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A study on the introduction of company performance to PSC in the impact of NIR

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A Study on the Introduction of Company Performance to PSC in the Impact of NIR

By

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Declaration

I certify that all the material in this research paper that is not my own work has been identified, and that no material is included for which a degree has previously been conferred on me.

The contents of this research paper reflect my own personal views, and are not necessarily endorsed by the University.

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Abstract

Title of Research paper: A Study on the Introduction of Company Performance to PSC in the Impact of NIR

Degree: MSc

This paper contains mainly three parts: the influence of PSC inspection, the reflecting method of shipping companies and the introduction of company performance factor into the ship targeting system.

First of all, the author illustrates PSC and the new inspection regime, since the NIR brings chances to the current ship targeting system. Furthermore, NIR has great influence on the ship management companies and PSC inspection. Therefore, the chapter 4 indicate the company's strategies in the whole process of PSC inspection.

Second, the paper analysis the current PSC inspection situation in mainly two aspects: detention and deficiency by collecting data from Tokyo MOU and Paris MOU. Thus, the trend and results of implementing the new inspection regime can be saw obviously.

Finally, the article introduce company performance factor to the ship targeting system to perfect the ship selection regime from an quantitive way. In addition, the results of the introduction of company performance factor is calculated and verified in the last case study.

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List of Abbreviation

EU	European Union
IMO	International Maritime Organization
NIR	New Inspection Regime
PSCO	Port State Control Officer
PSC	Port State Control
USCG	United States Coastal Guard

Chapter 1

Introduction

Recent years, have witnessed some major accidents in European waters such as "ERIKA" major oil spill and the "Prestige" shipwreck. The European authorities have realized that the existing PSC inspection regime does not completely prevent sub-standard vessels operating in the waters of the region. To prevent the low-standard ships entering EU waters, the European Union passed the EU maritime safety package of the third set of decrees on 11 March 2009, namely 2009/16/EC.

Corresponding to the new EU ports decree, Paris MOU Committee held its 42nd meeting on May 18-22, 2009 in Reykjavik, Iceland, adopting a new PSC inspection mechanism - NIR (New Inspection Regime), which was officially launched on January 1, 2011.

NIR is a target assessment mechanism based on risks, to filter and inspect ships based on points, differential treatment approach for low-risk and high-risk vessels, for high-quality, low-risk vessels will reduce the burden on port State inspections, while the high-risk ships will take a more thorough and frequent inspections. NIR takes advantage of the historical inspection data, widely considering and absorbing the ship itself operational safety factors involved in all aspects, the application of risk profile evaluation mechanism, to further strengthen the credibility of the shipping industry management level, effective incentives to improve safety management level of the ship itself. NIR reinforce the transparency of inspections, promoting the establishment of uniform standards of law enforcement, carrying out coordinated port state control inspection work within the region, reasonable allocating of port state control inspection resources.

1. 1 Background

Port State Control (PSC) is the inspection of foreign 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(IMO). Under International Law the concept of Port State Control embraces the requirement of a foreign vessel not only to comply with the laws of its own flag state but also those of the Port State(Ambrose, 2004, p.88). The MOUs invoke international instruments that are legally binding for states(Paris MOU, 2009). Their aim is to eliminate the operation of sub standard ships through a harmonized system of port state control(Dr.Z., 2009, p. 211).

On May 22, 2009, at its 42nd meeting, the Paris MOU Committee has agreed on the New Inspection Regime (NIR) of Port State Control, which was formally implemented on January 1, 2011(Liu, 2011, p.14), that is to say, from the beginning of 2011, the Member States of Paris MOU will be based on the New Inspection Regime for the implementation of Port State Control inspections to foreign ships to the port.

The New Inspection Regime changes in many ways compared with the previous ones, such as establishing a new ship risk assessment model, first incorporating ship management company's performance into the ship risk assessment system, adding orders to prevent the entry of low-standard ships etc.

In addition, in the new inspection regime, the performance of the ship management companies is the first time being evaluated and is integrated into ship management risk assessment factors. The situation of each ship in the fleet is relevant element when evaluating the company.

The port state control system is operating under two major systems around the world. One is the group of regional-based memorandums of understanding, and the other is the independent United States port state control system.

1.2 The Relationship Between PSC and Selection of Ship

Flag State control reflects the marine management responsibility of the Flag State to ships. However, PSC reflects more about the national sovereignty, is a way of controlling foreign ships by Port State maritime authorities and undertaking the task

of eliminating low-standard ships. PSC agencies fully consider ship relevant factors to select and determine target ship, according to the requirements of MOU(Yao, 2008, p.95).

PSC inspection contains two parts: selecting boats and inspection. The inspection can be divided into initial inspection and review inspection, thus, selecting boat is the basic and precondition of initial inspection. Selecting the target vessel, in essence, is to address the growing demand for foreign ships to carry out inspections upon arrival, which is against limited resources of the maritime authorities of the port states. Maritime authorities of the port states visit foreign ships according to their actual situation and focus, using a systematic approach that may affect the safety of the ship quantitative assessment of risk factors, which is a process of implementing PSC inspection for selecting ships of high-risk level.

1.3 Selecting Ship Regime and Selected Ship Model

In order to standardize and harmonize the risk assessment process for foreign ships arriving at ports, the PSC MOU organizations and maritime authorities of the port States establish their own selection regime. The selected ship regime defines the priority for the inspection of the ship. In general, ships under the provisions of the first priority level must be inspected, ships under the provisions of the second priority level may be checked and other ships might be checked randomly.

Priority of ship inspection is usually determined in two ways, first by the PSC MOU organizations and port state certain requirements on ships to be checked first. For example, the general organizations of the memorandum will list ships when entering port occur collision, stranding, and sitting at the bottom, as the first priority, suggesting that they must be inspected. This situation is relatively simple, just following the documentation requirements, and there is no necessity for further study. Another situation is that making quantitative analysis of possible risks for arriving ships based on the selected ship model developed by the Port States. According to the results of quantitative analysis, organizations can identify ships that need or possibly need inspection. This article focuses on the ship target system, a ship selection model used by the Tokyo MOU and our country currently.

Selected ship model is the mathematical model to quantify the possible risk of arriving foreign ships, in accordance with their actual situation and focus, combined with the past PSC inspections corresponding data, using mathematical modeling approach. A scientific and appropriate ship model directly determines whether the possible risks assessment of arriving foreign ships is comprehensive and scientific, and thus indirectly determines the results and efficiency of port state control inspections. Hence, to some extent, the selected ship model is the core of ship

selection regime.

1.4 Domestic Researches on Selected Ship Model

China maritime management department has began PSC inspection work in the early 1900's. In March, 1990, the Harbour Superintendency Administration issued the "People's Republic of China ship safety inspection rules", on July 1, authorized nine harbour superintendency organizations(Dalian, Tianjin, Qingdao, Lianyungang, Shanghai, Ningbo, Guangzhou, Zhenjiang) to commence safety inspection on foreign nationality ships. In April, 1994, China officially became the member of Tokyo MOU organization. After years of development, China PSC level has improved a lot, and has played an important role in eliminating low standard ships, ensuring ship safety and preventing pollution. At present, China has established its own port state control information center processing selection of ships. The current selection ship model of China Maritime Administration quotes the ship targeting system of Tokyo MOU. The difference is that the value of the ship targeting factor is calculated without considering the remaining deficiency targeting factors.

The research of PSC ship selection regime and model began late in China and to date there has been no professional monograph in this field. Since the end of last century, domestic scholars gradually used comprehensive evaluation grade method to research the significance of the PSC inspection. At the beginning of this century, some domestic scholars and graduate thesis began to use BP neural network, fuzzy inference system, AHP and multi-level fuzzy comprehensive evaluation method selected PSC conducted quantitative research ship models(Bao&Liu, 2011, p.15).

In the last two years, with the implementation of the NIR of Paris MOU, more and more inspectors and marine workers have started to study PSC selected ship model, which compares the characteristics, pros and cons among the Paris MOU, the Tokyo MOU and the United States Coastal Guide to provide some corresponding advice.

The above research has made a great effort to develop PSC activities in China, offering good ideas for our nation to found a selected ship model.

1.5 The Purpose and Contents of The Study

Although the ship target system of Tokyo MOU and the current ship target system of our nation have made a great effort in recognizing low-standard ships and improving the level of performance of shipping companies, the system does not consider about

the significant position of shipping management factor and human factor in ship security. The author theoretically analyzes the influence of the NIR from different aspects and corresponding measures of shipping companies.

The article analyze the statistics of PSC inspection in the last several years and discover the trend of the detention rate for one thing. The author provides the introduction of company performance factor into the ship targeting system of PSC and establish a quantitative model of company performance based on the history inspection data of company's fleet. The article verifies that the introduction of company performance factor into ship target system, a more reasonable and effective system, is more helpful to distinguish the low-standard ships by the last case study.

Chapter 2

The New Inspection Regime

This new inspection regime(NIR) of PSC is based on the PSC Act (Directive 2009/16 / EC on Port State Control) which is one of the third set of EU maritime safety package Act(3MSP) to establish, according to the consignation from the European Commission (EC) of the commission to the European Maritime Authority (EMSA) instead of the Paris MOU. As early as 1995, the Paris MOU PSC inspection mechanism has been incorporated into the EU legal system, therefore, once established the NIT was adopted(Ning, 2011, p.28).

2.1 The New Risk Evaluation System

The new evaluation system is no longer in use for ship "target factor value", and the factors that may affect the ship safety and pollution are put into two categories, namely Generic Factors and Historical Factors(Yi, 2011, p.63). Then, the system is derived ship VaR through a comprehensive assessment of these two factors. Particularly, the new system for the first time contains the performance of ship management companies within the general factor. According to the risk value, the

ship is divided into three level of risk: Low Risk Ship (abbreviated as LRS), Standard Risk Ship (abbreviated as SRS) and high-risk vessels (abbreviated HRS).

Table 1 show the ship profile scheme, so we can estimate the following:
High risk ships(HRS): risk value>5
Low risk ships(LRS): meet all the requirements set out in the low risk ship column
Standard risk ships(SRS): ranging between the high risk and the low risk

It is worth mentioning that, when calculating the number of defects, each of the ordinary defects counted as 1 point, and the ISM defects will count as 5 points. Calculated detention rate and deficiency rate will be under the jurisdiction of the EU regional average detention rate and the deficiency rate for comparison(Fu&Zhou, 2011, p.427). According to the comparison, results are divided into more than, less than, and equal to the average. It should be noted that any ships pf ISM management company is denied into port in the past 36 months, the management company's detention rate will be automatically marked as above average detention rate(Wei & Zeng, 2011, p.8).

Table 1-Ship Risk Profile Scheme

				Profile			
				High Risk Ships (HRS)		Standard Risk Ship (SRS)	Low Risk Ship (LRS)
Generic Parameters				**Criteria**	**Weighting points**	**Criteria**	**Criteria**
1	Type of ship			Chemical tankship Gas Carrier Oil tankship Bulk carrier Passenger ship	2	Neither a high risk nor a low risk ship	All types
2	Age of ship			All types > 12y	1		All ages
3a	Flag	BGW-list		Black – VHR, HR, M to HR	2		White
				Black - MR	1		
3b		IMO Audit		-	-		Yes
4a	Recognized Organisation	Performance	H	-	-		High
			M	-	-		-
			L	Low	1		-
			VL	Very Low			-
4b		EU recognised		-	-		Yes
5	Company	Performance	H	-	-		High
			M	-	-		-
			L	Low	2		-
			VL	Very Low			-
Historic Parameters							
6	Number of def. Recorded in each inspection within previous 36 months		Deficiencies	Not eligible	-		= 5
7	Number of Detention within previous 36 months		Detentions	= 2 detentions	1		No detention

Source: Korean Register of Shipping, 2011, *PSC Annual Report 2011*.

2.2 Assessment to the performance of shipping management companies

In the new inspection regime, for the first time, the performance of ship management companies(ISM requires shipping companies) is included into its risk assessment factors. The status of every ship in the fleet is the factor that the company should consider when evaluating. As a result, the company's performance linked to its managed vessels, truly reflects the company's overall safety and pollution prevention management level. Therefore, the chance that the requirements of company's ISM audit documentation are inconsistent with the ship's actual situation has been largely reduced.

Table 2-Evaluation of the Performance of Ship Management Companies

Deficiency indicator	Detention indicator	Company performance
> average value	> average value	Very low
>average value	Average value	Low
>average value	<average value	
Average value	> average value	
<average value	>average value	
Average value	Average value	Medium(if ships never get an inspection, then the performance is moderate)
Average value	<average value	
<average value	Average value	
<average value	<average value	High

Source: the Author

Note: deficiencies found in ship inspection belongs to ISM deficiency, each value of deficiency is 5, others is 1.
If there is rejection record in the ships managed by the company, then the record is higher than the average value in the detention indicator column.

2.3 The Chances of the NIR

2.3.1 The New Ship Inspection Intervals

The NIR take targeted ship inspection intervals for different risk levels of the ship, the inspection priorities and inspection category. Its purpose is to increase the frequency of inspections of high risk ships, intensity and scope, forcing them to either strictly comply with and implement safety and pollution prevention measures or not to enter the EU zone(Wang, 2011, p.67). Meanwhile, significant encouragement and incentives could be taken to the low-risk vessels such as extending the inspection interval, even if it is just a general initial inspection during inspection.

Table 3-The New Ship Inspection Intervals

Ship's risk level	Inspection interval
HRS	5-6 months
SRS	10-12 months
LRS	24-36 months

Source: the Author

2.3.2 The New Inspection Priority

In the NIR, the level of risk for all ships determines the inspection order (Inspection Priority), divided into the first stage (Priority I) and the second stage (Priority II). Ships that belong to the first inspection order should be inspected, regardless of the level of risk; ships which belong to the second inspection order could be inspected. The inspection priority is divided as follows:

Priority I : ships that has received no inspection from all the inspection window during inspection time
Priority II: all ships in inspection time within the inspection window, except the ships that belong to Priority I.

If ships do not belong to the above two statuses, yet have overriding factors, then they belong to Priority I; or ships have unexpected factors, then they belong to Priority II. Overriding factors include: ships clarified by members of Paris MOU, collision or

grounding of incident ships, ships with illegal collocation, ships of unsafe operation, ships whose ship class is suspended or revocable and ships with no record in the data base. Unexpected factors include: ships reported by pilots, VTS, captain, seafarers or other parties, ships without the required report, ships with uncorrected deficiencies, detained ships three months ago, ships existing problems in cargoes, RO accreditation removed by the EU.

After this division of the inspection level, not only the arbitrariness of the ship selection can be reduced, the inspection coverage rate can also be ensured.

2.3.3 The New Inspection Category

In the NIR, inspection category consists of initial regular inspection, more detailed inspection and expanded inspection. Additional inspection is also included. Table 4 shows the inspections of different levels of ships.

Table 4-The New Inspection Category

<table>
<tr><td colspan="2" rowspan="2"></td><td rowspan="2">Ship risk level</td><td colspan="3">Inspection category</td></tr>
<tr><td colspan="2">Regular inspection</td><td>Initial inspection</td><td>More detailed inspection</td><td>Expanded inspection</td></tr>
<tr><td colspan="2" rowspan="3"></td><td>HRS</td><td>Not applicable</td><td>Not applicable</td><td>Applicable</td></tr>
<tr><td>SRS</td><td rowspan="2">Applicable</td><td rowspan="2">If there is clear evidence</td><td rowspan="2">If it is HRS and its age is over 12 years</td></tr>
<tr><td>LRS</td></tr>
<tr><td>Overriding factors</td><td>Additional inspection</td><td>Ships for all risk level</td><td>Not applicable</td><td>Applicable</td><td>For HRS and its age is over</td></tr>
</table>

Unexpected factors					12 years, then based on the PSCO professional judgment

Source: the Author

2.4 New Add Banning Measures

The NIR regulates that all types of ships that are in the following situations will be forbidden to enter the ports and anchorage that belong to EU water zone.

1. The flag state is in the black list of the Paris MOU, and the ship has been detained three times or more in the last thirty-six months.
2. The flag state is in the grey list of the Paris MOU, and the ship has been detained three times or more in the last twenty-four months.
3. Ships navigate against the detention designated or do not sail to the ordered maintainance port.

Once the ship is detained, the ban can be removed only by the following three items:

1. If a ship is banned for the first time, then the ban can be removed at least three months after the ban is announced.
2. After the first ban, the ship has been detained many times in the Paris MOU zone resulting in the second detention, the second ban can be withdrawn at least twelve months later.
3. If the ship has been rejected twice, and is once again banned caused by detention, no matter how the flag state performs, the third ban can only be removed at least twenty-four months after the ban is announced.

In addition, before the expiration of the ban prohibits, the ship should satisfy all the following items:

1. The flag state is in the list of white list
2. Ship's statutory certificates and the class certificate are issued by an organization recognized by the EU
3. The performance of ship's management company is highly approbated by the EU.
4. The ship has accepted and passed the review of members of the Paris MOU,

and the nature of the review is expanded inspection.

All the ships that have already been banned three times or more, once detained, will lead to permanent ban to enter into the EU water zone.

Chapter 3

Overview of PSC status

From the annual report of PSC in the Asia-Pacific region, in 2012, 30,929 inspections, involving 16,439 individual ships, were carried out on ships registered under 101 flags. Out of 30,929 inspections carried out by the member Authorities of the Tokyo MOU, there were 19,250 inspections where ships were found with deficiencies. Since the total number of individual ships operating in the region was 24,019, the inspection percentage in this region is 68% in 2012. In 2011, 28627 inspections, involving 15771 individual ships, were carried out on the ship registered under 103 flags. And given the total number of individual ships operating in the Asia-Pacific region of Tokyo MOU was 23268, the inspection rate is 68% in 2011 in the region. Statistics show that 14536 individual ships received inspections in 2010. The total number of individual ships operating in the region was 22058, so the inspection percentage was approximately 66% in 2010. It is obvious to find the increase of the number of inspections and the growth of the inspection rate. As it shows in Figure 1, the trend of the inspection percentage in the last three years

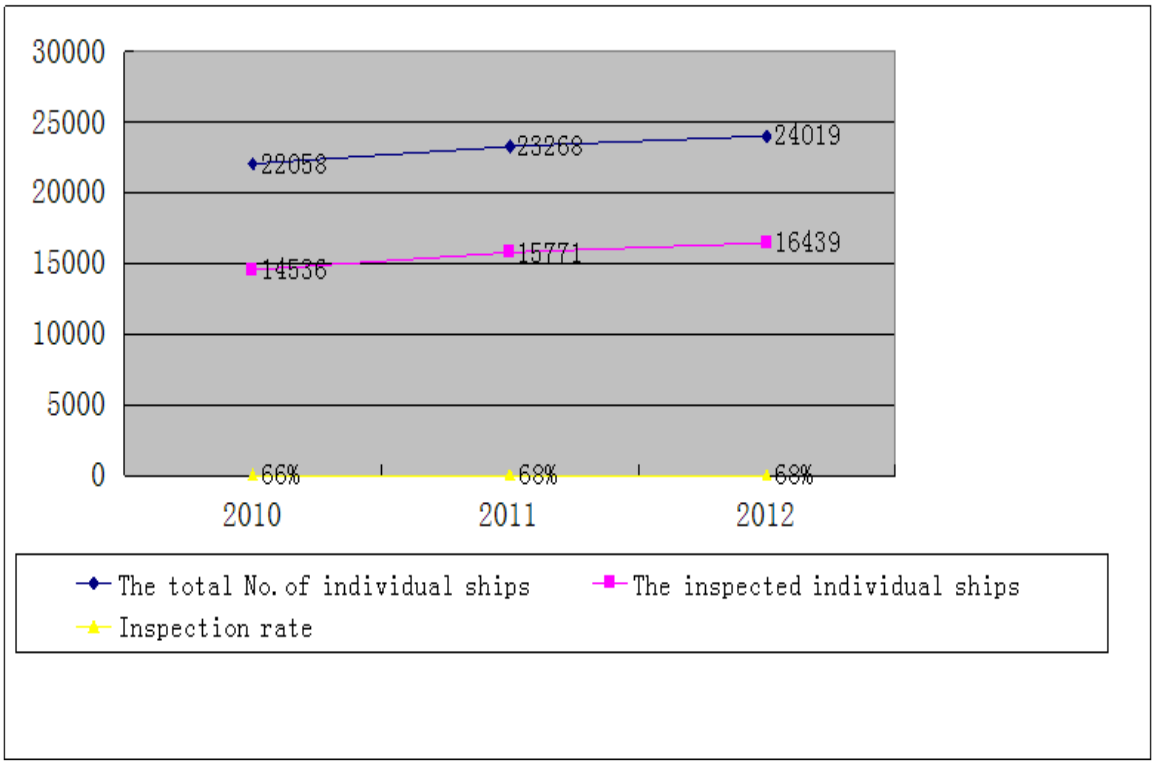

Figure 1- The Inspection Percentage From 2010 to 2012

Source: the Author

Figure 2 gives the clearer illustration of each member states of Paris MOU.

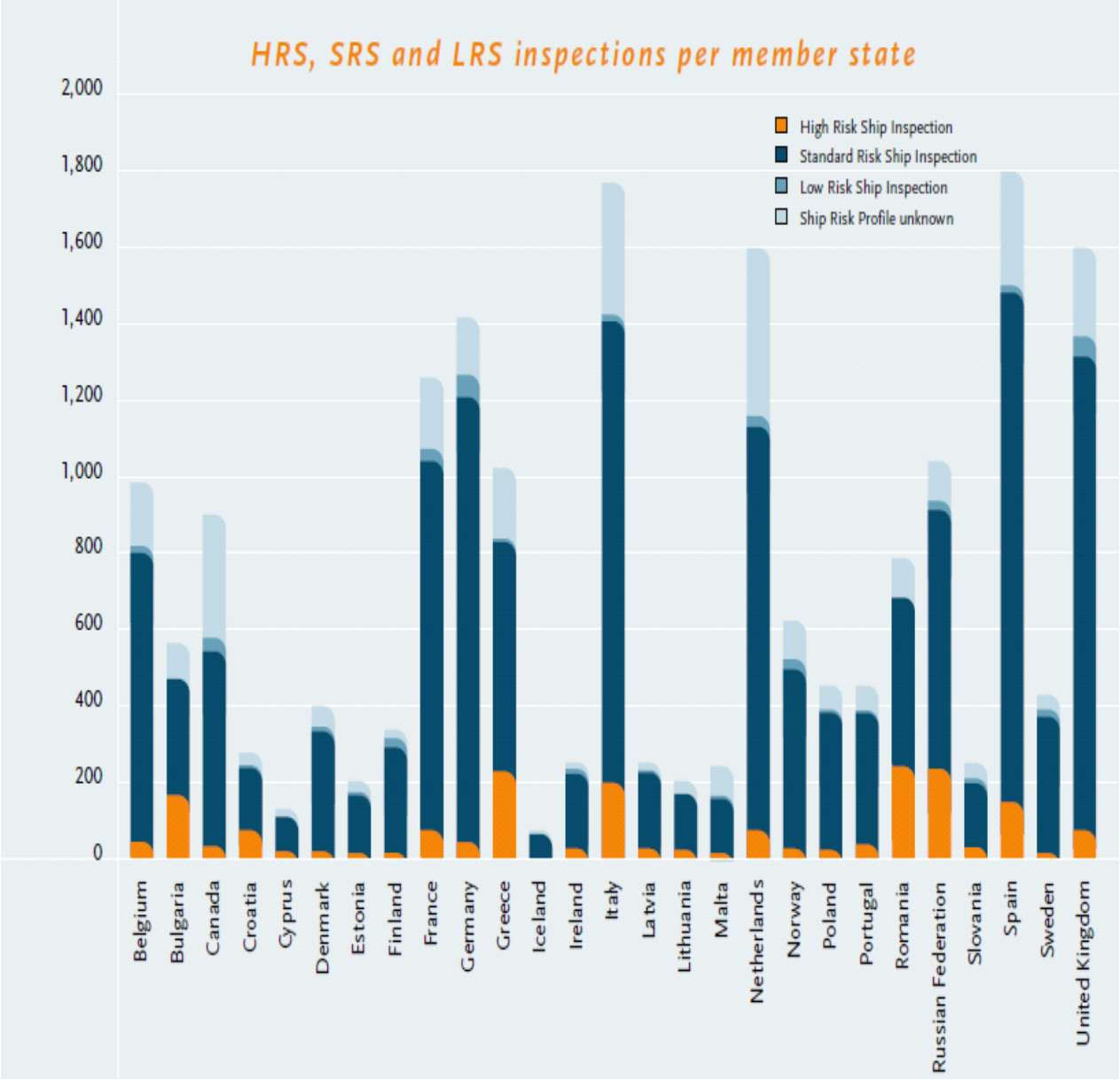

Figure 2- HRS, SRS and LRS Inspections Per Member State of Paris MOU

Source: Annual report 2011 on Port State Control of Paris MOU

3.1 Detention Rate of PSC

In 2010, the number of annual ship PSC inspection in Asia-Pacific region for the first time is surpassed 25 000, having increased by 12%, compared with 2009 and 16% compared with 2008. In 2011, PSC inspection achieves sustainable development, the number of ship is 28 627, up 11% (see Table 5). Moreover, with the tireless efforts of the Member States of the Paris MOU and the diversification PSC inspection means, the number is expected to be further increased.

Table 5- PSC Inspection Statistics in Asia-Pacific Region From 2008 to 2011

	year	2008	2009	2010	2011
	Number of inspections	22152	23116	25762	28627
	Number of deficiencies	89478	86820	90177	103549
	Number Of Deficiencies about fire safety	14796	14619	15998	18114
Quantity of deficiencies	Number of Deficiencies about lifesaving	11491	12131	11077	12281
	Quantity of deficiencies on safety navigation	15438	14207	15648	17435
	Number of detention	1528	1336	1411	1562
	Detention rate	6.91%	5.78%	5.48%	5.46%

Source: the Author

During 2011, there are totally 103,549 times deficiency records of all causes ships in the Asia-Pacific region, and the number exceeded 100,000 for the first time (see Table 5). Out of these, 1,562 ships registered in 61 flag States were detained, and the detention rate is 5.46% (see Figure 3). Figure 3 also shows the fluctuation in the last ten years. Although the number of implementation of inspections is increasing, but the detention rate is showing a declining trend, which indicating that seafarers, shipping companies and ship owners have made some effort in order to successfully pass PSC inspection.

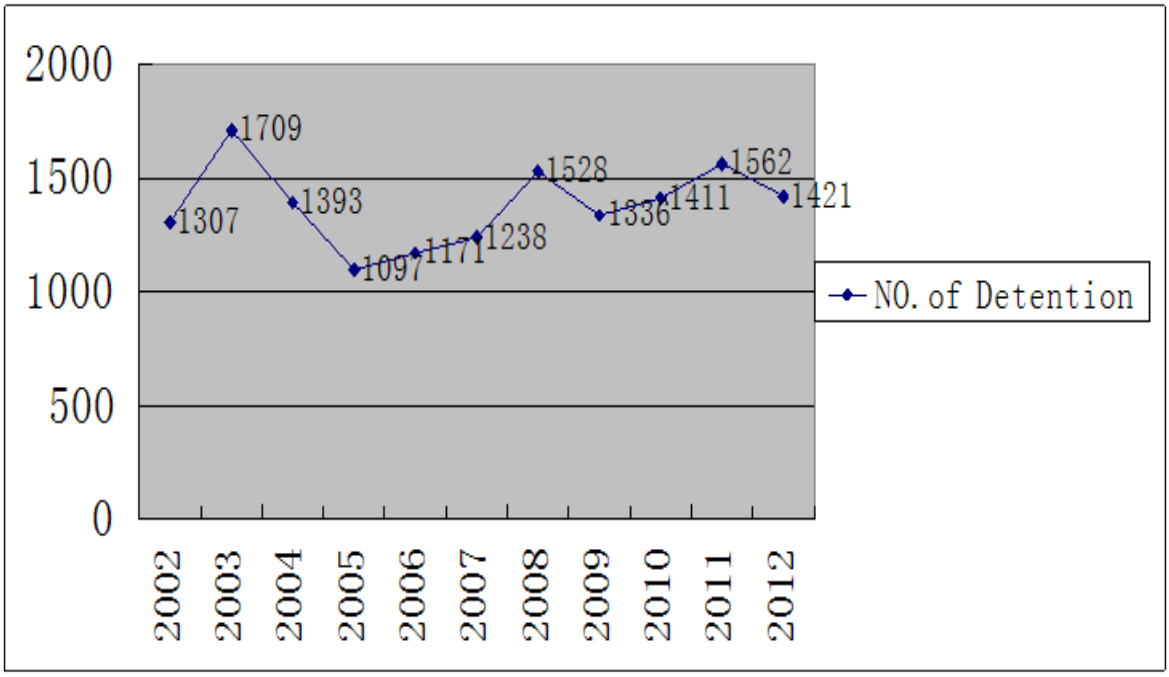

Figure 3- NO. of Detention From 2002 to 2012 in Tokyo MOU

Source: the Author

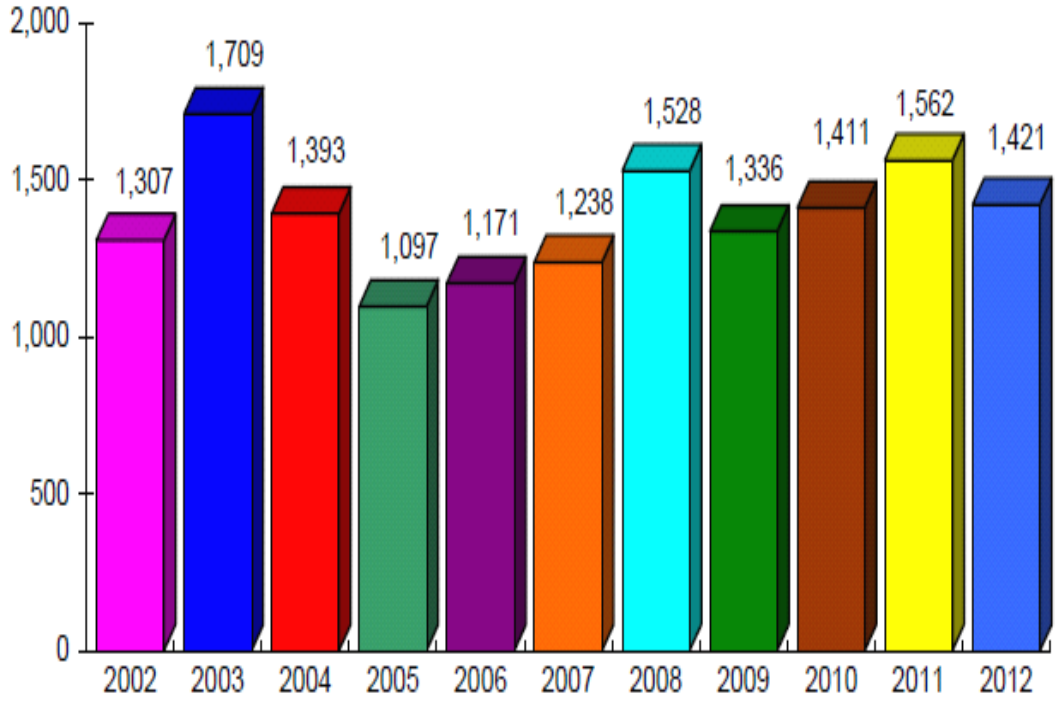

Figure 4- Detention Rate by Year in Tokyo MOU

Source: Tokyo MOU (2012). Annual report on PSC in Asia-Pacific Region of Tokyo MOU

3.2 The Status of Deficiency

Recorded in 2009, the number of deficiencies was 71911, in 2010 was 64698, in 2011 was 50738. So the year of 2011 saw a decrease of deficiencies of 22% compared with 2010 and we can make the following linear chart to obviously see the decreasing trend of deficiency (see Figure 5).

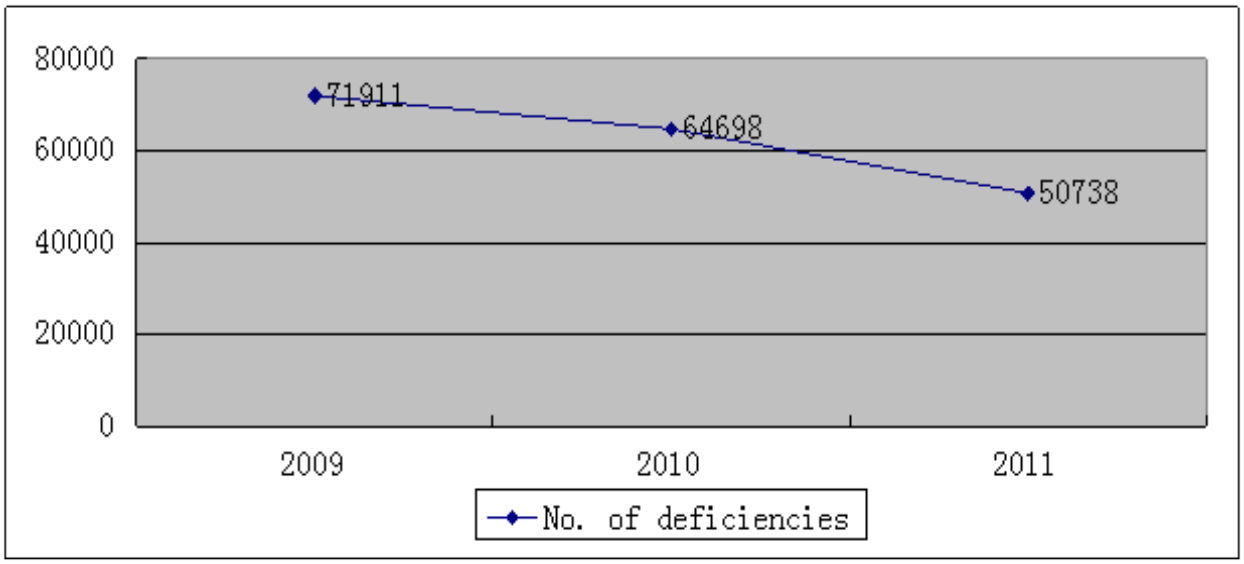

Figure 5- Deficiency 2009-2011 in Paris MOU

Source: the Author

3.2.1 The Main Deficiency Category

The main types of deficiencies are fire safety, lifesaving and safety navigation. In 2011, the total number of 18114 deficiencies related to fire safety appliance was recorded. The number of 12281 deficiencies in life saving appliance was recorded. The number of 17435 deficiencies in safety navigation was recorded. The three types of deficiencies that accounted for the proportion of the total number of deficiencies were 46.2% in 2011, 47.4 in 2010, 47.2% in 2009. The statistics is similar to that in 2012 showed in Figure 6. As we can see, recent years, the number of the three types of deficiencies is almost half of the total number of deficiencies; therefore, ships should enhance these aspects to receive the PSC inspection and to reduce detention rate.

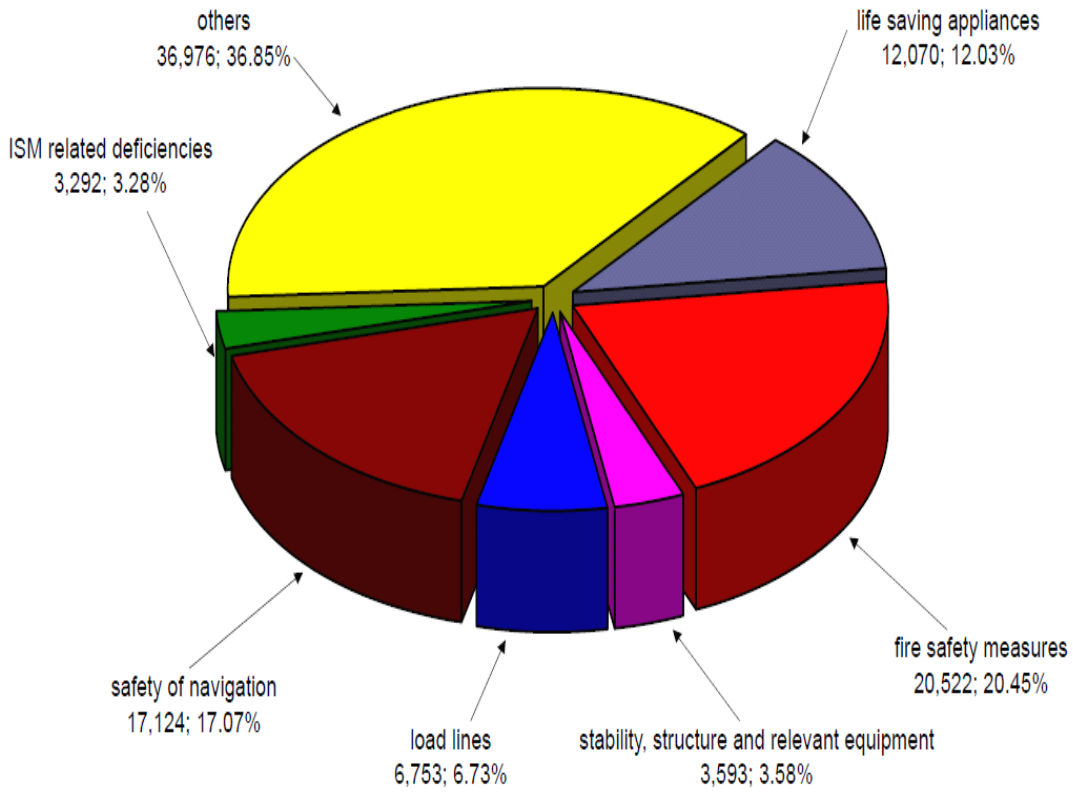

Figure 6- Deficiencies by All Main Categories 2012

Source: Tokyo MOU (2012). Annual report on PSC in Asia-Pacific Region of Tokyo MOU

Figure 7 shows that the number of deficiencies in the last ten years and the deficiency rate trend, which shows a gradual growth. However, compared with the number of inspections, the deficiency rate has not increased much in the last decade.

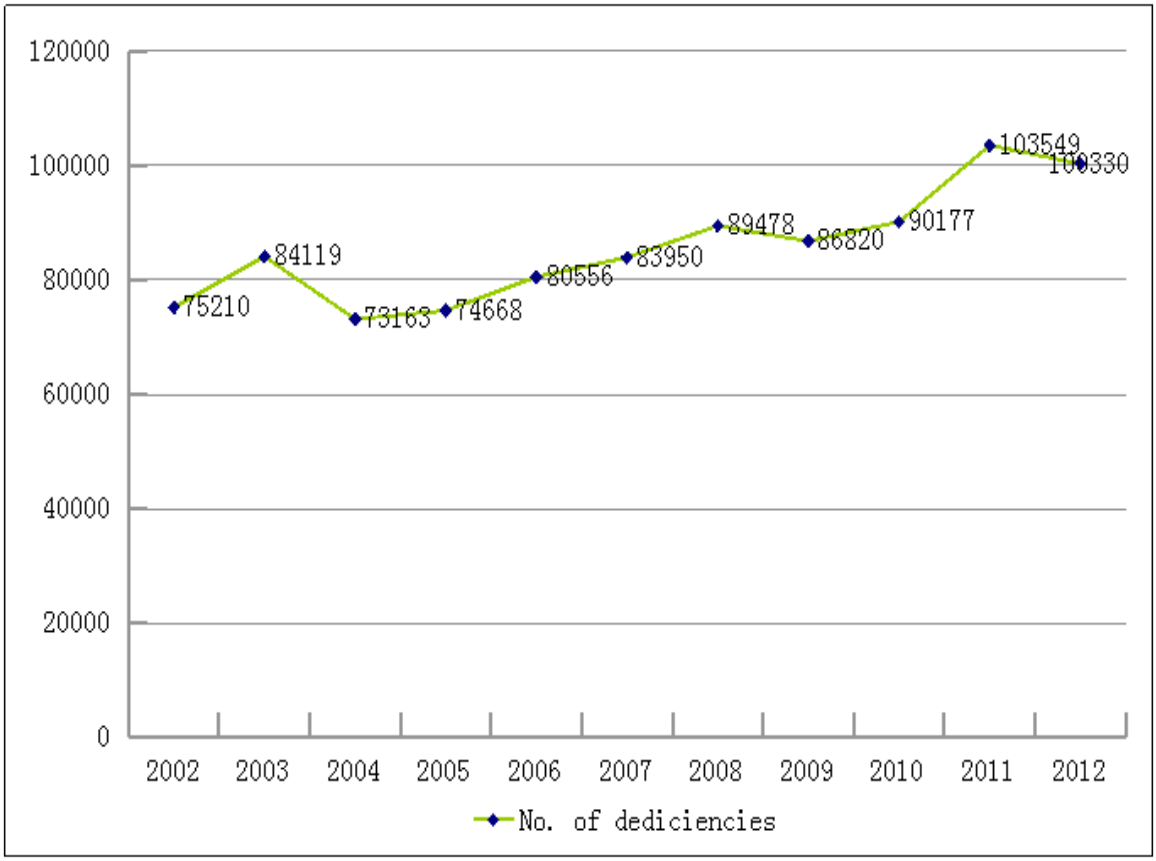

Figure 7- No. Of Deficiencies 2002-2012 of Tokyo MOU

Source: the Author

The pia chart (see Figure 6) and the bar graph (see Figure 8) almost express the same meaning though different water zone.

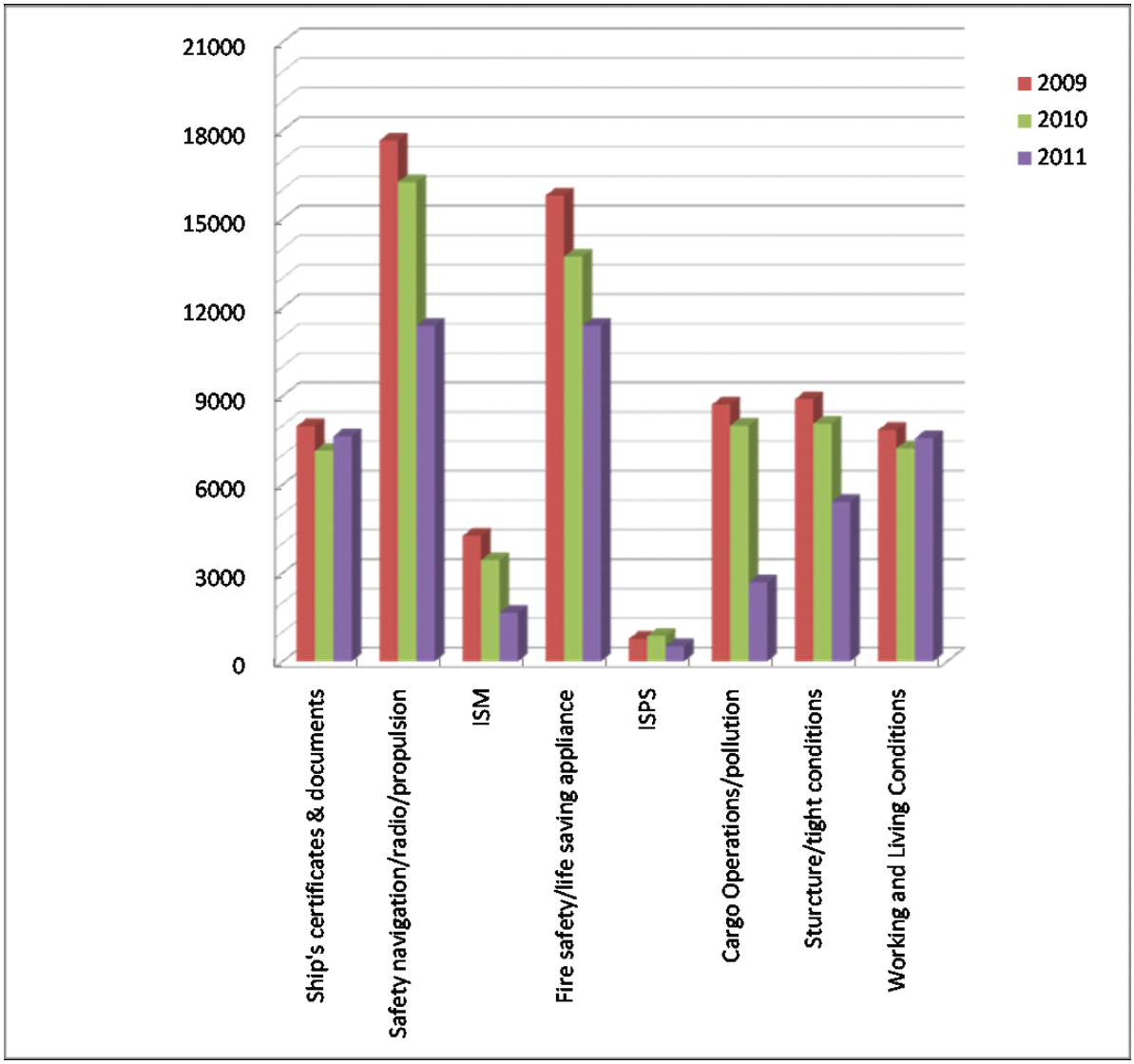

Figure 8- No. Of Deficiencies by Main Category in Paris MOU

Source: Paris MOU(2011). Port State Control, A*nnual Report.*

3.2.2 PSC Inspection Deficiencies on Main Types of Ships

PSC inspection covers oil tankers, containers, and other over twenty types of ship. The article use four types of ship whose inspection frequency is high and whose deficiencies are concentrated in. In 2011, the number of deficiencies of general dry cargo ship was the largest, 45040, which was 43.5% of the total deficiency number. Although the detention rate of refrigerated ships is not very high in PSC inspection, it always maintain a relevant high detention rate.

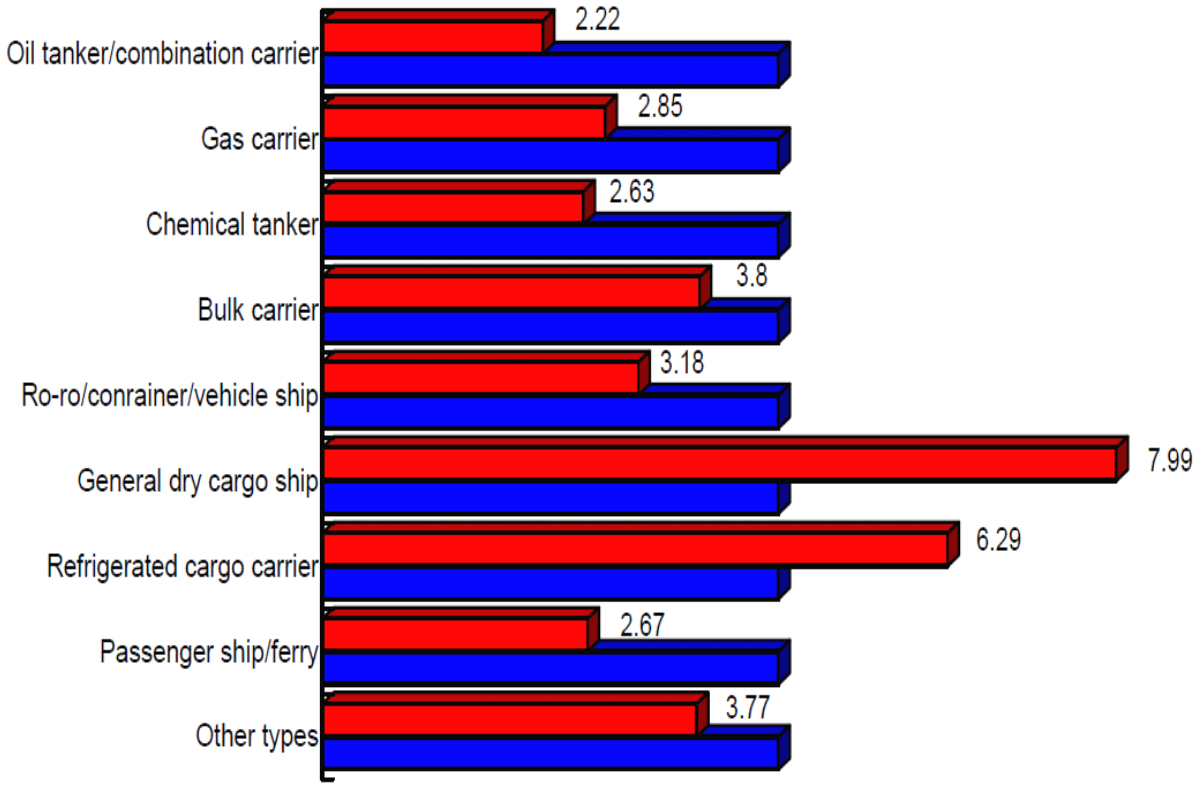

Figure 9- Detention Rate Per Ship Type in 2012

Note: Red: detention percentage Blue: average detention percentage: 4.59%

Source: Annual report on Port State Control in the Asia-Pacific region 2012

Statistics show that the average detention percentage is 4.59% in 2012, 5.46% in 2011, and 5.48% in 2010, as indicated in Figure 10.

From figure 10, we can see that the average detention percentage shows a decreasing trend. Therefore, on the one hand, the standard of ships is improving, namely, the low-standard ships are fewer and fewer. On the other hand, the NIR plays an important role in eliminating low standard ships.

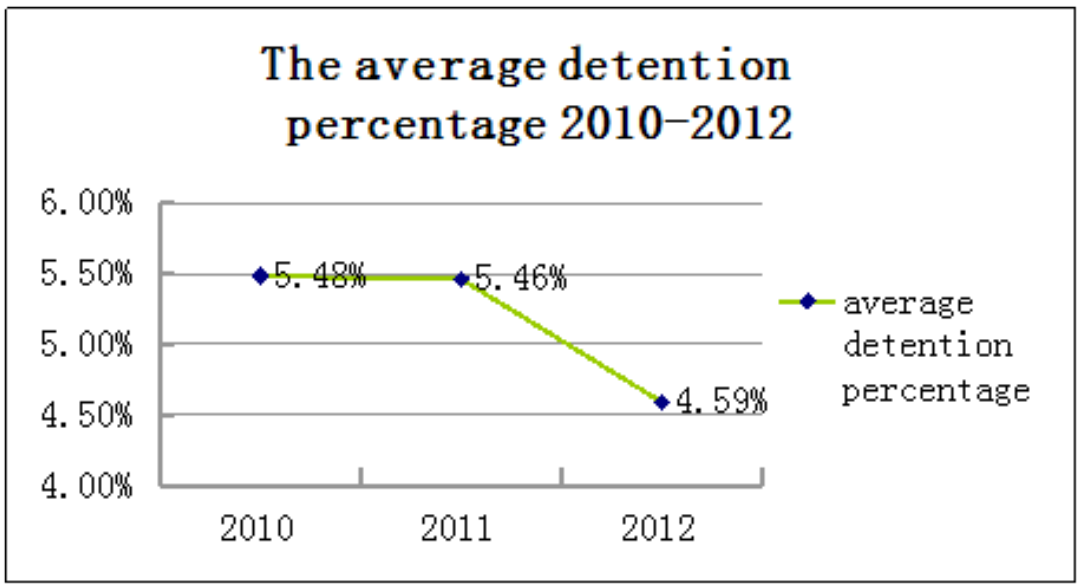

Figure 10- The Average Detention Percentage 2010-2012

Source: the Author

Chapter 4

Shipping Companies' Strategies Response to PSC Inspection

In the last several years, the effective implementation of PSC inspection has made great effort in excluding low standard ships, keeping marine security and protecting marine environment. At the same time, the further development of shipping technology, safety awareness and green concept, accompanied with the implementation of international convention and amendment, have both changed a lot in the content and standard of PSC inspection, which is also bringing a new challenge to shipping companies or ship owners. In this worldwide circumstance, how to take effective measures to improve the management level of the shipping companies, raising navigation safety coefficient, reducing the risk of marine accident and successfully passing PSC inspections in order to decrease the detention rate, has become the common goal of ship owners, shipping organizations and shipping companies.

Shipping companies should have an in-depth study of the NIR, taking relevant measures to reduce the risk level of the ship and improving the performance in PSC inspections to avoid detention and a ship being rejected to enter into the port.

Emphasis should be laid on the performance history of the ship and ship daily work performance, ensuring good records at each port state control inspections memorandum.

4.1 The Reaction of Chinese Shipping Companies

Before the commencement of the NIR, the Chinese government had already voluntarily accepted the IMO audit and achieved good audit results on November 7-18, 2009. Thus, it is easier for Chinese ships to access to the status of qualified "low-risk", and shipping companies should use good operating records to maintain this hard-won identity.

The new target ship selection regime takes the most stringent measures to evaluate safety records and performance of the shipping management company. As a result, the companies, regardless of size, regardless of the length of the survival period, and the number of inspections of ships, all will be included in the assessment system.

To cope with that, first, shipping companies need to introduce the concept of risk into safety management system. On July 1, 2010 effective amendment added to the section 1.2.2.2 of the ISM Code, requires "the company should evaluate its ships, personnel and the environment all identified risks and develop appropriate preventive measures"(Han. & Zhang., 2011, p.7). Chinese shipping companies should according to its operating ship, operation and operating characteristics to identify and assess risks and take appropriate preventive measures, to ascertain the risk management approach, to determine the risk management department, clear responsibilities, and select the appropriate risk identification and assessment methods(Sun, 2011). The "risk assessment " methods can keep reduce security risks and improve the performance of shipping management companies in PSC inspections to reduce the risk of being detained by raising risk awareness, which is a powerful way to get status of " low risk " ships. In addition, shipping companies should take some "passive" measures to deal with the assessment of company performance caused by the NIR, for instance, sending ships of good condition to Paris MOU region to improve the company's performance; minimizing ships of poor condition or ships with detention records in Paris MOU region;, applying for classification societies "pre-inspection" for ships entering the inspection window, especially for ships of expanded inspection.

4.2 Strategies Before PSC Inspection

4.2.1 Routine Maintenance And Hygiene Working of Ships

Port state control officers(PSCO) usually check the ship's overall appearance status, gaining the first impression of the ship. And then, PSCO check each deck and cabin equipment and etc., obtaining the actual general impression. If no obvious evidence was found, the inspection is finished. In this situation, good daily maintainance and clean hygiene conditions could leave a good impression to the PSCO, which probably will be the significant evidence for not carrying on " more detailed inspection".

4.2.2 Daily Maintainance Work of Appliances

Life saving appliance has special mission of saving marine lives and property in emergency conditions, so it has been a significant item in PSC inspection and also a concentrated item exposing deficiencies which would lead to detention. Therefore, doing a good daily maintainance work of these facilities, making sure that all the fire safety and life saving appliance are in good condition and can immediately be put into use in emergency, will help ships successfully pass PSC inspections.

4.2.3 Effective Preparation And Familiar With The Muster List

Ship muster list should be properly prepared and to consist with the contents of strain card. The writing of muster list should be clear and specific, and should be put in a visible spot. If the content of the muster list is changed or the relevant responsible person is altered, it should be renewed immediately and notified to all the crew. If necessary, seafarers ought to learn to know the meaning of strain signal and their responsibilities and correct methods to be taken in different situations. If it is possible, exercises related to fire safety, life saving and oil spilling need to be done strictly in accordance with the requirements of the muster list and need to be recorded well in order to be provided for the PSCO inspection.

4.2.4 The Check of The Relevant Certificates

According to "Port State Control Implementation Guide", the inspections of certificates is the cure of PSC(Wang, 2007, p.49). The captain should check the ship's certificates, documents and records to make sure the effectiveness of all the certificates before PSC inspection. The captain should check whether the SMS audit

materials are complete, whether facilities in the safety appliances certificates are comply with the actual facilities, and whether ship parameters in each certificate are unanimous, and then keep inspection records. If there are problems that can not be saved by the captain himself, he should contact the shipping management company immediately to obtain port support.

4.2.5 Prepare Work

All crew members' meeting shall be held before the arrival of PSC inspection, to make sure all the seafarers are clear about their responsibilities, every one should check the facilities according to the check list as well, especially, the appliances which are potentially deficient and can easily be neglected. Meanwhile, seafarers need to be familiar with detailed operation and procedure of the relevant appliance to react to some detailed questions in PSC inspection.

4.2.6 The Practice of The Local Port State

In general, PSC inspection focuses on shipping technologies, requirements of operation, manning, living devices and working conditions. However, different states has different inspection ranges and different focal points. In addition, the contents of inspection is distinct because of different PSCO, so the procedure is not the same. For instance, before arriving in the United States, the rubbish on board should not to be thrown, otherwise, PSCO will suspect the rubbish is poured into the sea. Therefore, the captain should search and study about the habit and significant item of the PSC inspection of the port state in order to take corresponding methods and to prepare the important.

4.2.7 Pre-inspection Work Before Arriving

Ship leaders do pre-inspection to check the flaws of the preparation work and correct them in time based on the practice of the local PSC inspection(Xue, 2004, p.13). If the ship has deficiency records, then the previous deficient items will be the important inspection contents and efforts should be made to avoid the similar deficiencies.

4.3 Reflects During the Procedure of PSC Inspection

4.3.1 Actively Cooperate With the PSCO

The captain should personally or send a senior seafarer whose English is good enough to welcome on the ramp before the PSCO boards the ship. If the PSCO on board the ship using flexible ladder, the responsible seafarer need to check carefully on the flexible ladder to ensure the safety of the PSCO. Duty officer should warmly greet him and lead the way.

4.3.2 The Responsibility of the Captain

Under the normal procedure, the PSCO will go directly to the captain's room to check the relevant certificates and documents after boarding. The captain should prepare these documents in advance. If the ship has been to the point before, then the captain could provide the non-deficiency inspection report to establish the trust among inspectors for further inspection.

4.3.3 Humbly Accept Inspections

The forms of the inspection generally taken by the PSCO are actual inspection of the whole ship, gathering crew members to operate appliance and finding some seafarers to talk to. During the inspection, accompanied seafarers should enthusiastically answer questions, show the record and do operation exercise according to the named appliance at the request of the inspectors. If possible, the captain and the chief engineer should accompany the entire inspection, and if necessary, should supplement the relevant documents.

4.3.4 Paying Attention to the Detention Documents

If the PSCO decide to detain the ship, the captain should not blindly comply. On the one hand, the captain should communicate with the PSCO, providing accept correct measures and convince the inspectors to change their mind. On the other hand, the

captain should immediately contact the shipping company or ship owner to gain some support.

Chapter 5

The Foundation of the Quantitative Model of Company Performance

This chapter uses statistical analysis method to establish a company performance assessment model, analyzing inspection data of the Tokyo MOU in 2010, and quantize the performance of the 3174 shipping companies inspected in the Asia-Pacific areas.

5.1 The Principle of Company Performance's Quantitation

Under the guidance of NIR, selecting the targeting ship has the more obvious "Matthew Effect", which has the effect of causing some vessels to fall into bad credit history " the more inspections the higher the score, the higher the score the more easy to receive inspections, " the vicious circle. To avoid "Matthew Effect" effectively, when quantizing factors for the performance of the company, the author put each of the company's data into the regional database for horizontal comparison assessment based on separately statistical data of each ship inspection, and thus realize the quantitative assessment of the performance of the shipping companies. The results for the quantitative assessment of the shipping company should follow the following principles.

1. Make sure that the coverage of quantitative assessment contains all shipping companies to be checked in the Asia Pacific region. The quantitative assessment should cover all ships inspected in the Asia Pacific region from all the shipping companies, instead of partially selection or some of the company's performance. Meanwhile, in order to be certain about each company's relative performance in the region, the evaluation should also include the overall average performance of all shipping companies that receive inspections in this region.

2. The data analysis should be based on the past inspection data of the Tokyo MOU. The evaluation of the company's performance should be based on all the PSC inspection data of the Tokyo MOU during a certain period(such as 36 consecutive months), according to all the identified relevant inspection information needed by the assessment before analyzing.

3. The quantitative procedure of the company performance is scientific and operational. The quantitative evaluation process need to adopt scientific statistics and analysis method, and strong operability as well, with the help of the Asia-Pacific computer information system or other software which automatically conducts quantitive assessment on the performance of each company.

4. The results of quantified company performance should be easily applied to ship targeting system. The aim of quantitation of company performance is to prepare for the introduction of the current ship targeting system into factors of company performance. In this way, the introduction of ship targeting system factor of the company's performance will be fully compatible with the current ship selection model.

5.2 Quantitative Model of Company Performance

Company's performance factors include company detention factor and company deficiency factor. The quantum of company's performance should begin with the company's detention rate and deficiency rate.

5.2.1 Definitions

To achieve a quantitative assessment of the company's performance, this article will define the following terms in company detention rate, company deficiency rate, the proportion of company fleet accepting inspection rate, regional detention rate, regional deficiency rate, company's detention rate level, and company's deficiency rate level, company's management level.

R_{det}^{C} refers to company detention rate, meaning the ratio of the total number of times detained by all the Port State authorities to the total number of inspections at all ports of Asia-Pacific areas during a certain period(36 consecutive months), expressed as a percent.

R_{def}^{C} refers to company deficiency rate, meaning the ratio of the number of inspection times found deficiencies by all the Port State authorities in inspections to the total number of inspections in Asia-Pacific areas during a certain period(36 consecutive months), expressed as a percent.

T refers to company inspection rate, meaning the ratio of the number of ships(N) inspected by all the Port State authorities to the number of fleets' ships(M) in Asia-Pacific area, expressed as a percent.

Regional detention rate is $R_{\det}^{R}$, referring to the ratio of the total number of times detained by all the Port State authorities of all the shipping companies to the total number of inspections in Asia-Pacific areas during a certain period(36 consecutive months), expressed as a percent.

Regional deficiency rate is R_{def}^{R} , referring to the ratio of the total number of inspection times found deficiencies by all the Port State authorities to the total number of inspections of all the shipping companies in Asia-Pacific areas during a certain period(36 consecutive months), expressed as a percent.

The level of company's detention rate is $L_{\det}^{C}$, referring to the ratio of the company's detention rate and the regional detention rate during a certain period time.

The level of company's deficiency rate is L_{def}^{C} , referring to the ratio of the company's deficiency rate and the regional deficiency rate during a certain period time.

The company's management level, L^{C} , equals to the sum of company's detention level and company's deficiency level during a certain period time.

Company's performance refers to the performance of the company accepting PSC inspections in some PSC MOU organization or some Port State, the ratio has corresponding function relationship with the company's management level.

5.2.2 The Calculation of Company Inspection Index

Suppose $Company_i$ has M ships, in the last consecutive 36 months, N ships has received the PSC inspections in Asia-Pacific areas, the following data are from the data base of Asia-Pacific areas data information system.

Table 6-Company Fleet PSC History

No.	The IMO identifier of ship	Name of ship	Inspection times (A)	No. Of detention (B)	No. Of inspection times with deficiencies(C)
1	$SIMO_1$	$Ship_1$	A_1	B_1	C_1
2	$SIMO_2$	$Ship_2$	A_2	B_2	C_2
3	$SIMO_3$	$Ship_3$	A_3	B_3	C_3
……	……	……	……	……	……
n	$SIMO_n$	$Ship_n$	A_n	B_n	C_n
	Company amount		$D=\sum_{i=1}^{n} A_i$	$E=\sum_{i=1}^{n} B_i$	$F=\sum_{i=1}^{n} C_i$

Source: the Author

According to the above definitions, the formulas of $R_{\det}^{C}$, R_{def}^{C} and T are as follows.

$$R_{\det}^{C}=\frac{E}{D}=\frac{\sum_{i=1}^{n} B_i}{\sum_{i=1}^{n} A_i}\times 100\% \tag{5.1}$$

$$R_{def}^{C}=\frac{F}{D}=\frac{\sum_{i=1}^{n} C_i}{\sum_{i=1}^{n} A_i}\times 100\% \tag{5.2}$$

$$T = \frac{N}{M} \times 100\% \tag{5.3}$$

5.2.3 The Calculation of Regional Index

Using INO identification number as search field, collect the last 36 consecutive months regional inspection statistics data from the Asia-Pacific data information system.

Table 7-Region Company PSC History

No.	The IMO identifier of Company	Company Name	Ships of the fleet	Ships inspected (N)	Inspected voyage (D)	Detained ships' voyage (E)	No. Of deficiencies
1	CIMO1	$Company_1$	M_1	N_1	D_1	E_1	F_1
2	CIMO2	$Company_2$	M_2	N_2	D_2	E_2	F_2
3	CIMO3	$Company_3$	M_3	N_3	D_3	E_3	F_3
……	……	……	……	……	……	……	……
m	CIMOm	$Company_m$	M_m	N_m	D_m	E_m	F_m
	Regional amount				$G=\sum_{i=1}^{m} D_i$	$H=\sum_{i=1}^{m} E_i$	$J=\sum_{i=1}^{m} F_i$

Source: the Author

According to the definitions, the formulas of $R_{\det}^{R}$ and R_{def}^{R} are as follows.

$$R_{\det}^{R} = \frac{H}{G} = \frac{\sum_{i=1}^{m} E_i}{\sum_{i=1}^{m} D_i} \times 100\% \tag{5.4}$$

$$R_{def}^{R} = \frac{J}{G} = \frac{\sum_{i=1}^{m} F_i}{\sum_{i=1}^{m} D_i} \times 100\% \tag{5.5}$$

5.2.4 The Level of Company Management Calculation

The formulas of $L^C_{\det}$, L^C_{def} and L^C are as follows.

$$L^C_{\det} = \frac{R^C_{\det}}{R^R_{\det}} \tag{5.6}$$

$$L^C_{def} = \frac{R^C_{def}}{R^R_{def}} \tag{5.7}$$

$$L^C = L^C_{\det} + L^C_{def} \tag{5.8}$$

As we can see, when company detention rate equals to regional detention rate, then the company detention level is 1, when company deficiency rate equals to regional deficiency rate, then company deficiency level is 1. The lower the detention rate and deficiency rate, the smaller the company detention level and deficiency level, the the better the company performance. When the company detention rate is zero, the company detention level is zero; when the company deficiency rate is zero, the company deficiency level is zero; otherwise, when the company detention rate and deficiency rate are higher, the company detention level and deficiency level are higher, the the performance of the company is worse.

Ideally, when $L^C_{\det} = L^R_{\det}$ and $L^C_{def} = L^R_{def}$, then L^C =2. It is not difficult to see that the regional company management average level is constant: 2.

5.2.5 The Calculation of Company Performance

From the above algorithm to calculate the value of the company management level can objectively quantify overall management level of the company's inspected ships , but can not fully reflect overall management level of the company's fleet (including the inspected ships and vessels not checked). Therefore, it is necessary to correct an inspection percentage.

$$CP = \begin{cases} L^C + (1 - T) & L^C > 2 \\ L^C & L^C = 2 \\ L^C - (1 - T) & L^C < 2 \end{cases} \tag{5.9}$$

To sum up, when the company management level equals the regional company management average level with the numerical value being 2, the company performance is 2 too. Furthermore, the worse the company management(the company management level is larger than 2), and the lower the company fleet inspection rate T, the company performance value CP is bigger; contrarily, the better the company management(the company management level is smaller than 2), the higher the company fleet inspection rate T, then the company performance CP is bigger. Theoretically, the minimum value of the company performance is infinitely close to -1.

5.3 The Assessment of Company Performance

Since 2010 Tokyo MOU, Uniform mandatory for Member States in the Port State Control inspection report has correctly recorded the shipping company IMO identification number, the Asia-Pacific computing information systems only collect one year data, without loss of generality. This article only use one-year statistics under the Tokyo MOU 2010, with the help of EXCEL office software, making assessment on the performance of 3,174 shipping companies inspected by the member states of Tokyo MOU in 2010.

From the statistical analysis of the assessment result, the author has found that the best company performance is -0.96 and the worst company performance is 14.16 among all the 3174 shipping companies. The performance of 2438 companies is better than the average level of the regional companies' performance(CP<2), about 76.8%. The number of companies whose performance is poor is 736, about 23.2%. Almost all the companies' performance CP is between 0 to 2, totally 2215 companies, approximately 69.78%. Statistical segmentation results are as follows in table 8.

Table 8-Company performance value statistics of Tokyo MOU in 2010

The value of CP	No. Of companies	Proportion of companies
>10	233	7.34%
6-10	180	5.67%
2-6	323	10.18%
1-2	1065	33.55%
0-1	1150	36.23%

<0	223	7.03%
Amount	3174	100.00%

Source: the Author

After the Asia-Pacific computing systems accumulate enough information including the company's IMO identification number inspection report, the company's performance data can also be calculated with the flag State. The recognized organizations performance evaluation as a three-year data for the sample to calculate the performance of the company, so the results will be more reliable.

Chapter 6

Introducing Company Performance Factor into Ship Targeting System

Selected Ship Model is the tool for the PSC inspectors to select ships that may have security risk from numerous foreign ships quickly, scientific and effective selected ship models can make full use of limited resources of port state control inspections, reasonably arrange inspectors to carry out inspection work, so that selected ship model helps to improve the precision crackdown of low-standard ships and to achieve the ultimate goal of the elimination of sub-standard ships.

Introduction of company performance factor into ship targeting system aims to avoid the drawbacks of the current ship targeting system of the Tokyo MOU and perfect the system.

6.1 The Principles of Introduction of Company Performance Factor

There are principles that should be followed when introducing company performance factor into the current ship targeting system of the Tokyo MOU in order to make sure the program is scientific and operational with the ship targeting system.

1. The introduced program is fully compatible with the current ship targeting system. The purpose of introduction of company performance factor is to overcome the flaws of the current selected ship model and to offer a new selected ship model. Therefore, guaranteeing the compatibility is very important.

2. The introduction of specific programs should be able to quantify the results of every ship's company performance targeting factor values. The current ship targeting system is a linear additive model. In order to reach the goal that the introduction of the scheme and the current ship targeting system is fully compatible, the introduction of company performance factors program should make each ship's company performance target factor value of the dependent variable and company performance of the independent variables correspond to each other. That is to say, when the results of company performance is a certain value, the company's performance should be a determining value are in order to successfully do linear addition calculation with other target factor value.

3. The introduced program should be operational. The ship targeting system with the introduction of company performance should be operational, ensuring that the Asia-Pacific computer information system or other software can automatically calculate each ship's target factor value.

4. Company performance target factor value should possess appropriate weights in ship targeting system, not only reflecting its importance in ship targeting system, but also avoiding weakening the position of other original system's target factors in the ship targeting system.

6.2 The Calculation of Company Performance Target Factor Value

In reference to the weight value of company performance factor in ship risk model of the NIR and the weight value of ship management factors of safety and environmental protection compliance target matrix in PSC of USCG. The author conducted a questionnaire survey to ten PSCO who work long-term in the forefront of the PSC. After analyzing comprehensive information and practical experience of the parties, the calculation of the target factor value of the company performance factors in ship targeting system is:

$$TFV = \begin{cases} 2 \times (CP - 2) & CP > 2 \\ 0 & CP \le 2 \end{cases} \tag{6.1}$$

Example1: If the CP of company A is 4.35 calculated from the quantitative company performance model, then the target factor value of the company performance factor TFV=2 × (4.32-2)=4.64 due to CP>2, namely, round 4.64 is 5 which is the target factor value of company A performance factor.

Example2: If the CP of company B is 1.5 calculated from the quantitative company performance model, then the target factor value of company B's company performance factor is 0.

Method of introducing company performance factor

According to the introduction of the principle of company performance factors, the introduced method of company performance factors should use linear additive model of the current ship targeting system. In targeting system, ship target factor will increase from the current eight to nine.

The introduction of company performance factor is completely independent with age of the ship, ship, flag States, classification societies, deficiency left and initial inspection from the last time interval six factors of the current ship targeting system, only with the last four deficiencies found in inspections and the recent four initial inspections or the number of discovery of tracking inspections' deficiencies has cross, moreover, the more ships the company has, the less the cross, but any case, this cross are no more than four times. Therefore, the company performance factor can be directly introduced into the ship targeting system by a linear sum.

6.3 The Target Factor System Introduced by Company Performance Factor

Under the premise of maintaining other target factors of the current ship targeting system constant, adding performance of the company in which the target factors, the target factor value is calculated as a formula (5.1), the correction target factor system of the company performance is as follows in Table 9.

Table 9-The Ship Targeting System Incorporated in CP Factor

Factors	TFV
1. The age of ships	0-5 : 0
	6-10 : 10
	11-15 :10
	16-20 :10+; above 15, +1/year
	>20 : 15+; above 20, +2/year
2. Ship types	The age of Certain types of ships is over 15(tankers, chemical cargoes, bulk cargoes, passenger ships, refrigerated cargoes, general dry cargoes and ro-ro ships) +4
	Other types : 0
3. Ship flag: rolling average detention rate over three years	+1 for each additional one percent point(rounding decimals)
4. Deficiency	+0.6 for Each deficiency found in the last four initial inspections and new tracking inspections(rounding decimals)
5. Detention: the number of the last four initial inspections or the number of new found deficiencies in tracking inspections	One times detention : 15
	Two times detention : 30
	Three times detention : 60
	Four times detention : 100

6. Classification society: non member of IACS	10
7. Company performance: surpass the average regional company performance	+2 for each additional one point(rounding decimals)
8. Left deficiencies(no mark of corrected deficiencies of the last inspection or tracking inspections from the records of APCIS)	+2 for each left deficiency
9. Inspection intervals: the period since the last initial inspection	6-12 months : 3
	12-24 months : 6
	Over 24 months or accept no inspection of the Tokyo MOU(including new ships) : 50

Source: the Author

The calculation of each target factors is as follows.

1. The target factor value of the age of the ship is calculated: if the age of the ship N<5, then the value of the target factor is 0; if 5<N<10, then the value of the target factor is 5; if 10<N<16, then the value of the target factor is 10; if 15<N<20, then the value of the target factor is 10+(N-15); if N>20, then the value of the target factor is 15+2×(N-20). For instance, if the age of the ship is 17, then the value of the target factor is 12.

2. The target factor value of the ship type is calculated: if the ship is one of the following types: tanker, chemical vessel, bulk cargoes ship, ro-ro ships, general dry cargoes container, refrigerated cargoes ship, passenger ship and the age of the ship is over fifteen, then the value of the ship type target factor is 4, otherwise, the value is 0. For example, if the tanker is thirteen years old, then the value of ship type targeting factor is zero; if the refrigerated cargoes ship is 17 years old , then the value is 13; if the container ship is 25 years old, then its value of ship type targeting factor is zero.

3. The target factor value of ship flag is calculated: Tokyo MOU annually released (such as "Asia-Pacific Port State Control Annual Report") of the flag states rolling average detention rate and the regional rolling average detention rate in the past three years. For example, "2010 Asia-Pacific Annual Report on Port State Control," published in Asia-Pacific 2008-2010 with average detention rate of 6.02 percent, China's detention rate was 1.26%, Malta's detention was 6.62%, then in 2011, Chinese flag ship target factor value is zero, the ship's flag Maltese target factor is 1.

4. The target factor value of the deficiency target factor is calculated: the target factor value of the deficiency target factor is the total number of deficiencies in the last four initial inspections and new found in the tracking inspections multiplies 0.6, and then rounded to the nearest decimal integer. For example, the number of deficiencies of the Asia-Pacific region last four PSC inspections is 14, then the value of the deficiency target factor is 8.

5. The target factor value of the detention target factor is calculated: if the number of detention in the last four initial inspections or in the new found deficiency tracking inspections is one, then the target factor value of the detention target factor is 15; if twice, the target factor value is 30; if three times, the target factor value is 60; if four times, the target factor value is 100.

6. The target factor value of ship's classification society target factor is calculated: if the ship's classification society is not the member of IACS or has no classification society, then the target value of the classification society target factor is ten. For instance, if the ship's classification society is CCS, then the target factor value of the classification society target factor is zero.

7. The target factor value of the company performance factor is calculated: the calculation has been indicated in the last chapter.

8. The target factor value of the left deficiency target factor is calculated: the target factor value of the left deficiency target factor is the total number of deficiencies without marked of correction in the last inspection or related tracking inspection multiplies two.

9. The target factor value of the inspection intervals target factor is calculated: If a ship's inspection interval is less than six months from the last initial inspection, then the target factor value of the inspection intervals target factor is 0; if a ship's inspection interval is between 6 and 12 months from the last the initial inspection, then the target factor value of the inspection intervals target factor is 3; if a ship's inspection interval is between 12 and 24 months from the last inspection, and then the target factor value of the inspection intervals target factor is 6; if the ship's inspection interval is more than twenty-four months from the last inspection or never received inspections in the Tokyo MOU(including new ship), then the target factor value of the ship's inspection interval target factor is 50.

Each ship target value is the sum of the target factor corresponding to each of the above target factor value, APCIS update daily calculation of the target value for each ship. Ship risk is still classified into four level: "very high, high, medium, low" according to Table 3." Tokyo MOU ship risk classification", in order not to reduce the inspection standards after revising the company performance factors, select the "target

factor" value in the "very high" and "high" ships inspection first. That is to say, ships that get 41 points or more have the priority of inspection.

6.4 Case Study

In order to verify the evaluation method of company performance and the appropriation of the revised program of ship targeting system, the author take an instance to certify.

On October 12, 2011, the ship "ASIAN FORTUNE" arrived at Shanghai port, information is given as follows.

Table 10-Basic information of "ASIAN FORTUNE"

Name	ASIAN FORTUNE
Call signal	3FRZ8
IMO identification number	9196462
Built	1998
Gross tonnage	4346
type	General cargo/multipurpose
Flag state	Panama
Classification society	Nippon Kaiji Kyokai
Shipping company IMO identifier	5399689
Shipping company	JP ALLIANCE SHIP MANAGEMENT CO. INC

Source: the Author

TF of this ship is 56 calculated by the current ship targeting system, which means it is a high risk ship. CP of the shipping company is 5.6 calculated by the calculation method of chapter three, which is lower than the regional average level, according to the revised method of company performance in chapter four, the factor value of the shipping company is 8, the revised TF is 64, which means a high risk ship. The Shanghai MSA inspected the ship and found eleven deficiencies, including a deficiency of emergency system and three deficiencies of fire safety, an indication of appropriate level of detention. Thus, the ship was detained.

The example above has verified that the revised ship targeting system is helpful to discover and distinguish low standard ships.

Chapter 7

Conclusion

The article first indicate the situation of PSC inspections in the last few years by statistics from Tokyo MOU and Paris MOU, obtaining the trend of inspection results. Second, through analyzing the changes of the NIR and the ship targeting system of Tokyo MOU, the the idea of introducing company performance factor into the current ship targeting system has been offered. Third, the quantified model of company performance factor of ship targeting system has been founded with actual examples.

As technology advances and the rapid development of the world economy, the shipping industry will be fully developed. Safety and environmental pollution problems will be more prominent. Questions about carbon emissions, low-carbon economy will far-reaching impact on the ships and the shipping industry(Wang, 2011).

International conventions will be more stringent, ship safety and pollution prevention work will be more difficult. Shipping companies will face more stringent port state inspection. How to control and prevent the risk of ships from being detained in port state inspections will test all persons engaged in shipping and shipping enterprises. Only by using the approach of risk management to manage ship detention in port state inspection, we can in an invincible position in the future market.

References

Ambrose Rajadural(2004). Regulation of Shipping: The Vital Role of Port State Control. *MLAANZ Journal*, 18, 87-110.

Bao, Z.J., Liu, Z.J. & Huang, T.H.(2011). Ship Risk Assessment Model. *Journal of Dalian Maritime University*, 4, 13-15.

Dr. Z. (2009). The Use of Port State Control in Maritime Industry and Application of The Paris MOU. 201-240.

Fu, J.J. & Zhou, C.(Sep, 2011). The Assessment of New Ship Targeting System in Paris MOU's NIR. Journal of Zhejiang Ocean University(Natural Science), 30(5), 426-437.

Han, J.L.& Zhang, X.Q.(2011). NIR: the new regime of Paris MOU to select target ships for PSC inspection. *China Maritime safety*, 2011(06), 5-7.

IMO, *Port State Control.* Revised June 16 2013 from World Wide Web: http://www.imo.org/blast/mainframe.asp?topic_id=159

Korean Register of Shipping (2011). *PSC Annual Report 2011*.

Liu, J. Y.(2011). The New Inspection Regime of Paris MOU. *World Navigation*, 195, 14-16.

Ning, P.(2011). Rationality for The Application of NIR Ship Targeting System in the Asia-Pacific Region. *China Maritime Safety*, 6, 28-29.

Paris MOU (2011). Port State Control. Annual Report 2011.

Paris MOU on Port State Control, *Relevant Instrument.* Revised July 2 2013 from World Wide Web: http://www.parismou.org/ParisMOU/Organisation/About+Us/ Instruments/default.aspx.

Sun, J.F.(2011). *The Research about ISM/NSM Rules in The Shipping Company*. Dalian Maritime University, China, Dalian.

Tokyo MOU (2012). Annual Report on Port State Control In the Asia-Pacific Region. Revised June 10 2013 from World Wide Web: http:\\www.tokyo-mou.org.

Wang, Z.Y.(2007). How Chinese Ships Prepare For PSC Inspections In Paris MOU Regions. *TIANJIN NAVIGATION*, 01, 48-51.

Wei, D., Zeng, Q.S. & Li, W.F.(2011). The Comparison Between NIR and The Ship Risk Assessment System of Tokyo MOU and The Enlightenment Thereof. *China Maritime Safety*, 6, 8-10.

Wang, S.Y.(2011). Study on Vessel PSC Detention Risk Management in ZH Shipping Company. Lanzhou University, China, Lanzhou.

Wang, J.(2011). The Trend of Port State Inspection Policy of USCG and Tokyo MOU. China Ship Survey, 2, 66-68.

Xue, Z.Z.(2004). An Analysis on Problems That Should Be Noted in PSC Inspection. *Journal of Nantong Vocational & Technical Shipping College*, 4, 31-32.

Yao, J.R.(Dec, 2008). Port State Control Plays A Very Important Role in Flag State Control. Journal of Dalian Maritime University, 34(2), 95-96.

Yi, X.(2011). Ship Risk Assessment and Strategies Under NIR. *CHINA SHIP SURVEY*, 1, 62-64.