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Study on harmful effect of the current management systems on Offshore Support Vessel (OSV) in China

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STUDY ON HARMFUL EFFECT OF THE CURRENT MANAGEMENT SYSTEMS ON OFFSHORE SUPPORT VESSEL (OSV) IN CHINA

By

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DECLARATION

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

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

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ABSTRACT

Title of Dissertation: **Study on Harmful Effect of the Current Management Systems on Offshore Support Vessel (OSV) in China**

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Currently, Management system is one of the key management methods which are widely around the world, likewise, there are many management systems in the OSV shipping company and some of them are mandatory and the others are non-mandatory.

A questionnaire had been sent to ship's crew, officers working at shore of two OSV shipping companies (COSL and HUAWEI shipping company, both of them are the typical OSV shipping companies in China) concerning investigation the effectiveness of current management systems running in the OSV shipping companies.

After the questionnaires were replied and interviews responded from some of the ships' Masters, Chief Officers and Chief Engineers, a lot of the deep questions had been discovered not only concerning the OSV Shipping companies and ship's crew but also the maritime administrations.

Through identifying the root causes of the unreasonable phenomena existed, it is discovered that the main reason is the unreasonable integration of the current management systems. Finally, some recommendations are given on the integration of management systems in my own views.

Key Words: IMS, OSV, ISM, OHSMS, QMS, EMS, Harmful Effect.

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LIST OF ABBREVIATIONS

AB	Able Seaman
CCSC	China Classification Society Certification
COSL	China Oilfield Services Limited
DOC	Document of Compliance
EEOI	Energy Efficiency Operational Indicator
EMS	Environment Management System
FPSO	Floating Production Storage and Offloading
HSE	Health, Safety and Environment Management System
Huawei	Shenzhen Huawei Offshore Shipping Transport Co. Ltd.
IEEC	International Energy Efficiency Certificate
IMO	International Maritime Organization
IMS	Integrated Management System
ISM	International Safety Management Code
ISO	International Organization for Standardization
ISPS	International Ship and Port Facility Security Code
ITF	International Transport Workers Federation
MARPOL 73/78	International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978
MLC	Maritime Labor Convention MLC, 2006
OHSMS	Occupational Health and Safety Management System
OSV	Offshore Support Vessel
PSV	Platform Supply Vessel
QMS	Quality Management System
RO	Recognized Organization

ROV	Remote Operated Vehicle
SEEMP	Ship Energy Efficiency Management Plan
SEEMS	Ship Energy Efficiency Management System
SMC	Safety Management Certificate
SOLAS	International Convention for the Safety of Life at Sea, 1974, and its Protocol of 1988
SPM	Single-point Mooring
WSSS	Work Safety Standardization System

Chapter I: Introduction

1.1. Purpose and Background of This Dissertation.

As in the current shipping company, for enhancing and improving their safety management level, more and more safety management systems have been used, no matter whether this management system is mandatory or recommended, no matter whether the management system is applicable or not, no matter whether the workload of their seafarer is overloaded or not, because a new management system certificate symbolizes their management level, standing for their qualification of bidder, therefore, a growing number of ship owners widely bring in many kinds of the management system, which results in avoiding the important ones and dwelling on the trivial ones, and also the fact that many management systems that should have been implemented compulsorily cannot run smoothly.

With the rapid development of ocean exploitation and exploration, more and more offshore support vessels were put into practice in offshore service in China. As a special kind of vessel-Offshore Support Vessel, other than the main function of the ordinary vessel, most of the function is to provide service of all kind of the ocean engineering, which brings more complicated task to the ship's seafarers, which means more additional work should be done for the ship and ship's seafarers compared with the other kinds of the ship. Through introducing each safety or other management system existing in the Offshore Support Vessel and Offshore Support Vessel Company, this dissertation reveals the problem and cause of the current diversity or integrated running management system and, finally, some recommendations are given in my own viewpoints.

1.2. Brief Introduction of Offshore Support Vessel and Current Offshore Support Vessel Shipping Company in China.

1.2.1. Offshore Support Vessel (OSV)

The OSV including Offshore Supply Vessel & Platform Supply Vessel (PSV) are the very special type of vessel, other than the normal function such as the navigation or loading/unloading of other ship, they are special function of the OSV, they are designed for providing the service for the offshore production platform, drilling platform, survey platform, Floating Production Storage and Offloading (FPSO), Export Tanker and other oceanic engineering. The routine operations of the OSV include but are not limited to the following ones:

Figure 1.2.1: Picture of OSV

Sources: Shenzhen Huawei Offshore Shipping Transport Co., Ltd.

a) Supply and Transport: Supply and transportation of cargoes including the wet and dry cargo and personnel to or from offshore facilities, which is the most frequent operation in OSV routine operation.
b) Anchor handling and Towing: anchor handling for the offshore installation such as the drilling platform, ocean engineering vessel, FPSO and etc. and are always

accompanied with towing task.

c) Offloading/Lifting Assistance Operation: When there is an offloading operation on the oil field, the OSVs are required to provide assistance to FPSOs and export tankers. OSVs are required to perform a wide range of functions, including deployment and recovery of mooring system messenger lines, deployment and connection of tow line to export tanker and conduction of towing during off-loading progress, transferring off-loading cargo hose to shuttle tankers from FPSO, connected to and towing the tanker in emergency situations, standby duties and repairing and maintenance of the tanker mooring and cargo hose system, etc. (A Handbook for Safety Operations of Offshore Support Vessels, 2008).
d) Standby for the oilfield: including steaming standby for the helicopter, evacuation for the typhoon, overboard operation for the platform and other ships passing through the whole oilfield.
e) Ocean engineering operation assistance: it includes diving operation (saturation diving, Remote Operated Vehicle (ROV) operation), in-water survey for the Single-point Mooring (SPM) tanker and underwater piping system, assistance for in positioning of the platform, etc.
f) Emergency response: external fire-fighting, saving life at sea, anti-pollution operation including cleaning oil at sea and recovering the spill oil, etc.

Therefore, due to their special characteristics of the OSV, it requires the OSV in a particular design with small size and low freeboard, which results in the ship rolling and pitching heavier than other ship and it's easy for the wave to go through the main deck, which endangers the ship's crew on deck.

As the crew on board of the OSV, there are totally less than 15 crew members on

board due to the limited accommodation, and the goal of the OSV is to provide good service for the Oil Company and platform, and thus, the crew has to overcome all kinds of suffering and troublesome condition, such as adverse weather and sea condition, ship rolling and pitching, green water from the main deck, continuous and irregular operation, and so on. It always makes the crew members exhausted and fatigued.

Finally, we can conclude that the offshore supply vessel operation is a high-risk and hard job for the seafarers. Due to the particular work nature, the seafarers have to work under a high-risk environment, as is said by the Chief Executive of the Australian Maritime Safety Authority, P. M. McGrath "The Offshore Industry is one where danger lurks at every turn, where, in addition to the normal hazards of the sea, operations are carried out which would not be contemplated on the normal merchant ship." (A Handbook for Safety Operations of Offshore Support Vessels, 2008).

1.2.2. The Typical Offshore Support Vessel Shipping Company in Current China Market.

Currently, there are two main offshore shipping companies in the Chinese market: the China Oilfield Services Limited (COSL) and Shenzhen Huawei Offshore Shipping Transport Co. Ltd. (hereunder referred to as Huawei).

In the year 2015, COSL operated thirty-three jack-ups, twelve semi-submersibles, five module rigs, and two accommodations rigs, totaling fifty-two various platforms. Supporting them were COSL's one-hundred-and-thirty working vessels, thirteen seismic survey ships, and more than four-hundred-and-thirty units of modern facilities and equipment for logging, directional drilling, drilling-fluids handling,

cementing, and well work over services— all being augmented by COSL's self-developed logging-while-drilling tool, DRILOG®, and COSL's rotary steering drilling tool, WELLEADER®.[1]

Shenzhen Huawei is a Sino-foreign joint venture between China Ocean Engineering Services Ltd., Shanghai (COESS), China Ocean Engineering Corporation, Wah Tak Marine Engineering Co. Ltd., Hong Kong (WAHTAK), Shanghai Huawei Offshore Shipping Service Co., Ltd. and China Offshore Oil Nanhai East Corporation, with COESS and WAHTAK being the original shareholders. Huawei was incorporated under the laws of the People's Republic of China in August 1983. It has its registered office in Shenzhen, and currently has over 600 staff. As a ship operation and management company, Huawei is engaged in the operation and management of over 20 ships (such as Anchor/Handling/Tug/Supply vessels and so on). Boasting the world-leading offshore operation facilities and a team of experienced operation staff, Huawei is capable of delivering top-class comprehensive services involving supply, guarding, marine engineering and oil development. Huawei specializes in the anchor/handling/tug/supply service for offshore oil field, and also delivers such services as oil field guarding, marine engineering, diving support, maritime salvage and anti-pollution operations in a wide range of sea areas including the South Yellow Sea, South China Sea, Bohai Sea, East China Sea, Pacific Ocean and Middle East. Since its establishing in 1983, Huawei has won the trust of quite a few oil companies and other clients and maintained excellent work record by virtue of its outstanding service quality and excellent safety management. (Huawei Safety Quality Management System Book, 2016).

[1] http://www.cosl.com.cn/col/col20671/index.html

Chapter II: Questionnaire & Question Rose

2.1. A Questionnaire concerning current management system in OSVs and OSV Shipping Company.

A "Questionnaire of Current Management System"[2] had been sent to the senior seafarers and the staff working at shore of Shenzhen Huawei Company. and COSL with a total of 50 copies by email and hard copies, after one month's investigation and statistics, with a total of 22 questionnaires being replied which is concluded as follows:

Table 2.1: The Statistics of Questionnaire Replied.

Company	Seafarer	Staff working at shore	Remarks
Huawei	12	4	
COSL	4	2	

After the reply from the chief mate, chief engineer and the ship's mater working board of OSV, and the safety management officer working in these two companies, at least seven kinds of safety or environmental management systems are existed in the companies and the OSVs, which constitutes a big diversity system, and makes the staff at shore and the seafarers more perplexed and confused.

2.2. Questions Rose.

As such a big diversity management system, how can it make all the management systems connect with each other smoothly? How many hours would be used for the

[2] See Appendix 1

seafarers to complete a huge number of the reports, records and forms? Compared with the staff working in company, there are different responsible persons in charge of the different management system, as the ship's seafarers, they have to face not only one or two management systems, but also the whole diversity management system. Under such circumstances, do they have enough time and energy? As the word "fatigue" has been mentioned in recent years, actually, who indeed cares and guarantees the seafarers' work and rest hours…etc. (Li C. T. 2015)

Chapter III: Current Management System Introduction

After the investigation of the questionnaires, it is found that there are several safety management systems in these two OSV Shipping Company and the OSVs: they can be mainly divided into two types "compulsory management system" and "non-compulsory management system" which can be discussed and introduced briefly as follows:

3.1. The Compulsory Management System

3.1.1. International Safety Management System (ISM).

ISM Code was passed through by the International Maritime Organization (IMO) Resolution A.741 (18) and A. 742 (18) on the 4th, Nov. 1993, and a new Chapter IX "Management for the safe operation of ships" was added to the International Convention for the Safety of Life at Sea, 1974, as well as its Protocol of 1988 (SOLAS) by IMO in May 1994. It required that ISM Code shall be compulsorily implemented gradually according to different kind of the ship from 1st, July. 1998. The ISM development has been described as a chart as follow:

Table 3.1.1: The Development of the ISM Code.

MSC 353(92)	Amendment to the Regulation 6.2 and 12.2 of ISM Code.
MSC 273(85)	Added risk assessment and improved the dispose of the certificate.
MSC 195(80)	The Document of Compliance (DOC) and Safety Management Certificate (SMC) have been improved, Company Identification Number was added.

MSC 179(79)	The Document of Compliance (DOC) and Safety Management Certificate (SMC) have been improved.
MSC 104(73)	Amendments to ISM Code with Part A and B, and with sixteen elements were formed and certificate format in the appendix.
IMO A. 741(18)	Only thirteen elements of the ISM Code, it was passed through on 4th, Nov.1993.
IMO A.680(17)	"International Safety Management" Code was passed through on 6th, Nov. 1991.
IMO A.647(16)	"Guide for ship safe operation and anti-pollution management" was passed through on 19th, Oct. 1989.

Not only because the ISM Code is compulsory but also because it is a shipping and anti-pollution management standard distinct from other technical standard or convention, the management objects extend from the vessels to the shipping company, and cover the Flag State Administration and Recognized Organization (RO), systematically contains human resource management, marine and machinery management in order to realize its ultimate aim "to provide an international standard for the safe management and operation of ships and for pollution prevention". (Ma Y. M. 2009).

3.1.2. International Ship and Port Facility Security Code (ISPS)

The International Ship and port Facility Security, ISPS was passed through in Dec. 2002 in London and came into force on 1st, Jul. 2004; meanwhile, Chapter V and XI of SOLAS has been amended and a new Chapter "Chapter XI-2" was added into SOLAS due to the "911" terrorist attack.

There are Part A and Part B of the ISPS Code, with Part A implement the detail requirements of Chapter XI-2 of SOLAS which is compulsory, and Part B as a guideline on how to implement Part A of ISPS Code and the Chapter XI-2 of SOLAS which is the recommended regulations. Therefore, the main purpose of implementing of the ISPS Code is to build the security at sea, build an international operation among the contracting party government, inter-governmental organization, non-governmental organizations, shipping company and the port, timely collect and share the security information and provide security assessment method, in order to build an effective security management system and nip dangers in the bud. (Chen Q. M. 2006).

3.1.3. Maritime Labor Management System (Maritime Labor Convention MLC, 2006)

Maritime Labor Convention MLC, 2006 came into force on 20th, Aug. 2013, which is well known as the forth pillar of the international convention, which formulates the international unified standards on working condition, health, safety, minimum age, recruitment, work and rest hours, accommodation of the seafarers. The convention was divided into Articles, Regulations and Code, among which Part A of the Code is compulsory and Part B is about guidelines.

There are two main features of this convention, one is that the certificate is assessed and issued by the flag states, simultaneously, supervised by the port state; the other one is that no favorable treatment is allowed for the non-contracting party, it should all be enforced by the port state control inspection.

The fundamental aim of the MLC 2006 is to protect the rights and interests of the

seafarers and ensure them a decent work in the maritime industry program. (Li D. Z. 2015).

3.1.4. Ship Energy Efficiency Management System (SEEMS)

The amendments of regulation 22 of Annex VI of the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL 73/78) was deliberated and approved by the MEPC 62 Meeting in Jul. 2011. Compulsory rules require that the ships over than 400 gross tonnages navigating in international voyage shall establish and implement Ship Energy Efficiency Management Plan (SEEMP), and obtain the International Energy Efficiency Certificate (IEEC).

The theory of SEEMS is the same as the management system: the shipping company and the ships have to establish a structured and documented management system as a part of the management system of the company based on the improvement of energy efficiency.

The purpose is to save energy and reduce emission. Thus, the shipping company has to set the energy management goal and allocate it to all vessels: appoint one person responsible for energy efficiency and for establishing the unified energy supervision system in order to calculate Energy Efficiency Operational Indicator (EEOI) to continuously improve ship operation energy efficiency in the company and on board ships; Make full use of the best industry practices for and experience in ship energy efficiency management; Take appropriate energy efficiency improvement actions from three aspects, that is, management, technology and operation, to maximize energy utilization; Take and continuously improve effective energy saving and

emission reduction actions and carry out the energy efficiency polices of the company in a systematic manner; Enhance ship energy efficiency, reduce carbon emission and increase social and enterprise benefits. (Zheng R. M. 2013)

3.1.5. Work Safety Standardization System (WSSS)

"Basic norms for work safety standardization of enterprises" was issued by State Administration of Work Safety and State Administration of Coal Mine Safety of China on 15th, Apr. 2010, which is an industry standard with number AQ/T9006-2001 in China. There are totally 16 elements in the WSSS with a total of 1000 scores in three grades: in Grade I, the score shall be more than 900, in Grade II, the score between 750 to 900 and in Grade III, the score shall be more than 600 which will be judged by a expert team after a comprehensive inspection to the company.

WSSS is a compulsory management system in China; the enterprise has to establish the WSSS based on their safety management system according to the requirements. The benefits of the WSSS is to make each step of the production meet relevant requirements of safety production laws and standards, keep human beings, machines, material and environment in a favorable condition through establishing the safe production responsibility system, safety management system and operation instruction, through identifying and checking the hazards, and then take controlling measures for them for preventing the outbreak, in order to achieve the goal of the continuous improvement.

3.2. The Recommendation Management System

3.2.1. Quality Management System (QMS) (International Organization for

Standardization ISO 9001)

For improvement of their management level, many shipping companies bring in the recommendation standard ISO 9001 and build their QMS document. The purpose of the ISO International Standards is to ensure that products and services are safe, reliable and of good quality. For business, they are strategic tools that reduce costs by minimizing waste and errors and increasing productivity. They help companies to access new markets, leveling the playing field for developing countries and facilitating free and fair global trade. (ISO Website)[3]

The ISO 9001 has been updated to ISO9001:2015 at present, with ten elements and two appendices, as the shipping company also has to build their own Quality Management System Document according to the standard for improving their service for the clients. There are many benefits for building the QMS as the shipping company: it can clearly define the division between departments and the each position, clarify the working process of each department, standardize all the performance standards, improve the whole service process quality, prevent running away of the management experience, enhance the reputation and company competitiveness of the company, and satisfy the clients' requirements continually.

3.2.2. Environment Management System (EMS) (ISO 14001:2015)

The EMS is another international recommendation standard issued by ISO after ISO 9000, which has been widely used by hundreds of countries and regions. ISO 14001:2015 is applicable to any organization, regardless of size, type and nature, and applies to the environmental aspects of its activities, products and services that the

[3] http://www.iso.org/iso/home/about.htm

organization determines it can either control or influence a life cycle.

The benefits for the organization to adopt the ISO 14001:2015 are as follows: it specifies the requirements for an environmental management system that an organization can use to enhance its environmental performance. It is intended for use by an organization seeking to manage its environmental responsibilities in a systematic manner that contributes to the environmental pillar of sustainability.

Furthermore, it helps an organization achieve the intended outcomes of its environmental management system, which is valuable for the environment, the organization itself and interested parties. Consistent with the organization's environmental policy, the intended outcomes of an environmental management system include: enhancement of environmental performance; fulfillment of compliance obligations, and achievement of environmental objectives. (ISO website)[4]

3.2.3. Occupational Health and Safety Management System (OHSMS 18000)

The OHSMS is another widely used standard by hundreds of the countries and regions nowadays, and the core of the OHSMS is hazard identification, and risk assessment and risk control, the same as the other management system, the enterprise still has to carry out the establishment of management system, audit and certification process.

Generally speaking, enhancing the health and safety awareness, continuously

[4] http://www.iso.org/iso/home/store/catalogue_tc/catalogue_detail.htm?csnumber=60857

reducing the hazard risk can be defined as the benefits for the OHSMS. Firstly, identify the hazard and reduce the risk, which will prevent the accident and lower the ship’s owner operation cost; secondly, eliminate the trade barriers by implementing OHSMS 18000 to a certain degree; thirdly, generate direct and indirect economic benefit to the enterprise through improving the working condition, strengthen the labor’s physical and psychological health, increase the working efficiency; finally, foster a good brand image for the enterprise, enhancing the enterprise's economic efficiency and competitiveness.

Chapter IV: Problems Finding and Causes Identified.

After the introduction of current integrated management system above, we can conclude that in the current diversity management systems, the basic starting point of all the management is beneficial for the enterprise, either in terms of safety, health, energy or environment, it is main purpose is to enhance the management to guarantee the safety and protect human beings and the environment. It is the inevitable outcome of the economic development, and meanwhile, it is the reflection of the human development.

However, just because of the diversity and integrated management existing in the OSV shipping companies and the OSVs, it brings so many confusions and problems to the seafarers, ship's owners, as well as the administration departments.

4.1. For the Government Administrative Departments.

4.1.1. Due to the complex management systems, some functions and duties of part government departments cannot be clearly defined or separated, which brings the trouble and duplication work to the ship's owner and seafarers. One good example is that after the MLC 2006 came into force, a new health certificate "Medical Certificate of Seafarers" required by Marine Administration appears according to the requirements of International Conventions, which is different from previous "Certificate of Health Examination" required by Entry-Exit Inspection and Quarantine Department according to the domestic regulation. Thus, the ship's owners have to arrange their seafarers to carry out twice physical examinations and hold these two types of the certificates on board for a long time, virtually, which increases the additional operational cost to the ship's owners, and also causes

inconvenience to the seafarers.

Root causes: on one hand, be short of fully considering the connection state operational system with the international convention when changing the international convention into the domestic legislation. After an international convention came into force, the contracting party has to transform it into the domestic regulation or adopt it completely without transformation, whichever forms of the adoptions, it should be taken into the state operation system's consideration.

On the other hand, there are still some conflictions among the domestic laws and regulations, which cause the overlap of functions of relevant Administrations, and disagreement with each other. As the above case shows, we can see the following information collected in China:

Table 4.1.1: Ratification of Seafarers' Health Certificate by Inspection Organization.

Inspection Organization	Medical Certificate of Seafarers	Certificate of Health Examination
Entry-Exit Inspection & Quarantine Bureau	De-recognition	Recognition
Immigration Department	De-recognition	Recognition
Port State	Recognition	De-recognition
Flag State	Recognition	De-recognition
International Transport Workers Federation (ITF)	Recognition	De-recognition

Additionally, as the description of Reg.73 of "Labor Contract Law" is shown in China (Sui P.S. 2009), it regulated that the social security of the seafarer shall be under the supervision of the Labor Department, recommendations and suggestions can be given by the Marine Administration Department, but actually, all the seafarers' management is under the control of the Marine Administration Department; the description of Reg. 45 of "Seafarers' Regulation of People Republic of China" awarded the Marine Administration Department powers to supervise and inspect the protection of seafarers' legitimate rights and interests. Apparently, these two government departments both have the power in supervision and inspection of seafarers' rights and interests of labor and social security, which is against carrying out the seafarer's management successfully in practical work.

Furthermore, with the fulfillment of the MLC 2006, more and more government departments will be involved concerning the seafarer's employment, recruitment, health protection, medical and social protection and so on, and a great deal of the problems between the departments should be solved.

4.1.2. The conflict between the Chinese characteristics safety management model and the international management model, a typical example is that the WSSS in China which is a safety standard or regulation applied to the coal mine industry and other shore enterprise, but it is also mandatory for the shipping companies, although they can use their Chinese DOC for applying a level-3 certificate, more and more shipping company has to do a huge amount of additional work in order to get the level-1 or level-2 certificate. Actually, the management model of the theory of WSSS is the same as the ISM Code, and it just adds the Chinese management features into the ISM management model, such as the hazards identification and control, safety input, safety responsibility system, technical innovation and informatization and so

on, which brings a great deal of paper work to the shipping companies and the seafarers.

Root causes: the WSSS is issued by the State Administration of Work Safety and State Administration of Coal Mine Safety of China which is the only focus on the safety of the coal, mine and other type of the transportation at shore, and they even do not know what is the ISM Code and its management models in the shipping company; conversely, they force you to implement the WSSS and even worse each time they carry out the audit or inspection to the company, they would make your management system documents beyond of all recognition.

4.1.3. Due to the different auditing institutions of different types of the certificates the company obtained, and the different backgrounds of the auditors, the suggestions they gave to the company is in different, without a comprehensive guide. For instance, if there is a Chinese DOC annual or renewal audit carried out by auditors from MSA, the auditors will only pay attention to the ISM running in the company and the ships; they don't care about other integrated management system. On the contrary, if they is a EMS, OSHSAS or QMS external audit carried out by China Classification Society Certification (CCSC) company or other ROs, they may even ask you to amend your management system, no matter whether the management is mandatory or not. Finally, the result is that as the shipping companies are afraid of external audit.

Root Cases: in the shipping company's management system, most of the external audits are conducted by the auditors by their knowledge, experience and ability of judgment through designated management system and criteria in a way of qualitative assessment. Mostly, it depends on the subjective initiative of the auditors, the

disadvantages are: on the one hand, there would be an enormous difference of the audit results for a same shipping company due to the different audit teams and auditors relying on the knowledge level and audit ability, and that would be harmful to the authority and impartiality of the audit intuitions and the administration departments. On the other hand, most of the OSV shipping companies have integrated a diversity management system with wide-ranging, multi-level and complex process relationship; therefore, it is very hard for the auditor to perform a comprehensive evaluation for integrated management system by their own knowledge and experience.

4.2. For the OSV Shipping Companies.

4.2.1. The greatest impact for the OSV shipping company is that the key management system is not outstanding; the companies may avoid the important and dwell on the trivial, making the mandatory management system in an ineffective running.

Root causes: Influenced by their client "oil and gas" company, it's well known that most of the world's oil and gas companies own or hire fleet, as the oil companies they implement mature HSE management system early, influenced by this, most of the OSV shipping companies are forced to carry out the HSE management systems: some of them established the same system as the oil company, others added some elements of HSE system into their own management system due to the frequency inspection by the oil company, said by Wu Jianpan (Wu J. P., 2011): "these inevitably form a nondescript management system of OSV shipping companies".

4.2.2. A good practice of how to effectively integrate all the management systems

with different objectives, standards and service objects into an efficient and effective management system haven't been formed due to the different focuses of each different systems. For example, the ISO 9000, ISO 14000 and OHSAS 18000 encourages incorporate the environment, occupational health and safety into the QMS, but actually there is no clear answer on how to incorporate. Finally, a pattern of each management system separately running without any or little connection has been formed in the company.

Root causes: firstly, as the given cases, because of the different management objectives, different characters of objects, QMS aims at the demand of client and EMS serves for the environment as well as the OHSMS focus on the occupational health of the internal employee, there is a major difference among these three management systems, and it is very hard for the company to integrate them clearly. Secondly, improper method has been used: some companies still used the "element method" instead of "process method" during the integrating management system. There is a big difference between these two methods, as the "process method" is to identify and manage the related resources and activities in the organization, use PDCA dynamic cycle to keep and continuously improve the process, oppositely, the "element method" is to establish the management system in a static situation to a great extent, it's difficult for the shipping companies to realize the continuous improvement.

4.2.3. It lowers the enterprise management efficiency and reduces the running efficiency of management system for the OSV shipping company due to the multiple management systems and plenty of duplication paper work; meanwhile, a large amount of information and resource cannot be fully used or wasted.

Root Causes: Firstly, for the sake of the different certification needs of different standards, the OSV shipping company has to carry out the repetitive work; therefore, it appears many sets of management manuals, management procedures, repetitive internal audits and reviews and etc. Secondly, because of each management system running separately, the resource distribution, the coordination of each system's connector and elements, exchange of information become more and more complex and inconsistent, which increase the complexity and randomness of enterprise management system to a great degree, and bring down the system function and management efficiency of management system. Finally, the different management systems required that the same position should have the different responsibility and authority, so it easily confuses and overlaps the responsibility and authority, and some of the post functions cannot be fully performed.

4.2.4. Most of the management systems in OSV shipping companies are similar, and they do not reflect the enterprise culture, and plagiarism existed among the enterprises.

Root causes: Due to the fact that the top management lack understanding of the management system, and that they are reluctant to employ the professionals or the qualified consulting company, the only shortcut is to copy the other company's management systems out of context. Some companies may copy one company's management manuals, and then copy another company's management procedures; the joint management system cannot reach the designated goal of standards or rules.

4.2.5. Increasing the company's financial burden, as well as creating chaos in the company internal-management and internal-coordination.

Root causes: on one hand, establishment and implementation of any management system needs the supports of all kinds of the resources, as a consequence, implementation of multiple management systems increase the times of internal and external audits, and management reviews, undoubtedly, it rises the shipping company's economic burden and also the human resources; on the other hand, based on the different background of different internal and external auditors, there would be a different explanation and understanding on one same concept, which will bring the difficulties in cooperation and coordination in the internal of the shipping companies. And also it may appear that resources and information cannot be shared or may even be rejected among different departments from their own career scope and management duty due to the independence and different management framework of the each management systems when implementing the integrated management systems.

4.3. For the Seafarers of OSVs.

4.3.1. The greatest impact of the seafarers is the fatigue due to the endless paper work.

Root causes: It is well known that more that 80 percent of the accidents was caused by human's behavior, as the fatigue is a key element in the human's unsafe behavior. Firstly, as in the OSVs, there are additional ocean projects and oil lifting operation except the routine shipping operation, so the overload work is a common phenomenon; secondly, compared with the other type of the ships, the manning level of the OSV is lower than the other vessel compared with the workload, commonly, there are only three to four ABs in the deck department, and they have to carry out the routine navigation or anchor watch. Additionally, they have to conduct the

loading and offloading operation, lifting operation, or other physical work on the main deck days and nights if there are requirements by the platform or other offshore oil terminals, as the ship's captain, if there is a towing and anchor handling operation for the semi-submersible platform, they may even have to work continuously for two to three days or maybe even longer until the operation is completed, which impacts the seafarers' rest at a great deal. Finally, as the spirit of the management system is that "Do what you should do, record what you have done", actually, the management system is only the paper work as the understanding of some seafarers. If one work finished, they would make many kinds of the same records in order to meet the different requirements of the different management systems. Even though the work is not finished they also have to make sure the records or reports are intact so that they can pass through each kind of the management system audits or surveys. Hence, it substantially influences the execution of management system by seafarers.

4.3.2. The ship's masters of OSV cannot fulfill their responsibility and authority completely.

Root causes: As the Regulation 5 of ISM Code "Master's Responsibility and Authority" described as that "The Company should establish in the SMS that the master has the overriding authority and the responsibility to make decisions with respect to safety and pollution prevention and to request the Company's assistance as may be necessary", the ship's master is the overall responsibility of implementing and supervising the management system onboard the vessel, executes the company's safety, environment and occupational health policy onboard, who plays a key role in transferring company management systems into practice by each level of seafarers. But in practice, in some OSV shipping companies, the ship's masters cannot fulfill their responsibilities due to management of their ship's owners. Most of the OSVs

navigate in coastal waters, the ship's owner can directly contact and command the ship's master easily, or sometimes if there is an important ocean engineering project, one or two ship's owner's representatives will be designated onboard. Generally, in this situation, the ship's master will lose his commanding authority as a migrant worker.

4.3.3. Some management systems on board of OSV become a mere formality, "it is a burden" as is said by the ship's seafarers.

Root causes: It is well known that the management system running effectively and efficiently or not depends on the execution of the basic level-ships. As the multiple management systems running onboard separately, which results in generating more and more documents, records and reports, it is difficult for the seafarers to master the whole documents. Another key factor is the workload is increased for the seafarers especially in terms of onboard training. Because of the excessive workload and short manning onboard, the onboard training is carrying out in a perfunctory way. The onboard training should lay emphasis on shortage of the seafarer knowledge, familiar training on all key equipment's operational instructions, seafarers' emergency responsibilities, new international conventions or national laws, and the problems identified during the emergency excise and the drills etc. Actually, during my routine internal audit or inspection or visit to the OSVs seafarers, the training records can be discovered but without any practical training.

Chapter V: Some Recommendations.

5.1. The most important measure is to establish the Integrated Management System (IMS) through comparing and analyzing the elements and processes of each management system by merging the same or similar elements.

As the analysis above indicates, we can easily find that the most important thing is how to integrate the whole management systems into an applicable integrated management system (IMS) with a brief and clear framework, in order to reduce the workload of the seafarers and OSV shipping companies. The original intention and essence of IMS is to optimize the existing management systems, not to update or invest in resources and technology, and its final purpose is to reduce management cost, improve work efficiency, and ensure a harmonious development of each management system.

Here, we will take the four standards (ISM Code, ISO 9001, ISO 14001 and OHSAS18001) as an example. By comparing their objectives and purposes, we can find that:

Table 5.1.1: the Different Objects of the Different Standards.

Standards	Objectives	Purpose
ISM	Ship	Focus on the commitment for the safety of seafarers and the ocean environment by company.
ISO9001 QMS	Client	Focus on the quality commitment for the client by company.

ISO14001 EMS	Related Parties	Focus on the environment commitment for the society by company.
OHSAS18001	Staff	Focus on the occupational health and safety for their staff by company.

Despite their different service objectives, their principles and management model are the same through comparing their processes. These four standards all obey the same model “Deming Cycle”, which is the PDCA model including Plan, Do, Check and Act these four steps as follow:

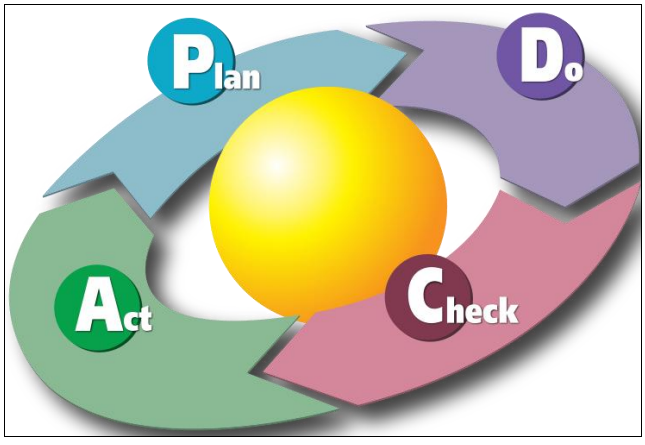
Step one: PLAN, establish the objectives and processes necessary to deliver results in accordance with the expected output (the target or goals). By establishing output expectations, the completeness and accuracy of the specification is also a part of the targeted improvement. There are four steps in this section: current situation analysis, problems or question identification, causes analysis and influence factors, then to make the measure plans aim on the main influence factors and causes.

Step two: DO, implement the plan, execute the process, and make the product. Collect data for charting and analysis in the following "CHECK" and "ACT" steps.

Step three: CHECK, study the actual results (measured and collected in "DO" above) and compare against the expected results (targets or goals from the "PLAN") to ascertain any differences. Look for deviation in implementation from the plan and also look for the appropriateness and completeness of the plan to enable the execution, i.e., "Do". Charting data

can make this much easier to see trends over several PDCA cycles and in order to convert the collected data into information. Information is what you need for the next step "ACT".

Step four: Act, if the CHECK shows that the PLAN that was implemented in DO is an improvement to the prior standard, then that becomes the new standard for how the organization should ACT going forward (new standards are enacted). If the CHECK shows that the PLAN that was implemented in DO is not an improvement, then the existing standard will remain in place. In either case, if the CHECK showed something different than expected (whether better or worse), then there is some more learning to be done... and that will suggest potential future PDCA cycles. Note that some who teach PDCA assert that the ACT involves making adjustments or corrective actions... but generally it would be counter to PDCA thinking to propose and decide upon alternative changes without using a proper PLAN phase, or to make them the new standard without going through DO and CHECK steps.[5]



[5] Source: https://en.wikipedia.org/wiki/PDCA

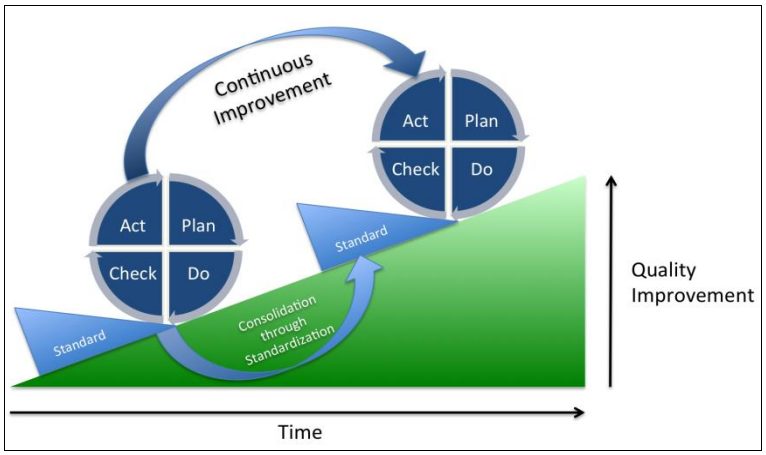


Figure 5.1.1: Indication of Deming Cycle

Sources: https://en.wikipedia.org/wiki/PDCA

So the improvement is continuous, after each PDCA circle completed, it will take the improvement on the prior basis and make the product quality into a higher level.

Obviously, the structures of EMS and OHSMS are basically similar, the model of these two standards are all from the theory of PDCA circle and continuous improvement. As the ISM Code, it also absorbed the theory and method of ISO 9000, and emphasized keeping the system running through PDCA circle in order to improve the shipping safety and protect the ocean's environment.

Although the chapters of these four standards are not a one-to-one correspondence, the framework are mainly the same, which all concludes: commitment of the top management; objectives and goal establishment; organization structures, responsibilities, training, awareness and capacity; information exchange and communication, document management; operational control, product or service realization process control; monitoring and measuring, non-conformity, corrective and preventive measures; suitability, sufficiency and effectiveness evaluation of

objective, process and result; and continuous improvement.

Taken together, the aforementioned four standards have the same or similar contents in programmed requirements on documentation control, record management, internal audit, management review or evaluation, non-conformity control, corrective and preventive measures, etc., additionally, they have the similarly documented and programmed requirements on organization structure and responsibility, policy and objective, training and awareness, information exchange and communication, resource management, law and regulation requirements, implementation and operation, monitoring and measuring, etc. (Yang. D. L., Guo Q. & Xu W. Y. 2005)

Moreover, the quality management principles of ISO9000 series standard are also applied to the other three standards. For example: Firstly, the leadership is emphasized in these four systems, because the organization principles and objectives are determined by the leader or top manager in the organization, and they should ensure that the objectives and goal can be realized through providing sufficient and suitable resources. Secondly, "involvement of all staff" is defined in these four systems: for instance, the ISO 9001 underlines all levels of personnel are the foundation of organization as well as the ISM Code highlights "human-oriented principle" in safety management, all these reflect that human element has been regarded as the first factor in the safety management systems. Thirdly, process approach is adopted in these four systems, all the relevant processes, particularly the key processes should be identified and controlled. Finally, the other management rules such as system management method, continual improvement, decision-making method, mutually beneficial supplier relationships, etc. are widely applied among these four systems. (Liang X. C. 2007)

In conclusion, after a comprehensive comparison and analysis with ISO9001, ISM Code, ISO14001 and OHSAS18001, we can integrate them together based on the framework of ISO 9001. Finally, an integrated management system covers the requirements of the above four standards, and its outline can be listed in the following table 5-1.2: IMS Outline of the shipping company has been formed simultaneously, also in accordance with the actual situation of shipping company, and it would be the systematic management guidelines for the shipping company on safety, quality, environment and occupational safety.

Table 5.1.2: IMS Outline of the Shipping Company

Syllabus Elements	Regulation number of relevant standards			
	ISO 9001:2015	ISM Code	ISO 14001:2015	OHSAS 18001:2007
1 Preface				
1.1 Issue of management system				
1.2 Approval by Management representative				
1.3 Company introduction				
1.4 Scope of application	1	1.3	1	1
2 Referenced Standards and Laws	2		2	2
3 Terms and definitions	3	1.1	3	3
4 Requirements of IMS				
4.1 General Requirements	4.3 4.4	1.2.3 1.4	4.1	4.1
4.2 Document requirements	7.5	1.4	4.4 7.5	4.4.4
4.2.1 Company Management Documents	7.5.1 7.5.2	1.4	7.5.1 7.5.2	4.4.4
4.2.2 Manual of IMS		11.3		
4.2.3 Control of documents and records	7.5.3	11.1 11.2	7.5.3	4.4.5 4.5.4
5 Management responsibility				

5.1 Management commitment	5.1		5.1	4.2
5.2 Focus	5.1.2			4.3.1 4.3.2
5.3 Policy and objective	5.2 6.2	6.2	5.2	
5.3.1 Management objective	5.2	1.2	5.2	4.3.3
5.3.2 Management policy	5.2	1.4.1 2	5.2	4.2
5.4 Responsibility, authority and communication.	5.3		5.3	
5.4.1 Responsibility and authority	5.3	3	5.3	4.4.1
5.4.2 Designated person		4		4.4.1
5.4.3 Responsibility and authority of ship's Master.		5		
5.4.4 Information transfer and communication	7.4	6.6 6.7	7.4	4.4.3
5.5 Internal audit, assessment and management evaluation.	9.2 9.3	1.4.6 12	9.2 9.3	
5.5.1 Internal audit.	9.2.1 9.2.2	12.1	9.2.1 9.2.2	4.5.4
5.5.2 effectiveness assessment and management evaluation	9.3.1 9.3.2 9.3.3	12.3	9.3	4.6
6 Management of human and resource.		6		
6.1 Human resource	7.1	6	4.4.1 4.4.2	4.4.1 4.4.2
6.1.1 Ship's master	7.1.2	6.1	4.4.1	4.4.1
6.1.2 Ship's manning	7.1.2	6.2	4.4.1	4.4.1
6.1.3 Shore staff	7.1.2		4.4.1	4.4.1
6.1.4 Training and education	7.1.6 7.2 7.3	6.3 6.4 6.5	4.4.1 4.4.2	4.4.1 4.4.2
6.2 Ship and Shore base installation	7.1.3	10	4.4.1	4.4.1
6.2.1 provision and maintenance of ship and shore installation	7.1.3		4.4.1	4.4.1

6.2.2 Ship and equipment maintenance	7.1.3	10	4.4.1	4.4.1
6.3 working environment	7.1.4		4.4.1	4.4.1
7 Planning	6		6	
7.1 Quality planning	6			
7.1.1 Quality objective	6.2			
7.1.2 Shipping service realization planning.	6.2			
7.2 Planning to the management of environment and occupational health.			6.1	4.3
7.2.1 Environmental factor and hazard factor			6.1.2	4.3.1
7.2.2 Legal and other requirements			6.1.3	4.3.2
7.2.3 Objective and index			6.2.1	4.3.3
7.2.4 Occupational health and safety management program			6.2.	4.3.4
7.3 Development of plans for shipboard operations		7		
7.3.1 Routine operation		7		
7.3.2 Key operation		7		
7.3 Planning for management system	6.2	1.2.3 1.4	6.1.1	4.3.3
7.4 Planning for measurement, analysis and improvement.	7.1.5		9.1	4.5.1
8 Operational control	8		8.1	4.4.6
8.1 Shipping service realization process control	8.5.1			
8.1.1 Process related to client.	8.2			
8.1.2 Procurement management	8.4			
8.1.3 Shipping service provision	8.5			
8.2 Operational control of environment and occupational health.			8.1	4.4.6
9 Monitoring, measurement	9.1		9.1	

and improvement	10		10	
9.1 Monitoring and measuring	9.1.1		9.1.1	
9.1.1 Control or monitoring and measuring equipments	7.1.5.2	10	9.1.1	4.5.1
9.1.2 Customer satisfaction	9.1.2			
9.1.3 Analysis and evaluation	9.1.3			
9.1.4 Monitoring and measuring to environment			9.1.1 9.1.2	
9.1.6 Monitoring and measuring to occupational health and safety				4.5.1
9.2 Emergency preparedness and response		1.4.5 8	8.2	4.4.7
9.2.1 emergency situation identification		8.1		4.4.7
9.2.2 Emergency procedure		8.1		
9.3 Nonconformity control				
9.3.1 Nonconformity control of quality	8.7			
9.3.2 Nonconformity control of safety		9.1 10.2.2		
9.3.3 Nonconformity control of environment and occupational health.			10.2	4.5.4
9.4 Analysis of data	9.1.3		9.1.1	4.5.1
9.5 Improvement	10		10	4.2
9.5.1 Corrective and preventive action	10.2	9.2 12.6	10.2	4.5.2
9.5.2 Continual improvement	10.3	12.3	10.3	4.3.4

The benefits after the management systems have been integrated can be described as follows: firstly, many repeated requirements have been cut down, such as the internal audit, management evaluation and effectiveness assessment; therefore, it will reduce the repetitive work and increase the working efficiency for the shipping company. Secondly, the quantity of processes which should be controlled will reduce

dramatically through merging the processes in the same work sites. The control requirements of any process needs the resources on human, equipment, materials and monitoring, so reduce the number of processes will lower the management cost for shipping company. Thirdly, it will substantially compress the quantity of the management system documents; it will bring a high working efficiency in document control, amendment, distribution and recycling. Finally, there is some overlap between organization structures and functions in these management systems: after combining and optimizing of the IMS, the indirect management cost of the shipping company will be reduced if some of the staff's responsibilities and authorities can be optimized too. For example, a qualified warehouseman can be designated as the supervisor on the quality of the cargo, also, he can be designated as the supervisor on the environment and safety factors of danger cargo. There is no need for the shipping company to assign another person for the same job.

5.2. There are still some other recommendations apart from the aforementioned measures which need the cooperation and coordination among the departments of the government, marine administration, RO and shipping company. If there are good relationships among each others, the management systems of the shipping company will run smoothly and effectively; therefore, each party should carry out their own responsibilities and maintain a close relationship.

5.2.1. As the Government Administrative Departments, there are two aspects of their functions that should be improved in China. One is legislation, when bringing in a new issued convention, on how to transform the international convention into domestic legislation; the actual domestic situation should be comprehensively considered rather than tacitly accepted. And the nation-related legislation should be improved in order to make sure that the requirements of the new international

convention can be kept abreast and conducted properly, to avoid the reoccurrence of the same phenomenon of seafarers' "Medical Certificate of Seafarers" and "Certificate of Health Examination" which was mentioned in the Reg.1.1 of Chapter IV.

As this problem, maybe the department concerned can coordinate the Marine Administration and Entry-Exit Inspection and Quarantine Department to merge the same requirements and list out the different examination items, and then send it to the hospital or the authorized physical examination center. After the physical examination of the seafarer, a certificate covering both requirements and recognized by both parties will be issued to the seafarers.

Another aspect is the loose or ineffective supervision. Due to the uneven level of ship's design and construction, quality of ship and seafarers around the worldwide and excessive strictness of external supervision according to implement the current ISM Code, more and more ships are out of service. The supervision of port state and flag state around the world are enslaved to the demand of the local economy and politics, and the audit and certification of the classification society are also limited to their own business and competition. For these reasons, some substandard vessels are allowed entrance the market, and the professional competence and integrity of the auditor and surveyor cannot warrant any substandard vessels to slip through the cracks, either. Furthermore, safety supervision and evaluation cannot be effectively carried out, and quantitative classification and evaluation criterion cannot be performed based on the current mechanically stipulated of safety management rules and standards. In this situation, seeking a suitable monitoring method combined with China's national condition is a critical problem.

5.2.2. As the OSV Shipping Company, besides integrating the management system, another important suggestion is to invite the safety management professionals or institution to take part in the safety management for the shipping company. It's well known that the traditional experienced safety management model is not adaptable to the development nowadays, and the "passive mode" has been changed to "active mode", as this change needs huge numbers of safety professionals especially in the shipping enterprises. Thus, the join of the safety professionals or the safety institution will have a great effect on the safety management of the company. On the one hand, they can influence the top management on their safety awareness and skills, which will pave the way for the company's safety management and culture. On the other hand, they can train the seafarers who always understand safety according to their own experience and previous accidents. Finally, the safety professionals or the safety institution can also provide good practice and advice on establishing and simplifying the IMS. (Luo C. J. 2016)

5.2.3. As seafarers of OSVs, the most important thing is to reduce the workload indeed and make sure the seafarers have enough time for rest. It's known that the formalism is the universal and serious phenomenon onboard the vessels nowadays, the management system routine tasks of most OSV shipping companies and their seafarers are to cope with the inspection or audit by the administration. If there is a hazard or deficiency of equipment, what the shipping company and ship's seafarer care is to cover it up, so that it cannot be discovered by the inspector or auditor instead of repairing it. Likewise, the routine violation operations of the seafarers also cannot be identified by the inspector easily. A good example is the shipboard drill: the inspector only can discover that the completed records in the deck log book, engine log book or drill record book without detecting the drills were carried out or not indeed. Therefore, on the one hand, the top management of the shipping

company shall take care of the seafarer's work and rest time with proper manning to make sure the seafarers are in good rest and full of energy; on the other hand, they should train the seafarers to make sure they understand the management system thoroughly in order to ensure that the management systems can be implemented effectively and efficiently in the primary level.

Chapter VI Conclusion

Nowadays, the competition becomes fiercer and fiercer in all walks of life, and the oil product is one of the most important energy sources in the world, therefore, exploitation of the offshore oil is closely related to national economy and people's livelihood. As essential aiding tools during exploiting the offshore oil, the OSVs play a vital role in oceanic engineering, lifting assistance, cargo and personnel supply or transportation and etc. Other than other vessels, the OSVs not only have additional functions but also a lower manning. Thus, the safety of the OSVs has been paid more and more attention to.

More and more OSV shipping companies bring in all kinds of the management systems for enhancing their management level, also for improving thier competent qualification. Nonetheless, it doesn't mean that the more manamgent systems, the safer for the OSV shipping companies. The key point is how to use them smoothly and effectively instead of bringing more workload for the ship's crew.

In China, there are still some Chinese characteristics in safety management. A good example is that if there is a major accident occuring in an enterprise, an immediate emergency notice will be issued to the same kind of the enterprises, followed by a huge number of documents, firstly from the state level, and then from the provincial level and city level; after that, the companies would pay their all attentions in the documents for coping with their superior instead of using thier own management systems. Once I audited a OSV manned with the Philippines, and the ship's Master is a British man, who told me that: "why there is a 'Safety Month' Activity in June every year, does it mean we only need safety in June, not in other months?".

Due to the different cultures and characteristics of different countries, it is very important for a company to take into account their actual situation when bringing in the standards or management systems from other countries, especially as for some non-mandatory standards. After that, the relationship and integration of all the management systems should be cleared up and underlined, in order to make sure it makes a real improvement for the ship's crew actually, not only to bring over workload for them. A good example is that the WSSS, it does not suit and conform to the shipping company, it is merely a typical formal routine in my own view.

A perfect management system needs all the interested parties involved to take full attention, not only focusing on the paper work or monthly or quarterly meeting. No matter how perfect a management system is, it is impossible without human's implementation. Therefore, the human element as the first element also is the fundamental and vital element regardless of safety fields.

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Appendix 1: Questionnaire used in this thesis for Master Degree

World Maritime University MSEM 2016

WMU

Type of Management system	Effectively Running or not?	Problems	Hours on paper work	Recommendations
International Safety Management System (ISM)				
International Ship and Port Facility Security Code (ISPS)				
Maritime Labor Management System (Maritime Labor Convention MLC, 2006)				
Ship Energy Efficiency Management System (SEEMS)				
Work Safety Standardization System (WSSS)				
Quality Management System (QMS)				
Environment Management System (EMS)				
Occupational Health and Safety Management System (OHSMS 18000)				
Other Management System				

Note:

This Questionnaire only tries to identify the problem existed in the current management system of the offshore support vessels and the companies, and is not used for any commercial purpose. It will be appreciated for you to add supplementary systems not listed above, if you think it is appropriate.

E-mail:dmu_afa@hotmail.com

Background information of respondents：

Rank: _____; Education: _____

Sea experience: _____years

Address of your company: _____

Your contact details:

Fax:_____

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