

Summary

Safety in maritime transport: Is flag state important in an international sector?

*TØI Report 1500/2016
Author: Tor-Olav Nævestad
Oslo 2016 117 pages English language*

We conduct a literature review, expert interviews and a small-scale survey of seafarers in order to investigate the importance of flag state for safety in maritime transport. From the literature review it is difficult to draw any clear conclusions about the importance of flag state for ship accidents, as existing studies point in different directions, often emphasizing other risk factors as more important (e.g. ship type and age). Results do indicate, however, that ships flying newer flags of convenience have a higher risk. Qualitative interviews support our conclusion that flag state is just one of several risk factors affecting maritime safety outcomes. In our survey we ask crew about six risk factors, and compare the responses of those sailing on nationally flagged vessels (e.g. Norwegian Ordinary Ship Register, NOR) with those sailing on vessels flying flags of convenience (FOC). Results indicate that communication could be a risk factor on FOC vessels. These vessels generally have multinational crews, and our results indicate that these are more likely to experience unsafe situations because of language misunderstandings. Differences in national safety culture could further confound communication problems. Despite this, FOC vessels may perform better than nationally flagged vessels on other factors influencing safety. In conclusion, we question the utility of flag state as an indicator of vessel safety. We discuss eight measures aimed at the main risk factors related to internationalisation in maritime transport, and conclude that three measures should be strengthened or developed further.

Background and aims

The domestic transport of goods at sea in Norway is open to foreign actors, and port statistics show an increase in cargo transported by ships flying flags of convenience, and a sharp reduction in cargo carried by Norwegian registered vessels in the period 2003-2012 (Nævestad, Caspersen, Hovi, Bjørnskau & Steinsland 2014). Vessels flying flags of convenience account for the largest proportion of transported cargo in the 30 largest ports in Norway over recent years. In 2005 it was reported that 50 % of the total crew of 35,000 on board Norwegian-registered vessels were foreign citizens, mostly from the Philippines, India, Poland or Russia (Håvold, 2005).

It is important to establish whether the increased presence of ships flying flags of convenience and foreign crew members in Norwegian waters have safety implications, in order to implement mitigating measures if necessary. In particular, vessels flying flags of convenience are largely manned by multinational crews comprising seafarers with different languages, national safety cultures and wage and working conditions than Norwegian seafarers. It is therefore important to assess safety implications of diverse culture, varying communication abilities and working conditions on board ships in Norwegian waters.

The aims of the present study are to:

- 1) Examine safety outcomes of increasing internationalisation in (Norwegian) maritime transport, by comparing the safety performance of nationally flagged vessels (NOR) and vessels flying FOCs.

- 2) Discuss the importance of potential risk factors, comparing nationally flagged vessels (NOR) and vessels flying FOCs.
- 3) Discuss potential measures to increase maritime safety further.

The study is part of a larger research project aiming to assess the effect on accident risk of the increasing shares of foreign actors in road and sea transport of goods in Norway; and to provide a scientific knowledge base that Norwegian authorities can use to develop measures to reduce any increased risk identified. Information on the project: «Safe Foreign Transport» (SAFT) can be obtained on the website: www.toi.no/SAFT. The project is funded by the TRANSIKK program of the Norwegian Research Council.

Multi-method approach

The study employed four different methods to generate data needed to meet each of the three main study aims:

- 1) *Literature review.* We conducted a literature review on safety outcomes, risk factors and measures. The literature review included 20 studies that were relevant to at least one of the three aims of the study listed above.
- 2) *Qualitative interviews.* We conducted qualitative interviews with 10 sector experts from employers, employees and authorities, again to inform each of the study aims.
- 3) *Small-scale survey.* Based on the results from the literature study and qualitative interviews on relevant risk factors, we conducted a small-scale survey (N=222) to examine the prevalence and importance of different risk factors among seafarers. The respondents were both Norwegian (N=177) and foreign (N=45) seafarers and were recruited through “Kystrederiene”, an employer organisation for Norwegian based shipping companies. All of the respondents worked on ships operating from Norway. A total of 180 respondents worked on NOR vessels, 32 on FOC vessels and 10 on board NIS vessels.

The survey included in this report was originally meant to consolidate the findings from literature review and expert interviews, and as such is based on the responses of a small sample of seafarers. We recommend therefore that the small-scale survey results should be explored by a more extensive survey and robustly designed sampling method. We expand more on this below, in the discussion of methodological limitations.

- 4) *Reference group meeting.* We were provided with useful information and viewpoints in a meeting with the projects’ reference group held at the Institute of Transport Economics, March 2014. Results from this meeting are presented together with results from the interviews.

Flag state is one of several risk influencing factors

When it comes to the effect of flag state on ship accident risk, the literature is inconclusive. Flag state is one of several risk factors predicting ship accident risk along with factors like vessel age, main cargo, ship type, weather conditions and location/sailing patterns, but it is usually not found to be the most important variable for maritime safety. Four of the seven studies on ship accidents in the review questioned the utility of focusing on flag state as the most important risk indicator.

Some studies indicate that the safety of vessels flying newly established FOCs is lower than that of vessels registered with traditional maritime states, second registers or more established FOC states. Thus, flag state seems to be an important predictor of ship accident risk if we take the age of the flag state into account. New and inexperienced flag states may implement and enforce maritime safety rules to a lesser extent than more established flag states.

When asked whether ships from different flag states have different risks for ship accidents in Norwegian waters most interviewees were either uncertain, or they questioned the relevance of flag state as a key variable explaining ship accident risk, at least in Norwegian waters. It was mentioned that the maritime sector is an international sector and that nationality therefore is of less importance. One interviewee said that Norwegian shipping companies traditionally have chosen established FOCs. There were comments that other risk factors are more important than flag state. In particular there is considerable variation in risk within each flag state fleet, depending on the sub-sector and customers' willingness to pay for safety.

In the small-scale survey, respondents were asked the following question: "Has the vessel been involved in a shipping accident (e.g. grounding, collision, contact injury, fire) in the two last years?". A total of 43 seafarer respondents (20 %) answered yes to this question. In order to avoid counting the same ships several times in our analysis of factors predicting ship accidents, we filtered our data to only analyse results for captains (N=57). Our analyses were unable to conclude on any factors predicting ship accidents.

We also examined the relationship between registry and seven other safety outcomes, and did not find that registry was an important predictor of safety outcomes. However, the lack of findings in both these analyses may have been because there were too few FOC vessels in the sample. As far as these and some other results are concerned, the survey should be regarded as preliminary, giving useful indications that need to be followed up by more extensive survey.

Factors influencing maritime safety

We compare nationally and FOC vessels on six factors potentially influencing the risk for a ship accident. We find that there may be important differences in two of these risk factors.

Communication and language difficulties

The literature review indicates that communication may be an important factor influencing maritime safety, and that this may be a main drawback of mixed nationality crews. In a 2009 survey, the Norwegian Coastal Administration found that in communications between ships, 81 % of respondents believed language skills to be a problem of high or moderate degree. The importance of communication and language for safety was also underlined in the interviews.

Survey respondents from FOC/NIS vessels reported to work in crews that are much more multinational than those from NOR vessels. We therefore conducted survey analyses to examine factors influencing respondents' experiences of unsafe situations due to language misunderstandings.

Figure S.1 shows respondents from FOC/NIS vessels and NOR vessels' answers to the question: "Have you experienced unsafe situations because of language misunderstandings between different nationalities on board?"

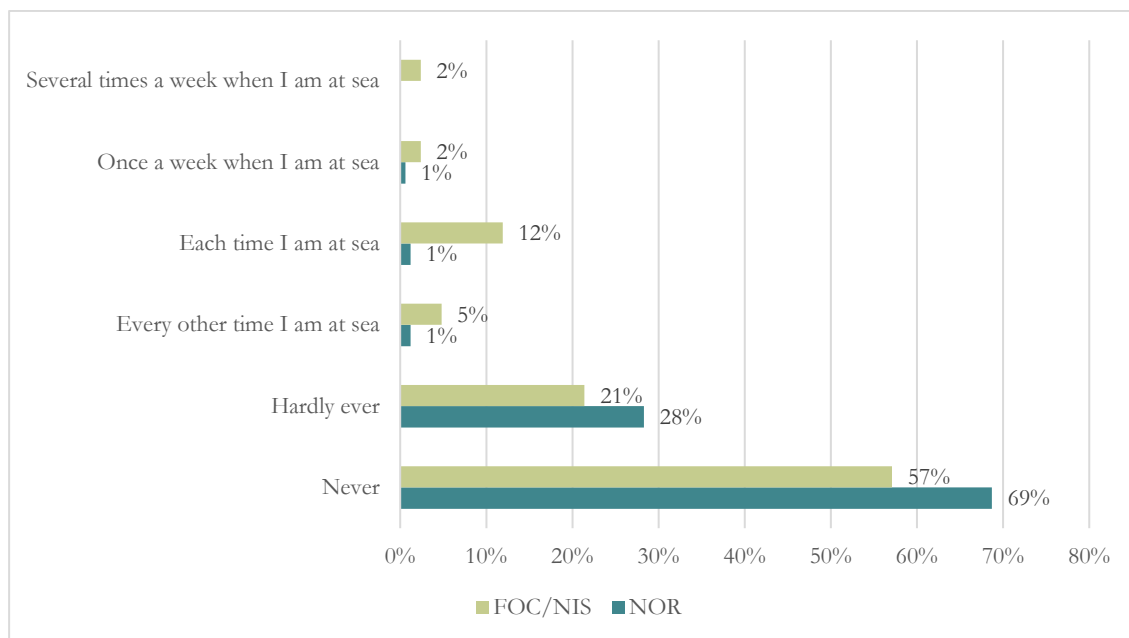


Figure S.1: Respondents answers to the question: "Have you experienced unsafe situations because of language misunderstandings between different nationalities on board?" NOR (N=166), FOC/NIS (N=42).

Results show that ship register was the strongest predictor of experiencing unsafe situations because of language misunderstandings. The second strongest predictor of experiencing unsafe situations because of language misunderstandings was the share of colleagues with different nationalities. The third most important predictor was organisational safety culture, indicating that good organisational safety culture may facilitate good and safe communication. Our analyses did not indicate that communication difficulties predict ship accidents, but we did find an association between communication difficulties and risk perceptions.

Foreign seafarers find it more impolite to intervene

The research literature indicated that national culture may influence values, communication styles, methods of conflict resolution, decision making and organisational behaviour. Our interviews also indicated the importance of national safety culture for several aspects of maritime safety. Our survey results indicate that respondents from Central/Eastern European countries and Asian countries find it far more impolite to tell colleagues to work in a different and safer way (“colleague safety intervention”) than Norwegians do, which strongly implies how national culture might influence safety (Figure S.2).

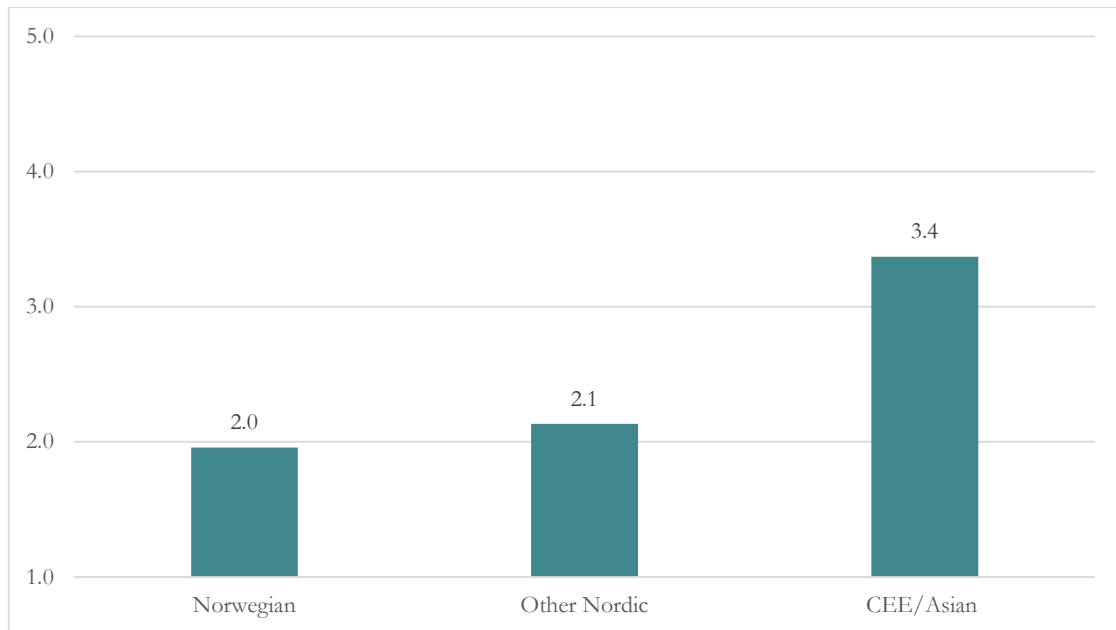


Figure S.2: Mean scores of national groups' assessment of colleague safety intervention: "It is impolite to tell colleagues to work in another and safer way". Norwegian (N=177), Other Nordic countries (N=15), Central/Eastern European countries and Asian (N=27). Answer alternatives ranged from 1 (totally disagree) to 5 (totally agreed). (the sixth answer alternative: "do not know" was removed in the analysis) * $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$.

We conducted analyses to examine factors predicting respondents' views on colleague safety intervention. When we included register in the analysis, we saw that nationality ceased to contribute significantly, and that register was the strongest predictor. Crew of FOC vessels are generally small multinational communities, and research indicates that it is particularly important to avoid conflict in order to optimise working environment and safety on such vessels. This could explain why register became the most important predictor of views on colleague safety intervention. Perhaps foreign respondents' view on intervention is a result of their working conditions, i.e. multinational crews, rather than national culture (i.e. values seafarers have before they start working in the multinational crews), or perhaps both? This is a question that could be examined in future research.

The literature finds that nationality is a strong influence on the cultural dimensions of "deference to authority" and the "value of the individual versus the group". We did not find statistically significant differences between the groups on the deference to authority dimension, but the numbers of foreign respondents in our survey were small. More research is needed to examine this

Do FOC vessels perform better on some risk factors?

Qualitative data suggested that fatigue and manning levels may influence safety more than flag state does. Some interviewees had the impression that the manning levels are higher on board FOC and NIS vessels than on NOR vessels. The reason is that FOC and NIS vessels are permitted to pay foreign seafarers according to the lower wage levels in their home countries. It was suggested that lower wage level may facilitate employment of more people on board. This is merely a hypothesis.

Reference group members agreed that fatigue and manning levels are among the most important factors influencing maritime safety in Norwegian waters. They suggested that the small Norwegian vessels sailing along the coast of Norway have low manning levels, and that this contributes to high levels of workload and time pressure. They suggested that these risk factors are particularly important in this segment of the NOR fleet, and that they may lead to fatigue and stress which may be negative to safety. However, our small-scale survey indicates that seafarers from Central/Eastern Europe and Asia (on FOC vessels) report higher levels of stress and pressure than seafarers from Norway/Nordic countries. More research is needed to examine this.

In the survey, we asked respondents about the manning levels on their vessels. The results indicate that manning levels on board FOC vessels could possibly be higher than they are on NOR vessels, but a more extensive survey is required to confirm this.

The survey also suggests that manning levels are important for safety, as analyses indicate that vessels' manning level influence respondents experiences of shift delays, 16-hours of continuous work and interrupted rests and their inclination to be fatigued in manners that may compromise safety.

Finally, we have also discussed the impact of other risk factors than those highlighted above. Our data have, however, not been sufficient to evaluate these. More research is therefore needed to examine whether and how the following factors may explain variations in safety among vessels of different flag states: technology and equipment, failing implementation and enforcement, fatigue and working conditions, safety management system and training, competence and experience.

Measures

We discuss eight measures aimed at: 1) Newly emerging flags of convenience and 2) Communication problems related to language difficulties and cultural differences. We suggest that three measures in particular should be strengthened and developed further:

- 1) Continued development of supranational inspection agencies like EMSA (European Maritime Safety Agency)
- 2) Further development of the new risk-based PSC (port state control) regime and
- 3) Improved communication (English) skills.

Methodological challenges

- 1) *Small samples.* The most important methodological challenge of the present study is the small survey samples. The survey included in this report was originally meant to consolidate the findings from literature review and expert interviews, and as such is based on the responses of a small sample of seafarers (N = 222). Analysis of the responses gave rise to some findings that are unique and potentially important, but because it was meant only to consolidate other findings the survey design is not robust enough to be able to draw solid conclusions.

When interpreting results, it is therefore crucial to remember that the samples for several key variables are small, for instance for foreign seafarers and NIS and FOC vessels. This influences our abilities to draw conclusions; it is for instance less likely to find statistically significant differences with small samples on key variables. We must also remember, that with small samples in key groups, respondents may not be representative. These reservations are important to bear in mind when looking at the results of the small-scale survey. We must be very careful when it comes to generalizing results.

We recommend therefore that the small-scale survey results should be explored by a more extensive survey and robustly designed sampling method. It would be important in such a survey that samples are both representative of crewing populations, and large enough enable solid conclusions to be drawn when comparing the responses of crew on Norwegian versus foreign-registered vessels (i.e. give sufficient statistical power).

- 2) *Respondents from different countries have different points of reference.* The seafarers may refer to different baselines, and their survey answers may have different anchoring. If safety standards vary substantially between different nationalities or cultures, respondents' evaluative judgments are based on different expectations to the safety commitment of their managers and their colleagues, and the safety level of their businesses. Many of the survey questions involve subjective definitions, e.g. "safety-compromising fatigue", "pressured to work even though it is not perfectly safe" and "unsafe situations."
- 3) *Experience with and trust in surveys.* Seafarers from different nationalities or cultures may relate to surveys differently. It is likely that Norwegian seafarers are accustomed to being subjects of various tests and surveys. Seafarers from other nationalities, however, may be less culturally attuned to these kinds of surveys, and react to them differently. It is conceivable, for instance, that promises of anonymity are not trusted.
- 4) *Awareness of comparison.* Seafarers may be aware that they would be compared to other national groups, and respond correspondingly. In the presentation of the survey it was stated that a central purpose was to compare nationalities and flag states. Respondents had to report their nationality and vessels register in the survey.
- 5) *The need to use underdeveloped survey items.* This line of research is at an early stage, and so we needed to develop many of the questions for this survey. There is a need to develop these items further in order to test for psychometric robustness.

- 6) *National culture and reporting.* Measuring safety culture and reporting culture by means of surveys (i.e. self-reports) is in one sense paradoxical, as giving straightforward answers is dependent on a culture which encourages the communication of negative issues (i.e. a good reporting culture). A previous study of safety culture in construction in Denmark, UK and The Netherlands found that Eastern European migrant workers generally rated their managers more positively than employees who were born in the respective countries. The study suggests that that Eastern European migrant workers' deference to authority may explain this.

Deference to authority is as a trait of national culture that may explain over-reporting of positive results. It may perhaps also explain under-reporting of negative results. One of the interviewees suggested that deference to authority will influence how foreign seafarers answer the survey, stating that "for the foreign seafarers, the survey is an authority". In line with this, Størkersen et al (2011) found that the foreign respondents that they interviewed were less critical when answering their quantitative survey than they were in the preceding qualitative interviews. Although these questions are interesting, it is impossible for us to conclude on this. These hypotheses should therefore be examined further in future research.

- 7) *Structural incentives for "laying low"?* The answers foreign seafarers give in surveys may also be influenced by structural features; e.g. time limited job contracts that are renewed regularly. In international shipping, ratings may be hired on a contract basis from one assignment to another, and the staffing agency may have information on the employment history of each seafarer. Such arrangements may provide foreign seafarers with structural incentives for "laying low" when answering the survey. It is impossible for us to conclude on this. These hypotheses should therefore be examined further in future research.

Finally, we wish to point out a typographical error on one of the survey response scales in the English language version of the survey. There are good grounds to believe that this did not influence responses, and this is explained fully in the main body of the report.