values lower than zero between 2008 and 2018 and have a detention rate (2.30% in 2018) below than 3.15% in the Paris MoU, although the detention rates increased extremely in 2015 and 2016 compared to previous years. Accordingly, it seems that Turkish flagged ships have recently a "good" PSC performance in the Paris MoU from the view of both indicators, however, some recommendations for the sustainability of this performance have also been presented.

**Keywords:** Port State Control, Turkish Flagged Merchant Ships, Paris MoU, Maritime Safety, Maritime Business Management.

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## ÖZET

Günümüzde, dünya mal ticaretinin yaklaşık %90'ı denizyoluyla yapılmakta olup ticaret gemileri uluslararası lojistik, tedarik ve taşımacılık zincirinin en önemli unsurlarını teşkil etmektedir. Gemilerin emniyet standartlarına ilişkin birincil sorumluluk Bayrak Devletine ait olmakla birlikte, standart altı gemilerin tespitinde PSC bir "güvenlik ağı" sağlamaktadır. Literatürdeki birçok çalışma, PSC'nin sadece gemilerin güvenliğini artırmak için değil, aynı zamanda deniz güvenliği ve deniz çevresinin korunmasını sağlamak için de çok önemli bir araç olduğunu ortaya koymaktadır. Bugüne kadar, PSC bağlamında dokuz bölgesel anlaşma yapılmış olup en önemlilerinden biri Paris MoU'dur. Bu çalışmada, Türk bayraklı ticaret gemilerinin Paris MoU'daki PSC performansının değerlendirilmesi amaçlanmıştır. Bu amaçla, Türk bayraklı ticaret gemilerinin Paris MoU'daki PSC performansını değerlendirmede "Excess Faktör (EF)" ve "Tutulma Oranı" göstergeleri kullanılmıştır. Sonuç itibarıyla, Türk bayraklı gemilerin 2008-2018 yılları arasındaki EF değerlerinin sıfırına altında olduğu ve 2015-2016 arasında tutulma oranları önceki yıllara göre oldukça artmış olsa da özellikle 2018 yılındaki %2,30'luk tutulma oranının Paris MoU'daki ortalama tutulma oranının (%3.15) altında olduğu görülmüştür. Dolayısıyla, günümüzde Türk bayraklı gemiler Paris MoU'da her iki gösterge açısından da "iyi" denilebilecek bir PSC performansına sahip olmakla birlikte, söz konusu performansın sürdürülmesine yönelik olarak bazı öneriler sunulmuştur.

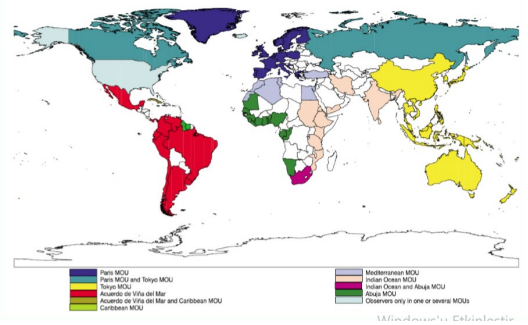
**Anahtar sözcükler:** Liman Devleti Kontrolü, Türk Bayraklı Ticaret Gemileri, Paris MoU, Deniz Emniyeti, Denizcilik İşletmeciliği.

## 1. INTRODUCTION

Port State Control (PSC) is the inspection of foreign flagged ships in national ports to verify that the condition of the ship and its equipment comply with the requirements of international regulations and that the ship is manned and operated in compliance with these rules. The International Maritime Organization (IMO) adopted resolution A.682(17) on Regional co-operation in the control of ships and discharges promoting the conclusion of regional agreements (IMO, 2019). Today, there are nine regional agreements and MoUs established on the PSC:

- Paris MoU
- Tokyo MoU
- Acuerdo de Viña del Mar
- Caribbean MoU
- Abuja MoU
- Black Sea MoU

- Mediterranean MoU
- Indian Ocean MoU
- Riyadh MoU
- United States Coast Guard (USCG) may be accepted the tenth PSC regime.



**Figure 1.** PSC MoUs worldwide (URL-1, 2020)

The Paris MoU covers the waters of the European coastal States and the North Atlantic basin from North America to

Europe and includes 27 member maritime administrations. The Paris MoU's mission is to eliminate the operation of sub-standard ships through a harmonized PSC system and to ensure that the ships meet international safety, security, environmental, working and living standards (Paris MoU, 2020a).

The Turkish flagged ships also visit the ports within the Paris MoU region and inspected by the Paris MoU member port authorities for conducting their commercial activities in maritime trade. As of 31.12.2017, the Turkish flagged merchant fleet consists of 545 ships (1000 GT and above) with a total carrying capacity of 7.6 million DWT, 37.23% of which are bulk carriers, 23% oil tankers, 12.73% dry cargo ships, 14% containers, 5.88% chemical tankers and 6.61% other types of ships. The average ages are 16 for bulk carriers, 15 for containers, 17 for chemical tankers and 14 for oil tankers (IMEAK DTO, 2018).

The aim of this study is to carry out an evaluation of the PSC performance of the Turkish flagged merchant ships in the Paris MoU. The PSC performance of ships in the Paris MoU is important for the relevant stakeholders in maritime trade such as Shipping Companies, ROs, PandI clubs, Flag Authorities etc.

### 1.1. Literature Review

In the literature, there are various studies investigating different aspects of PSC inspections. For example, Anderson (2002) investigated the effects of PSC on sub-standard shipping. Yilmazel and Asyali (2005) analyzed ISPS inspections by using MoU databases. Cariou *et al.* (2007) carried out an econometric analysis of PSC deficiencies noted by Swedish Maritime Administration. Randić *et al.* (2016) analyzed the impact of PSC on safety of maritime navigation and carried out a SWOT analysis. Im *et al.* (2016) focused on the analysis of PSC inspection results of 170 ships that were registered to the Korean Register of Shipping and detained as a result of inspections. Emecen (2016) carried out a risk assessment for the Istanbul Strait using the

Black Sea MoU's PSC data and analyzed the flag States of ships passing through the Istanbul Strait according to different risk levels in her study. Yılmaz and Ece (2017) analyzed the relationship between some PSC variables of the Turkish flagged ships inspected in the Paris MoU and they concluded that %91.7 of the PSC inspections where 5 or more deficiencies was resulted in a detention.

Furthermore, there are also various studies focused on relationship between the performance including PSC inspections of flags of convenience (FOCs), which are considered as the subjects of sub-standard shipping and a risk factor for maritime safety in the world shipping, and the casualty rate of ships flying their flags. For example, Li and Wonham (1999) examined 20-year data of safety records of world's leading 36 fleets in terms of accidental total loss rates and concluded that the FOCs tend toward sub-standard ships. Li (1999) investigated the relationship of accidental total loss rate and PSC detentions and concluded that the detention rates of FOCs were above the world average. Odeke (2006) argues that PSC is a tool that eliminates unfair economic advantages in shipping. According to Li and Zheng (2008), the PSC's mission is to detect substandard ships and prevent marine accidents. Knapp and Franses (2008) analyzed the effect of PSC inspections on the probability of casualty and concluded that the FOC flag States on black list had a higher probability of a serious casualty compared to the flag states on the gray and white lists. Alderton and Winchester (2002) examined the casualty records of the flag States using Lloyd's casualty database and concluded that the FOCs had a worse record than other international registries and national flags.

In the summary, there is a common opinion in maritime literature that PSC significantly contributes to improve the maritime safety and marine environmental protection and it also eliminates the unfair competitive advantages of sub-standard ships (Kaybal,

2018).

## 2. MATERIAL AND METHOD

### 2.1. Flag State Performance Assessment Methodology of Paris MoU

The performance of a flag State is calculated using a standard formula for statistical calculations in which certain values have been fixed in accordance with agreed Paris MoU policy. Two limits have been included in the system, the ‘black to grey’ and the ‘grey to white’ limit, each with its own specific Formula 1 and 2 respectively (Paris MoU, 2020b):

$$u_{black\_to\_grey} = N \cdot p + 0,5 + z \sqrt{N \cdot p \cdot (1 - p)} \quad (1)$$

$$u_{white\_to\_grey} = N \cdot p - 0,5 - z \sqrt{N \cdot p \cdot (1 - p)} \quad (2)$$

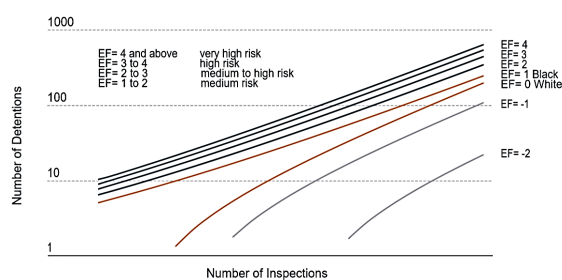
N: number of inspections

p: allowable detention limit (yardstick), set to 7% by the Paris MoU

z: significance requested (z=1.645 for a statistically acceptable certainty level of 95%).

u: allowed number of detentions for either the black or white list.

The “u” results can be found in the Figure 2 which also includes EF graphics depending on the results.



**Figure 2.** EF graphics of the Paris MoU (Paris MoU, 2020b)

A number of detentions above the ‘black to grey’ limit means significantly worse than average (black list), where a number of detentions below the ‘grey to white’ limit means significantly better than average (white list). When the amount of detentions

is positioned between the two, the Flag will find itself on the grey list (Paris MoU, 2020b).

### 2.2. Method of Study

In this study, the “EF” is used as a primary indicator for carrying out an evaluation of PSC performance of the Turkish flagged merchant ships in the Paris MoU between 2008 and 2018, as it is an indicator used by the Paris MoU. Additionally, the “Detention Rate” is also used as a secondary indicator in order to compare the detention rates of the Turkish flagged ships with the average detention rates (inc. all ships inspected) in the Paris MoU between 2008 and 2018.

The EF values of the Turkish flagged ships have been calculated by using the “WGB List and Excess Factor Calculator” (Paris MoU, 2020c) and also verified their compliances with the relevant Paris MoU reports. The yearly average Detention Rates in the Paris MoU have been generically calculated by dividing the number of detentions to the number of inspections, data of which have been obtained from the Paris MoU’s annual reports as well.

### 2.3. Findings

#### 2.3.1. Ship Inspection Activities in Turkey and Paris MoU

In Turkey, the flag State’s ship inspection and certification activities are carried out by the Turkish Maritime Authority (Ministry of Transport and Infrastructure – MoTI) and seven Recognized Organizations (RO) including Turkish Lloyd and International Association of Classification Societies (IACS) member classification societies. Turkey has been conducting a pre-inspection implementation in order to improve the performance of the Turkish flagged ships before they go to foreign ports since 2003. The pre-inspection implementation has been conducted by the MoTI’s own inspectors employed in seventy-one harbour master offices located on the Black Sea and Mediterranean Sea coastline. Turkey has successfully

maintained its position on the white list of the Paris MoU since 2008.

On the other hand, Turkey has also a well-designed Port State Control (PSC) organization in order to fulfil the responsibilities of being a member of both the Black Sea MoU and the Mediterranean MoU. There are more than 150 duly authorized PSC officers of MoTI employed in the harbor Master Offices located on the Black Sea and Mediterranean Sea coastline as well. The PSC activities has been carried out by the PSC officers under the coordination of seven coordinating harbor master offices and under the monitoring of MoTI's Ship Inspection Head Office in Ankara. Turkey also actively participates in the Committee meetings of the Black Sea MoU and the Mediterranean MoU, and strives to improve the effectiveness of regional PSC activities in corporation with other members and MOU Secretariat.

**Table 1.** PSC statistics in the Paris MoU (Paris MoU, 2020b)

Year	Number of Inspections (1)	Number of Detentions (2)	Detention Rate (%) (2) / (1)*100
2018	17,952	566	3.15
2017	17,916	685	3.82
2016	17,842	685	3.84
2015	17,878	611	3.42
2014	18,447	623	3.38
2013	17,687	668	3.78
2012	18,308	669	3.65
2011	19,058	688	3.61
2010	24,058	790	3.28
2009	24,186	1,059	4.38
2008	24,647	1,220	4.95

The harmonized PSC activities have been carried out by 27 maritime authorities in the Paris MoU. Selecting which ships will be

inspected has been made by a central database "THETIS" which is hosted by the European Maritime Safety Agency (EMSA). Table 1 includes number of inspections, number of detentions and detention rates (inc. all ships inspected) in the Paris MoU between 2008 and 2018. The detention rates have been generically calculated. As seen from the Table 1, number of inspections carried out by Paris MoU member port authorities decreased to 17,952 in 2018, while it was 24,647 in 2008. The number of detentions also decreased to 566 from 1,220 for the same years. The average detention rate can be generically calculated by deviding the number of detentions to number of inspections. For example, the average detention rate in the Paris MoU for 2018 was 3.15%.

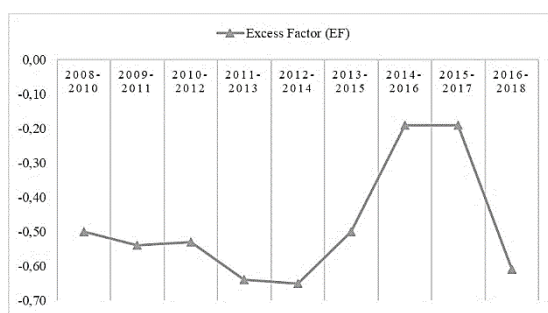
### 2.3.2. Evaluation in Terms of "Excess Factor (EF)" Indicator

According to the Paris MoU's flag State performance assessment methodology explained, the EF is the main indicator on how is a flag State's performance. The flag States on the white list have the highest performance. Table 2 includes the number of inspections, the number of detentions and the EF values of the Turkish flagged ships for 3-year periods between 2008 and 2018. As seen from the Table 2, number of inspections of the Turkish flagged ships decreased to 1,047 in 2006-2018 period, while it was 2,294 in 2008-2010 period. The number of detentions also decreased to 42 from 108 for the same periods. The EF value of the Turkish flagged ships was between -0.50 and -0.60. Turkey has been on the white list of the Paris MoU since 2008, since its EF value is below than zero.

**Table 2.** EF values of Turkish flagged ships in the Paris MoU (Paris MoU, 2020b; 2020c)

3-Year Period	Number of Inspections	Number of Detentions	Excess Factor (EF)	List of Paris MoU
2016-2018	1,047	42	-0.61	White
2015-2017	1,133	59	-0.19	White
2014-2016	1,237	65	-0.19	White
2013-2015	1,324	59	-0.50	White
2012-2014	1,494	61	-0.65	White
2011-2013	1,650	69	-0.64	White
2010-2012	1,930	88	-0.53	White
2009-2011	2,107	96	-0.54	White
2008-2010	2,294	108	-0.50	White

The Figure 3 shows the changes of EF values for each period.



**Figure 3.** Changes of EF values of the Turkish flagged ships (created by Author)

As seen from the Figure 3, the EF values of the Turkish flagged ships were below than zero between 2008 and 2018. The lowest and best EF values were caught in 2012-2014, 2011-2013 and 2016-2018 periods respectively.

### 2.3.3. Evaluation in Terms of “Detention Rate” Indicator

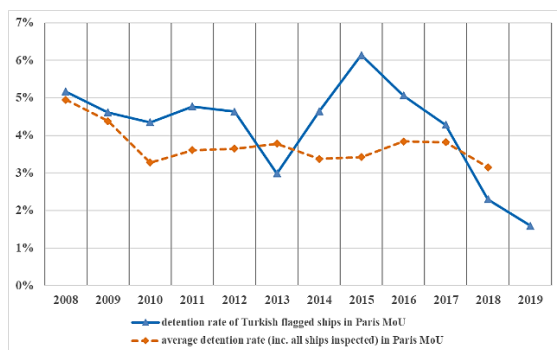
The “detention rate” is the ratio number of detentions to number of inspections. This indicator is useful for comparing the detention rates of the Turkish flagged ships with the average detention rates in Paris MoU. Table 2 includes number of inspections, number of detentions and detention rates of the Turkish flagged ships inspected in the Paris MoU between 2008 and 2019. The detention rates have been generically calculated.

**Table 3.** Detention rates of Turkish flagged ships in Paris MoU (Paris MoU, 2020b)

Year	Number of Inspections (1)	Number of Detentions (2)	Detention Rate (%) (2)/(1)*100
2019	252	4	1.59
2018	304	7	2.30
2017	327	14	4.28
2016	415	21	5.06
2015	391	24	6.14
2014	431	20	4.64
2013	502	15	2.99
2012	561	26	4.63
2011	587	28	4.77
2010	782	34	4.35
2009	738	34	4.61
2008	774	40	5.17

As seen from the Table 3, number of inspections carried out by Paris MoU member port Authorities to the Turkish flagged ships decreased to 252 in 2019, while it was 774 in 2008. The number of detentions also decreased to only 4 from 40 for the same years. The detentions rates of the Turkish flagged ships in the Paris MoU were 2.30% in 2018 and 1.59% in 2019 respectively.

Figure 4 shows a comparison of the yearly changes of both the detention rates of the Turkish flagged ships and the average detention rates in the Paris MoU.



**Figure 4.** Comparison of yearly changes of detention rates (created by Author)

As seen from the Figure 3, the detention rates of the Turkish flagged ships have been below than the average detention rates in the Paris MoU in the last few years. The lowest detention rates for the Turkish flagged ships were caught in 2013 and 2018.

### 3. DISCUSSIONS

The main findings of this study are that the Turkish flagged ships have EF values below than zero between 2008-2018 and have a detention rate (2.30% in 2018) below than 3.15% in the Paris MoU. This situation will probably continue in the 2019 annual report of the Paris MoU, which has not been announced yet. According to both indicators evaluated in this study, it can be stated that the Turkish flagged ships have recently a “good” PSC performance in the Paris MoU, although the detention rates of the Turkish flagged ships increased extremely in 2015 and 2016 compared to previous years.

It is considered that “training and inspection campaign” still conducted by the MoTI has a very important role in this performance so that it monitors and inspects each of the Turkish flagged ships before leaving the country in accordance with the pre-inspection implementation, and carries out planned training activities for designated persons ashore (DPA) of shipping companies and its own inspectors, and participates in International Safety Management (ISM) audits conducted by ROs. In fact, the foundation of the “training

and inspection campaign” was laid in 2003 and has been going on ever since.

As stated by the IMO, the PSC provides a “safety net” to catch identify sub-standard ships and eliminate them. Many studies in the literature also shows that the PSC is a very important tool not only to improve the safety of ships and flag States’ performance but also to enhance the maritime safety and marine environmental protection. There is a concensus in the maritime literature that the PSC contributes for eliminating the unfair competitive advantages of sub-standard shipping as well. In this study, it is observed that the MoTI has an effective ship inspection policy for ensuring the high standart shipping and thus the Turkish flagged ships have been on the white list of the Paris MoU since 2008. In this context, it can also be stated that Turkey, as a flag State of the Turkish slagged ships, contributes to enhance the maritime safety and marine environmental protection in the Paris MoU as well as in other MoUs, since it effectively implements the international maritime rules and thus the Turkish flagged ships have recently a “good” PSC performance in the Paris MoU.

On the other hand, the sustainability of this performance in the coming years is also an important issue. In this study, it has been showed that the “detention rate” as well as the EF is a useful indicator for evaluating the PSC performance of the ships. As a recommendation, the average of previous 3-year detention rates (inc. all ships inspected) in the Paris MoU may be a useful future target for the ships to be inspected in the coming years in the Paris MoU.

Of course, some other indicators rather than mentioned indicators, which can be used for monitoring and evaluating the PSC performance of the ships, may be studied in the future. The other MoUs such as the Tokyo MoU, USCG etc. as well as the Paris MoU, which have different ship inspection and risk assessment systems for the ships, may be studied in the future as well.

#### 4. CONCLUSIONS

In this study, an evaluation of the PSC performance of the Turkish flagged merchant ships in the Paris MoU has been carried out by using the EF and detention rate indicators. The findings have been presented in the Section 2.3 of the study. These kind of studies contribute not only to understand the ships' PSC performance but also to the efforts for enhancing the maritime safety and environmental protection in the global maritime sector.

#### DISCLOSURE STATEMENT

The author declare that there is no conflict of interest.

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