

TURUN YLIOPISTON
MERENKULKUALAN KOULUTUS- JA TUTKIMUSKESKUKSEN JULKAISUJA

PUBLICATIONS FROM THE CENTRE FOR MARITIME STUDIES
UNIVERSITY OF TURKU

A 48
2009

SAFETY CULTURE AND MARITIME PERSONNEL'S SAFETY ATTITUDES

Interview Report

Jouni Lappalainen & Kim Salmi

Leverage from
the EU
2007-2013



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PUBLIKATIONER AV SJÖFARTSBRANSCHENS UTBILDNINGS- OCH
FORSKNINGSCENTRAL VID ÅBO UNIVERSITET

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SARJAN PÄÄTOIMITTAJA / EDITOR-IN-CHIEF

Juhani Vainio

JULKAISIJA / PUBLISHER :

Turun yliopisto / University of Turku
MERENKULKUALAN KOULUTUS- JA TUTKIMUSKESKUS
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Kopijyvä Oy
Kouvola 2009

ISBN 978-951-29-4043-1 (paperback)

ISBN 978-951-29-4044-8 (PDF)

ISSN 1456 - 1816

PREFACE

The METKU Project (Developing Maritime Safety Culture) researches maritime safety in Finland and aims at measuring the prevailing safety level of the Finnish maritime sector.

This is an interim report produced in co-operation between workpackage 1 and workpackage 2 of the METKU project. The report presents the results of interviews carried out in autumn 2008 and spring 2009.

The interview study showed that a safety culture has emerged and is developing in the Finnish maritime industry. The top management of the shipping companies included in the study consider safety as a value of the shipping business. The maritime personnel act in a more safety-oriented manner than before the implementation of the ISM Code.

The results of our study could be summed up in the words of one maritime inspector:

“in the long run, the safety culture will establish itself, but it will take time.”

This project was funded by the European Union and several private partners. The Centre for Maritime studies in the University of Turku would like to express its gratitude to the European Community, Regional Council of Päijät-Häme, City of Kotka and all member companies of the project corporate group. We also want to thank the interviewees for their participation to this study.

Turku 14th September, 2009

Juhani Vainio
Director
Centre for Maritime Studies

ABSTRACT

The purpose of the METKU Project (Developing Maritime Safety Culture) is to look at how the ISM Code has influenced the safety culture in the maritime industry. The project strives to find the best practices for shipping companies to improve their operations by implementing and developing their safety management systems.

This is an interim report produced in co-operation between workpackage 1 and workpackage 2 of the METKU project. This report presents the results of the interviews carried out in autumn 2008 and spring 2009.

In this report, we discuss the results of empiric evaluations concerning the impacts of the ISM Code. In course of the study, we collected experiences and impressions of the ISM Code by interviewing the personnel of Finnish shipping companies, particularly the crews and officers of vessels. In total, 94 representatives of seven Finnish shipping companies were interviewed.

The Finnish maritime community considered that the top management is committed to safety management and the application of the ISM Code. The interviewees reported that communication in shipping companies had improved.

The interviewees shared a concern concerning the functioning of the continuous improvement process. The reluctance to draw up incident reports indicated that the continuous improvement process is not functioning properly. Many interviewees indicated that incident reporting should be in some way improved or encouraged.

The interviewees named several benefits of the application of the ISM Code. These benefits included better co-operation and communication between shore and shipboard personnel, clarified roles and responsibilities of the maritime personnel, improved quality of maritime operations and formal requirements set for the company in safety aspects.

The interviewees recognised various defects in the application of the ISM Code. The Code itself was regarded as satisfactory. The interviewees named increasing bureaucracy and a complicated safety management system as major defects in the application of the ISM Code. The interviewees suggested that guidance in its application should be provided and the documentation of the safety management system simplified.

Keywords: Maritime Safety, Safety Management, Safety Culture, ISM Code

TIIVISTELMÄ

”METKU –projektissa” (Merenkulun turvallisuuskulttuurin kehittäminen) tutkitaan kansainvälisen turvallisuusjohtamiskoodin (ISM-koodin) vaikutuksia merenkulun turvallisuuteen ja etsitään kehittämiskohteita merenkulun turvallisuusjohtamisen parantamiseksi. Tämä haastatteluraportti on laadittu METKU –projektin yhteistyössä työpakettien 1 ja 2 kesken.

Tähän raporttiin haastateltiin yhteensä 94 merenkulun ammattilaista. Suurimman osan haastateltavista muodostivat aktiiviset merenkulkijat: miehistön jäsenet, päällystö ja alusten päälliköt. Haastattelukohteena oli seitsemän suomalaista varustamo. Haastatteluissa kerättiin merenkulkijoiden kokemuksia ja mielipiteitä ISM-koodin vaikutuksesta heidän käytännön työhönsä.

Suomalaiset merenkulkijat uskovat, että tänä päivänä varustamoiden johtajat ovat hyvin sitoutuneita turvallisuuteen. Myös miehistön asenteet turvallisuuteen ovat ISM-koodin käytön myötä parantuneet.

Haasteltavien yhteinen huoli kohdistui jatkuvan parantamisen toimivuuteen. Kaikki haastatellut ryhmät olivat samaa mieltä siitä, että poikkeamien raportointi ei ISM-koodin vaatimuksesta huolimatta toimi kunnolla.

ISM-koodin käyttöön otosta on ollut merenkululle selkeää hyötyä. Haastateltavat esittivät hyötyinä parantuneen yhteistyön ja tiedonkulun alusten ja varustamon välillä sekä sen, että merenkulun toiminnan laatu on parantunut. Monet haastateltavat korostivat, että ISM-koodin selkeät turvallisuusvastuut yhtiölle on ollut merkittävä hyöty.

Itse ISM-koodiin merenkulkijoilla ei ollut juurikaan huomauttamista. Sen sijaan turvallisuusjohtamisen käytännön toteutuksessa nähtiin parantamisen varaa. ISM-koodin aiheuttamina ongelmina mainittiin mm. lisääntynyt byrokratia ja liian monimutkaiset ja yksityiskohtaiset turvallisuuskäsikirjat. Monet haastateltavat toivovat, että ISM-koodin käytännön soveltamiseen laadittaisiin ohjeita.

Avainsanat: Merenkulun turvallisuus, turvallisuusjohtaminen, turvallisuuskulttuuri, ISM-koodi

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1 INTRODUCTION

1.1 Background

The METKU research project evaluates the impacts of the ISM Code on the maritime safety culture in Finland (METKU – Developing Maritime Safety Culture). The project was launched at Kotka Maritime Research Centre in the first quarter of the year 2008 and will last for 2.5 years. The METKU project is funded by the European Union, with additional financing received from the European Regional Development Fund of Southern Finland, Regional Council of Päijät-Häme, City of Kotka and private companies.

The purpose of the METKU Project is to examine how the ISM Code has influenced the safety culture of the maritime industry. The project attempts to find the best practices for shipping companies to improve their operations by implementing and developing their safety management systems.

This is an interim report produced in co-operation between workpackage 1 and workpackage 2 of the METKU project. The report presents the results of interviews carried out in autumn 2008 and spring 2009. The report was written by Researcher Jouni Lappalainen (University of Turku) and Research Assistant Kim Salmi (Helsinki University of Technology). Salmi was the author of Chapters 1.3, 2.4, 4.4, 4.5.2 and 5.5, while the remaining chapters were written by Lappalainen. Senior researcher Risto Jalonen (Helsinki University of Technology) took part in compiling the interview questionnaire.

1.2 METKU Research Project

The METKU-project consists of the following workpackages and responsible research partners:

- WP1: Statistical indicators of maritime safety, Helsinki University of Technology, The Department of Applied Mechanics
- WP2: Study of the development of the Finnish Maritime Safety Culture, University of Turku, Centre for Maritime Studies
- WP3: Comparing ISM –OHSAS practices in shipping companies and port operations (ISM – OHSAS), Kymenlaakso University of Applied Sciences, Maritime Studies
- WP4: Exploring the Best Practises in shipping companies, Turku University of Applied Sciences, Ship Laboratory
- WP5: Safety management practices of Finnish maritime and port authorities, Kymenlaakso University of Applied Sciences
- WP0: Project management and communications, Kotka Maritime Research Centre

The METKU Project is administered by Kotka Maritime Research Centre (KMRC). The KMRC is a rapidly growing research centre located in Kotka, Southeast Finland, on the Baltic Sea and the Gulf of Finland. The research centre staff consists of professors, researchers, project managers and administrative staff, currently totalling 30 persons. Administratively, the research staff belongs to Helsinki University of Technology, Kymenlaakso University of Applied Sciences, the University of Helsinki and the University of Turku. Kotka Maritime Research Centre conducts research related to the maritime industry, maritime safety and marine environment especially in the Gulf of Finland and the Baltic Sea. Maritime transport and environmental safety threats have substantially increased in the Gulf of Finland and the Baltic Sea. Kotka Maritime Research Centre aims at reducing these threats through research and education. Maritime transport and port operations and their economic impacts are also important areas of research at the Centre.

A group of Finnish shipping companies and major Finnish ports participate in the project. The project partners are listed below:

- Finnlines Oyj
- Finstaship - Varustamoliikelaitos
- Kristina Cruises Oy
- Meriaura Oy
- VG-Shipping Oy
- Port of Helsinki
- Port of Kotka
- Port of Hamina

These business partners support the project through financing and by providing information on their safety management systems.

Workpackage 1 is conducted by the Marine Technology unit of Helsinki University of Technology (TKK). TKK is the main university of technology in Finland. Since organisational changes that took effect on 1 January 2008, the Marine Technology unit (previously Ship Laboratory) belongs to the Department of Applied Mechanics, which is part of the Faculty of Engineering and Architecture. The Marine Technology provides degrees and carries out research in naval architecture, ship design and ship structures, ship hydrodynamics, marine engineering, marine traffic safety and arctic marine technology. Marine Technology has four professors, in addition to research scientists and technical staff of 20 persons. Additional personnel include some 5+10 graduate students and postgraduate students aiming at a doctorate. Current research activities are relevant to light structures, fatigue of laser welds, analysis of the ship grounding and collision process, simulation of marine traffic in the Gulf of Finland to evaluate risks, progressive flooding of a large passenger vessel, hydroelasticity of large vessels, CFD development and use in naval hydrodynamics and the dynamic stability of an intact ship. The Ship Laboratory has been the coordinator and/or a participant in many EU-funded projects, e.g.: ARCOP, EFFICIENSEA, EFFORT, IRIS, INTERMODESHIP, DISCO, MSGOF, SAFEICE, SAFEWIN, SAFGOF, SANDWICH and SAND.CORe.

Workpackage 2 is conducted by the University of Turku, Centre for Maritime Studies. The Centre for Maritime Studies (CMS) was founded in 1980 and became a special unit of the University of Turku in 1984. The CMS has developed into one of the leading providers of education, research and expert services in the maritime field and in other related fields in Finland, and become a strong provider of research and expert services related to seafaring and logistics. The services it offers include logistics and industry business consulting, research and development projects for the maritime sector and international co-operation projects. Most of the research and development project reports are published in the CMS's own series. These publications are available, for example, in the specialised maritime library located at the Centre for Maritime Studies in Turku. In addition to its national activities, the CMS has taken part in international projects, especially those concerning the Baltic Sea. For example, the CMS has led several EU-funded projects, taken part in other EU projects and participated in research and development work in connection with other types of projects.

1.3 Workpackage 1

The objective of workpackage 1 is to find and develop quantitative measuring methods for the use of maritime safety development. This research is concluded in 5 phases:

- Literature review, which was published in May 2009, concerned current measuring methods in maritime and other industry branches.
- Interview study, conducted in co-operation with workpackage 2
- Accident analysis, concerning the effects of the ISM on accidents that Finnish vessels and foreign vessels in the Finnish coastal waters have had.
- Statistical analysis of incident, accident, near-accident, and violation data acquired from officials and private companies.
- The final report will summarize the findings of earlier phases with expert commentary. It will include proposals for the private sector as well as for the administration based on these findings and expert commentaries.

The literature review of workpackage 1 (Jalonen et Salmi, 2009) discussed the value of a statistical approach in maritime safety development. The importance of safety performance indicators in particular was estimated high in safety evaluation. The use of these indicators in other industry branches was studied. Based on these studies, the following conclusions were drawn:

- The aviation industry is considered a forerunner in safety matters. The set of safety indicators in use is very large and full of aviation particularities. The indicator system seems to be efficient but also cumbersome, and thus not likely to be accepted as it is by the maritime community. The most important example for maritime use is the reporting culture of aviation. This “blame free” reporting culture assures the flow of correct information for statistical analysis

The nuclear industry, which represents the most safety focused part of the process industry, has an outstanding level of safety. This level is maintained by a relatively

simple set of general quality tied safety indicators, Table 1.1. By replacing nuclear particularities by maritime specifics, it is possible to see the indicators in Table 1.1 being used in the maritime sector. The need for an accurate data flow is considered an important factor in preventive risk reduction in the nuclear industry.

Table 1.1 Safety sectors and indicators of Finnish NPPs. Presented by [STUK, 2008].

A.I Safety and quality culture

1. Failures and their repairs
2. Exemptions and deviations from the Technical Specifications
3. Unavailability of safety systems
4. Occupational radiation doses
5. Radioactive emissions
6. Keeping plant documentation current
7. Investments in facilities

A.II Operational incidents

1. Number of events
2. Direct causes of incidents
3. Risk-significance of incidents
4. Accident risk of nuclear facilities
5. Number of fire alarms

A.III Structural integrity

1. Fuel integrity
2. Primary and secondary circuits integrity
3. Containment integrity

- The off-shore industry shares similar features with maritime traffic, and its progress in occupational safety, with a statistical approach, in the last 10 years can be seen as encouraging. Even though their statistical approach has proven its efficacy in occupational safety, the off-shore industry admits that it does not necessarily predict the risks of major catastrophes equally well.
- The authorities have developed an excellent set of measuring methods for road transport. Particularly the constant use of LEADING indicators, as cameras measuring the speed and traffic flows, or the quantity of drunken drivers stopped by the police, should be adopted in maritime traffic. An approach of this type would require a greater contribution in the future from officials of the international maritime community. An on-going study in METKU WP1 has already found one existing tool for developing data for an approach of this type. The Finnish Maritime Administration's VTS operators use incident/violation reporting for vessels in their observation areas, and a set of leading indicators can be produced from these reports.

A common observation between the different industry branches is recognising the importance of the flow of correct information to back up analyses. And as Hänninen (2007) pointed out, an unsatisfactory reporting culture exists in the maritime industry, and thus the information flow is not adequate.

1.4 Workpackage 2

The target of Workpackage 2 is to study the development of the Finnish Maritime Safety Culture considering the effects of the ISM Code from the mid-1990's till the present. Workpackage 2 is divided into three main parts. A literature review forms part one. The second part consists of empirical research examining the impacts of the ISM Code on Finnish shipping companies. The objective of the third part will be to discover the best possible practices for improving the safety management procedures of shipping companies. In addition, we will collect benchmarking data concerning safety management practices from other industries, for example the aviation and oil industry.

The purpose of the literature review was to provide us with a preliminary understanding of the research problem. When examining the existing literature, we tried to find out and recognize the means and methods for eliciting the changes in the organisational culture. Moreover, we have tried to find out the prerequisites for a good safety culture.

The literature review showed us that the ISM Code has brought a significant contribution to the progress of maritime safety in recent years. Shipping companies and crews are more environmentally friendly and more safety-oriented than 12 years ago. (Lappalainen, 2008)

Othman (2003) states that most (80%) of Malaysian shipping companies have implemented their safety management systems effectively according to the requirements of the ISM Code. The member states of the Paris MoU conducted a Concentrated Inspection Campaign (CIC) which focused on the effectiveness of the ISM Code. The Paris MoU discovered that most of the shipping companies and crews on vessels understand safety and implement it (Paris MoU, 2008). The Tokyo MoU conducted a CIC simultaneously with the Paris MoU.

Nevertheless, the direct effect and influence of the ISM Code on maritime safety could not be very well isolated. No quantitative measurement (statistics/hard data) could be found in order to describe the impacts of the ISM Code on maritime safety (Mejia, 2001; Anderson, 2003, IMO 2005, ReportISM, May 2008).

In the light of the literature review, there are major shortcomings concerning effective safety management in the maritime industry.

Continuous improvement

The studies referred to above show that near-misses are not perfectly reported. Some mariners are still reluctant to expose their mistakes (Withington, 2002; Anderson, 2003). The Paris MoU (2008) reported that one of the most common deficiencies in safety management systems concerns the reporting of nonconformities and occurrences of accidents. Hence, there is still room for improvement in the reporting of deficiencies and non-conformities in the maritime industry. The proper reporting of deficiencies and non-conformities establishes a basis for continuous improvement.

Furthermore, Anderson (2003) discovered that in certain cases, further analysis of and corrective actions on the reported incidents were not properly carried out. Under these circumstances, a successful cycle of continuous improvement could not function (Lappalainen, 2008).

Management commitment

Some shipping companies prefer short-term profits at the expense of maritime safety (Anderson, 2003). The Paris MoU reported as a result of the CIC that 176 ships were detained due to serious deficiencies violating the requirements of the ISM Code. The reasons for the detentions were that the maintenance of the ship and its safety equipment were badly neglected. The status of emergency preparedness was poor as well. (Paris MoU, 2008; ReportISM, May 2008). Evidently, the top management of poorly performing shipping companies is not at all committed to safety issues (Lappalainen, 2008).

Personnel empowerment and motivation

Pun et al.(2003) stated that a high turnover of labour force could prevent the establishment of a safety culture in the maritime industry. Anderson(2003) also emphasized that establishing a safety culture is not easy when the turnover of the crew is high. The British Maritime and Coastguard Agency expressed the same concern in their study in 2008. The transient nature of the workforce with a relatively long distance between the ship owner and the vessel complicate the progress of safety management (ReportISM, May 2008).

In the literature study, we discovered that a safety culture has emerged and it is developing in the maritime industry. Even though the roots of the safety culture have been established, serious obstacles still remain to the breakthrough of safety management. These obstacles could be envisaged as cultural factors obstructing the safety process. Even though the ISM Code has been effective for over a decade, long-established behaviours based on the maritime culture of the old days still occur. (Lappalainen, 2008)

We conducted a field survey whose main target was to investigate the opinions and attitudes of active seafarers employed by Finnish shipping companies. The field survey consisted of 94 interviews, which were carried out as in-depth interviews. The purpose of this report is to present the results of the interviews.

1.5 Contents of this report

This report presents the results of empiric evaluations concerning the impacts of the ISM Code on Finnish shipping companies and Finnish-owned vessels. In course of the study, we collected experiences and impressions of the ISM Code by interviewing the personnel of Finnish shipping companies, particularly the crews and officers of vessels. This report includes the following sections:

- Introduction: the background to the METKU Project is described and the findings of the earlier phases are summarised.
- Section two introduces the research methods of the study.
- The participating shipping companies and the target group are described in section three.
- Section four discusses the current status of the Finnish maritime safety culture based on the results of the interview study.
- In section five, we present the maritime community's evaluations of the benefits and defects of the ISM Code.
- Section six gives the conclusions of the interview study's results.
- The next phase of the project is discussed in the last section.

2 METHODOLOGY

2.1 Introduction

The purpose of the interview study is to evaluate the potential improvement of the safety culture in the Finnish maritime industry.

In order to evaluate the safety culture, we first need to define the evaluation criteria for a good safety culture. The literature review showed us that for the purpose of evaluating a maritime safety culture, the evaluation should be based on the intention of the maritime community itself. The ISM Code provides indicators for recognizing whether a safety culture exists in the maritime industry. These indicators are going to be utilized as criteria for the forthcoming evaluation. The chosen indicators are listed below: (Lappalainen, 2008)

- 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)

The main research themes of the interview study were derived from these indicators.

For the statistical approach to the problem of measuring safety, this interview study supplies two types of information:

- Direct information about the measuring methods used
- Information about the reliability of statistical and report form data acquired from authorities and companies.

2.2 Methodology of previous studies

Most previous studies regarding the impacts of the ISM Code have been based on quantitative methods, such as structured questionnaires, the results of which were analysed statistically. The numbers of participants were high. Thus we could regard the results of previous studies as more or less representative when providing a general picture of the effects of the ISM Code. (Lappalainen and Tapaninen, 2009)

The main merits of previous quantitative studies are:

- The scope of previous studies has been global; considering that the maritime industry is extremely global
- The results of earlier studies reinforce the public impression that the ISM Code has achieved its objectives and that the majority of the world's maritime industry supports the ISM Code
- The difficulties and deficiencies in the implementation of the ISM Code were uncovered.

Moreover, subjects for further research were proposed. The IMO (2005) recommended that one should launch a study:

“employing researchers in the field to ensure that the views of non-supporters could be specifically captured”.

Anderson (2003) suggested that those shipping companies which have implemented their safety management systems successfully and gained benefit should be investigated thoroughly. Furthermore, a study investigating cultural and national differences in the perception of the ISM should be conducted (Anderson, 2003). One should go beyond the questionnaires (ReportISM, August 2006).

2.3 Interview study and qualitative analysis

In workpackage 2, we chose the thematic interview and qualitative analysis as the research method.

The impacts of the ISM Code have been looked at in several quantitative international studies. The authors of these previous studies strongly supported the need to study the cultural factors of maritime safety more intensively. In order to comprehensively study cultural factors, such as attitudes, beliefs, perceptions and values of the maritime personnel, we chose the interview study as the main research method for workpackage 2 of the METKU Project. (Lappalainen, 2008)

A semi-structured questionnaire was provided in order to examine the research area. The questionnaire consisted of questions analysing the main research themes and ones concerning background information on the interviewees and their employees. Additional questions were included to evaluate the significance of the ISM Code to the maritime safety.

The interviews in this study were mostly carried out as thematic interviews, in which we applied the method introduced by Hirsjärvi and Hurme (2001). The purpose of the questionnaire was to assist the interviewer and serve as a reminder. The interview sessions were structured as discussions. The interviewees were encouraged to express themselves freely in order to find out the most important issues from their point of view.

The main themes of the interviews were based on the indicators presented above. The indicators of a safety culture are: continuous improvement, management commitment and personnel empowerment. These indicators form the main themes of our interview study.

In order to evaluate the processes of continuous improvement, we for example asked: How are incidents and near-miss situations reported and analysed in your company and how are corrective actions performed? In addition, the designated persons (DP; safety managers of shipping companies required by the ISM Code) were asked about the

numbers of reported incidents per year and per vessel. The designated persons were asked about the existence of quantitative targets or indicators, or usage of statistical methods for evaluating the safety performance of the company. The management of the company was asked how the management supports the personnel in safety issues and gives feedback on safety issues. The officers and crews of vessels were asked if there are any contradictions between the manifestations of the company's safety policy regarding objectives, measures or values and the actual practices of the management. The motivation and involvement of the personnel were studied for example by asking: How do the personnel and officers communicate in safety issues? And how does the personnel make proposals concerning safety issues?

The interview results were evaluated through a qualitative analysis, which was based on the model presented by Alasuutari (1993). The qualitative analysis applied here has three phases: data collection, data reduction and solution of the research problem (problem solution). Table 2.1 describes the phases of qualitative analysis which were applied in the interview study.

Table 2.1: Phases of the qualitative analysis

Phases:	Tasks:	Results:
Data collection	Interviews	Interview data; individual answers of the interviewees
Data reduction	1. Data investigation 2. Data merging	Reduced observations; results presented in Chapters 4 and 5
Problem solution	Qualitative interpretation	Conclusions; Chapter 6

Data reduction comprises two steps (Alasuutari, 1993). Firstly, qualitative data should be investigated through the theoretical framework of the research problem. The purpose of the investigation is to screen relevant and important data from the bulk of the data. The theoretical framework shows what is important in terms of the object of the study. The literature review provided us with a theoretical framework for the interview study, also uncovering the fundamentals of the safety culture and indicators of a well functioning safety management system (Lappalainen, 2008). As these indicators have been the basis for formulating the interview questions, they have also helped us to reduce the mass of interview material into a more manageable format.

The second stage of data reduction concerns merging, which means that the interviewees' individual answers were compiled into a single observation or group of observations. The interview questions were not represented similarly and in the same order to all interviewees. Therefore the formulation of the answers varied significantly. In order to merge and summarize the answers, we collected answers under the research themes, which were derived from the three indicators of a safety culture. The results of data reduction are called reduced observations. The reduced observations of this interview study are presented in Chapters 4 and 5 of this report.

After the data reduction, a qualitative analysis proceeds with solving the problem. When applying the qualitative analysis, the research problem is solved by interpreting the reduced observations. According to Alasuutari (1993), the qualitative interpretation is based on earlier literature on previous studies (Alasuutari, 1993). The literature review provides the theoretical framework for the analysis of interview observations (Lappalainen, 2008). In the literature review, earlier studies were examined as regards the impacts of the ISM Code. The findings of earlier studies were compared to the observations made in this interview study.

2.4 Statistical study

The main focus of workpackage 1 is on finding suitable methods for measuring safety. The more accurate methods we can develop, the more detailed and thus more useful data we can obtain. By comparing accident and traffic volume statistics FMA(2009), it can be established that the average accident risk has diminished. The exact contributors to this decrease are not clear, even though a lot of effort has been put into evaluating them. The ISM Code has been considered a major contributor, but its actual weight has not been successfully defined as Anderson(2003) also concludes in his study. In METKU, both technical and cultural aspects of safety are given equal importance in order to evaluate the causes of accidents and safety improvements.

Interviews are to be used in two ways in workpackage 1 of the METKU Project. The purpose of the direct approach including questions concerning the measurement of safety levels was to gain information about methods that are being used or developed. The other approach is less direct. The interview material is used to analyse the reliability of information in statistical and report form acquired from companies and authorities. This analysis will be conducted in a future phase of this workpackage 1 study.

Originally, the intention was also to obtain some straightforward quantitative information by means of the interview questionnaire about what seafarers think about the influence of the ISM, accident probabilities and their causes. Unfortunately, the first interviewees felt that these table form questions were difficult to answer, and most did not even bother to try. Due to these first impressions, an effort was made to change these tables to facilitate answering them, which resulted in a more positive response of the interviewees. Even after the tables were changed, a large group of interviewees still considered these table format questions too difficult. Difficulties in filling in the questionnaire lead into an insufficient quantity of material for a proper quantitative analysis. Even though the quantity of answers to questions requiring numerical evaluation is not adequate (between 18 and 31 responded) for a reliable quantitative analysis, some general opinions can still be discerned. Answers were gained from all occupational groups, but not from all different types of companies (which can be seen as a weakness of this study).

The enthusiasm in replying other questions also varied, which would give a higher weighting to the answers of specific groups if used statistically.

Even though a true quantitative analysis was not conducted for this interview report, some figures are included, where considered to provide added value for the qualitative analysis.

2.5 Summary

Most earlier studies on the impacts of the ISM Code have been based on quantitative methods, such as structured questionnaires, the results of which have been analysed statistically.

We chose the interview study as the main research method for workpackage 2 of the METKU Project. The purpose of the interview study was to collect the maritime personnel's subjective perceptions of the maritime safety culture in Finland. The results of the interviews were analysed qualitatively.

The purpose of the statistical approach is to develop safety measuring tools that can be used to evaluate the impact of the ISM Code and other particularities. By thoroughly singling out the causes of both accidents and safety improvements, more efficient safety management is possible. The subjective views of the interviewees are used to evaluate the reliability of statistics and reports acquired from companies and authorities.

3 TARGET GROUP

3.1 Introduction

This section describes the target group of the interview study. The target group consists of seven Finnish shipping companies with their personnel and other interests groups of the shipping industry with their officers. The information about the target group was collected during the interviews and from the companies' websites.

Four of the shipping companies are members of the corporate group of Kotka Maritime Research Centre. The members of the corporate group monitor and help focus research projects and make use of the latest research findings. The corporate group also supplied part of the funding for the METKU Project and other projects led by Kotka Maritime Research Centre. The other three shipping companies are taking part in the METKU Project due to their special interest in the development of maritime safety management.

The organisations that form the other interest group have close relations with shipping companies, their vessels and crews. These organisations work with ISM issues in their daily operations.

There are other significant stakeholders of the maritime industry that are in one way or another involved in maritime safety management. These include nautical schools, maritime colleges, trade unions of the maritime personnel, the employers' association etc. This report does not deal with these organisations, some of which have been involved in other workpackages of the METKU Project.

The focus of this study is limited to shipping companies and their personnel.

3.2 Shipping companies

There are seven Finnish shipping companies involved in the METKU Project: Bore, Finnlines, Finstaship, Kristina Cruises, Langh Ship, Neste Shipping and VG-Shipping.

These shipping companies represented all important business areas, i.e. passenger vessels, cruising business and all types of cargo vessels. The ships were engaged in liner traffic, time charter and voyage charter. The ownership of the companies varied. Four companies were family-owned companies, while one was state-owned. Two companies were stock exchange companies. The size of the fleet and the personnel differed. Three flags states were involved, i.e. Finland, Gibraltar and the Netherlands. The vessels that were visited sailed under the Finnish flag, except for one that sailed under the flag of Gibraltar.

Each one of the shipping companies supported the research project by allowing us to examine their safety management systems, giving us access to their vessels, giving us permission to interview their management and personnel and by providing additional information concerning their safety management systems.

3.2.1 Bore

Bore was founded in 1897 and is owned by the family company Rettig. The Bore fleet sails on the Baltic Sea and the North Sea. Bore was enlarged through the acquisition of Rederi Ab Engship and Bror Husell Chartering companies in 2005-2006. The company's fleet consists of 22 ships, which comprise ro-ro vessels, general cargo vessels, car carrier vessels and a bulk vessel. Bore has approximately 500 employees, both seafarers and office staff. Today, Bore's ships sail under both the Finnish and the Dutch flag. We visited three vessels during the project, which were the ro-ro ship Estraden, car carrier Autobaltic and bulk ship Belgard. All vessels were visited at port.

3.2.2 Finnlines

Finnlines provides ro-ro and passenger services in the Baltic Sea and the North Sea. Finnlines is listed on the NASDAQ OMX Helsinki. Finnlines Ltd. is part of the Grimaldi Group, one of the world's largest shipping companies. The number of personnel in Finnlines is approximately 1,500 people. Finnlines' safety management system is applied on 19 vessels. In addition, Finnlines has 30 vessels owned by other shipping companies assigned to it by a charter agreement. We visited three vessels that fly the Finnish flag during the project. These were the ROPAX ships Finnstar, Finnmaid and Finn hansa. Two vessels were visited during their voyage from Helsinki to Travemünde. One vessel was visited in its homeport in Helsinki.

3.2.3 Finstaship

Finstaship is a stated-owned shipping company which offers icebreaking and fairway services for general shipping needs, specialised offshore and marine construction services, as well as ship management and ferry services. The Finstaship fleet consist of three multipurpose vessels, six icebreakers, several special ships for fairway maintenance and marine construction services and several vessels for ferry operations. Two vessels were visited, but the seafarers that were interviewed also included personnel from other vessels.

3.2.4 Kristina Cruises

Kristina Cruises is a family-owned shipping company. Kristina Cruises (earlier known as Rannikkolinjat) was founded in 1985. Kristina Cruises operates with two passenger ships, m/s Kristina Brahe and m/s Kristina Regina. M/s Kristina Regina is operating all year round. In spring 2001, the renovated m/s Kristina Regina began a series of Mediterranean cruises. Summer destinations have traditionally included several ports of the Baltic Sea, Norwegian fjords and cities in Northern Europe. During winter seasons 2001 – 2007 the ship sailed around the Canary Islands and East coast of Africa (Gambia, Cap Verde and Senegal). During the winter season 2008 – 2009 the ship sailed on the Red Sea.

During the period of open water, m/s Kristina Brahe sails in the Gulf of Finland, the Saimaa Canal, Lake Saimaa and Lake Kallavesi. The personnel of Kristina Cruises

numbers approximately 130 people. We visited both m/s Kristina Brahe and m/s Kristina Regina during their sea voyages.

3.2.5 Neste Shipping

Neste Shipping transports around 40 million tons of crude oil, petroleum products, and chemicals annually, primarily on the Baltic, the North Sea, and the North Atlantic. Neste Shipping is a part of Neste Oil Company that is listed on the NASDAQ OMX Helsinki. The biggest shareholder in Neste Oil is the Finnish state. Neste Shipping has more than 30 vessels in its fleet, with a total tonnage of over 1 million tons. All vessels are ice-reinforced and feature a double hull. Six tankers are fully owned and three 50% owned by Neste Oil, while the others are chartered. Neste Oil uses around one half its tonnage for its own needs, and offers the remainder at the international market to international oil companies and brokers. Neste Shipping employs around 510 people, of whom approx. 430 work at sea and around 80 in the office. Four tankers were visited during the study.

3.2.6 Langh Ship

Langh Ship is a family-owned Finnish cargo shipping company. The fleet consists of five cargo ships specialised on container cargo and steel coil transportations. Langh Ship has developed a solution for transporting heavy steel coils. This solution is called the Cradle Tween Deck, where heavy coils can be loaded in several layers.

3.2.7 VG-Shipping

VG-Shipping is a privately owned Ship Management company established in 1995. VG-Shipping operates and manages nine vessels. VG-Shipping owns and operates two dry cargo vessels and one ship specialised in heavy cargoes. The managed ships are state owned. One of the ships managed by the company is research vessel r/v Aranda owned by the Finnish Institute of Marine Research. Other vessels under its management are hydrographic surveying vessels owned by the Finnish Environment Institute. VG-Shipping Ltd. has some 60 employees at sea in the winter season and some 120 in the summer season. The ships of VG-Shipping sail under the flags of both Finland and Gibraltar. We visited two vessels, Mirva and Eeva, during the project. The both vessels were engaged in dry cargo transportations.

3.3 Other interest groups

Other interest groups that have participated in the METKU project are the Finnish Maritime Administration (FMA), Finnpilot, and the Accident Investigation Board Finland.

3.3.1 Finnish Maritime Administration

The Finnish Maritime Administration (**FMA**) is responsible for the development and maintenance of channels and waterways. The FMA publishes both printed and electronic charts. The FMA is the authority in charge of assisting winter navigation. The FMA is responsible for ship safety, ship and port facility security and small craft safety in Finland. Compliance with rules and regulations is ensured by means of surveys and inspections. FMA also ratifies the minimum safe manning of Finnish ships, issues certificates of competence, and maintains a register of seafarers.

The Maritime Inspections Division of the FMA is in charge of the inspection and survey of ships and the Port State control of ships sailing under foreign flags. The four regional inspection divisions are in charge of Flag State and Port State control and deal with maritime incidents and accidents at sea in their respective regions. The regional inspection divisions are responsible for performing ISM Audits. The purpose of ISM Audits is to verify that safety management systems are compliant with the ISM Code in shipping companies and on vessels. We visited three of four regional inspection divisions during the METKU Project. The FMA provided additional information about safety management, for example incident and violation reports drawn up by VTS operators (and a few by pilots) which were also made available for analysis. Statistics and the possible use of this data for indicator purposes will be discussed in a future report under workpackage 1.

3.3.2 Finnpilot

Finnpilot is an acronym for the Finnish State Pilotage Enterprise. Since the beginning of 2004, the pilotage unit of the Finnish Maritime Administration has operated independently under the name of the State Pilotage Enterprise. The State Pilotage Enterprise provides national pilotage services and other related services that support maritime safety and operational requirements and is responsible for the development of these services.

Pilots have significant experience in and influence on maritime safety. They have several years of experience in operating different types of vessels in various types of companies. This experience combined with boarding vessels sailing to or from Finnish ports on a daily basis gives them first row seats to observe changes in the maritime safety culture.

3.3.3 Accident Investigation Board Finland

In Finland, the **Accident Investigation Board (AIB)** investigates all major accidents regardless of their nature as well as all aviation, maritime and rail accidents and incidents. The Accident Investigation Board investigates all waterborne traffic accidents having occurred: in Finland's territorial waters or in which a Finnish vessel has been involved. In addition, incidents in waterborne traffic can also be investigated. The purpose of waterborne accident and incident investigation is to prevent accidents, not to apportion blame or to determine responsibility.

In accident investigations, special attention has been paid to the safety management systems of the companies of accident vessels. The purpose of investigating the safety management system is to find out whether the procedures of it have been complied with and whether the safety management systems conform with the requirements of the ISM Code. The safety management system documentation is investigated thoroughly, similarly to the safety records of the accident vessel. The safety records include for example previous accident and non-conformity reports, master's review reports and reports of corrective actions.

Based on such thorough investigations of safety management systems, the AIB has accumulated a comprehensive understanding of the state of safety levels and the safety culture on accident vessels.

3.4 Interviewees

A total of 94 interviewees were involved in the interview study (see table 3.1 below).

Table 3.1 Table of interviewees

Active Seafarers	Masters	Officers		Crew Members		Subtotal
		Deck officers	Engineering officers	Deck hands/eng. Operators	Hotel and catering staff	
	15	21	10	5	11	62
Management (DPA's and top management)	Maritime working experience	No maritime working experience				Subtotal
	10	4				14
Other interviewees	Pilots	FMA Maritime Inspectors	FMA* (other officers)	FAIB*		Subtotal
	4	8	4	2		18
						Total
						94

* the semi-structured questionnaire was not applied

3.4.1 The personnel of shipping companies

The main group of interviewees were active seafarers: masters, deck officers, engineering officers, deck hands and engineering operators, and hotel and catering staff. Whenever we considered it relevant to group the responses of the interviewees, we categorised the results into three groups. These groups were the group of masters, the group of officers including deck officers and engineering officers, and the group of other crew members, including deck hands, engineering operators, and hotel and catering staff. The anonymity of the maritime personnel could be secured by grouping the results into larger categories. The total number of active seafarers was 62.

The management group includes safety managers (DPAs) and managing directors of the shipping companies involved in our study. The management group consisted of 14 interviewees, including both people who have maritime working experience and people who have no maritime working experience. The group with no maritime working experience is small. From that point of view, the overwhelming majority of the interviewees have maritime working experience. Almost all managers have worked at sea and applied the ISM Code in practice. In order to ensure the anonymity of the interviewees, the responses of the DPA's were processed together with other management representatives.

The personnel of vessels under the Finnish flag were mostly Finnish. The personnel of vessels under the Dutch and Gibraltar flag represented various nationalities, such as Russian, Latvian and Filipino. The personnel members who were interviewed were mostly Finnish, including one Estonian citizen.

3.4.2 The officials of other interests groups

We interviewed eight maritime inspectors of the FMA and four pilots. The maritime inspectors of the FMA had conducted external ISM Audits in shipping companies and on vessels. These inspectors were responsible for carrying out the Port State Control inspections of foreign ships visiting Finnish ports. All of the pilots and maritime inspectors who were interviewed had been active seafarers before their engagement in Finnpiilot or the FMA. The answers of the pilots were included in the maritime personnel's results due to the small number of interviewees.

We also interviewed four other officials of the Finnish Maritime Administration and two maritime accident investigators of the Accident Investigation Board. The officials of the FMA provided useful background information about issues relating to the ISM Code. The officials of the FMA and the accident investigators of the AIB were not interviewed using the semi-structured questionnaire (marked * in Table 3.1). These interviews were carried out as open discussions.

The results of the interviews with representatives of public administration concern the entire maritime sector, not only the shipping companies involved in the research project.

3.5 Summary

A total of 94 people were interviewed in this interview study. All those who were interviewed were actively working in the Finnish shipping business. Almost all had a maritime education and maritime working experience. Every person interviewed had worked with the ISM Code based safety management system. Almost all were Finnish citizens.

The shipping companies involved in the METKU Project comprehensively represent the Finnish maritime industry. There were seven shipping companies involved in the study, which widely represent the Finnish shipping business. All important shipping business areas were represented. We visited 16 ships during the project. These were passenger ships, ROPAX ships and all types of cargo ships. The combined fleet of the shipping companies represents a large proportion of the total Finnish fleet.

The other stakeholder organisations are involved in safety management on a daily basis. They have a comprehensive idea of the current safety culture of the Finnish shipping business due to their close co-operation with Finnish shipping companies and their personnel.

4 IMPACTS OF THE ISM CODE ON MARITIME SAFETY

4.1 Introduction

In this section, the results of the interview study concerning the impacts of the ISM Code on the maritime safety culture in Finland are described in detail.

The main objective of the ISM Code was to establish a safety culture in the maritime industry. In this Chapter, we will discuss the maritime community's own perceptions of how successful the ISM Code has been in improving the maritime safety culture in Finland.

The results are presented in the following order: we first discuss the level of commitment of the top management in Finnish shipping companies to safety, secondly we will describe the maritime personnel's attitudes towards safety and thirdly we will assess the effectiveness of the continuous improvement process.

4.2 Management commitment

4.2.1 Management role and responsibilities

The IMO declared that the cornerstone of good safety management is commitment from the top management (IMO, 2008a).

According to the ISM Code, the company is responsible for supporting the personnel and providing adequate resources for safety management. The top management shows commitment by setting a company policy, providing resources for safety improvements, capital investments and active communication in safety related issues (Lappalainen, 2008).

The ISM Code requires that the company should designate a person ashore (DPA) who has direct access to the highest level of the management. The role of the DPA is crucial for the functioning of the safety management system. The DPA is a link between the personnel on board and the company's office. The DPA should actively monitor the safety and pollution prevention efforts on each ship. The DPA should ensure that adequate resources are available and shore based support is applied on each ship (IMO, 2008a). From the ship's point of view, the DPA represents the management to the master and the crew. In order to manage his responsibilities, the DPA needs the support of the management.

The master of the ship has a special role in relation to management commitment. The master represents the company on board. According to the ISM Code, the company should describe the responsibilities of the master clearly (IMO, 2008a). The responsibilities and authorities of the master should be documented in the safety management system. The master enforces the safety and environmental policy set by the management of the company. The master should motivate and encourage the crew to

adopt the policy. Similarly to the DPA's role, the master's role could also be seen in two ways. On the one hand, the master's role could be understood as a representative of the management. In that sense, the master should motivate the crew as regards safety issues. On the other hand, the master could be seen as a member of the personnel. From that point of view, the management should provide adequate resources and shore based support to the master.

4.2.2 Safety policies, safety goals and customer requirements

In order to evaluate the current safety levels of Finnish shipping companies we asked questions about their safety policies, safety goals and other aspects which contribute to the companies' safety targets.

The management assured that they regard safety and environmental responsibility as a value. The companies have attempted to minimise their impacts on the marine environment and taken safety issues into consideration in all of their operations. Some managers added that occupational safety is regarded as an important value of the company. Companies aim to decrease the incidence of occupational accidents. A common principle of the companies' safety policies was that the requirements of the ISM Code should be fulfilled.

Seven managers said they have to take customer needs into consideration as regards safety and environmental issues. Three managers mentioned that their customers have set strict requirements for the operations of the company. Those shipping companies that operate in passenger traffic have to pay special attention to passenger needs. A safe voyage should be ensured for the passengers. Four managers said that their customers have not expressed any particular safety requirements. They felt that their customers prioritised economical aspects over safety and environmental issues.

In addition, some of the companies have applied other management systems alongside with the ISM Code based safety management system. These systems were quality management systems based on quality standard ISO 9001 and environmental management systems based on environmental management standard ISO 14001. One shipping company applies OHSAS 18001 occupational safety standard.

The management were asked what the target level of safety in the target companies was and whether they had achieved the intended safety level. Typically, the safety goals of the shipping companies were introduced in general terms. The common goal of the companies' safety management was to take proper care of environmental and safety issues.

The usage of a quantitative measurement of the safety level was not very common among shipping companies. In some companies, incident reports were still being analysed individually case by case, and the actual connections between incident types were not studied. In the most sophisticated companies, target values for statistical safety

goals were set and periodically monitored. The usage of quantitative measurements of safety levels will be discussed in more detailed in Chapter 4.5.2 on statistical methods.

Because of the lack of specific safety goals, we asked the management to evaluate their companies' safety levels by comparing their safety level to that of other shipping companies. The management was asked how they could compare their safety level to that of other Finnish shipping companies and international shipping companies, if they considered the comparison relevant. Seven managers out of the fourteen that were interviewed said that the major safety goal of the company was to exceed the average level of safety when compared to other Finnish companies. These managers estimated that their companies had achieved the target level. Three managers said their safety goal was to be one of the best shipping operators when compared with other Finnish, or even European, shipping companies. These comparative goals were more or less unwritten estimations of the interviewees. All of these estimations should be regarded as conjectural. No specific methods to make comparisons between shipping companies exist or are applied.

On the other hand, the masters (15 interviewees), officers (31 interviewees) and other crew members (16 interviewees) were asked about their opinions of their employer's safety level. Most of the masters (11) considered that the shipping companies which employed them had achieved a very good safety level. The estimations of other personnel were similar to those of the masters. The other officers (18 answers) and crew members (10 answers) considered that the safety levels were at least average in their companies. None of the interviewees believed that the safety levels of their employers were below the average. Some of the masters, officers and crew members (4 answers) added that their companies required higher safety level of the ships than could be regarded as reasonable. These interviewees represented separate companies. The numbers of answers presented here are suggestive, because all interviewees were not asked about the safety levels of their employers, or they did not bring up their opinions of the safety level.

The representatives of the Finnish Maritime Administration (6 answers by 8 interviewees) estimated that the safety level of Finnish shipping companies has been comparatively high in recent years. Maritime inspectors recognised the fact that the top management of shipping companies regards safety and environmental friendliness as a value. The maritime inspectors particularly respected the progress in safety made by larger shipping companies and companies engaged in passenger traffic. Some inspectors (3 answers) felt that there has been shipping companies with a poor safety level. Fortunately, these "black sheep" have been individual cases.

The public administration has not utilised any statistical measurements in order to evaluate the safety level of Finnish shipping companies. The only statistics that are available were provided by the Paris MoU. The Paris MoU has provided statistics on deficiencies found in Port State Controls. According to one maritime inspector, these statistics showed that Finnish vessels have had very few deficiencies and detentions, which indicates that Finnish shipping companies have achieved a good safety level.

The maritime inspectors (6 comments) shared a common concern about the safety level of small charter boats. The owners of these boats usually are small companies with rather a limited number of staff. The ageing of charter boats has been a worry for the maritime inspectors.

We must emphasise that the maritime inspectors' estimates were focused on the entire shipping industry in Finland.

4.2.3 Management support in safety issues

Thirteen representatives of the management assured that their companies take safety and environmental issues seriously. Some managers felt that safety oriented operations were an integral part of profitable business. The managers cited some practical examples of how they have supported and encouraged the maritime personnel in safe operation. The management could demonstrate their support by communication, by visiting onboard and by participating in ISM audits, by giving feedback and by reacting to any non-conformities and safety initiatives. Four of the managers expressed some criticism about the commitment of the top management to safety. They felt that sometimes the company did not provide the funds for necessary safety improvements due to economical reasons. One interviewee added that sometimes there has been more talk than action on the part of the top management.

Three of the management representative said that the top management of a shipping company should have some seafaring experience, or at least a good understanding of seafaring. These interviewees said there has been cases where the top management (the executive board) of the company did not have much seafaring experience. These interviewees supposed that a lack of seafaring experience could prevent comprehensive understanding of the safety requirements of maritime transports.

The masters, officers and crews were asked how the management supports the personnel in safety issues and how the management gives feedback about safety issues. In addition, they were asked whether there has been any contradictions in the manifestations of the company's safety policy regarding goals, measures and values and the actual management practices.

The maritime personnel mostly felt that the commitment of the management to safety issues has improved. Some of the masters (6 answers) and some officers (7 answers) mentioned that the basic way to support the vessel in safety issues is to provide financial resources when needed. These interviewees said that the top management does provide money or other resources for safety investments, particularly if the need is well-founded. The personnel felt that reasonable safety initiatives have been supported by the management. Many of the interviewees (15 answers in total) could not see any contradictions between the company policy and the actual practices (typically investments in safety improvements) of the management.

Some of the interviewees (4 answers in total) expressed a critical opinion. They told the researchers that for financial reasons, even well-founded improvements have sometimes been rejected. One officer criticized the fact that there had not been enough human resources in order to update and renew the safety management system. One interviewee added that the management had been satisfied with and interested in nothing but the minimum safety level, ensuring that the ISM audits were passed and certifications remained valid.

The common view of the maritime inspectors (6 answers) was that the top management of Finnish shipping companies was highly committed to safety management. The top management actively supports and encourages the maritime personnel. The top management have internalised their crucial role in successful safety management. According to the maritime inspectors (3 answers), a practical way to support and encourage the personnel is to participate in the ISM audits. Especially in larger shipping companies, the representatives of the top management were actively present in the ISM audits on the ships. The inspectors considered that participation in the ISM Audits is a good indicator of top management commitment. One of the inspectors added that the management of “good” shipping companies visit the ships regularly.

According to five maritime inspectors (5 answers), there has been shipping companies where the top management should pay more attention to safety management. The management of these companies has not been committed to safety properly. Typically, these shipping companies were quite small with a small staff. The maritime inspectors said that there has been a lack of competence in smaller shipping companies. Two inspectors added that the smaller shipping companies have in place overly complicated safety documentation, and following their requirements in practice has caused problems. The maritime inspectors have registered non-conformities due to inconsistencies between the documentation and operations in these cases.

4.2.4 Communication and feedback

The interviewees were asked how the management communicates safety issues to the personnel. Particularly the employees of smaller shipping companies (7 interviewees) told the researchers that the company management had visited the vessels regularly and chatted with the personnel. One shipping company had adopted a good practise of keeping a log of the management's visits on board. On the other hand, the representatives of bigger shipping companies (7 answers) wished that the top management would visit the vessels more regularly. Some shipping companies have arranged regular meetings for the officers and personnel where safety related issues are discussed. These personnel meetings have typically been arranged once or twice a year.

Six masters answered that they had been satisfied with the communication between the vessel and the management ashore. Some officers (7 answers) and other crew members (7 answers) said they have not had any direct communication with the top management of the company. The interviewees (12 answers) said that the safety managers (DPA's) took care of communication between the office and the vessel. Eight of the interviewees

commended the safety managers for good communication between the vessel and the office of the company.

Although the crew members and officers did not have direct communications with the management of the company, they did have communications with the master of the vessel. Many interviewees (11 answers) commended their masters and said that the masters had good communication capabilities. Particularly the mates whom we interviewed commended the working conditions on the bridge for having become more communicative.

Some interviewees told the researchers that the management should give more positive feedback to the personnel on the progress of safety management. The management should award the personnel for actions which benefit the safety of the vessel. In some cases, the management was criticized because they occasionally neglect giving feedback on incident reports and safety proposals. When the crew members did get feedback on earlier initiatives, they were more willing to talk in the future. Even negative answers to initiatives were considered better than no answer.

4.3 Personnel involvement and motivation

The IMO (2008a) declares that the safe management and operation of ships depends on the personnel at all levels of the company. The safety culture can only improve if individuals at all levels of the organisation are committed and motivated to the safety and if all individuals have adopted a positive attitude towards the safety management system. A special role is assigned to the master. The master's responsibility is to actively motivate the personnel (IMO, 2008a).

The motivation and involvement of the personnel was looked at by asking: How does the personnel communicate with their superiors and among themselves on safety issues? And how does the personnel put forward proposals concerning safety issues?

4.3.1 Attitudes to the ISM Code in the implementation phase

According to many interviewees, the safety management system was faced with resistance to change during the implementation phase and in the early years of the ISM Code. The interviewees described the resistance that people felt when their professional pride was discredited. People felt that they had managed to do their jobs without red tape because they were professionals. Because they considered themselves professionals, they regarded the safety manuals as useless. This resistance has weakened in the last decade. According to some interviewees, the reason for this is that the systems have been developed to become more user friendly, and the documentation has been lightened and streamlined. The new generation of maritime personnel regards safety management as an integral part of their work. They have been educated in ISM issues during their studies in maritime institutes.

The maritime inspectors (5 answers) had also recognised the averse attitudes of maritime personnel in the early days of ISM implementation. The maritime inspectors said that the maritime personnel had felt that the administration was only trying to annoy them with their bureaucratic requirements. The maritime personnel were afraid that their workload would become excessive. The maritime personnel felt that the safety management system burdened them by useless practices, such as checklists and reporting.

According to maritime inspectors (5 answers), the attitudes of the maritime personnel have improved a lot in recent years. Today, the maritime personnel have positive attitudes towards the ISM Code and safety management. The maritime inspectors said that the maritime personnel have internalised the principles of safety management and they apply the instructions of the safety management system in their daily operations.

4.3.2 Communication and openness

We asked the management of the shipping companies and masters of the ships how actively their subordinates talk about safety related issues to their superiors. The masters who were interviewed (11 answers out of 15) believed that the maritime personnel has the courage to express their opinions and make proposals for improvements in safety issues. The answers of the management were polarized. Five managers believed that their personnel dare express themselves freely. Four representatives were of the opposite opinion. They believed that the personnel should find courage to express their opinions and make proposals for improvements. These managers (4 answers) expected the personnel to report incidents more actively. The maritime personnel (10 officers and 9 crew members) assured the researchers that they had no problems with communicating with their superiors. Some officers mentioned that their work onboard has recently become team work.

Some masters and managers told the researchers that although Finnish mariners have the courage to bring up issues with their superiors, they believed that the mariners are not willing to draw up reports or safety proposals on paper. The interviewees said that the reporting of incidents and near-misses has frequently been neglected.

According to some masters and managers, this culture has changed during the years of the ISM Code. They reported that the safety culture has taken root among the maritime personnel. The interviewees perceive that the establishment of a safety culture is manifested through the attitudes, communications and initiative of the personnel.

The management of shipping companies were asked about the influence of the nationality of the personnel to safety levels on vessels. Two of the shipping companies had vessels flying another flag than the Finnish one. The personnel on those vessels were representatives of other nationalities, for example Estonians, Latvians, Russians and Filipinos. The management considered that the safety levels of these vessels were as good as on Finnish vessels. There has been no difference in safety records between

the vessels under the Finnish flag and those under another flag. Neither has the nationality of the personnel influenced the safety level.

According to maritime inspectors, the personnel have been encouraged to express their opinions. They are not afraid to talk about safety issues with the higher officers. Especially when meeting in mess, people talk about safety issues during their coffee and lunch breaks.

4.3.3 Safety training

Only a few of the interviewees were asked about the personnel's attitudes towards safety training, despite the fact that the attitudes towards safety training were taken up several times during the interviews.

Some masters and managers (6 answers in total out of 29) told the researchers that the personnel have been highly motivated to participate in safety training. The interviewees told the researchers that some crew members were even enthusiastic. The interviewees considered that safety training is more systematic and planned by virtue of the ISM Code. Safety training sessions have been organized regularly. Safety training has been given weekly on passenger ships and monthly on cargo vessels. The interviewees believed that the motivation of the personnel has improved due to well-organised safety training.

Some maritime inspectors (3 answers) also mentioned that the maritime personnel has been highly motivated in participating in safety training. According to the maritime inspectors, regular safety training has improved the motivation. The maritime personnel have been more conscious about their responsibilities in emergency situations.

4.4 Learning from accident and incident reports

The personnel's attitudes towards and involvement in safety is also reflected in responses to questions 29 and 30 (these questions were put to 32 interviewees, out of whom 31 answered; all occupational groups were represented, but not all the companies).

- Do you think that by reading/hearing about accidents and near misses of others (on your own ship / on another ship of your company / on a ship of another company), you can learn to avoid these types of accidents?

27 answered **indisputably** and 4 answered **yes**, which means that all thought that one can learn from the mistakes of others. (Variation occurred in the category 'ships of other companies', where 19 answered **indisputably**, 9 answered **yes** and 3 answered **maybe**.)

- How many accidents/near misses have you examined thoroughly?

18 answered that they had examined **over 100** reports, while 6 answered they had only read 1-10 reports (while most of them thought they should have read more); the remainder of the categories 10-20 / 20-50 / 50-100 reports had 2 answers each. (One did not give numbers, but based on other information gained during the interview he can be included in the category of persons who have examined 100 or more reports.)

- Do you think that you have gained something useful for your own work/work safety from examining these cases?

26 answered **indisputably** and 5 answered **yes**

From the number of accident reports read by these seafarers and their opinions about their importance for their own work, we can conclude that contrary to some beliefs, seafarers are both motivated and involved in safety development.

4.5 Continuous improvement

According to the ISM Code, the safety management system should be based on the philosophy of continuous improvement. The ISM Code requires that the company should actively improve the skills of personnel and enhance the preparedness for emergencies. In addition, the ISM Code requires that the shipping companies should establish procedures which ensure that non-conformities, accidents and hazardous occurrences are reported to the company. Naturally, the companies should ensure that corrective actions are implemented. (IMO, 2008a)

Furthermore, the IMO has emphasised the importance of continuous improvement by providing guidance on near-miss reporting (IMO, 2008b). According to the IMO, investigating near-misses is an integral component of continuous improvement in the safety management system.

In this report, we refer to this process as incident reporting.

4.5.1 Incident reporting

In order to evaluate the processes of continuous improvement, we asked: How are incidents and near-miss situations reported and analysed in your company, and how are corrective actions performed? In addition, the safety managers were asked about the quantities of reported incidents per year and per vessel. The designated persons were asked about the existence of quantitative targets, indicators or usage of statistical methods for evaluating the safety performance of the company.

The safety managers (DPA) and the masters of the vessels were asked about the number of reported incidents and near-misses per year. The average number of reported incidents and near-misses varied greatly depending on the vessel. Typically, the number of written reports was low; just a few reports per year and per vessel. On some vessels, only 1 to 3 cases were reported per vessel per year. In some vessels, the reported number was as much as 20 – 30 incidents per year per vessel.

The interviewees shared a common opinion that incidents are reported defectively. Regardless of how many incidents were reported per year, the majority of the interviewees hold the view that compliance should be improved in reporting incidents.

Some interviewees (8) considered that over-reporting occurs. According to the interviewees, the reason for over-reporting was a system that rewarded active reporting. These interviewees said that there also has been cases where under-reporting was apparent.

The public administration also considered incident reporting a problem. Four of the maritime inspectors brought up incident reporting. They considered that incident reporting has been poorly applied by the maritime personnel. According to one maritime inspector, the ISM Code has not been successful in that respect. One maritime

inspector added that the older seafarers have often neglected to report incidents. According to the inspectors who were interviewed, the ordinary crew members' attitude to incident reporting is poor. The ratings and hotel and catering staff do not report incidents at all.

When executing an ISM Audit in a shipping company, the maritime inspectors go through the reports of internal audits and records of non-conformities, accidents and hazardous situations (incidents). They considered that very few incidents were reported per vessel and per year. One inspector added that it was hard to believe that more situations which should have been reported have not occurred. According to one maritime inspector, alarm bells should start ringing, if no reports on incidents or non-conformities can be found onboard.

The inspectors whom were interviewed, consider that those ships that reported the largest numbers of incident were the safest ones. The large number of reported incident shows that these ships and companies are interested and willing to learn from their mistakes and to develop their operations towards a safer course.

The inspectors that were interviewed considered that poor reporting practices were also a problem at the international level. The interviewees said that this does not depend on the nationality of the ship. Their shared opinion of foreign ships was no better than that of ships under the Finnish flag. The maritime inspectors confessed that even the maritime administration itself has been unwilling to report it if something went wrong.

Reasons for this unwillingness to report were mentioned. Some (5 answers) interviewees thought that people are ashamed if something goes wrong. One interviewee told the researchers that some masters discourage reporting because they think that nothing should happen on their ship. Especially older seafarers considered that minor incidents should not be reported, as they felt this was bureaucratic.

According to some interviewees minor mistakes and all the technical problems are reported (due these problems are wanted to be noticed by the management), but mistakes that cause near-accident situations are not reported unless forced by circumstances.

Notwithstanding, some interviewees thought that unreported incidents and near-miss situations are discussed onboard. Improvements are made, although written reports do not exist. One maritime inspector also believed that corrective actions have been executed onboard quietly without official reporting.

One interviewee added that when a close shipmate makes a mistake, they usually fail to report it. People are reluctant to put blame on their shipmates. However, when a foreign ship has caused a near-miss situation, the report of this incident is much easier to compose.

In a case where bonus salaries were based on a safety target (for example target = zero defects or occupational casualties), this could be an obstacle to drawing up an incident report. If the casualty has been minor, the report has often been neglected.

Some mariners felt that the concept of incident was not specific. They suggested that the descriptions of non-conformities, accidents and hazardous situations should be clarified and standardised in the maritime industry.

Some mariners supposed that the maritime personnel have perceived the significance of incident reporting poorly. In such a case, the negligent person has not understood the positive consequences of reporting incidents for safety.

Shipping companies should establish a bonus system for rewarding active reporting.

4.5.2 Use of statistical methods

The use of quantitative analyses and statistical methods in general for safety purposes greatly varies between the companies studied. In some companies, a highly detailed reporting system regularly feeds information to a databank. This information on file can then be used statistically to evaluate present and future risks and the level of safety. At the other end of the scale, in some companies the statistical approach is seen as futile due to the small number of reports, or statistical information was not found to give added value when a statistical approach was tried. In the next phase of the METKU project, the reporting and statistical methods of some companies will be studied thoroughly to evaluate good and useful approaches to safety development and measuring.

The attitude towards continuous improvement has developed and can be seen in the way some companies are nowadays using their accident and incident reports for developing safety. The continuous improvement in reporting can be seen to progress in steps, the first of which is the development of efficient reporting methods and routines. The second phase is when responding to reports changes from time-consuming individual analyses to overall analyses of incident types. The final step seen in some of the companies that were interviewed is a statistical approach, where trends are used to estimate risks in advance, making preventive actions possible.

Safety managers considered that there is a lack of suitable indicators and felt that such indicators should be developed. According to the interviewees, some quantitative or statistical measures should be developed. The types and causes of non-conformities should be recorded in some manner in order to analyse the phenomenon/data more comprehensively.

According to the maritime inspectors, the use of statistical methods is not common in Finnish shipping companies. The inspectors could not name a single shipping company that utilises statistical methods in order to evaluate the progress of safety management. One representative of the public administration considered that quantitative measurement of safety progress is quite difficult. Suitable statistical measures have not been established. One should establish a practical indicator in order to evaluate the progress of safety.

Some interviewees discussed the fundamental problems of quantitative measurement. For example, the quantity of incident reports is arguably an indicator. Which option should be preferable: a low rate of reports or a high rate of reports? A lower rate of reports could indicate that the safety level has increased, but it could also indicate poor attention to reporting. Likewise bonus systems based on a quantitative indicator were discussed. On the one hand, the maritime personnel have been rewarded for active reporting of incidents. According to an interviewee, this could cause over-reporting, where insignificant defects are reported. On the other hand, the personnel have been rewarded for zero defects, which could counteract active reporting, especially that of minor incidents or near misses.

4.6 Summary

The Finnish maritime community felt that the top management is committed to safety management and the application of the ISM Code. The top management assured that they considered safety as a value, and their companies had taken safety issues into consideration in all of their operations. The top management said that they have supported and encouraged their personnel by providing adequate resources for safety work and by communicating actively on safety issues. The maritime personnel mostly felt that the commitment of the management in regard of safety issues has improved. The personnel felt that reasonable safety initiatives have been supported by the management. The management had provided money and other resources for safety improvements when necessary. The shared view of the maritime inspectors (6 answers) was that the top management of the Finnish shipping companies is highly committed to safety management.

Every group of interviewees said that communications in shipping companies had improved. The personnel stated that communications with the companies' officers have improved, and especially communication with the DPAs. Communication between the masters of the ships and the crew has improved. Some managers indicated that the personnel should more actively put forward proposals and initiatives concerning safety aspects. The maritime inspectors said that maritime personnel are not afraid to express themselves to their superiors.

During the implementation phase of the ISM Code, the safety management system confronted resistance to change. That resistance has weakened during the last decade. The maritime personnel's safety attitudes have improved. The willingness to participate in safety training has been a good indicator of that.

The groups that were interviewed had a common concern about the functioning of the continuous improvement process. The reluctance to make incident reports indicated that the continuous improvement process was not functioning properly. Many interviewees said that incident reporting should be improved/encouraged somehow.

Table 4.1 summarises the impacts of the ISM Code on the maritime safety culture in Finland. The achievements and deficiencies are listed in the Table.

Table 4.1 Impacts of the ISM Code on maritime safety culture

The Impacts of the ISM Code	
Achievements	Deficiencies
<ul style="list-style-type: none"> • Improved management commitment • Management regards safety as a value • Management supports and encourages the maritime personnel • Better communication and co-operation • Improved personnel attitudes and motivation • Enthusiastic attitudes towards safety training 	<ul style="list-style-type: none"> • Continuous improvement process does not function correctly • Negligence in reporting incidents • Inconsistencies between the system documentation and operations • Poor commitment to safety in some shipping companies • Financial issues take precedence over safety issues sometimes

5 APPRAISALS OF THE ISM CODE

5.1 Introduction

In this Chapter, we will discuss the maritime community's appraisals of the benefits and defects of the ISM Code. In addition, considerations of the influence of the ISM Code on maritime safety will be presented.

The ISM Code provides the functional requirements for a safety management system which should be implemented by the shipping company. The company should establish a safety and environmental protection policy which is implemented and maintained at all levels of the organization. The company should produce instructions and procedures to ensure safe operation of ships and define responsibilities and levels of authority of the personnel who are involved in these operations. The company should establish lines of communication between shore and shipboard personnel and procedures for reporting accidents and non-conformities. The company should prepare for emergency situations, carry out internal ISM audits and review the effectiveness of safety management regularly. (Lappalainen, 2008)

In order to evaluate whether the ISM Code has achieved its functional objectives, we asked the interviewees to name the benefits and defects of the ISM Code. The interviewees were not given any ready-made options to choose from. Instead, they were asked to discuss freely the benefits and defects they considered important. We classified the appraisals by using the functional requirements of the ISM Code as criteria.

5.2 Benefits of the ISM Code

The ISM Code has been useful in general. This opinion was expressed in several ways by the interviewees. The interviewees said that the ISM Code has improved the safety level of the maritime industry, the maritime culture has changed and become more safety oriented, the personnel's safety attitudes have improved and the maritime personnel's safety awareness has improved. One manager indicated that shipping companies were not willing to give up their safety management systems any more, because they have provided economic benefits for the company and facilitated the general management of the company. Some interviewees said that the ISM Code has influenced the daily practices.

Eight interviewees regarded it as a benefit of the ISM Code that co-operation between the shore and shipboard personnel has improved due to the improved communication. Information between the shore and the ships flows more easily nowadays. The personnel know the key persons to contact in safety issues. The ISM Code has provided useful tools for reporting safety aspects from the ship to the company's office. Co-operation between personnel groups onboard has likewise improved. Safety meetings have been arranged regularly onboard. Information has been shared between ships in the company's fleet.

Sixteen interviewees said that the roles and responsibilities of the personnel have been clarified due to well-defined documentation. The personnel have been better aware of their duties. Especially the responsibilities in emergency situations have been clarified. The documentation has provided practical information about different tasks and operations. Staff members could check the manuals for safe routines and their duties.

Eleven interviewees mentioned that safety management systems have helped the induction training of new crew members. The new crew members could easily find out about their tasks and responsibilities from the documentation. The new person could read the instructions of the safety management system in private and at his own pace. When the new mariner comes onboard, he can find answers to any questions concerning his tasks or duties.

Fifteen interviewees said that the application of the ISM Code has harmonized the instructions. Uniform instructions have made it easier for personnel to transfer between the company's ships. The tasks have been performed similarly on various ships. Similarly, uniform instructions have helped the induction training of new personnel.

Nine interviewees mentioned as one important feature the fact that the ISM Code has placed formal requirements on the company. According to some interviewees, the responsibility of the company for safety issues has improved maritime safety. Another benefit has been that the personnel have been conscious of the company's manifested will. The company has had to react to reported safety defects and problems. Safety information has flowed better to the top management of the company. The company has been forced to operate safely.

According to 15 interviewees, application of the ISM Code has improved the quality of maritime operations. The operations have been planned and systematic. The ISM code has introduced systematic thinking into maritime operations. Instructions have become better defined and clearer. The ships have been better prepared for emergency situations. Any problems have been taken into account in advance. The instructions for different tasks and operations have been found easier to take in. Safety issues have been taken into consideration extensively.

The maritime inspectors pointed out rather similar benefits as the other interviewees. According to the maritime inspectors, the ISM Code has brought safety awareness, systematic and planned operations and clearer roles and responsibilities of the maritime personnel.

5.3 Defects of the ISM Code

Most of the interviewees felt that the ISM Code itself has no considerable defects. Nevertheless, the application of the ISM Code was considered inappropriate. According to the interviewees (23 answers), one of the major defects of ISM Code application is the increasing bureaucracy. Some interviewees said that the safety management system has encumbered the maritime personnel with unnecessary official procedures. The reporting procedures were considered too complicated and cumbersome. The safety management system has created too much paperwork. Some interviewees felt that certain inspections are ineffective and futile, just a waste of time.

Up to 24 interviewees stated that the safety management system has been made too complicated. The instructions were too detailed. The documentation did not correspond with the actions. There have been problems in following the instructions of the safety manuals. No room has been left for common sense and situational sensitivity. Sometimes organisations suffer from a lack of common sense, and the complex safety manual stops the employees from acting rationally.

One interviewee indicated that in the earlier days of the ISM Code, shipping companies tended to develop safety documentation that was too complicated and too detailed. The operations were documented such as the company wished them to be, instead of documenting the operations as they were in real life. This problem occurred particularly where the shipping company was assisted by external consultants who were not familiar with the routines of the vessel.

Seventeen interviewees considered that there was no need to change the Code. On the contrary, some interviewees regarded any changes to the ISM Code as suspicious. They considered that the Code should not be changed at all. Especially any restrictions of the Code were considered quite risky. Two interviewees wished for changes in the Code. They pointed out that the ISM Code has not evolved since it was established. They suggested that the Code should be more explanatory. One interviewee suggested that the ISM code should encourage shipping companies to adopt a more self-regulated safety policy.

The practical aspects of the ISM Code should be developed. According to seven interviewees, guidance should be provided in the application of the Code. Practical examples of successful implementation of the ISM Code should be provided. One interviewee suggested that the best practices of safety management should be disseminated to the entire maritime industry. The public administration should provide interpretations of the Code requirements.

Many interviewees (18 answers) considered that safety management system documentation should be simplified. Streamlined documentation could mean that the system would be utilised better. The basic principle should be that the documentation corresponds with real operations onboard. Some interviewees added that there had been cases where the safety documentation had been relaxed and streamlined, which made it

more usable. In addition, some interviewees considered that regularly updating the documentation is a good indicator of a functioning safety management system.

The maritime inspectors observed similar defects as the maritime personnel. They (6 answers) considered that safety management systems were too complicated, particularly in the early days of the ISM Code. One inspector added that sometimes a complex safety manual has restricted rational action.

According to five inspectors, there is no need to change the ISM Code. Other inspectors suggested that some clarifications and interpretations could make the Code more user-friendly.

5.4 Development of maritime safety in Finland

In order to explore the impacts of the ISM Code on maritime safety in Finland, the interviewees were asked about any major changes in maritime safety in Finland during the years of the ISM Code.

In addition, the interviewees were asked about safety risks they could foresee in the near future and in the long run. This question was put to them to investigate any major challenges in Finnish maritime safety.

According to the interviewees, the ISM Code has made a significant contribution to the positive development of maritime safety in Finland in recent years. Fifteen interviewees considered that the ISM Code has improved maritime safety. In addition, the interviewees named other causes for positive development and progress. Seven interviewees said that the incidence of working under the influence of alcohol among officers and crew has decreased significantly. Especially those who have been in the business for a couple of decades have noticed that people no longer are drunk onboard. Some interviewees added that technological innovations and changes in the social environment have increased safety in maritime operations.

The interviewees named several risks they perceived in the Finnish sea areas. Mostly, the interviewees mentioned risks concerning human resources (25 answers). They mentioned the following risks which related to human resources:

- fatigue of the maritime personnel due to small crews onboard
- the shortage of professional labour force
- deficiencies in maritime education
- educational level of foreign maritime personnel

When talking about fatigue of the maritime personnel, the interviewees considered that ships are nowadays operated by crews that are too small. The reasons for operating with shorthanded crews were found in international competition. Undersized crews was recognized as a factor by every group of interviewees. The concern over the

consequences of fatigue is shared by shipping companies, the maritime personnel and public administration. The maritime inspectors also related that the maritime personnel suffer increasingly from fatigue. According to one maritime inspector, the fatigue of maritime personnel is the biggest risk in the Finnish maritime industry. The personnel were not afraid to tell the inspectors about their fatigue during audits. One maritime inspector added that the fatigue of maritime personnel has been an public secret in the maritime industry. It was said that working time records were falsified onboard. In addition, fatigue has been the main cause of for several accidents.

The shortage of professional labour force is already a reality. There is a particular shortage of maritime engineers in the Finnish shipping business. The interviewees felt that the shortage of professional labour force will be worse in the future due to retirements. Some interviewees identified the shortage of seamen as a risk in the future. Young people prefer the education of a maritime officer to service as a seaman who does the practical work.

Several interviewees were worried about losing the tacit knowledge of senior seafarers due to deficiencies in the apprentice practices of present educational systems. In the present educational system, the students spend shorter times as trainees than earlier. The interviewees were also worried about the loss of tacit knowledge due to retirements. The older mariners feared that the new generation of maritime personnel would not be ready to take on the responsibilities of senior officers. This is due to both a shortage of labour force and problems in passing on the tacit knowledge from senior mariners to the new generation.

Some mariners mentioned as a safety risk foreign maritime personnel and foreign vessels that navigate on the Baltic Sea. The interviewees feared that foreign vessels and seafarers have poor knowledge of the circumstances in the Baltic Sea. The Baltic Sea and particularly the Gulf of Finland are regarded as difficult to navigate. The interviewees also worried that winter navigation on ice-covered waters could be too challenging for foreign seafarers.

Seventeen interviewees named the growing traffic volumes and the growing speed of new vessels as a safety risk. Maritime traffic has increased steadily in recent years due to growing oil transportations. According to the interviewees, the risk also increases due to the busy passenger traffic across the Gulf of Finland and the northern Baltic Sea. Furthermore, the ice conditions increase the risk of accidents in the wintertime.

Many interviewees brought up the ISPS Code in comparison with the ISM Code. Mariners felt that the ISPS Code has been quite useless onboard. They considered, however, that the application of the ISPS Code has been useful for port authorities as it has provisions for controlling trespassing.

5.5 A numerical evaluation of risk reduction

When asked to numerically evaluate accident risks and near miss frequencies today in comparison with the time before the ISM, the following numerical information was obtained:

- A total of 19 answers from all occupational groups, but not from all company categories
- Only one considered that the overall risk of the accident categories shown has slightly increased.
- 12 answered that the overall risk has gone down considerably, and 4 noticed a slight decrease.
- The risk was considered to have decreased the most in environmental and personal injury categories
- The least reduction was found in the risk of damage due to storms and collisions with a dock or bridge
- Only three interviewees considered that the overall frequency of near misses has gone up
- 7 thought that the frequency of near misses has decreased considerably and 9 that it had decreased slightly
- The collision category of near misses was seen as having decreased the least, and 4 experienced officers considered that this frequency is higher than 15 years ago (the same officers commented about the lack of seamanship in the new generation that relies too much on technology).

The interviewees were asked to evaluate 5 accident causes (from DAMA cause list) which the coming of the ISM code has influenced the most by decreasing these types of accidents. Due to the small quantity of answers (18), some of which were also given less precisely than expected, the analysis was made by comparing subcategories rather than individual accident types. The answers of all 18 interviewees were given an equal weighting of 15 points, which gave a total of 270 points to be distributed. The following information was obtained:

- 12 out of 18 of those who replied felt that the positive impact of the ISM could mostly be seen in the category “Communication, organisation, policies and routines”- category (F).
- The category “communication, organisation, policies and routines” (F) received 57% of all points given.
- Category (G), “Personnel, situation evaluation and action”, was considered the second most important, with a share of 18,5%.
- The remaining categories were not considered important with only 2.6 to 8.1% of the total points.

There is a high correspondence between replies to this numerical question with the other information acquired during this research project. The impact of the ISM can be seen at the organisational and cultural level.

5.6 Role of the administration

According to the Guidelines on Implementation of the ISM Code by Administrations (IMO, 1995) the administrations should support and encourage the company in achieving the objectives of the ISM Code during the ISM verification process. One of the major objectives of the ISM Code is the establishment of a continuous improvement process. In order to verify the safety management system, the administrations have executed ISM Audits in the shipping company's office and onboard the ships.

According to maritime inspectors, continuous improvement could only be indirectly verified in the ISM audits, as no practical indicators of safety improvements have existed. The maritime inspectors discovered that continuous improvement was indirectly applied. One indication was the updating of safety documentation. If safety manuals are updated regularly, this is positive evidence of progress and continuous improvement. But if the safety manuals, once established, are not updated, this indicates that the safety management system has not been improved in general.

Other important implications of continuous improvement include incident reporting. The ISM Code obliges shipping companies to record incident data and establish corrective actions. Recent incident records are checked as a permanent practice in ISM Audits. The purpose of these checks is to verify that the procedures for incident recording and corrective actions have been functioning effectively in the audited company. The inspectors who were interviewed consider that the ships that have reported the largest numbers of incident are the safest ones. A large number of reported incidents with corrective actions shows that these ships and companies have been interested and willing to learn from their mistakes and to develop their operations toward a safer course.

These records have not been utilised for a general evaluation of the progress of the safety management in the shipping industry. The incident records have not been collected by the administration for any follow-up purposes. The Finnish Maritime Administration has not utilised any statistical indicators in order to evaluate the continuous improvement of the entire shipping business. There has been no time or resources to collect such data during the ISM audits.

If a maritime inspector has observed that the operation of a company or a ship does not fulfil the requirement of the ISM Code, the inspector has had to report this observation as a non-conformity. The inspectors said that typically, several (approximately 0 – 3) non-conformities were found in every audit. This data has not been collected in order to evaluate the continuous improvement of the entire shipping business. According to the maritime inspectors, the administration has not applied any statistical indicators to the evaluation of safety progress as an effect of the ISM Code.

Some maritime inspectors regarded the concrete support of continuous improvement as somewhat complicated. During the ISM audits and other inspections, the maritime inspectors have observed that certain operation could have been improved. It is not easy to put it on record that a company or ship should develop or improve the relevant aspect, if there has been no concrete violation against the ISM Code requirements.

The maritime inspectors took a practical view of the non-conformities they observed. In several cases, the safety manual was too complicated and too detailed. Under these circumstances, the actual operation and the safety manual did not match, which caused the non-conformity. The inspectors' advice in these cases was that the non-conformity could be corrected by a more relaxed description in the manual.

The maritime inspectors (7 answers) were not fully satisfied with the competence of the Finnish Maritime Administration to carry out the ISM Audits. The inspectors said that there has been room for improvements in the work of the Administration. One inspector felt that the manner in which the audits are carried depends too much on the personal talents of the inspector. Another added that the results of the audits vary too much depending on the auditor. The FMA applies a quality system in their operations. According to two inspectors, the quality system and the actual operations do not match from time to time. One inspector added that the audit practises of the FMA have not been consistent.

The other interviewees (11 answers) considered that the ISM audits executed by the FMA have been objective. The inspectors of the Finnish Maritime Administration were commended for having a broad scope when auditing or inspecting safety onboard. The inspectors have used common sense and focused on relevant issues in the audits, such as the whole of the safety management system.

Thirteen interviewees considered that the ISM audits carried out by the Administration were useful. External auditors observe the safety management on the vessel from a new perspective. The auditors found areas which should be improved. The personnel of the vessel had to be prepared for the audits and revise the manuals in order to pass the audit. The company had to respond to any non-conformities found in the audits and to carry out corrective actions.

According to twenty interviewees, improvements are needed in the ISM Audits. The interviewees pinpointed several deficiencies in the ISM Audits. These interviewees felt that the differences in the ways the audits are carried out are too great depending on the personal talents of the maritime inspector. The inspectors tend to interpret the requirements of the ISM Code differently. Some interviewees characterized certain inspectors as nitpickers. Some interviewees said that the auditors set out specifically to find faults and errors. There have been too many audits and inspections onboard.

The interviewees suggested some improvements which should be implemented in regard with the ISM Audits. The maritime inspectors should have audit training which should concentrate on the uniform interpretation of the ISM Code requirements and

other rules. The maritime inspectors should focus on supporting and encouraging continuous improvement.

5.7 Summary

The interviewees named several benefits of the application of the ISM Code. These benefits include better co-operation and communication between shore and shipboard personnel, clarified roles and responsibilities of the maritime personnel, improved quality of maritime operations and the formal requirements set for the company in safety aspects.

The interviewees observed various defects in the application of the ISM Code. The Code itself was regarded satisfactory. The interviewees named increasing bureaucracy and complicated safety management systems as major defects in the application of the ISM Code. The interviewees suggested that guidance in the application of the Code should be provided, and the documentation of the safety management system should be simplified.

The benefits and the defects of the ISM Code are summarised in Table 5.1.

Table 5.1 Appraisals of the ISM Code

Appraisal	
Benefits	Defects
<ul style="list-style-type: none"> • The ISM Code has improved the overall safety level • Formal requirements set for the company • Improved quality of maritime operations • Heightened safety awareness among the maritime personnel • Well-defined roles and responsibilities • Harmonized instructions and easier induction training • ISM audits are consider useful 	<ul style="list-style-type: none"> • Burden of bureaucracy • Complicated documentation of the management system • Lack of guidance in application of the Code • Lack of suitable safety performance indicators • Non-uniform interpretation of the requirements • Overlapping safety regulation i.e. the ISPS Code

The fatigue of maritime personnel is a concern for the maritime personnel and the other interviewees. Fatigue was considered as a major maritime safety risk currently.

The interviewees said that ISM audits executed by the FMA have mostly been objective and useful. Nevertheless, both the maritime inspectors and other interviewees realise there is a need for improvements, as for example the ISM audit practices should be harmonised.

6 CONCLUSIONS

In this report, we have described the results of empiric evaluations concerning the impacts of the ISM Code on Finnish shipping companies and Finnish-owned vessels. In course of the study, we collected experiences and impressions of the ISM Code by interviewing the personnel of Finnish shipping companies. Particularly the crew and officers of the vessels were interviewed. In total, we interviewed 94 representatives of the Finnish maritime industry. All those who were interviewed were actively involved in the Finnish shipping business. Almost all of the interviewees had a maritime education and relevant work experience. Seven shipping companies were involved in the study.

The purpose of the interview study was to evaluate if the safety culture has improved in Finnish maritime industry. We utilized three indicators of a good safety culture in our evaluation. These indicators were: process of continuous improvement, commitment of the top management and motivated and empowered personnel onboard.

In workpackage 2, we used thematic interviews and qualitative analysis as the research method.

In workpackage 1, qualitative analyses were produced to find methods and indicators for measuring safety. The efficiency of these methods and indicators will be analysed (quantitatively and qualitatively) in a later phase of this project. These analyses will also be affected by the doubts of reliability expressed by the interviewees.

6.1 Management commitment

The literature review showed that the role of top management is essential when establishing a safety culture and implementing a safety management system. The IMO emphasises that the cornerstone of good safety management is commitment from the top management. (Lappalainen, 2008)

Our interview study aimed at discovering whether the top management is committed to safety. Management representatives assured that their companies regarded safety as a value and took safety into consideration in all of their operations. According to the management representatives, their companies have achieved very good safety levels.

The overall opinion of the maritime personnel supports the estimations of the management. The maritime personnel mostly felt that the commitment of the management as regards safety issues has improved. The maritime inspectors who were interviewed shared this opinion.

One solution for assessing an organisational culture is to analyse contradictions or inconsistencies between the manifested values and policies and actual operations (Lappalainen, 2008). The results of the interview study support the conclusion that there were no significant conflicts between the manifested safety policies and goals and the

actual operations of the shipping companies. The management has made the financing and other resources available for safety improvements.

The results of the interview study support the idea that management commitment could be regarded as crucial for the successful application of a safety management system in shipping. Where management commitment is sincere, the safety management system has functioned as intended. In these cases, the maritime personnel seemed to be more satisfied with the application of the safety management system.

6.2 Maritime personnel's safety attitudes

According to the IMO (2008a), the safety culture can only improve if individuals at all levels of the organisation are committed and motivated to safety and if all individuals have adopted a positive attitude towards the safety management system.

The interview study examined the attitudes and motivation of the Finnish maritime personnel. The management and masters said that the maritime personnel are not afraid to put forward proposals and initiatives regarding safety. The maritime personnel dare express themselves freely. The maritime inspectors who were interviewed also felt that the maritime personnel are not afraid to talk about safety issues with their superiors.

Many interviewees added that the maritime personnel are highly motivated to participate in safety training. This supports the conclusion that the safety attitudes of maritime personnel have improved. Better attitudes are expressed especially in safety training. Well-organized training increases the motivation of the personnel.

Every group of interviewees said that communication and co-operation in the shipping companies has improved. Improved communication and co-operation is an indicator of an improved safety culture and yields benefits for the safety management. This is promising as regards the establishment and progress of the safety culture in future.

6.3 Incident reporting and continuous improvement

According to the IMO, the safety management system should be based on the philosophy of continuous improvement. The investigation of near-misses is an integral component of continuous improvement in the safety management system. (IMO, 2008d; MSC-MEPC.7/Circ.7)

Several previous studies concerning the impacts of the ISM Code found insufficiencies in the reporting of incidents (Lappalainen, 2008). The findings of this interview study were similar. The study showed that the maritime personnel's attitudes towards incident reporting were unsatisfactory. The mariners who were interviewed admitted that reporting is often neglected. The low number of reported incidents supports this conclusion. In spite of the fact that some interviewees felt that apparent over reporting

has sometimes occurred, the under reporting of incidents is a much more serious problem.

The poor reporting practises cause further problems. Information about non-conformities, accidents and hazardous incidents does not cumulate at any level of the maritime industry. The personnel cannot learn from the experiences of other vessels. There are no possibilities of interchanging information about incidents between the vessels. The company cannot utilize cumulative information to improve its safety performance. Companies do not have the opportunity to learn from the mistakes of others. The national maritime administrations are powerless in their attempts to develop maritime safety.

Even in the companies where reporting is already everyday work, a consistent reporting failure exists. Minor mistakes and all the technical problems are reported due to these problems are wanted to be noticed by the management. But mistakes that cause near-accident situations (often navigational) are still considered as taboo and are not reported unless forced by circumstances.

The fundamental philosophy of the ISM Code is the philosophy of continuous improvement. The procedures for reporting incidents and carrying out corrective actions are essential features of continuous improvement. Under these circumstances, a successful cycle of continuous improvement cannot exist.

6.4 Benefits of the ISM Code

Some international studies have been carried out to explore the significance of the ISM code to the safety culture in the maritime industry. These studies have found that it has been difficult to verify quantitative benefits gained by implementing a safety management system. Appropriate statistics and indicators for safety performance evaluation were unfortunately not available in the maritime industry (Anderson, 2003; IMO, 2005).

Although earlier studies have considered it difficult to measure the impacts of the ISM Code quantitatively, they have come to the conclusion that the application of the ISM Code have improved maritime safety considerably (Lappalainen, 2008).

The results of this study support that conclusion. According to many interviewees, maritime safety in Finland has improved in recent years. They considered that the ISM Code has made a significant contribution to that progress. The interviewees consider that the ISM Code has been useful. A common view was that the ISM Code has produced a more systematic approach to safety management. The crew members of the vessels we visited felt that safety management systems have helped them in their daily work.

According to the interviewees, the application of the ISM Code has provided several benefits to the maritime safety. These benefits include better co-operation and communication between shore and shipboard personnel, clarified roles and responsibilities of the maritime personnel, improved quality of maritime operations and the formal requirements set for the company in safety aspects.

Shipping companies considered that a safety management system is essential for their operations. They were no longer willing to give up their safety management systems.

6.5 Defects and concerns

The interviewees named various defects in the application of the ISM Code. The Code itself was regarded as satisfactory. These defects were the burden of bureaucracy, complicated documentation of the management system, lack of guidance in the application of the Code, lack of suitable safety performance indicators, non-uniform interpretation of the requirements and overlapping safety regulation.

Although the interviewees considered that there is no special need for improvement of the ISM Code, the practices of safety management should be improved. The interviewees suggested several improvements which should be executed. These suggestions were:

- system documentation should be simplified
- guidance should be provided in the application of the Code
- suitable safety performance indicators should be developed
- the interpretation of the ISM requirements should be harmonised.

Anderson (2003) also found that too voluminous and complex documentation has caused problems in the implementation of the ISM Code. According to the interviewees in our study, where the system documentation had been streamlined, the motivation of the personnel to utilise the safety management system had improved. The interviewees of our study asked for practical guidance in the application of the ISM Code. A study conducted by the British Maritime Safety and Coast Guard Agency (MCA) also came to the conclusion that guidance and uniform instructions should be provided (ReportISM, 2008). Both guidance and the streamlining of the documentation could improve the utilisation of the safety management systems.

The interviewees hoped that the Administration would develop their auditing practices. They felt that interpretations concerning the requirements of the ISM Code should be harmonised. Anderson (2003) and the MCA came to similar conclusions.

The improvements listed above could be performed without any amendments to the legislation and maritime safety regulations. Some of the improvement could be realised by individual shipping companies. For example, the companies could quite easily simplify their safety documentation.

The authors of this report suggest that shipping companies should be encouraged to adopt a more self-regulatory approach to safety management. If any updates in the ISM Code are made, the Code should be updated in the direction of self-regulation. Shipping companies could be more spontaneous in developing their safety management practices. The ISM Code has set the minimum requirements for safety management. Maximum requirements have not been determined. Mutual activities for developing safety management should be launched within the shipping industry. A perfectly functioning safety management system should be seen as a competitive advantage.

For example, developing safety performance indicators could be seen as an action which should be performed jointly by the shipping companies. The safety performance indicators applied by the aviation industry could also be applicable in the shipping industry.

6.6 Reliability and validity of the research results

The interview results are based on the opinions of the Finnish maritime personnel. Almost all of the interviewees had work experience at sea. The number of interviewees was 94 people. There were seven shipping companies involved in the study. These shipping companies represent the Finnish shipping business widely, and all important shipping business areas were represented. The target group was a representative sample of Finnish mariners and the Finnish maritime industry. In that regard, we could say that the results of the interview study could be generalised to the entire Finnish maritime industry.

Almost all interviewees worked or had worked onboard a vessel and also had a maritime education. All interviewees had applied the ISM Code in practise. The interview results were based on authentic experiences. The considerations and implications of the interviewees concerning the ISM Code can be considered relevant and trustworthy. There was a significant correlation between the replies of each group of interviewees, which supports the conclusion that the results could be considered reliable.

The results of the interview study were parallel with the results of previous studies included in the literature review (Lappalainen, 2008). The interview study found similar success factors and similar obstacles in the application of the ISM Code and safety management systems. The interviewees named similar benefits gained from the use of the ISM Code. Similarly, the defects and concerns matched the results of earlier studies.

In workpackage 2, we applied thematic interviews and qualitative analysis to the study. The benefit of a qualitative approach has been the fact that we have gained more comprehensive answers concerning the experiences and impressions of active seafarers. The interviewees focused on issues which they considered important concerning the ISM Code. In that regard, the interview results highlighted in course of the study can be consider valid.

The qualitative approach has some weaknesses. Due to the selected research method, we are unable to classify the research results by importance of issues. When developing safety management practices, it could be useful if the actions for improvement could be prioritised. In order to prioritise the research findings, a quantitative questionnaire study, where the results are analysed statistically, could be a more reasonable approach.

The selected criteria can be considered valid in order to evaluate the safety culture. Earlier literature (Wiegmann et al, 2002; Anderson; 2003; see also Lappalainen, 2008) introduced the indicators of a good safety culture. Each of the three indicators which we have applied in our analysis has provided valid results when compared to the results of earlier studies concerning the impacts of the ISM Code. When analysing the process of continuous improvement we focused on incident reporting procedures. The incident reporting procedures were emphasised in our study. Many interviewees highlighted the importance of incident reporting. The IMO has also emphasised incident reporting in regard of continuous improvement.

Certainly there are other useful tools for the implementation of continuous improvement. The ISM Code also provides other tools for continuous improvement. These tools include procedures for internal audits and reviews. The functioning of the other tools was not examined in our study. These tools have also not been comprehensively examined in previous studies concerning the ISM Code.

The fact that incident reporting producers have not functioned properly in the maritime industry is a good reason to investigate the other tools for continuous improvement. The suitability and feasibility of the other tools for the purposes of the maritime industry should be investigated in the future.

7 FURTHER RESEARCH

The literature review (Lappalainen, 2008) showed that the ISM Code has significantly contributed to the progress of maritime safety in recent years. Shipping companies and ships' crews are more environmentally friendly and more safety-oriented than a decade ago. This has been proven by several studies that were analysed for this research (Othman, 2003; Anderson, 2003; IMO, 2005; Paris MoU, 2008; ReportISM, May 2008).

The results of our interview study support the general view of earlier studies. A safety culture has emerged and it is developing in the Finnish maritime industry. The top management of the shipping companies studied consider safety as a value of the shipping business. The maritime personnel act in a more safety-oriented manner than before the implementation of the ISM Code.

The results of our study could be captured in the words of one maritime inspector:

“in the long run, a safety culture will establish itself, but it will take time.”

In workpackage 1, an accident report analysis, concerning reports drawn up by the Accident Investigation Board, will be produced within the scope of estimating the ISM's impact on accident types and frequencies. A statistical study based on reports and statistics from the Finnish Maritime Administration, the Paris MoU data bank and participating companies will be conducted. Both the accident analysis and the statistical study will go through a reliability analysis using the information gained by interviews conducted for this study.

In the next phase of workpackage 2, we will investigate other tools than incident reporting for continuous improvement. We will collect benchmarking data from other industries, for example the aviation and oil industry. We have already participated in some internal and external ISM Audits. In the next phase, we will complete the observations gained from these audits by participating in some more audits. We will evaluate the usefulness and functionality of the internal and external audits as regards continuous improvement.

TERMINOLOGY

International Safety Management (ISM) Code

- the International Management Code for the Safe Operation of Ships and for Pollution Prevention

Company

- The owner of the ship or any other organization or person, such as the manager or bareboat charterer, who has assumed the responsibility for operating the ship from the ship owner and who, by assuming such responsibility, has agreed to take over all duties and responsibilities imposed by the ISM Code.

Designated Person Ashore (DPA)

- 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.

Administration

- The Government of the State whose flag the ship is entitled to fly.

Safety management system

- a structured and documented system enabling the Company personnel to effectively implement the Company's safety and environmental protection policy.

Document of Compliance

- a document issued to a Company which complies with the requirements of the ISM Code.

Safety Management Certificate

- a document issued to a ship which signifies that the Company and its shipboard management operate in accordance with the approved safety management system.

Source: IMO, (2008a)

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