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Human-Transport Interaction
Preliminary Communication
Submitted: 14 Nov. 2018
Accepted: 28 June 2019

ATTITUDES OF EXPERIENCED SEAFARERS AS PREDICTOR OF ISM CODE IMPLEMENTATION: A CROATIAN EXAMPLE

ABSTRACT

The aim of this paper is to identify what attitudes towards safety performance indicators influence the attitudes towards successfulness of ISM Code implementation among contemporary seafarers. Secondly, the goal of the research was to obtain insight into the seafarer's attitudes towards the current state of ISM implementation and safety performance. Consequently, a sample of N=330 seafarers was examined regarding their attitudes towards safety performance variables and ISM Code implementation. By using multiple regression analysis it was concluded that well designed and structured safety rules and procedures, positive work environment and adequate communication can make significant contributions to seafarers' attitudes towards ISM implementation.

KEY WORDS

safety performance variables; ISM Code implementation; multiple regression analysis;

1. NTRODUCTION

Safety of lives at sea and environmental protection became a topic of interest for all the involved stakeholders at the end of the last century. Following a series of maritime accidents resulting in numerous losses of human lives, property and environmental damages, of which the most severe was capsizing of the Herald of Free Enterprise in March 1987 resulting in a loss of 193 of its 539 passengers and crew, the public demanded answers. After a detailed investigation the cause of accident was known; a combination of human error done by the ship crew and management failings. The public report of the Herald of Free Enterprise accident [1] was concluded with the statement "From top to bottom the body corporate was infected with the disease of sloppiness" (p. 14).

The International Maritime Organization (IMO) responded by the introduction of International Safety Management Code (ISM), which became part of the SOLAS Convention, Chapter IX. The ISM Code requires that shipping companies create and implement onboard Safety Management System (SMS) for ships they operate, in order to reduce accidents caused by human error.

For some of the shipping companies ISM was just a new, legal framework for SMS which they already had, but for others it was a wakeup call for the required operational and organizational changes. For the first time a legal obligation forced companies with inadequate management systems to create a formal, structural, safety management system, i.e. ISM introduced self-regulation to the industry.

Over the years, the ISM Code has had several revisions and amendments [2]. The ISM greatest advantage is its simplicity, in the sense that objectives and requirements, which shipping companies should comply with, are summarized in 16 short sections, on nine A4 format pages. But, the aforesaid advantage can also be its weakness. Functional requirements for a safety management system are set in section 1.4 of the Code and elaborated in the remaining sections [3].

The Code provides only general guidelines for the development of SMS that can be interpreted and implemented in a way that best suits the shipping companies. Therefore, the content of SMS will be affected by commitment, values and beliefs of the management structures prevailing in the shipping company, while complying with the basic international standards of safety management [4].

By design and effective implementation the ISM Code should support and encourage the development of safety culture in shipping [2, 5].

Early research on the effectiveness of ISM Code, conducted in 2001, analysed seafarers and shore-based personnel perception on the usefulness of ISM implementation. The results showed the distinction between seafarers and shore personnel perceptions; the seafarers were more critical than management counterparts. Another disadvantage found was the increased amount of paperwork and lack of resources. In addition to the above, significant differences in the perception were noticed between various nationalities [6].

The research carried out during 2006-2009 found disparity between seafarers and managers' perception of the ISM Code purpose. Findings included two important details; lack of seafarers' participation, i.e. seafarers were complying with formal system, but did not participate in shipboard safety management. To them, the implementation of the Code was perceived as imposition, or managerial tool, which required compliance, not participation. Another important finding was poor communication, caused by the lack of trust in the companies [7]. A research carried out during 2008-2009, between Finnish mariners and managers, studied the perceived impact of ISM Code on maritime safety. The research concluded that crew and managers have accepted ISM as essential safety measure, but old-fashion safety culture was still present. In addition, the lack of uniformity in the interpretation and implementation of the Code and the philosophy of continuous improvement was recognized as a problem [8]. Similar research in which authors interviewed regulators, shipping company management and crewmembers on ships sailing in different Norwegian regions presents interesting conclusions. The regulators and ship managers perceived that ISM led to safety improvements in the shipping industry, but also highlighted the shortcomings, like increased administrative burden related to SMS and increased safety investments. Similarly as in the previous studies, the crewmembers perceived that ISM and SMS have actually deteriorated the safety on board [9].

Following implementation of the ISM Code, a reduction in the number of accidental events was expected. Although statistical data indicate a reduction of maritime accidents (i.e. total losses) [10], human erroneous actions are still the leading cause of all accidental events (i.e. incidents and accidents) [11]. Research carried out by Batalden and Sydnes in which they investigated 94 maritime accident reports, were published by Maritime Accident Investigation Branch (MAIB), in order to find causal factors, both human and organizational. The time frame for report selection was set from the date of implementation up to 2010. The results indicated that in most cases the causative factor was non-compliance with the ISM Code [12].

In accordance with the previously stated issues, the focus of this paper is on the safety performance variables, as part of requirements set by the ISM Code. The research aims to investigate the current state of ISM implementation and to conclude which variables can be used as significant predictors of ISM Code successful implementation.

2. SAFETY PERFORMANCE VARIABLES (INDICATORS)

In order to obtain information on organizational performance, to increase organizational safety potentials and to motivate people to work on safety, the safety performance indicators have a crucial role [13]. Their use is widely accepted within the safety-critical industries with the purpose of keeping track on the safety trends, i.e. they should be able to indicate significant changes in all safety critical areas, as a support during the risk management decision-making process and routing of funds intended to improve some specific areas that need further development [14, 15].

Safety performance indicators can be used by the industry itself, or by the various authorities whose responsibility is to monitor the implementation of international conventions.

Measurement and evaluation of safety performance in maritime industry has been commonly done using the traditional safety performance indicators such as monitoring (auditing) and outcome indicators [13].

Since shipping organizations were obliged to create SMS, one of the ways to measure safety performance became a method of internal safety audit, as per ISM Code. This approach is based on the fact that the SMS is approved by the Classification Society, implemented in practice and is considered to be functional. Focus is on the SMS performance, checking the use of pre-set safety rules and procedures and individual safety practices. The results depend on the quality of individuals conducting the audit and on the limited time while ship is alongside during the port stay, and can create faulty assumptions that everything is in good order.

Outcome indicators are the available safety outcomes like the rate of accidents, fatality rates, total recordable injury frequency rate - TRIFR, the number of deficiencies found during inspections, used for safety evaluation on site [13]. Recording safety performance this way is an objective and time-saving way, but some limitations do exist. Little or no information about the cause of accident, incident or found deficiencies are known.

While calling the ports, the ships are under constant surveillance by various authorities of which the Port State Control (PSC) stands out. The quality of ISM implementation is one of the important items to be

checked during the inspection. The available statistical data for the period from 2015 to 2017 indicates that the deficiencies are still present – *Table 1*.

Table 1 – Data of ISM deficiencies found by Port State Control during 2015-2017

	ISM deficiencies found		
	2015	2016	2017
Abuja MoU	8	4	15
Black Sea MoU	584	443	535
Caribbean MoU	51	27	14
Indian Ocean MoU	630	646	432
Latin America MoU	214	173	N/A
Mediterranean MoU	447	314	N/A
Paris MoU	1,810	1,839	1,774
Riyadh MoU	30	28	N/A
Tokyo MoU	2,803	2,192	1,987
Total	6,577	5,666	4,757

Source: authors as per [16-24]

Since the main requirements of ISM Code are the training of personnel, the establishment of safety rules and procedures, effective communication, motivation and promotion of safety culture [3], the presented outcome indicator of ISM, *Table 1*, does not provide a good insight in the required categories because it is so broad and it is hard to get the real insight into the situation.

In order to measure the ISM performance, several indicators are needed. The focus on the single aspect of performance should be avoided because it can be ineffective or misleading [25]. Previous studies connected the concept of safety performance indicators to safety climate/culture concept. Joint proposal from the researchers was to use the concept of safety climate or culture as a leading safety indicator [12, 26]. The results of similar studies indicate that the safety climate could also be a leading indicator of safety performance [27, 28].

One of the first definitions of safety climate [29] is a "summary of molar perceptions that employees share about their work environments" (p. 96). Since then, numerous studies and research have been conducted, different definitions used, but common for all of them was a way in which groups of people perceive the safety features of their work [27, 30, 31, 32, 33, 34].

Since the concepts are very similar, the distinction between safety culture and safety climate was also the topic of research. One of numerous explanations state that safety climate could be considered as a surface feature of safety culture that is different from the attitudes and perceptions of the workforce at a particular point of time [35].

3. METHODOLOGY

3.1 Research procedure and respondent sample

The research was conducted in approved seafarers' training facilities located in Dubrovnik, Split, Šibenik and Rijeka in the period from October 2017 till May 2018. The method of anonymous questionnaire distribution between employees of the shipping companies was used as recommended [29, 36, 37, 38], as their perception is the basis for measuring the safety climate.

The questionnaire used was based on the valid and reliable safety assessment tools already applied in working environments. A specified number of questions was adopted from the literature [38-42] and modified to fit the purpose of the research. In addition to the above, additional questions were included in order to get a deeper insight (see Appendix).

Before the distribution of the questionnaires, the purpose and the objective of the research was explained and complete anonymity for the participants was guaranteed. The only requirement for the participation in the study was that the person has done a minimum of one contract on board, regardless of rank.

The respondents were asked questions with offered response intensities using a Likert scale, 1 - "strongly disagree" to 5 - "strongly agree", where participants presented their perception of the subject matter. The total number of completed questionnaires was 403. In order to eliminate the answers of those respondents who participated in the research from a variety of motives, fear or shame of rejection of the same, and the potential failure of concentration during the study, a number of questions was set up in reverse order, which deviated from the abovementioned ways of answering. Based on a method of designing a questionnaire, 73 copies were discarded due to inconsistencies in the answers.

From the total number of respondents (n=330), 328 persons were of the Croatian nationality and two persons were from Montenegro. Since the majority of respondents were of the Croatian nationality, the cultural diversity was not discussed in this case. The details about the respondents' age and rank on board are presented in *Table 2*.

As presented in *Table 2*, deck officers (58.2%) constituted the largest part of the respondent sample, followed by engineers and electro-technical officers (30.6%), and other crew (11.2%). In terms of age of the respondents, the largest part (40.9%) belongs to the age group "26–35" and the smallest part of respondents (7%) belongs to the age group "56-65". Regarding the obtained sea time, 41 persons (12.4%) had less than one year of sea service, 78 persons (23.6%) had between 1-5 years of service, 69 persons

Table 2 – Respondents' age and rank on board

Rank on board	Respondents' age (years)					Total
	18-25	26-35	36-45	46-55	56-65	
Captain	0	0	17	20	6	43
Chief officer	0	11	16	9	6	42
2nd Officer	1	40	12	0	1	54
3rd Officer	14	35	3	1	0	53
Chief Engineer	0	1	6	9	4	20
2nd Engineer	0	3	8	3	0	14
3rd Engineer	0	12	3	5	0	20
4th Engineer	2	13	3	0	0	18
ETO	3	11	7	4	4	29
Other crew	20	9	4	2	2	37
Total	40	135	79	53	23	330

(20.9%) between 6-10 years, 29 persons (11.8%) between 11-15 years and 103 persons (31.2%) had more than 15 years of sea service. As it is well known that safety standards (i.e. implementation of ISM Code requirements) are not implemented in the same way on different types of ships, One-way ANOVA for independent samples was used to inspect the impact of ship types and crew experience on the final results of the research and no significant differences were found (p>0.05).

3.2 Variable sample

For the purpose of research, seven factors were selected, six of them are based on safety climate concept [27, 28, 30, 34, 35, 43] and also correspond to the main objectives and requirements stated in the ISM Code and one which describes the quality of ISM implementation. The objectives and requirements outlined in the Code indicate that each shipping company should provide adequate training to its employees, motivate them to work in a safe way and ensure that they are able to communicate efficiently. Ships should be manned with qualified crew members who are able to identify and assess the associated workplace risks. Furthermore, a company should establish the safety rules and procedures and provide a safe work environment. Additionally, the inquiry of railway transport accident [44] revealed that factors such as two-way communication, staff motivation, their training and competency are indicators which can affect the safety culture.

The present factors were designed based on the questions/variables which define the value of each separately. Since these factors are the basis of the research, it is necessary to point out that they are linear composite of variables, which are formed as the arithmetic mean of the variables used.

Factor TRE (*Training*) describes the perception of personal competence for work. Eight questions were used to explore whether the respondents really get all theoretical and practical knowledge following the employment, whether regular exercises and drills are being conducted and how the respondents perceive their significance.

Factor MOT (*Motivation*) describes the motivation to work in a safe way. Six questions covered the perception of respondents about personal safety priority, opinion about ignoring safety rules and procedures, and the relationship between the level of safety and their job satisfaction.

Factor COM (*Communication*) describes the perception of safety communication in an organization. The assessment was formed on the basis of nine questions posed to question the perceived safety communication between ship and shore, among crew members and the sense of freedom in communication at all levels of the organization.

Factor EPRAA (*Employee's Personal Risk Assessment and Appreciation*) describes the respondents perceived level of potential risks and their appreciation. Eleven questions examined the respondents' perception of personal risk appreciation and assessment related to their workplace, opinions about the use of safety rules and procedures for everyday work and opinions on the work on ships of different purposes.

Factor SRP (*Safety Rules and Procedures*) describes the perceptions of respondents in terms of the quality and relevance of safety rules and procedures. The eight questions raised were concerned with whether the safety rules and procedures are prepared and available to the employees, the quality of the information contained, that is, whether they are enforceable in practice.

Factor WE (*Work Environment*) describes the perceived stimulating environment in an organization. The evaluation was formed on the basis of eleven

questions including the involvement of land-based governance structures in terms of providing "strength" to persons in charge of safety for undisturbed work, encouraging them to comply with the rules and procedures, involvement of the ship's management structure towards creating a stimulating environment and personal attitudes of respondents towards safe work.

The idea of continuous improvement is the fundamental principle of the ISM Code [8]. Accordingly, factor ISM (ISM Code implementation) describes the perception of the compliance with the Code by shipping companies. The concept of the examination included the assessment of the ISM Code core provisions through six questions.

According to the goal of the research and previous research, the following hypotheses were tested:

$H_{1,1}$:TR influences ISM Code implementation positively.

$H_{1,2}$:MOT influences ISM Code implementation positively.

$H_{1,3}$:COM influences ISM Code implementation positively.

$H_{1,4}$:EPRAA influences ISM Code implementation positively.

$H_{1,5}$:SRP influences ISM Code implementation positively.

$H_{1,6}$:WE influences ISM Code implementation positively.

3.3 Data processing methods

For single observed factor, data from the items were condensed using the mean value. All data were presented as mean value±standard deviation (Mean±σ) together with 95% confidence interval for mean value (95%CI), median value (Med), minimal (Min) and maximal result (Max). Due to identification of impact of predictors: employees training (TRE), motivation (MOT), communication (COM), personal risk assessment and appreciation (EPRAA), safety rules and procedures (SRP) and work environment (WE) on ISM Code implementation as a criterion, a multiple linear regression analysis was applied.

Consequently, beta (β) and b coefficients (b), together with standard errors ($Se(\beta)$, $Se(b)$, respectively) were calculated. The coefficient of multiple correlation (R), coefficient of multiple determination (R^2), F value together with the corresponding degrees of freedom level of statistical significance (p) was calculated. The linear relationship between the criterion and predictors and normality or residuals distribution was inspected visually through scatterplots. Furthermore, multi-collinearity was inspected through observation of correlation matrix while the assumption of homoscedasticity was observed by using a plot of standardized residuals vs predicted values. The validity of the used questionnaire was examined through detailed inspection of literature and direct communication with the experts in the field, while Cronbach's alpha was taken as the appropriate measure of reliability.

All calculations were performed by using data analysis software system Statistica 13.2. (DellInc., Tulsa, OK, USA). Type I error was set at α=0.05.

4. RESULTS

For all the used factors, Cronbach's alpha showed appropriate reliability ranging from 0.71-0.88. In *Table 3*, the results of the descriptive statistics for all the observed factors are calculated and the following parameters are calculated: arithmetic mean, standard deviation, 95% confidence interval for the mean value, median, minimum and maximum result.

It is important to underline, as dealing with reliable and valid data strongly based on previous scientific research and taken from a relatively large respondent's sample, that consequently it is assumed that each particular question has the same influence on the attached factors. Additionally, the discrepancy in the results for separate answers (which could have significant influence on the final results and conclusion) could not be identified. Furthermore, it is important to underline that the minimal value can be a real number for each factor, because data were taken as a mean value of appropriate questionnaire items.

The obtained results, based on the perceived seafarer's opinion on set questions for each factor, indicate quite high values of all factors and it can be

Table 3 – Descriptive indicators of observed variables

Factors	Mean ± σ	95% CI	Med	Min	Max
ISM Code implementation (ISM)	4.01±0.87	3.92-4.11	4.17	1.00	5.00
Training (TRE)	4.18±0.74	4.10-4.26	4.25	1.00	5.00
Motivation (MOT)	4.01±0.60	3.95-4.08	4.00	1.67	5.00
Communication (COM)	3.93±0.85	3.83-4.02	4.00	1.00	5.00
Employee's Personal Risk Assessment and Appreciation (EPRAA)	3.74±0.47	3.69-3.79	3.73	1.73	4.82
Safety rules and procedures (SRP)	3.70±0.69	3.62-3.77	3.63	1.63	5.00
Work environment (WE)	3.89±0.77	3.81-3.97	4.00	1.00	5.00

Table 4 – Results of multiple regression analysis

	β	$Se(\beta)$	b	$Se(b)$	$t(323)$	p
Intercept			-0.45	0.19	-2.31	0.021
TRE	0.08	0.05	0.10	0.05	1.77	0.077
MOT	0.06	0.04	0.09	0.06	1.46	0.145
COM	0.29	0.06	0.30	0.06	4.87	<0.001
EPRAA	0.04	0.03	0.07	0.06	1.18	0.240
SRP	0.12	0.04	0.15	0.05	2.98	0.003
WE	0.39	0.06	0.44	0.07	6.30	<0.001
	R=0.880; R^2=0.775; $F(6,323)$=185.56; p<0.001					

understood that the current state, on the taken sample, is very good. However, it is evident that there is enough space for further progress.

Using a multiple regression analysis, a model of relationship between predictor factors: employees training (TRE), motivation (MOT), communication (COM), personal risk assessment and appreciation (EPRAA), safety rules and procedures (SRP) and work environment (WE) and factor ISM Code implementation as criterion, was obtained, presented in *Table 4*.

The results of multiple regression analysis presented in *Table 4* indicate that three statistically significant predictors of ISM implementation are recognized, factor communication (COM), safety rules and procedures (SRP) and work environment (WE), with relatively large and statistically significant coefficient of multiple correlation (R=0.880) and the coefficient of multiple determination (R^2= 0.775).

5. DISCUSSION AND CONCLUSION

The purpose of this study was to explore which safety variables can be used as a predictor of successful ISM Code implementation. The results indicated that well designed and structured safety rules and procedures, positive work environment and adequate communication each can make significant contributions to ISM implementation.

When it comes to rules and procedures, they should be prepared and available for use, they must contain all the necessary information to increase the safety of employees and ship itself and a detailed plan for each job separately. The mere use of procedures aims to stimulate the two most important components of the error management system: error reduction and error containment [45, 46]. If the employees perceive the same as poorly structured or difficult to understand, if they have difficulty in determining which rules and procedures are to be used in a particular situation, or they find it unsuitable for certain jobs, it is highly likely that they will be ignored and the job will be done in a way that may not be completely safe.

In order to achieve safe work environment, team work is essential and it requires safety-conscious co-workers, proper job guidance and supervision. According to Maritime Labor Convention job guidance and supervision is delegated to safety committee members and safety officer [47]. Taking for example the safety officers, their commitment to safety in the sense of encouraging all crew members to report near misses and incidents, encouraging individuals to behave responsibly and their readiness to identify problems and conduct investigations on reported cases will certainly contribute to a safer working environment. In order to achieve positive work environment employment policy, i.e. selection of those who have positive safety attitudes, is crucial.

In addition, the commitment of the management structures, at the company level and at the level of the ship itself, is of utmost importance for a safe work environment. If the management structure ashore provides safety staff on board with the "strength" to do their job and do not have major limitations while allocating resources, it is expected that the organization's safety policy will be implemented to the fullest extent.

Direct and consistent communication is an essential feature of each organization as it is a fundamental element for successful implementation of work processes involving two or more people. Communication was a subject of research in the past and the results indicate that inadequate communication was the main reason for low safety performance, productivity and morale [48, 49, 50].

Communication, especially on safety issues, involves the commitment of all levels of management structures in terms of arrangements with ship crew on ways of how to increase safety. Since the management structures carry out supervision over the implementation of work tasks and are often in a position to point to possible dangers in their realization adequate two-way communication is essential.

Mutual communication between team members is also required for safe work performance. The existence of conflicts between crew members is a particular problem, since non-communication can lead to

irregularities during the work process. A proper way of dealing with conflict issues is one of the preconditions that lead to successful communication.

In addition, it can be said that effective communication leads to confidence building. If employees hide or neglect safety problems on board, the cause may be considered as lack of the same. This implies that a sense of freedom is required in communicating at the management-officers-crew levels. To make a process successful, open communication atmosphere must be created.

All members of the ship complement should be positively engaged in communication, ordinary or safety related, in order to have a better understanding of safety issues such as safety policy, safety rules and procedures and unwanted outcomes in cases of non-compliance. It is important to underline that the obtained results are similar with research on ship crew management participation which indicates that new communication methods and team work principles should be applied in accordance with the specific style of management [51].

Based on the research conducted, carried out mainly on Croatian seafarers and their perceptions of safety management systems provided by the shipping companies where they are employed, it can be concluded that adequate communication, safety rules and procedures and safe working environment are the basic requirements for successful implementation of ISM Code. At the same time, there is research limitation. Future research should involve seafarers of other cultures and nationalities with the aim of detecting differences in perception and their impact on ISM Code implementation.

Furthermore, if self-report questionnaires are used to gather data at the same time from the same participants, a common method variance (CMV) may be a problem [52, 53]. This concern is usually the strongest when both the criterion and the predictor variables are perceptual measures observed from the same respondent. This can be also observed as a limitation of the research and authors strongly suggest that in the future research the criterion variable should be gathered using different sources than the predictor variables.

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STAVOVI ISKUSNIH POMORACA KAO PREDIKTOR PROVEDBE ISM KODEKSA: HRVATSKI PRIMJER

SAŽETAK

Cilj je ovog istraživanja utvrditi koji stavovi prema pokazateljima sigurnosne izvedbe utječu na stavove o uspješnosti provođenja ISM Pravilnika među suvremenim pomorcima. Uz navedeno, cilj istraživanja bio je dobiti uvid u stavove pomoraca prema trenutnom stanju ISM implementacije i stanju sigurnosti. Slijedom toga, uzorak od N=330 pomoraca ispitan je o svojim stavovima prema varijablama sigurnosti i primjeni ISM koda. Pomoću višestruke regresijske analize zaključeno je da dobro oblikovana i strukturirana sigurnosna pravila i postupci, pozitivna radna okolina i odgovarajuća komunikacija mogu značajno doprinijeti stavovima pomoraca prema provedbi ISM-a.

KLJUČNE RIJEČI

varijable sigurnosne izvedbe; provedba ISM Pravilnika; višestruka regresijska analiza;

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Appendix

ISM implementation		Source
ISM1	Company management insists on thorough and regular inspections and safety reviews.	[41] *
ISM2	Company management ensures that all required work equipment is available.	[39]
ISM3	Company management uses all available information and resources to improve existing safety policies and procedures.	[38]
ISM4	Company has a well-developed system for reporting events that have threatened and /or presented a safety issue.	
ISM5	Company has developed a system of response and solution implementation after the analysis of incidents or safety threats.	
ISM6	Company has developed a system that allows changes and development of the safety rules and procedures.	
Training		
TRE1	After the start of employment I was provided with all the necessary theoretical and practical knowledge in order to be able to follow the rules and procedures on board.	[40] *
TRE2	I received the necessary training to work in a safe way.	[40] *
TRE3	I received training necessary in order to cope with critical or dangerous situations.	

TRE4	Through training I got acquainted with all safety rules and procedures.	
TRE5	According to training sessions I can actively participate in the work place hazard elimination.	
TRE6	I am able to use the required protective equipment according to the nature of the work.	
TRE7	On our vessel, safety drills are carried out in regular intervals.	[40] *
TRE8	Training of additional skills is conducted regularly on board.	[40] *
Motivation		
MOT1	While I work, safety priority is on the first place in my head.	
MOT2	Sometimes I feel the need to ignore safety regulations in order to continue working.	
MOT3	We often remind each other that their actions/ behaviour is not safe.	
MOT4	I think that a higher level of safety has a positive impact on morale and crew satisfaction.	
MOT5	I think the current state of safety contributes to my job satisfaction.	
MOT6	I'm always ready to help colleagues to safely perform the work task.	
Communication		
COM1	Ship management structure and crew communicate well with each other.	[40] *
COM2	Ship management structure often let us know about a potential danger before performing the tasks.	[40] *
COM3	Communication between superior and subordinate officers, regarding safety, is good.	
COM4	Communication with designated person/s ashore, regarding safety, is good.	
COM5	Communication with superior's officers, regarding safety, is good.	
COM6	Communication between all crew members, regarding safety, is good.	
COM7	There is a sense of freedom while communicating with superiors.	
COM8	Resolving conflict situations on board is at a good level.	
COM9	Superior officer always closely explains the work plan and procedures before certain actions (e.g. mooring, unmooring ...).	[40] *
Employee's Personal Risk Assessment and Appreciation		
EPRAA1	I am sure it is just a matter of time before I am involved in an accident.	[39]
EPRAA2	I believe that safety rules and procedures are really necessary for the job to be done in a safe manner.	[39]
EPRAA3	I think no job can be done (in a safe manner) unless the safety rules and procedures are followed.	
EPRAA4	In my workplace the chances of being involved in an accident are quite large.	[39]
EPRAA5	Sometimes conditions here hinder my ability to work safely.	[39]
EPRAA6	I think that the rules and procedures are very useful for my work.	
EPRAA7	I am able to recognize potential hazards in the workplace.	
EPRAA8	If I have work experience only on tankers, I find that I can work without problems on container ships and vice versa.	
EPRAA9	I think that compliance with rules and procedures plays a significant role in preventing accidents.	
EPRAA10	I think that the level of safety in my company is higher than in other companies I have worked for.	[39] *
EPRAA11	I think that the container ships are more demanding, in terms of commercial pressure, than other types of ships.	
Safety rules and procedures		
SRP1	Safety rules and procedures are prepared and available for use.	[40]
SRP2	Safety rules and procedures contain all important safety information.	[40]
SRP3	I think that safety rules and procedures are difficult to understand or that they are badly written.	[40]
SRP4	I think it is very difficult to determine which rule and procedure to use, for a particular situation, in practice.	[40] *

SRP5	They require a detailed work plan for each job.	
SRP6	Prescribe the use of personal protection means for each job individually.	
SRP7	I think that some rules and procedures are not really practical.	[39]
SRP8	In accordance with safety rules and procedures risk analysis assessment is always carried out before performing high-risk jobs.	
Work environment		
WE1	A "no blame" approach is adopted in the work group with the aim of highlighting unsafe practices / behaviours.	[39] *
WE2	I think our (group) duty is to maintain a safe working environment.	[40] *
WE3	Company provides safety staff with "force" required to perform their job.	
WE4	Ship management structure ensures that officers and crews receive all the equipment necessary to safely perform the job.	
WE5	Ship management structure uses explanations (not explicit compliance) in order to promote safe work.	[38]
WE6	Ship management structure emphasizes safety rules and procedures when working under pressure.	
WE7	Ship management structure makes additional efforts to ensure that the crew follows all safety rules and procedures.	[40] *
WE8	My supervisor / safety officer is always engaged in the safety related topics.	
WE9	My supervisor / safety officer encourages everyone to report unsafe conditions and potential threats.	
WE10	The company expects from me to bend the safety rules, procedures and instructions to get the job done.	[42] *
WE11	In our workplace, safety is of primary consideration when planning work tasks.	[40] *

** modified*