CHALMERS

The ISM Code – CONTINUOUS IMPROVEMENT

Master of Science Thesis

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Abstract

This study was carried out in order to present an updated investigation of the Swedish shipping industry's compliance to "*Reports and analysis of non-conformities, accidents and hazardous occurrences*" in accordance to section 9 in the ISM Code and to compare the results of this research with the underlying intentions of the concept of continuous improvement, that is one of the indicators of the presence of a good Safety Culture.

This was done in order to be able to compare the Swedish conditions to the international status as described in earlier researches in this work and by use of the INSJÖ reporting system as a mall, investigate if this research was in line with the rest of the Swedish shipping industry. The result was also analyzed in relation to Dr W. Heinrich's Accident Distribution Model to achieve an understanding of the result's plausibility in this research.

The data collection for this research was carried out by mean of interviews with Masters, Designated Persons and top level Managers in five different Swedish shipping companies, representing a good spread of different kind of: ownership; size of fleet; numbers of employees; shipping activities. A literature revue was also carried out

The result of the study was that there was reluctance to report accidents, near misses and non-conformities of which the two later is of importance to prevent accidents in according to the concept of continuous improvement as described in this research.

It was also found that the number of reported near misses and non-conformities were not in proportion to the number of accidents comparing with the Accident Distribution Model by Heinrich. This result was also comparable with the INSJÖ reporting system as well as the earlier researches described in this study.

Keywords: ISM Code; continuous improvement; safety culture

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1. Introduction

1.1 Background

The disaster of the Herald of Free Enterprise in the 1987 which capsized in the Belgian port of Zeebrugge due to that the ship entered her sea voyage without closing the bow port resulted in a loss of 193 lives (Sagen, p 57-69, 1999).

The result of the preliminary Maritime Inquire was so grave that representatives from the shipping company even were accused of manslaughter caused by gross negligence and recklessness in their operation of the vessel. These serious charges could never be proved hence the ship/shore interface and the question of responsibility were neither defined nor clarified (Sagen, p 57-69, 1999).

The Secretary of the Department of Transport did however characterize the operation of the ship as "*sloppiness from top to bottom*" (Sagen, p 57-69, 1999).

This occurrence and its legal consequences raised an important and serious issue; there must be a liability to the shipping company or the company managing its vessels for the development of the operation system for their vessels. It has always been the Master of the vessel who has carried the total liability for all accidents involving his vessel and he has had to execute the existing operation system developed by the owner or their representatives as it is given (Sagen, p 57-69, 1999).

This occurrence did also result in that the International Maritime Organization (IMO, UN's legislative organization concerning the Maritime sector i.e. IMO create rules which after ratification of the member states become national law decided to create a set of rules in order to prevent accidents to occur caused by human errors.

In October 1989 at its 16th Assembly, the resolution A.647 (16), Guidelines on Management for the Safe Operation of Ships and for Pollution Prevention, was adopted by IMO.

The purpose of these Guidelines was according to IMO to provide a framework for the proper development, implementation and assessment of a good practice for safety and pollution prevention management for the shipping industry. This was in order to ensure safety and to prevent human injuries / loss of life as well as avoid environmental or property damages. These guidelines were based on general principles to promote the sound management and operating practices within the Maritime industry as a whole.

The Guidelines was set up to prevent breaches to all already existing mandatory rules in the first place as they are the most important means of preventing damage to life, property and environment and included sections on management and safety and environmental policies.

In 1993 after some experience of practicing the Guidelines, IMO adopted the ISM Code which proper name is International Management Code for the Safe Operation of Ships and for Pollution Prevention (IMO, n.d.).

In 1998, the ISM Code became mandatory.

The objectives of the ISM Code are:

> 1.2.1 The objectives of the Code are to ensure safety at sea, prevention of human injury or loss of life, and avoidance of damage to the environment, in particular to the marine environment and to property …

The Preamble of the ISM Code states:

> … 6. The cornerstone of good safety management is commitment from the top. In matters of safety and pollution prevention it is the commitment, competence, attitudes and motivation of individuals at all levels that determines the end result.

Section 9 in the ISM Code, regarding reporting of non-conformities:

> 9.1 The safety management system should include procedures ensuring that non-conformities, accidents and hazardous situations are reported to the Company, investigated and analysed with the objective of improving safety and pollution prevention.
>
> 9.2 The Company should establish procedures for the implementation of corrective actions (IMO, n.d.).

For full version of the ISM Code Part A including Preamble, see Appendix I.

1.2 The concept of continuous improvement

The concept of continuous improvement was established by the "quality gurus" in the fifties and sixties of which the American businessman Philip Crosby (1926-2001) was one of the more known.

He stated that in order to reach the objectives of a quality management system it is of importance to look into the task as a continuous process where nonconformities continuously are reported and corrected. This process is described in his work Quality is free where he writes about this process as the 14-step program for continuous improvement. This program was implemented in the American company ITT which by then had revenues of USD 15 billion and 350.000 employees, which made them to one of the largest companies in the world (Crosby, p 13-24, p 135-140, 1992).

The theory of continuous improvement as a never ending process as a system for Quality/Safety Management is well established within all kind of industries and one of the most known is the Kaizen model developed by Toyota in Japan during the fifties. Kaizen is the Japanese word for continuous improvement and is a policy of constantly introducing small changes in order to improve quality/safety. This assumes, because of their presence, that it is the people within the business who are the ones to best indentify where it is room for improvements.

The system can be operated at the individual level or by Kaizen Groups or Quality Circles which are groups for identification of improvements. One issue of importance in

order to make Kaizen effective, is the culture of trust between staff and manager including good communication both ways, and an open-minded and democratic view of the employees (kaizen, n.d.).

This can be related to the cornerstones of the ISM Code, "Commitment from the top" and continuous improvement by reporting, analyzing and implementing corrective actions as described in section 9 in the ISM Code.

In the work of Sagen (1999) he describes a theory developed by Dr. W.H. Heinrich (see Figure 1) who stated that the relation between serious accidents and minor accidents is 1 to 30 and minor accidents and near accidents (near misses) is 30 to 300, i.e. 300 near accidents results in up to 30 minor accidents and 30 minor accidents results in 1 serious accident. This theory is commonly accepted within the science of safety research (Sagen, p126-129, 1999) and will be used in this work as a framework for analyzing the results of this research.

1 Serious accident

30 Minor accidents

300 Near misses

3000 Unsafe acts & conditions

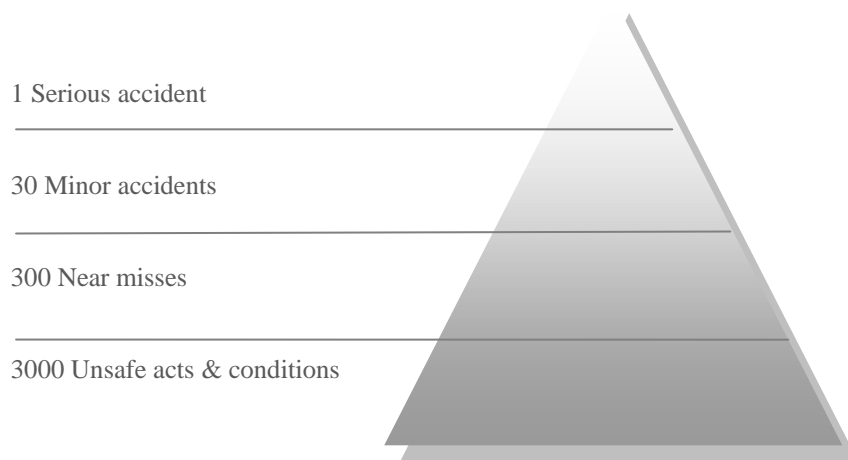Figure 1. Dr W. Heinrich's "Accident Distribution Model". Source: Sagen (p 127, 1999)

This theory is a well practiced and pedagogical way to explain the importance of the conception "continuous improvement" which is the fundament for the section 9 in the ISM Code:

> 9.1 The safety management system should include procedures ensuring that non-conformities, accidents and hazardous situations are reported to the Company

investigated and analysed with the objective of improving safety and pollution prevention.

9.2 The Company should establish procedures for the implementation of corrective actions. (IMO, n.d.)

Further on it is also stated by IMO that the Safety Management System (SMS, i.e. the ship specific safety manual based on the ISM Code) should be based on the philosophy of continuous improvement where the investigation of near-misses is an integral component of continuous improvement in the Safety Management System (IMO, 2008b).

All established Quality Management systems of which the ISM Code is one among others like e.g. ISO (International Organization for Standardization) are based on the same ground of which continuous improvement and the Accident Distribution Model theory of Dr, Heinrich are two of the most fundamental ones.

In the work "Transforming Maritime Safety Culture", Lappalainen (2008) he states that we have first to define the evaluation criteria for a good safety culture before we can evaluate the safety culture itself. In his literature review he discovered that for this purpose "the evaluation should be based on the intention of the maritime community itself" and that the ISM code provides the indicators for recognizing the existence of a good safety culture. The indicators to be utilized for this purpose are:

- An established and actively working process of continuous improvement
- Commitment from the top management of the company
- Motivated and encouraged personnel onboard to actively initiate safety improvements (personnel empowerment) (Lappalinen, p 46-47, 2008)

This corresponds with the ISM Code's section 9.2 and to the ISM Code Amendments: MSC.273 (85), effective 1 July 2010 where the writing:

The company should establish procedures for the implementation of corrective actions

has been amended with:

…including measures intended to prevent reoccurrence (IMO, n.d.)

These amendments are supposed to have effect on the practice of reporting accidents/incidents in order to avoid reoccurrence and to prevent incidents and nonconformities to develop into accidents by using a "Root Cause Analysis" system as a tool for understanding the reason of the occurrences of accidents.

This tool should obviously not be used only after an occurred accident, but also as a preventive purpose after occurred and reported incidents and nonconformities in order to respond to the ISM Code's Preamble in section 9 and the above described amendments to be in force by 1 July 2010.

In order to let all stakeholders in the Swedish shipping industry have the possibility to view the total reporting of accidents, incidents and non-conformities, a register called INSJÖ was created in 2007 and is now in full operation.

INSJÖ is an information system created by the Swedish Maritime Administration and the Swedish Ship owners' Association.

1.3 Earlier researches

The ISM code has been the object of a number of researches, but not many have had focus on only the concept of continuous improvement and the directly underlying causes. This chapter briefly describe the conclusions of three of the more important works which partly emphasis the concept of continuous improvement of which the study by Maritime and Coastguard Agency (2004) is one. It concluded that the continued success of the ISM Code is depending on the industry's ability to understand the strengths and limitations of the Safety Management System (SMS) by continuous improvement and the study concluded as well that the offshore industry has identified that there is a need to understand the difference between a functional SMS and an implemented one. Even if all efforts have been made in implementation of a SMS, one

must be able, by audits of it, to really indentify its efficiency in creating safety related outputs (Maritime and Coastguard Agency, 2004).

According to Anderson (2005) there is, even if improvements have been achieved, still work to be done in the improvement of the efficiency of the ISM Code.

Even if neither the ISM Code's requirements nor its philosophy have been totally understood by all ship owners and ship managers one could probably say that the ship owners and ship managers have made considerable efforts in the early stages. These efforts were made in order to fulfill requirements in order to receive their DOCs and SMCs (Documents of Compliance and Safety Managers Certificates). Even if the work and the financial commitments have been considerable in order to get that far, one must understand that the hard work of really getting the ISM Code to be functional as it was originally intended by its legislators, is still to come (Anderson, p 2, 2005).

According to the summary of Anderson's work, Cracking the Code – The Relevance of the ISM Code and its impacts on shipping practices shows that near-misses are not frequently reported and that there is still a certain reluctant to expose your own mistakes to the management (Anderson, p 152-191, 2003).

According to Anderson (2003) there are elements not functioning in the implementation of the ISM Code of which section 9: *Reports and analysis of non-conformities, accidents and hazardous occurrences* is one of importance (Anderson, p 152-191, 2003).

Lappalinen (2008) state "… The ISM Code provides indicators for recognizing whether a safety culture exists in the marine industry.

… An established and actively working process of continuous improvement …"
(Lappalinen, p 46-47, 2008)

This continuous improvement process is described in section 9 of the ISM Code as:

Reports and analysis of non-conformities, accidents and hazardous occurrences (IMO, n.d.).

In order to investigate the status of development of continuous improvement of the Safety Management System in accordance to the ISM Code' in the Swedish marine industry, there is a need for an updated research on this issue, which according to DNV can be described in way of "One of the primary objectives of the ISM Code emphasises the concept of continuous improvement, thereby integrating a dynamism leading to safer and cleaner seas in the future" (DNV, 2010).

2. Purpose

The purpose of this research is to carry out an updated investigation of the Swedish shipping industry's compliance to "*Reports and analysis of non-conformities, accidents and hazardous occurrences*" in accordance to section 9 in the ISM Code and to compare the results of this research with the underlying intentions of the concept of continuous improvement.

3. Method

3.1 Data collection

The data in this research were collected by interviews and a literature review.

The structure of the questions, origins from Anderson's Doctor Thesis on the ISM Code, "Managing Safety at Sea" (Anderson, 2002), and cover the areas of:

Profile of the interviewees
Profile of reporting Accidents
Profile of reporting hazardous occurrences/near misses
Profile reporting non-conformities
General Conclusions

(see Appendix III).

3.2 Participants of the interview research

Participants in the research was Ship Masters, Designated Persons (DP) (see Appendix I, section 4 regarding definition of DP) and top level managers e.g. Fleet Managers or similar who acts on behalf of the owner.

One from each category was chosen from five different shipping companies.

In the smallest company with only 2 ships, the Managing Director (MD) and the DP was one and the same person, and instead of a Master, a Chief Officer (C/O) was chosen as interviewee as the MD/DP stated that: "on their ships, the C/O was involved to the same extension in the reporting of accidents/hazardous occurrences/non-conformities in accordance to the ISM Code".

The companies were chosen in order to cover the following differences:

- Size: a good spread of numbers of ships in their fleet, between 2 ships up to 40 ships
- Kind of owner: quoted on the stock exchange - private
- Kind of vessels: tankers, RO/RO, RO-Pax, bulk carriers

(See list in Appendix II). All interviewees and companies are unidentified in the results.

3.3 Procedures

The interviews were carried out live, when possible, otherwise by telephone. The interviews were recorded.

The thematic interviews were of a semi-structural form and based on the questions as in Appendix III.

The interviews were held between week 12 and 17, 2010.

3.4 Analysis

The data collected by interviews have been analysed as qualitative data (Robson, p 130 f, 2007) and the basic method originates from the study "Safety culture and Maritime Personnel's Safety Attitudes – Interview Report by Lappalainen and Salmi (2009):

PHASES	TASKS	RESULTS
Data collection	Interviews	Interview data; individual answers of the interviewees
Data reduction	1. Data investigation 2. Data merging	Reduced observations; result presented in the chapter: Results
Problem solution	Qualitative interpretation	Chapter: Conclusions

The results have also been compared with the accident triangle theory of Heinrich as a model for establish understanding of the probability of these results.

INSJÖ has been used in order to compare the results with the rest of the Swedish shipping industry.

The results have as well been compared to above described earlier researches.

3.5 Limitations

This research is limited to the investigation of the issue "continuous improvement" as stated in section 9 in the ISM Code.

The participants selected as above, do not give the research bearing on the whole Swedish shipping industry. However the information collected/given can be used as an indicator for further researches and training of the marine industry's personnel.

4. Results

4.1 Profile of the interviewees

4.1.1 Master

Four Masters and one C/O (hereafter called Master) (see 3.2) were interviewed. Three of them have been in their positions for 10 years or more. Two have been in their position for 3 years.

All Masters were well aware of who the DP was in their company and who normally conduct the ISM Code internal audits.

On the question A4, "*Do you believe your Company operates a 'no blame' culture where accidents, hazardous occurrences and near misses can be reported without fear of punishment or reprisal?*"; all the interviewees answered a clear "yes" and one added "my employer has asseverated that"; one "yes, absolutely."

On the question A5, "*Do you believe you work within a 'safety culture' - where safety has been raised to the highest priority?*" all the interviewees answered" yes"; one answered that "yes, I think so", one "yes, in my opinion", one "yes, we are going there with big steps!"

4.1.2 DP

Six DP were interviewed including one who holds both the DP and the MD positions (hereafter called DP).

Three DP have held their positions of a period of more than three years, two DP for 10 years.

All DP were well aware of who normally conduct the ISM Code internal audits.

On the question F3, "*Do you believe your Company operates a 'no blame' culture where accidents, hazardous occurrences and near misses can be reported without fear of*

punishment or reprisal?", two of the DP answered a clear "yes" and two of them added remarks like "I think so" and "but we are proceeding with it"; one "absolutely, our system is very transparent."

On the question F4, "*Do you believe you work within a 'safety culture' - where safety has been raised to the highest priority?*" all five added remarks like "yes, in mine opinion; yes I think so, high level, can be improved; it's our ambition"; "yes, but it could however be improved."

4.1.3 Manager

The interviewees hold positions as: Head of Ship Management/Vice President, Technical Director, Managing Director/DP, Managing Director and Director Technical & Human Resources, they are all referred to as Manager.

Two have held their position for 3 years or more; one for 8 years; one for 12 years; one for 9 years.

All Managers were well aware of who normally conduct their ISM Code internal audits.

On the question K4, "*Do you believe your Company operates a 'no blame' culture where accidents, hazardous occurrences and near misses can be reported without fear of punishment or reprisal?*", two Managers answered a clear "yes" and one added the remark "but it can be improved"; one "I think and hope so; yes, one "we have never dismissed or degraded anyone for being involved in an accident/incident."

> *"... This is a question you can't answer before a severe accident has occurred… the persons involved can sometimes experience the presence of a Blame Culture as you really have to go into depths with the investigation and put everything to its peak…"*

On the question K5, "*Do you believe you work within a 'safety culture' - where safety has been raised to the highest priority?*", one Manager answered a clear "yes"; one "yes, in my opinion"; one "yes, I think so"; one "I think so, we are working on it"; one "yes, we do always try to have good margins to the rules and high priority on costs for safety matters."

4.2 Profile of reporting Accidents

4.2.1 Master

On the question B1, "*From your own experience, how many accidents* which occur on board are reported to the Company ashore?*" one Master answered "less than half"; one "almost all"; one "about 70%"; one "all"; one "all, I think."

On the question B2, "*In terms of numbers of accidents* - approximately how many accidents would be reported in one year?*" one Master answered "about 3 reports/ship/year"; one "1 per year/ship"; one "about 7/ship/year"; one "about 5/ship/year"; one "1/ship/year."

On question B3, "*For the reports submitted would you expect to receive corrective action reports?*" two Masters answered "for all"; one "no, I do that myself onboard"; one "; 0ne "yes but it takes an active role of the Master"; one "always."

On the question B4, "*Would corrective actions be subject to a follow up audit?*" one Master answered "all"; one "none"; one "do not know"; one "sometimes"; one "not always, depends on the dignity".

On the question B5, "*If there is reluctance to report accidents to the Company - why is that?*", one Master answered "there is no reluctance to report accidents onboard"; one " a question of culture among the Pilipino officers and ratings"; one "can be a tendency to hide things that happen onboard for the company ashore, it can feel embarrassing"; one "sometimes one does not care about it"; one "avoiding extra paper work."

*In this section the term 'accident', or similar, refers to any reportable incident which resulted in, or might have resulted in, a loss or injury to people, ship, the environment or cargo - e.g. personal injuries, pollution, collision, cargo damage, etc.

4.2.2 DP

On the question G1, "*From your own experience, how many accidents* which occur on board are reported to the Company ashore?*" two DP answered "all"; one "almost all"; one "about 80% but only more grave accidents reports"; one "95%, I think."

On the question G2, "*From your own experience, how many accidents* which occur on board are reported to the Company ashore?*" *In terms of numbers of accidents - approximately how many accidents would be reported in one year?*" one DP answered, "2/ship/year"; one "4/ship/year; one "do not know by heart; one "2-3/ship and year"; one "about 1-2/year/ship."

On the question G3, "*For the reports submitted from the ship would the company send back corrective action reports?*", three DP answered "always"; one "it varies, it can also be solved onboard"; one "for about half of them."

On the question G4, "*Would corrective actions be subject to a follow up audit?*", two DP answered "no, only at the yearly internal audit every six month"; one "in some cases"; one "not generally, but at the next ordinary internal audit"; one "only for major accidents."

On the question G5, "*If there is reluctance to report accidents to the Company - why is that?*", one DP answered "yes, there is reluctance to report accidents due to the Mariners 'do it yourself' mentality; one "can be reluctance to report accidents because of unclear routines for the reporting procedures; one "one sort things out by oneself onboard"; one "I experience that one onboard thinks it's sufficient to just make a telephone call to the DP"; one "difficulties with the definition of accident and to handle the computer system."

*In this section the term 'accident', or similar, refers to any reportable incident which resulted in, or might have resulted in, a loss or injury to people, ship, the environment or cargo - e.g. personal injuries, pollution, collision, cargo damage, etc.

4.2.3 Manager

On the question L1, "*From your own experience, how many accidents* which occur on board are reported to the Company ashore?*" one Manager answered "all"; two "almost 100%; one "at least 80%, one "my experience is that 99% of all accidents which occurs are reported and 100% of the serious ones."

On the question L2, "*In terms of numbers of accidents* - approximately how many accidents would be reported in one year?*", one Manager answered "about 1-2/ship and year"; one "about 3/ship/year; one "about 1/ship/year; two "about 2/ship/year."

On the question L3, "*For the reports submitted from the ship - do you think the Company sends back corrective action reports?*" two Manager answered "yes, all"; one "25%; two "100%."

On the question L4, "*Would corrective actions be subject to a follow up audit?*" three Manager answered "no, at the next ordinary audit"; one "in some cases otherwise at next ordinary audit"; one "not often, depending on the dignity."

On the question L5, "*If there is reluctance to report accidents to the Company - why is that?*" one Manager answered "reluctance to report accidents might be due to cultural background" ; one" almost 100% of accidents are reported, the rest is probably because of fear of blame" ; one "negligence" ; one "I experience that one onboard thinks it's sufficient to just make a phone call to the DP", one " it differs from person to person but it is almost always a form of omission."

*In this section the term 'accident', or similar, refers to any reportable incident which resulted in, or might have resulted in, a loss or injury to people, ship, the environment or cargo - e.g. personal injuries, pollution, collision, cargo damage, etc.

4.3 Profile of reporting hazardous occurrences/near misses4.3.1 Master

On the question C1, "*From your own experience, how many hazardous occurrences / near misses which occur on board are reported to the Company ashore?*" one Master answered "less than 50%"; one "about 20%"; one "about 30-40%"; two "about 70%."

On the question C2, "*In terms of numbers of hazardous occurrences /near misses - approx how many would be reported in one year? "* one Master answered "12-20/ship/year"; one "2/ship/year"; one "5/ship/year"; one "about 10/ship/year for one Master out of four for the deck department"; one " about 2-3/ship/year."

On the question C3, "*For the reports submitted would you expect to receive corrective action reports?*" one Master answered "for more than 90%"; one "no, only at request for 'corrective action'"; one "for 90%"; two "yes, for all."

On the question C4, "*Would corrective actions be subject to a follow up audit?*" one Master answered "yes, to 100%"; one "no"; one "do not know" one "not by routine"; one "at the yearly audit, depending on the dignity."

On the question C5, "*If there is reluctance to report hazardous occurrences /near misses - why is that?*" one Master answered "mariner´s culture, /problems with definition of a near miss, but most are reported"; "one do not want to let the company know everything that happens onboard/problems with definition of a near miss"; one "can be a question of the Pilipino crew's 'loosing face culture"; one " to avoid extra paper work"; one: uncertainness regarding definitions or laziness."

4.3.2 DP

On the question H1, "*From your own experience, how many hazardous occurrences / near misses which occur on board are reported to the Company ashore?*" two DP answered "I do not know, but not all near misses are reported" ; one "about 20%" ; one "significant less than 80%" ; one "60-70%."

On the question H2, "*In terms of numbers of hazardous occurrences /near misses - approx how many would be reported in one year?*" one DP answered "2/ship/year"; one "about 4/ship/year"; one "I do not know by heart"; one 12/ship/year: one "max 10/ship/year."

On the question H3, "*For the reports from the ship would the company send back corrective action reports?*" three DP answered "always"; one "they will always receive some kind of information onboard"; "for about 30% of them, the rest is sorted out onboard by the Master and crew."

On the question H4, "*Would corrective actions be subject to a follow up audit?*" one DP answered "only at the yearly internal audit, every 6 month"; two "no, only at yearly

audit"; one "not in general but at the next ordinary audit"; one "sometimes, it depends on the dignity of the incident."

On the question H5, "*If there is reluctance to report hazardous occurrences /near misses - why is that?*" one DP answered "that is the mariner's mentality"; one "the mariners onboard find it complicated to write reports and they do not believe it is of any importance"; one "a question of 'do it yourself culture' "; one "they are not used to paper work onboard and there are differences in cultural based behaviour"; one "it could be a question about differences in culture, but that could we do something about, then it is also difficulties with the writing of reports."

4.3.3 Manager

On the question M1, "*From your own experience, how many hazardous occurrences / near misses which occur on board are reported to the Company ashore?* ", one Manager answered "70-80% are reported, I think" ; one "about 10" ; one " the level of reports is low, I think" ; one "I do not know, but not all are reported" ; one "almost all."

On the question M2, "*In terms of numbers of hazardous occurrences /near misses - approx how many would be reported in one year*?", one Manager answered "about 3/ships/year ; one "4-5/ship/year" ; one "1/year/ship" ; one "12/ship/year" ; one "about 10/year/ship."

On the question M3, "*For the reports submitted from the ship - do you think the Company sends back corrective action reports?*" three Manager answered "yes, for all" ; one "yes, for all, I presume" ; one "yes, for all, but it can take some times."

On the question M4, "*Would corrective actions be subject to a follow up audit?*" three Manager answered "no, only at the next ordinary audit"; one "sometimes, if it serious"; one "no, only at the next ordinary audit."

On the question M5, "*If there is reluctance to report hazardous occurrences /near misses - why is that?",* one Manager answered "might depend on ones cultural background, one is maybe ashamed for having made a mistake"; one "the mariners

onboard might be ashamed for reporting 'near misses' "; one "people onboard have low focus on reporting 'near misses' "; one "not use to do paperwork and different cultures": one "it can experienced as unimportant and time-consuming."

4.4 Profile reporting non-conformities

4.4.1 Master

On the question D1 "*From your own experience, how many non - conformities which come to light on board are reported to the Company ashore?"* one Master answered "about 50-70% of the 'non-conformities' are reported"; one "100%"; one "I do not know"; one "all"; one "about 50%."

On the question D2, "*In terms of numbers of non- conformities - approx how many would be reported in one year?*" one Master answered "10/ship/year"; one "about 1-2/ship/year"; one "7-8/ship/year"; one "I don't know"; one "4-5/year, for my ship."

On the question D3, "*For the reports submitted would you expect to receive corrective action reports?*" one Master answered "for more than 90%"; one "no, only at request of 'corrective action'; one "90%"; one "yes, all"; almost always, at least for 70%."

On the question D4, "*Would corrective actions be subject to a follow up audit?*" one Master answered "yes, for all"; none "no, only at next yearly audit"; one "I do not know"; one "it can happen, if there is a special reason"; one "at yearly audit, depending on the dignity."

On the question D5, "*If there is reluctance to report non conformities - why is that?*" one Master answered "50-70% of the non-conformities are reported"; one "it is the mariner's culture not to report everything ashore, they also find it difficult to define a non-conformity, but almost all are reported"; two "there is no reluctance to report non-conformities"; one "it's a question of ability to define a non-conformity and also a question of motivation"; one "to avoid extra paper work."

4.4.2 DP

On the question I1, "*From your own experience, how many non - conformities which come to light on board are reported to the Company ashore?*" one DP answered "maybe half of the non-conformities are reported"; one "all"; one "75%"; one "not all, but more than the 'near misses'"; one "65-70, I believe"; one "about 85-90%."

On the question I2, "*In terms of numbers of non- conformities - approx how many would be reported in one year?*" one DP answered "4/ship/year"; one "6/ship/year"; one "do not know by heart"; one "5/ship/year"; none "about 6-7/year/ship."

On the question I3, "*For the reports submitted from the ship would the company send back corrective action reports?*" three DP answered "always"; one "they will always receive some kind of answer onboard"; one "yes, for about 80%, the rest is taken care of onboard."

On the question I4, "*Would corrective actions be subject to a follow up audit?*" two DP answered "no, only on the yearly audit" one not in general, but at the next yearly audit"; one "no"; one "it is depending on the dignity,"

On the question I5, "*If there is reluctance to report non conformities - why is that?*" one DP answered "the mariners onboard thinks it is too much paperwork to report non-conformities"; one "unclear routines for reporting 'non-conformities'"; one "a difference between generations, younger mariners have a tendency to report more and a question of differences in culture"; one "I experience that one onboard thinks it's sufficient to just make a phone call to the DP" ; one "uncertainty about the definition of a non-conformity."

> "*The system is uniformed as it is, then it is a matter of informing and educating on what is a near miss, what is an accident, what is a non-conformity… this should clarify the system…*"

4.4.3 Manager

On the question N1, "*From your own experience, how many non - conformities which come to light on board are reported to the Company ashore?*" one Manager answered

"60-70% of the 'non-conformities are reported"; one "25%"; one "I think it is few, I seldom got to know about them"; one "not all of the non-conformities are reported, but more than the 'near misses' "; one "in my opinion about 50%, at least,"

On the question N2, "*In terms of numbers of non- conformities - approx how many would be reported in one year?*" one Manager answered "6-7/ship/year 'non-conformities' are reported"; one "about 10/ship/year"; one "20/38 ships (total fleet)/year"; one "about 5/ship/year"; one "about 10/year/ship."

On the question N3, "*For the reports submitted from the ship - do you think the Company sends back corrective action reports?*" one Manager answered "yes, after a valuation by the DP, to find out if it is a 'non-conformity'"; two "always"; one "I am convinced of that we do so"; one "no, it's for the most times sorted out onboard by the Master and the crew."

On the question N4, "*Would corrective actions be subject to a follow up audit?*"one Manager answered "no, at the next ordinary audit, if it is not urgent"; one "from time to time"; one "at the ordinary audit"; two "no."

On the question N5, "*If there is reluctance to report non conformities - why is that?*" one Manager answered "difficulties onboard to define a 'non-conformity'"; one "difficulties to do paperwork onboard"; one "I experience that one onboard thinks it's sufficient to just make a phone call to the DP"; one "the definition is not always made conscious by everyone working onboard"; one "I don't know."

4.5 General Conclusions

4.5.1 Master

On the question E1, "*In your view - have the number of accidents, hazardous occurrences and non conformities reduced since implementation of the ISM Code?*" one Master answered "I think the number of accidents have decreased, but the number of reports have increased"; one "yes, significantly"; one "I do not know"; one "no"; one

"yes, at least in our company". One "yes but not to the grade intended mostly for reports of "non-conformities.""

On the question E2, "*In your view has the ISM Code achieved its objectives?*" one Master answered "start to improve, but have not achieved its goals yet"; one "I think so, relatively well"; one "yes, really"; one "no, I don't think so; too much bureaucracy leads often to questions of interpretation"; one "yes, at least in the west countries."

4.5.2 DP

On the question J1, "*In your view - have the number of accidents, hazardous occurrences and non conformities reduced since implementation of the ISM Code?*" one DP answered "situation has improved"; one "I am doubtful about that"; one "yes"; one "there are less numbers of serious accidents"; one "yes, but they could have been more stringent."

On the question J2, "*In your view has the ISM Code achieved its objectives?*" one DP answered "yes"; one "to a degree"; one "partly"; one "yes."

4.5.3 Manager

On the question O1, "*In your view - have the number of accidents, hazardous occurrences and non conformities reduced since implementation of the ISM Code?*" one Manager answered "yes, considerably"; one "yes, quite clearly, probably by half"; one "yes, I think so" one "there are less numbers of serious accidents"; one "the number of accidents has decreased but the number of near misses has increased."

> *"The number of incidents is the same today as it was ten years ago, but considering our extended numbers of voyages per year the safety level has been relatively raised."*

On the question O2, "*In your view has the ISM Code achieved its objectives?"* one Manager answered "yes, in our point of view" one "yes, but too much paperwork decreases the willingness to report"; one "one might say so, I am not going to clarify this"; one "yes"; one "yes in a wider aspect, but the writing of the rules could have been

more stringent"; one "yes, it (the Code) has created a paradigmatic shift regarding the reporting of incidents, but it (the Code) could have been more uniformed."

5. Discussion

5.1 The interview

The Designated Persons and the persons referred to as Managers in this interview study were chosen by the author however the Masters were chosen by the companies. This might have had an influence on the results.

5.1.1 No blame culture and Safety culture

Almost all the interviewees were of the same opinion, that their companies did operate a "No blame culture. Only a few added comments like "I think so" and "but we are proceeding with it" or "I think and hope so".

Almost all the interviewees also thought it was obvious that they worked in a "Safety culture" even if comments like "I think and hope so", and "it's our ambition" were added to the clear "yes."

5.1.2 Accident reporting

All interviewees except 3 were of the opinion that a number of accidents were not reported to the companies DP. The numbers of not reported accidents did vary, but were in some cases about 70-80% even down to 50%.

The numbers of accidents reported were quite low, in general far less than 10 accidents yearly per ship, only one company had more, 12 yearly per ship.

All the interviewees said that all or almost all reports submitted from the ship to the DP was responded to with a corrective action report. However, the frequency of auditing the action taken onboard was considerably low, most persons answered that it was not

done before the next ordinary internal audit and some answered that it was done "in some cases."

5.1.3 Reporting of hazardous occurrences/near misses

For this type of occurrences, the reporting was considerably low, at the best in one case, less than 80%, but in general less than 50% and even down to 20-30%.

Also regarding this type of occurrences, the actual number of reports was low in general less than yearly 10 per ships and in one case up to 12 yearly per ship.

Regarding the response in terms of corrective actions reports on the reports submitted from the ships to DP, it was a common opinion that this was carried out to 100%, but one manager answered "yes, for all, I presume" one Master that he "did not know" and by one DP "they will always receive some kind of information onboard."

The answers in general regarding the frequency of audits carried out on the taken corrective actions onboard were regarding the same subject for "accidents" i.e. "not before the next ordinary internal audit."

5.1.4 Reporting non-conformities

This type of occurrences were reported in general between 65-75% only one person thought that 100% of the non-conformities were reported, but one Manager answered "I think it is few, I seldom got to know about them" and one Master "did not know."

In terms of figures, the actual numbers of reported non-conformities was in general 10-4 yearly per ship, only two had 1 or less.

The majority answered that 90-100% of the non-conformities reported submitted from the ships to DP were responded to with a corrective action report and that almost none of these were subjected to an audit before the next ordinary internal audit, unless it was of sudden urgency.

5.1.5 General Conclusions

There was no clear consensus regarding if the numbers of accidents, near misses and non-conformities has been reduced since the implementation, opposite, some was doubtful, some did not know and some thought it had, at least to a degree.

No more consensuses were presented regarding the achievement of the ISM objectives. The opinions varied from a "yes" to a vague "I think so, relatively well" and a "one might say so, I am not going to clarify this."

5.1.6 Reluctance to report

There was no doubt about that there in general was reluctance to report accidents/near misses and non-conformities in a formal correct way to the DP, even to report at all. Only two interviewees said that there was no reluctance to report accidents to the DP.

The most frequent causes for this reluctance to report accidents were according to the interviewees (in gradual order):

- To time consuming
- Unclear definitions of an accident/near accident/non-conformity
- Unclear procedures for reporting
- Fear of blame
- Culture differences

The result of the interview also shows that the frequency of reluctance to report is gradual:

- Near Accidents
- Non-conformities
- Accidents

which is, regarding to the intension of the ISM Code section 9 and Dr H.W. Heinrich's "Accident Distribution Model", a problem for a good working SMS when it comes to learning from incidents in order to avoid accidents.

5.2 Parallels with earlier studies

The result of this interview study, does as earlier researches described in chapter 1.2 in this work, show discrepancies with the intention of the ISM Code of which discrepancies with the concept of continuous improvement, which is in accordance to Anderson (2003) and Lappalainen (2008) as mentioned in chapter 1.2 in this work, of importance.

There are also discrepancies in the study between the participant's apprehension of their level of commitment to the concepts of "Safety culture" and "No blame culture" (as described in the questions regarding these matters) when comparing the answers in above sections 3.1.1 and 3.1.6 the interviewees answers, that in general 20-50% of occurred accidents, 50-70% of occurred near misses and 25-35% of non-conformities are not reported by the employees onboard.

The results from this interview are comparable to the work of Lappalinen & Salmi (2009) where they state in their conclusion that their study showed that maritime personnel have reluctance to report incidents and that their attitudes were not satisfactory (Lappalinen, Salmi, p 53-54 2009). There have also been previous studies on the impacts of the ISM Code which have found insufficiencies in the reporting of incidents (Lappalainen, p 47, 2008).

The work of Anderson (2003) where he establish the importance of continuous improvement also support my theory that continuous improvement is the fundament for a successful implementation of the code and of importance in order to make progresses in accordance with the intension of ISM Code (Anderson, p 152 – 191, 2003).

Further on in the work of Lappalainen & Salmi (2009) they establish that the interviewees admitted that they often neglected reporting incidents, which also was the

conclusion of their study, and that the interviewees felt that the under-reporting was a serious problem.

They also draw the conclusion that poor reporting practices cause further problems when the information about accidents, incidents and non-conformities do not cumulate at any level so that the personnel and the companies can learn from the experiences of other ships as there will be no interchange of information when the reporting practices is poor. Even in companies practicing reporting of accidents/incidents as a daily routine, there was a consisting reporting failure to be found and that the minor mistakes and technical problems are information that the management want to know about. Mistakes that causes near accidents which often are navigational errors will not be reported unless forced by circumstances, these mistakes are still looked upon as a "taboo".

At the end of their report they draw a fundamental conclusion which also is the reason for my study and parallels with my own conclusion that under circumstances with a reluctance to report accidents/incidents which is the fundamental philosophy of the ISM Code's concept of continuous improvement and without fulfilling the intentions of the ISM Code regarding the procedures of analysis and implementation of corrective actions and follow ups on these, a successful cycle of continuous improvement cannot exist (Lappalinen, Salmi, p 53-54, 2009).

According to the IMO, the safety management system, should be based on the philosophy of continuous improvement and the investigation of incidents is an integral component of continuous improvement, in the safety management system (IMO, 2008d).

5.3 INSJÖ
This chapter presents some relevant statistics in order to compare the results of this study with the reported accidents, near misses and non-conformities reported for the entire fleet operated by Swedish owners.

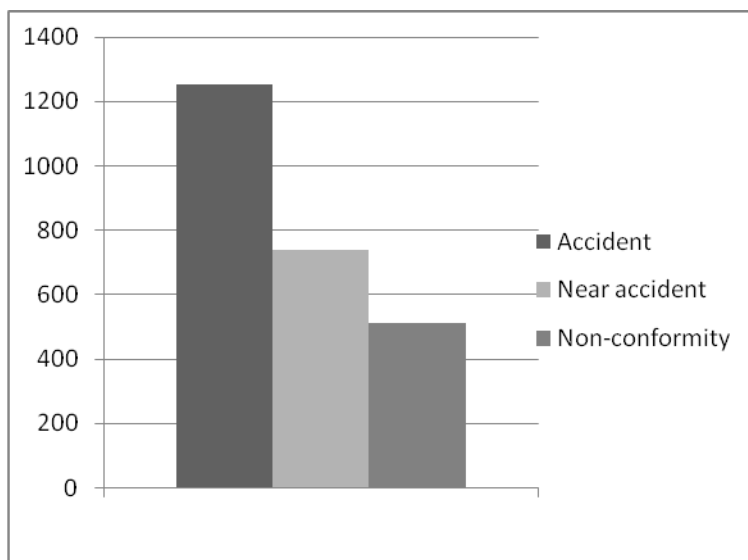N.B. all Swedish companies do not report to INSJÖ and the reluctance to report is an uncertain factor.

Fig. 2 Number of reports (INSJÖ, n.d.)

As we can see in above diagram, the result of this research shows the same trend, even with a wider span between the categories, and do not support the theory of Heinrich.
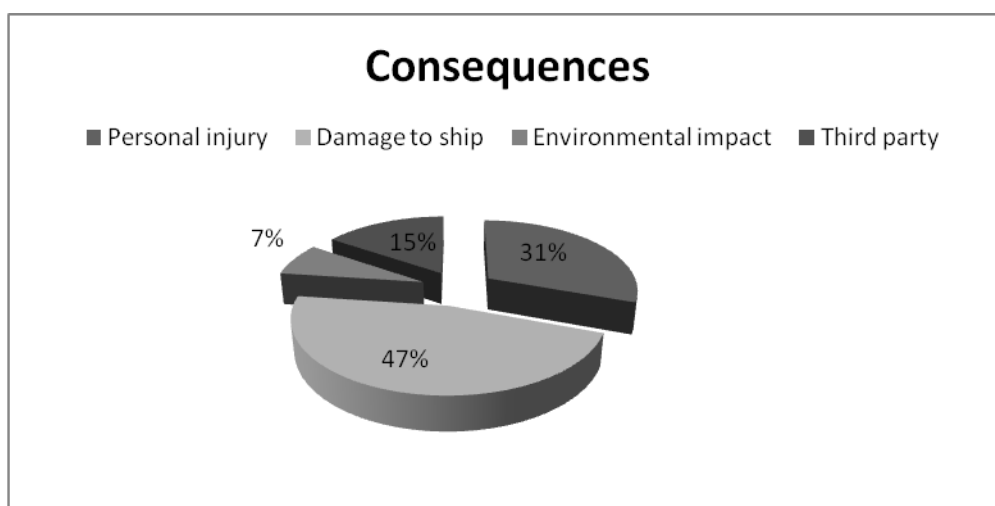

Fig. 3 Consequences of reported accidents/incidents (INSJÖ, n.d.)

In Fig. 3 is shown the consequences of the accidents/incidents reported to the INSJÖ information system.

In this report there has not been any collection of such data, but according to Fig.3 it is damage to ships that are the most common types of occurred accidents, which means that the cause is probably most of the times some sort of a "navigation fault", which is an interesting fact as it is more often a human error rather than a technical error that is the cause. One seems to have a tendency to report faults on equipment rather than human errors.

5.4 Further research

The results of this research did show that according to most of the interviewees there is a reluctant to report accidents, incidents and non-conformities. The reasons were as above:

• To time consuming

• Unclear definitions of an accident/near accident/non-conformity

• Unclear procedures for reporting

• Fear of blame

• Culture differences

at the same time almost all the interviewees were of the opinion they were operating a company with a "No blame culture" as well as they were of the opinion that their "Safety culture" was on a high level. As these statements do not seem to be in compliance with the conclusions regarding the indicators for recognizing the existence of a good safety culture, which are:

• An established and actively working process of continuous improvement

• Commitment from the top management of the company

• Motivated and encouraged personnel onboard to actively initiate safety improvements (personnel empowerment) (Lappalinen, 2008)

there are reasons to assume that a field for further research is opened here, as this issue is not within the limitations of this study.

6. Conclusion

Based on Heinrich theory (chapter 1.2 above) we can estimate the following:

- The five companies involved in this interview study are operating all together 65 vessels.

- They recon they have all together about 117 accidents, 216 near accidents and 184 non-conformities reports yearly.

Expressed in terms of Heinrich's theory this can be described as:

4 Serious accidents

113 Minor accidents
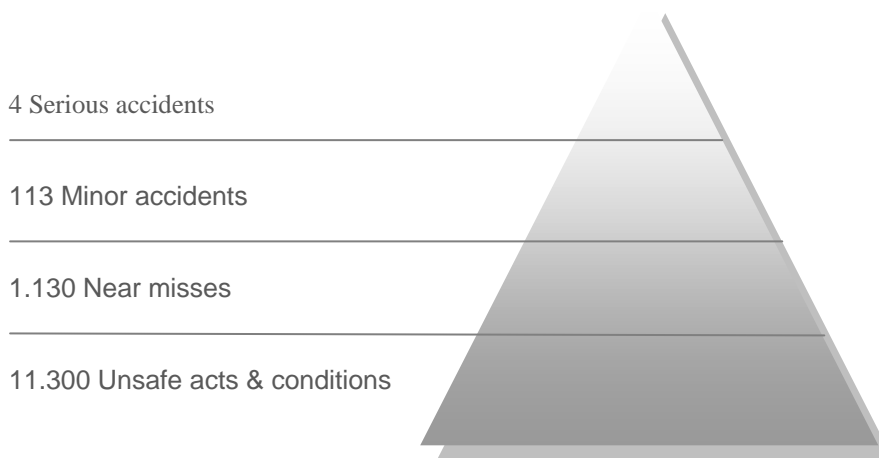
1.130 Near misses

11.300 Unsafe acts & conditions

Figure 4. Dr W. Heinrich's "Accident Distribution Model" applied on this research.

If we take this discussion further we can see that, instead of having 1.130 near accident reports (or with a reporting frequency of 50%: 585 accidents reports) they actually have 216 near accidents reported yearly.

Regarding non-conformities they should according to this theory have 11.300 non-conformities reported per year (or with a frequency of 70%: 7819 non-conformities reports) instead of the actual figure 184 non-conformities reported yearly.

There can be different explanations for this discrepancy, but the two most plausible are according to the work of Anderson (2003), that, as he explains, it had been recognized for many years that there is a relationship between the number of major incidents, the number of minor incidents and the number of near misses. This relationship is in fact that well recognised within the shipping industry that the Marine insurance companies

uses the theory for pricing the cover of a risk at a certain level, which is referring to the pyramid theory.

If this theory is correct then we should expect to see significantly more near misses and non-conformities than real accidents.

The survey results in his survey do as in this survey not support the theory. The numbers in Anderson's surveys seem to be rather equal regarding reported accidents, near accidents and non-conformities and in this study the relation is as above 117 accidents - 216 near accidents – 184 non-conformities reported on a yearly base.

There can according to Anderson (2003) be two possible explanations for this and these explanations adapted to this study would be:

    i. The pyramid theory is wrong.

    ii. The interviews were wrong; the reported figures presented/estimated were much less than in reality.

Further on in Anderson's reasoning he stated that whilst it may be some debate as to the steepness of any particular pyramid, there would be quite few who would want to challenge the general principle.

A clear understanding of the implication of the theory of the accident pyramid must be understood in order to appreciate the significance of reporting near accidents and non-conformities (Anderson, p 160 f, 2003).

There are at least two ways to address the problem of under-reporting of near misses and non-conformities which are occurrences that leads to accidents of different grades of seriousness.

One can either try to eliminate the occurrences of incidents by use of a proper "Root Cause Analysis" system (provided all near misses and non-conformities are reported); alternatively one can try to alter the behaviour leading to these occurrences by

corrections by use of a Behaviour Based Safety (BBS) program, which is the application of science of behaviour, implemented on real problems and with focus on how people actually do things in their day to day work. BBS analyzes why they do it and then applies a research-supported strategy to improve the person's behaviour.

This could probably reduce the number of accidents/incidents, but as a single measure it would not likely have any major impact on the occurrences of accidents/incidents.

The other way is to adapt to the ISM Code's fundamental philosophy of continuous improvement as the fundament of the Code, and create a climate where everyone involved understands the importance of reporting incidents/non-conformities and consider them to be actively supporting a "No Blame Culture" creating:

- An established and actively working process of continuous improvement

- Commitment from the top management of the company

- Motivated and encouraged personnel onboard to actively initiate safety improvements (personnel empowerment)

which are the indicators to be utilized for the creation of a good "Safety Culture" were reporting procedures in accordance to the ISM Code's Section 9 in the ISM Code, regarding reporting of non-conformities is one of the fundamental cornerstones.

For both ways of addressing the problem, one ought to think the same way as one does when it comes to repair and maintenance of delicate and expensive computer software, one lets an extern specialist deal with it. It might have a positive effect when using "fresh eyes" and having no form of loyalties within the organization.

These are conclusions drawn in the light of the importance of using the tools given in the ISM Code, of which the concept of continuous improvement can be one of effectiveness when it comes to reduce the number of accidents by reporting, analyzing and learning from incidents.

From a personal point of view

According to INSÖ reporting system (ch.5.3 above) one can say that the Swedish ship owners/managers are operating a fleet with a ticking bomb generating about 12.000 unreported near misses, waiting to be developed into about 1.200 accidents (see Figure 2) of which about 40 will be of a serious nature, and they will not go away before they have happened, if one does not do something about the root causes.

However the accident pyramid of Heinrich can be applied on this research and in this way with accuracy, there is still reasons to assume that the actual number of occurred accidents, incidents and non-conformities should form some kind of a figure with similarities to a pyramid rather than like in this case a pyramid upside down or a square.

One of the reasons behind this might be that the shipping industry may have created a kind of standard regarding the level of accidents/incidents which are normal to occur. The vetting surveyors for instance are actually informing the tanker owners that they assume that e.g. six near accidents should be reported in a month.

This and a kind of bench marking, where the companies keep track of each other's statistics, may be a reason to a development of an within the industry "acceptable" level of what should be reported. If so there would probably be some reluctance to be the first to deviate from this standard and report a higher level of accidents, incidents and non-conformities.

This is obviously a matter of both seriousness and delicacy that will take time to solve, but in order to prevent damage to personnel, goods and environment it is surely a matter of importance to comply with the concept of continuous improvement as a fundament for a Safety Culture.

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Appendix I: ISM Code

Preamble

1 The purpose of this Code is to provide an international standard for the safe management and operation of ships and for pollution prevention.

2 The Assembly adopted resolution A.443 (XI), by which it invited all Governments to take the necessary steps to safeguard the shipmaster in the proper discharge of his responsibilities with regard to maritime safety and the protection of the marine environment.

3 The Assembly also adopted resolution A.680 (17), by which it further recognized the need for appropriate organization of management to enable it to respond to the need of those on board ships to achieve and maintain high standards of safety and environmental protection.

4 Recognizing that no two shipping companies or ship owners are the same, and that ships operate under a wide range of different conditions, the Code is based on general principles and objectives.

5 The Code is expressed in broad terms so that it can have a widespread application. Clearly, different levels of management, whether shore-based or at sea, will require varying levels of knowledge and awareness of the items outlined.

6 The cornerstone of good safety management is commitment from the top. In matters of safety and pollution prevention it is the commitment, competence, attitudes and motivation of individuals at all levels that determines the end result.

PART A - IMPLEMENTATION

1 GENERAL

1.1 Definitions
The following definitions apply to parts A and B of this Code.

1.1.1 "International Safety Management (ISM) Code" means the International Management Code for the Safe Operation of Ships and for Pollution Prevention as adopted by the Assembly, as may be amended by the Organization.

1.1.2 "Company" means the owner of the ship or any other organization or person such as the manager, or the bareboat charterer, who has assumed the responsibility for operation of the ship from the ship owner and who, on assuming such responsibility, has agreed to take over all duties and responsibility imposed by the Code.

1.1.3 "Administration" means the Government of the State whose flag the ship is entitled to fly.

1.1.4 "Safety management system" means a structured and documented system enabling Company personnel to implement effectively the Company safety and environmental protection policy.

1.1.5 "Document of Compliance" means a document issued to a Company which complies with the requirements of this Code.

1.1.6 "Safety Management Certificate" means a document issued to a ship which signifies that the Company and its shipboard management operate in accordance with the approved safety management system.

1.1.7 "Objective evidence" means quantitative or qualitative information, records or statements of fact pertaining to safety or to the existence and implementation of a safety management system element, which is based on observation, measurement or test and which can be verified.

1.1.8 "Observation" means a statement of fact made during a safety management audit and substantiated by objective evidence.

1.1.9 "Non-conformity" means an observed situation where objective evidence indicates the non-fulfilment of a specified requirement.

1.1.10 "Major non-conformity" means an identifiable deviation that poses a serious threat to the safety of personnel or the ship or a serious risk to the environment that requires immediate corrective action and includes the lack of effective and systematic implementation of a requirement of this Code.

1.1.11 "Anniversary date" means the day and month of each year that corresponds to the date of expiry of the relevant document or certificate.

1.1.12 "Convention" means the International Convention for the Safety of Life at Sea, 1974, as amended.

1.2 Objectives

1.2.1 The objectives of the Code are to ensure safety at sea, prevention of human injury or loss of life, and avoidance of damage to the environment, in particular to the marine environment and to property.

1.2.2 Safety management objectives of the Company should, inter alia:

.1 provide for safe practices in ship operation and a safe working environment;

.2 establish safeguards against all identified risks; and

.3 continuously improve safety management skills of personnel ashore and aboard ships, including preparing for emergencies related both to safety and environmental protection.

1.2.3 The safety management system should ensure:

.1 compliance with mandatory rules and regulations; and

.2 that applicable codes, guidelines and standards recommended by the Organization, Administrations, classification societies and maritime industry organizations are taken into account.

1.3 Application

The requirements of this Code may be applied to all ships.

1.4 Functional requirements for a safety management system

Every Company should develop, implement and maintain a safety management system which includes the following functional requirements:

.1 a safety and environmental-protection policy;

.2 instructions and procedures to ensure safe operation of ships and protection of the environment in compliance with relevant international and flag State legislation;

.3 defined levels of authority and lines of communication between, and amongst, shore

and shipboard personnel;

.4 procedures for reporting accidents and non-conformities with the provisions of this Code;

.5 procedures to prepare for and respond to emergency situations; and

.6 procedures for internal audits and management reviews.

2 SAFETY AND ENVIRONMENTAL-PROTECTION POLICY

2.1 The Company should establish a safety and environmental-protection policy which describes how the objectives given in paragraph 1.2 will be achieved.

2.2 The Company should ensure that the policy is implemented and maintained at all levels of the organization, both ship-based and shore-based.

3 COMPANY RESPONSIBILITIES AND AUTHORITY

3.1 If the entity who is responsible for the operation of the ship is other than the owner, the owner must report the full name and details of such entity to the Administration.

3.2 The Company should define and document the responsibility, authority and interrelation of all personnel who manage, perform and verify work relating to and affecting safety and pollution prevention.

3.3 The Company is responsible for ensuring that adequate resources and shore-based support are provided to enable the designated person or persons to carry out their functions.

4 DESIGNATED PERSON(S)

To ensure the safe operation of each ship and to provide a link between the Company and those on board, every Company, as appropriate, should designate a person or persons ashore having direct access to the highest level of management. The responsibility and authority of the designated person or persons should include monitoring the safety and pollution-prevention aspects of the operation of each ship and ensuring that adequate resources and shore-based support are applied, as required.

5 MASTER'S RESPONSIBILITY AND AUTHORITY

5.1 The Company should clearly define and document the master's responsibility with regard to:

.1 implementing the safety and environmental-protection policy of the Company;

.2 motivating the crew in the observation of that policy;

.3 issuing appropriate orders and instructions in a clear and simple manner;

.4 verifying that specified requirements are observed; and

.5 reviewing the safety management system and reporting its deficiencies to the shore-based management.

5.2 The Company should ensure that the safety management system operating on board the ship contains a clear statement emphasizing the master's authority. The Company should establish in the safety management system 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.

6 RESOURCES AND PERSONNEL

6.1 The Company should ensure that the master is:

.1 properly qualified for command;

.2 fully conversant with the Company's safety management system; and

.3 given the necessary support so that the master's duties can be safely performed.

6.2 The Company should ensure that each ship is manned with qualified, certificated and medically fit seafarers in accordance with national and international requirements.

6.3 The Company should establish procedures to ensure that new personnel and personnel transferred to new assignments related to safety and protection of the environment are given proper familiarization with their duties. Instructions which are essential to be provided prior to sailing should be identified, documented and given.

6.4 The Company should ensure that all personnel involved in the Company's safety management system have an adequate understanding of relevant rules, regulations, codes and guidelines.

6.5 The Company should establish and maintain procedures for identifying any training which may be required in support of the safety management system and ensure that such training is provided for all personnel concerned.

6.6 The Company should establish procedures by which the ship's personnel receive relevant information on the safety management system in a working language or languages understood by them.

6.7 The Company should ensure that the ship's personnel are able to communicate effectively in the execution of their duties related to the safety management system.

7 DEVELOPMENT OF PLANS FOR SHIPBOARD OPERATIONS

The Company should establish procedures for the preparation of plans and instructions, including checklists as appropriate, for key shipboard operations concerning the safety of the ship and the prevention of pollution. The various tasks involved should be defined and assigned to qualified personnel.

8 EMERGENCY PREPAREDNESS

8.1 The Company should establish procedures to identify, describe and respond to potential emergency shipboard situations.

8.2 The Company should establish programmes for drills and exercises to prepare for emergency actions.

8.3 The safety management system should provide for measures ensuring that the Company's organization can respond at any time to hazards, accidents and emergency situations involving its ships.

9 REPORTS AND ANALYSIS OF NON-CONFORMITIES, ACCIDENTS AND HAZARDOUS OCCURRENCES

9.1 The safety management system should include procedures ensuring that non-conformities, accidents and hazardous situations are reported to the Company, investigated and analysed with the objective of improving safety and pollution prevention.

9.2 The Company should establish procedures for the implementation of corrective action.

10 MAINTENANCE OF THE SHIP AND EQUIPMENT

10.1 The Company should establish procedures to ensure that the ship is maintained in conformity with the provisions of the relevant rules and regulations and with any additional requirements which may be established by the Company.

10.2 In meeting these requirements the Company should ensure that:

.1 inspections are held at appropriate intervals;

.2 any non-conformity is reported, with its possible cause, if known;

.3 appropriate corrective action is taken; and

.4 records of these activities are maintained.

10.3 The Company should establish procedures in its safety management system to identify equipment and technical systems the sudden operational failure of which may result in hazardous situations. The safety management system should provide for specific measures aimed at promoting the reliability of such equipment or systems. These measures should include the regular testing of stand-by arrangements and equipment or technical systems that are not in continuous use.

10.4 The inspections mentioned in 10.2 as well as the measures referred to in 10.3 should be integrated into the ship's operational maintenance routine.

11 DOCUMENTATION

11.1 The Company should establish and maintain procedures to control all documents and data which are relevant to the safety management system.

11.2 The Company should ensure that:

.1 valid documents are available at all relevant locations;

.2 changes to documents are reviewed and approved by authorized personnel; and

.3 obsolete documents are promptly removed.

11.3 The documents used to describe and implement the safety management system may be referred to as the Safety Management Manual. Documentation should be kept in a form that the Company considers most effective. Each ship should carry on board all documentation relevant to that ship.

12 COMPANY VERIFICATION, REVIEW AND EVALUATION

12.1 The Company should carry out internal safety audits to verify whether safety and pollution-prevention activities comply with the safety management system.

12.2 The Company should periodically evaluate the efficiency of and, when needed, review the safety management system in accordance with procedures established by the Company.

12.3 The audits and possible corrective actions should be carried out in accordance with documented procedures.

12.4 Personnel carrying out audits should be independent of the areas being audited unless this is impracticable due to the size and the nature of the Company.

12.5 The results of the audits and reviews should be brought to the attention of all personnel having responsibility in the area involved.

12.6 The management personnel responsible for the area involved should take timely corrective action on deficiencies found.

Appendix II: Participants

Älvtank Rederi AB

Rederi AB Älvtank is located on Donsö and owned by the brothers Johannes and Sven Jakobsson and their brother in law Per-Arne Nilsson.

Today, Rederi AB Älvtank has two tankers in service:

- M/T Ramira, 17000 dwt, trading Europe

- M/T Ramona, 16000 dwt, trading Europe

1999 was a new office built close to Donsö harbour the company has about 40 employees at sea and 4 at the office.

Furetank Rederi AB

Furetank is committed to the kind of shipping business where attention to environment, the cargo, the vessel and its personnel count.

The company is owned by the Höglund family and today run by the third generation. The company is located on the island of Donsö, and has its roots in an archipelago tradition going back to the 18th century.

Furetank runs six modern product and chemical tankers which normally navigate the shipping lanes of Europe.

MT Furenäs is constructed and built in close cooperation with Søviknes Verft A/S and FKAB Naval Architects.

MT Fure Sun and MT Fure Star were built at Siong Huat Shipyard in Singapore and were bought at the second hand market in 2001.

Laurin Maritime AB

Laurin Maritime manages a fleet of 46,000 dwt tankers for chemicals and oil. The company has expanded its fleet through new buildings of its own design. (10 vessels) The six vessels in the "T-series", delivered between 2002 and 2004, have strengthened tanks for heavy cargoes, and high capacity nitrogen generators (4,400 m3/h). In order to give redundancy and increased manoeuvrability, the ships have two four-stroke engines, a controllable pitch propeller, and a flap type Becker rudder.

Laurin Maritime will take delivery of five 46,000 dwt new buildings between 2010 and 2011, the "C-series". The vessels will have 20 coated cargo tanks, each with a capacity of below 3,000 m3. The ships have nitrogen generators and the cargo tanks are fully strengthened to carry high density cargoes such as Caustic Soda 50% solution.

Rederi AB Transatlantic (Industrial shipping division)

Ship Management

The Ship Management support unit comprises vessel operations and a New building division.

Ship Management is responsible for operating not only Transatlantic's fleet, but also Atlantic Containers Lines (ACL) container/RoRo fleet and icebreakers and survey vessels belonging to the Swedish government. Transatlantic staffs a total of 38 vessels with approximately 1,100 employees.

Through its own operation organization, Transatlantic offers its employees an opportunity to develop on various types of vessels, in various marketing areas and in various shipping sectors. The broad range of job opportunities creates a unique workplace, which is advantageous to the employee, Transatlantic and our Ship Management customers.

Stena Line Group

Stena Line is one of the world's largest ferry companies with a modern fleet of (11 vessels, Stena Line Scandinavia) 35 vessels and Europe's most comprehensive route network consisting of 18 ferry routes in Scandinavia and around the UK.

By constantly developing its products and services, Stena Line has achieved a strong position with significant market shares on all its market sectors.

The demands are becoming tougher

Demands from customers are becoming tougher and changes happen more quickly. Stena Line's way of meeting these demands is to continually develop new products and services for both freight and passenger services.

Business concept

Stena Line's business concept is to produce and sell safe and efficient transport by sea and connecting port services so that:

Passengers arrive at their destination having had an experience that exceeds their expectations.

Transport companies can ship goods to their destinations in a cost efficient way

By doing this we create a long-term, stable, environment for the company and its employees.

Vision

The No.1 ferry company and always customers' first choice

Stena Line has around 5 700 employees of which about two-thirds are employed onboard. The head office is in Göteborg, Sweden. In 2008, 15 280 100 passengers and 2 866 800 cars travelled with Stena Line. 1 789 400 freight units were transported over the same period.

Appendix III: Interview Questions

Masters

A. Profile of the Master

1. *How long have you worked for your present company?*

2. *Who is the Designated Person in your Company?*

3. *Who conducts your internal audits?*

4. *Do you believe your Company operates a 'no blame' culture where accidents, hazardous occurrences and near misses can be reported without fear of punishment or reprisal?*

5. *Do you believe you work within a 'safety culture' - where safety has been raised to the highest priority?*

B. Profile of reporting Accidents

1. *From your own experience, how many accidents* which occur on board are reported to the Company ashore?*

2. *In terms of numbers of accidents* - approximately how many accidents would be reported in one year?*

3. *For the reports submitted would you expect to receive corrective action reports?*

4. *Would corrective actions be subject to a follow up audit?*

5. *If there is reluctance to report accidents to the Company - why is that?*

*In this section the term 'accident', or similar, refers to any reportable incident which resulted in,   or might have resulted in, a loss or injury to people, ship, the environment or cargo - e.g. personal injuries, pollution, collision, cargo damage, etc.

C. Profile of reporting hazardous occurrences/near misses

1. *From your own experience, how many hazardous occurrences / near misses which occur on board are reported to the Company ashore?*

2. *In terms of numbers of hazardous occurrences /near misses - approx how many would be reported in one year?*

3. *For the reports submitted would you expect to receive corrective action reports?*

4. *Would corrective actions be subject to a follow up audit?*

5. *If there is reluctance to report hazardous occurrences /near misses - why is that?*

C. Profile reporting non-conformities

1. *From your own experience, how many non - conformities which come to light on board are reported to the Company ashore?*

2. *In terms of numbers of non- conformities - approx how many would be reported in one year?*

3. *For the reports submitted would you expect to receive corrective action reports?*

4. *Would corrective actions be subject to a follow up audit?*

5. *If there is reluctance to report non conformities - why is that?*

D. General Conclusions

1. *In your view - have the number of accidents, hazardous occurrences and non conformities reduced since implementation of the ISM Code?*

2. *In your view has the ISM Code achieved its objectives?*

Designated Persons (DP)

E. Profile of the DP

1. *How long have you worked for your present company?*

2. Who conducts your internal audits?

3. Do you believe your Company operates a 'no blame' culture where accidents, hazardous occurrences and near misses can be reported without fear of punishment or reprisal?

4. Do you believe you work within a 'safety culture' - where safety has been raised to the highest priority?

F. Profile of reporting Accidents

1. From your own experience, how many accidents* which occur on board are reported to the Company ashore?

2. In terms of numbers of accidents* - approximately how many accidents would be reported in one year?

3. For the reports submitted from the ship would the company send back corrective action reports?

4. Would corrective actions be subject to a follow up audit?

5. If there is reluctance to report accidents to the Company - why is that?

*In this section the term 'accident', or similar, refers to any reportable incident which resulted in,   or might have resulted in, a loss or injury to people, ship, the environment or cargo - e.g. personal injuries, pollution, collision, cargo damage, etc.

H. Profile of reporting hazardous occurrences/near misses

1. From your own experience, how many hazardous occurrences / near misses which occur on board are reported to the Company ashore?

2. In terms of numbers of hazardous occurrences /near misses - approx how many would be reported in one year?

3. For the reports from the ship would the company send back corrective action reports?

4. Would corrective actions be subject to a follow up audit?

5. If there is reluctance to report hazardous occurrences /near misses - why is that?

G. Profile reporting non-conformities

1. *From your own experience, how many non - conformities which come to light on board are reported to the Company ashore?*

2. *In terms of numbers of non- conformities - approx how many would be reported in one year?*

3. *For the reports submitted from the ship would the company send back corrective action reports?*

4. *Would corrective actions be subject to a follow up audit?*

5. *If there is reluctance to report non conformities - why is that?*

H. General Conclusions

1. *In your view - have the number of accidents, hazardous occurrences and non conformities reduced since implementation of the ISM Code?*

2. *In your view has the ISM Code achieved its objectives?*

Manager

I. Profile of the Manager

1. *What is your position*

2. *How long have you worked for your present company?*

3. *Who conducts your internal audits?*

4. *Do you believe your Company operates a 'no blame' culture where accidents, hazardous occurrences and near misses can be reported without fear of punishment or reprisal?*

5. *Do you believe you work within a 'safety culture' - where safety has been raised to the highest priority?*

J. Profile of reporting Accidents

1. *From your own experience, how many accidents* which occur on board are reported to the Company ashore?*

2. *In terms of numbers of accidents* - approximately how many accidents would be reported in one year?*

3.   *For the reports submitted from the ship - do you think the Company sends back corrective action reports?*

4. *Would corrective actions be subject to a follow up audit?*

5. *If there is reluctance to report accidents to the Company - why is that?*

*In this section the term 'accident', or similar, refers to any reportable incident which resulted in,   or might have resulted in, a loss or injury to people, ship, the environment or cargo - e.g. personal injuries, pollution, collision, cargo damage, etc.

M. Profile of reporting hazardous occurrences/near misses

1. *From your own experience, how many hazardous occurrences / near misses which occur on board are reported to the Company ashore?*

2. *in terms of numbers of hazardous occurrences /near misses - approx how many would be reported in one year?*

3. *For the reports submitted from the ship - do you think the Company sends back corrective action reports?*

4. *Would corrective actions be subject to a follow up audit?*

5. *If there is reluctance to report hazardous occurrences /near misses - why is that?*

K. Profile reporting non-conformities

1. *From your own experience, how many non - conformities which come to light on board are reported to the Company ashore?*

2. *In terms of numbers of non- conformities - approx how many would be reported in one year?*
3. *For the reports submitted from the ship - do you think the Company sends back corrective action reports?*

4. *Would corrective actions be subject to a follow up audit?*

5. *If there is reluctance to report non conformities - why is that?*

L. General Conclusions

1. *In your view - have the number of accidents, hazardous occurrences and non conformities reduced since implementation of the ISM Code?*

2. *In your view has the ISM Code achieved its objectives?*