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Pekka Räisänen

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TURUN AMMATTIKORKEAKOULU
TURKU UNIVERSITY OF APPLIED SCIENCES

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ABSTRACT

Räisänen, Pekka

Possibilities of Co-operation in Maritime Occupational Statistics

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An inquiry of some public maritime occupational accident statistics was carried out in Turku University of Applied Sciences. The project was funded by the European Union, European Regional Development Fund, the Regional Council of Päijät-Häme, Turku University of Applied Sciences and the participants from the industry.

Reliable statistics of occupational accidents are necessary for rational improvement of safety of seafarers by benchmarking. Each of the Nordic authorities publishes maritime occupational accident data, but the comparisons and benchmarking are difficult between nations for several reasons. Differences are typical in:

- definitions of occupational accidents
- what is the number of persons and time at risk on board
- sizes and types of ships which are included in each statistics
- incentives for reporting of the accidents.

For this reason, the content of some published information was analysed in Turku University of Applied Sciences. Similar features and possibilities of joint uses of the data were reviewed. A case study of the statistics of four Nordic countries was carried out, and the details of the accidents reporting were inquired for each country. Comparative graphs for occupational accidents frequencies in Denmark, Finland, Norway and Sweden are shown. A joint method of occupational accident statistics is proposed with an aim for practicality, but sufficient accuracy for benchmarking. Based on comparisons, it is proposed e.g. that a Nordic occupational accident comparison could be carried out, with output of:

1. occupational accident frequencies for statistics could be extracted from insurance company case data instead of on board reporting

2. risk exposure could be based on true on board manning positions data and 24 hours per day
3. accident rates (LTIF) could be calculated per million exposure hours, as this information can be obtained directly from true manning data.

For first trials, ferry operations, ro-ro traffic and tanker shipping would be interesting.

TIIVISTELMÄ

Räisänen, Pekka

Yhteistyömahdollisuudet merenkulun työturvallisuustiedon käytössä

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Turun ammattikorkeakoulussa tutkittiin merenkulun työturvallisuustiedon käyttöä. Projektin rahoittivat Euroopan Unionin Euroopan aluekehitysrahasto, Päijät-Hämeen liitto, Turun ammattikorkeakoulu ja alan toimijat.

Luotettavat tilastot ovat tärkeitä merenkulun työturvallisuuden parantamisessa keskinäisen vertailun avulla. Pohjoismaat julkaisevat kukin onnettomuustietoa, mutta maiden keskinäinen vertailu on vaikeaa useista syistä. Erot ovat tyypillisiä mm. seuraavissa:

- työturvallisuusonnettomuuden määritelmät
- todellinen miehitysmäärä ja riskille altistusaika laivalla
- tilastoihin sisältyvien laivojen koko ja tyyppi
- onnettomuusraportoinnin kannustimet.

Asiasta julkaistua aineistoa arvioitiin Turun ammattikorkeakoulussa. Yhteisiä tekijöitä ja aineiston yhteiskäytön mahdollisuuksia tutkittiin neljän Pohjoismaan tilastojen ja onnettomuusraportoinnin avulla. Raportissa esitellään otteita Tanskan, Suomen, Norjan ja Ruotsin onnettomuusyhteenvedoista ja ehdotetaan keskinäisiin vertailuihin yhteistä menetelmää, jossa yhdistyvät käytännöllisyys ja riittävä tarkkuus. Ehdotetaan, että vertailtaisiin

1. onnettomuusdataa, joka saataisiin vakuutuskorvaustiedosta laivojen raportoinnin sijaan
2. riskille altistumisaika laskettaisiin todellisista miehitystietoista ja riskialtistumisesta 24 h vuorokaudessa
3. onnettomuustaaajuudet (LTIF) laskettaisiin miljoonaa altistumistuntia kohden, sillä tämä tieto saadaan suoraan todellisista miehitystiedoista.

Laivatyypeistä kiinnostavimpia ensi vertailuihin ovat lautat, ro-ro-laivat ja tankkerit.

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ABBREVIATIONS

DMA	Danish Maritime Authority
LTI	Lost Time Injury (or Incident)
LTIF	Lost Time Injury Frequency
NMA	Norwegian Maritime Authority, also NMD (D from Directorate)
OCIMF	Oil Companies International Marine Forum
OGP	International Association of Oil & Gas Producers
OSHA	Occupational Safety and Health Administration
STA	Swedish Transport Agency

I INTRODUCTION

Reliable statistics of occupational accidents are necessary for rational improvement of safety of seafarers by benchmarking. Several organisations regularly publish maritime occupational accident data, but the comparisons and benchmarking are difficult for several reasons, which are discussed in this short commentary. For this purpose, the content of published information was analysed in view of similar features and the possibilities of joint uses of the data were reviewed for four Nordic countries. The people who produce the statistics were interviewed, and the details of the accidents reporting were inquired for each country. This resulted in better understanding of the existing challenges and development possibilities in statistical representation of maritime occupational safety. The possibilities are presented as a proposed joint method of occupational accident statistics, with an aim for practicality, but sufficient accuracy for benchmarking. In addition, some future possibilities of increasing knowledge on the matter are discussed.

The main purpose of this publication is to start a discussion on how the statistic information of maritime occupational accidents could be made comparable for the Nordic countries.

The project CAFE was funded by the EU, the Regional Council of Päijät-Häme, Turku University of Applied Sciences and the participants from the industry.

2 CURRENT PRACTICES OF ACCIDENT REPORTING IN FOUR NORDIC COUNTRIES

The differences of societal and business environments between the Nordic countries are relatively small, and therefore meaningful comparisons of occupational safety data could be possible between the countries. In maritime fields, the comparisons are not straightforward, as subdivision and reworking of data is needed even before it can be known if comparisons are feasible. According to data collected by IHS Fairplay and published by Danish Maritime Authority (2011), Norway and Denmark have the largest fleets of the Nordic countries, measured in gross tonnage. Together, they represent about 80% of the fleet. The fleets of Nordic countries differ in ship types and traffic areas, but comparisons in sea-going fleets should be interesting. In particular the Icelandic fleet differs from others, and it was therefore not yet included in the study.

All the four Nordic countries in consideration publish information about the occupational accidents. In Sweden (Swedish Transport Agency 2011), Norway (Norwegian Maritime Authority 2010, 2011) and Denmark (Danish Maritime Authority 2009, 2011), the publisher is the national maritime authority. In Finland, the Statistics Finland and the Finnish Occupational Health and Safety Administration (Finnish OSHA 2010, 2011) publish statistics based on the Statutory Accident Insurance (aka Federation of Accident Insurance Institutions, TVL) data.

The format and coverage of the statistics varies. The statistics differ not only because the structure of the maritime industry and the types of traffic and ships vary in each country, but also because the format and the sources of accident data differ. However, all the nations gather much more extensive data than they publish, and there is a good potential for joint development. In the following, the current reporting practices and formats for each country are reviewed in alphabetical order.

The Danish reporting concerns accidents that the ships are obliged to report to the Danish Maritime Authority. The comparisons are presented as accidents per million work hours. The graphs show that during the years there has been generally a positive development in accidents. Interesting questions that arise are the effects of details of reporting systems and ways of counting the work hours.

WORK RELATED ACCIDENTS ON BOARD MERCHANT SHIPS

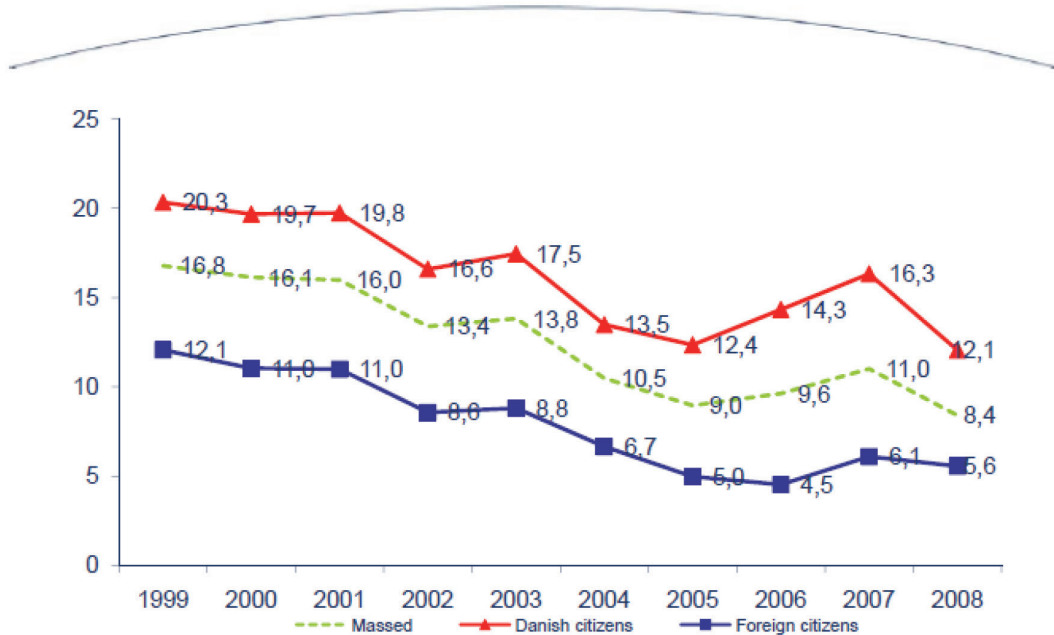


FIGURE I. Published data on reportable accidents of Danish International Register (Danish Maritime Authority 2009).

The Danish system can be used as a generic benchmark by shipping companies, but more detailed information about ship types and traffic could be useful.

The Finnish reporting system is based on insurance company case data for the number of accidents and the actual payroll hours that the companies are obliged by law to report to the private insurance companies. They forward their data to the Federation of Accident Insurance Institutions, which provides joint data to the authorities. The authorities provide detailed datasets, e.g. comparisons between years, by request and publish only general statistics on maritime occupational accidents.

Vuosi	TOIMIALA (2)	Vahinkojen lkm	Työtunnit (1000 h)	Taajuus
2005	43 Erikoistunut rakennustoiminta	9023	97353	92,7
2005	45 M. ajoneuvojen ja -pyörien tukku- ja v. kauppa	2692	56619	47,5
2005	46 Tukku- ja kauppa (pl. m. ajon. ja mp. kauppa)	3452	141659	24,4
2005	47 Vähittäiskauppa (pl. m. ajon. ja mp. kauppa)	5229	199844	26,2
2005	49 Maaliikenne ja putki- ja johtokuljetus	5929	96264	61,6
2005	50 Vesiliikenne	582	17106	34,0
2005	51 Ilmaliikenne	373	11501	32,4
2005	52 Varastointi ja liikennettä palveleva toim.	1584	42263	37,5
2005	53 Posti- ja kuriiritoiminta	1843	36604	50,3
2005	55 Majoitus	465	19637	23,7
2005	56 Ravitsemustoiminta	2491	70078	35,5
2005	58 Kustannustoiminta	373	31143	12,0
2005	59 Elokuva-, video- ja televisio-ohjelmatuot.	136	4359	31,2
2005	60 Radio- ja televisiotoiminta	-	-	-
2005	61 Televiestintä	319	31595	10,1
2005	62 Ohjelmistot, konsultointi ja s. liitt. toim.	211	57559	3,7

FIGURE 2. An example of the Finnish reporting of yearly occupational accident rate from insurance data and salaried hours (Vahinkojen lkm= Number of accidents, 50 Vesiliikenne = waterborne traffic, Taajuus = frequency) (Finnish Occupational Safety and Health Administration. 2010).

The above example of Finnish reporting provides the number of accidents, working hours and the accident rate per million hours. Also office personnel are included in the statistics. Making conclusions of the Finnish data e.g. on yearly development is more difficult than from the other statistics, but the possibility of obtaining specialised reporting may compensate for this shortcoming. For shipping companies, using Finnish data as a benchmark may not be accurate enough, as the effects of traffic and ship type as well as the inclusion of office staff may obscure the results. Also the relatively small amount of statistics may reduce the predictive power of more detailed analyses.

In Norway, the occupational accidents which occur on board Norwegian ships, and on foreign ships in national waters, are to be reported by the shipping companies to the Norwegian Maritime Authority (NMA). The graphs are published as direct numbers of occupational accidents and show a decreasing trend. As there is no information attached about the number of persons at risk, the curves can be used for comparisons of Norwegian national trends, but are less useful as benchmarks for shipping companies. More details on ship and traffic types in the statistics could benefit the shipping companies in their safety development. For this, time at risk would be needed in the published data.

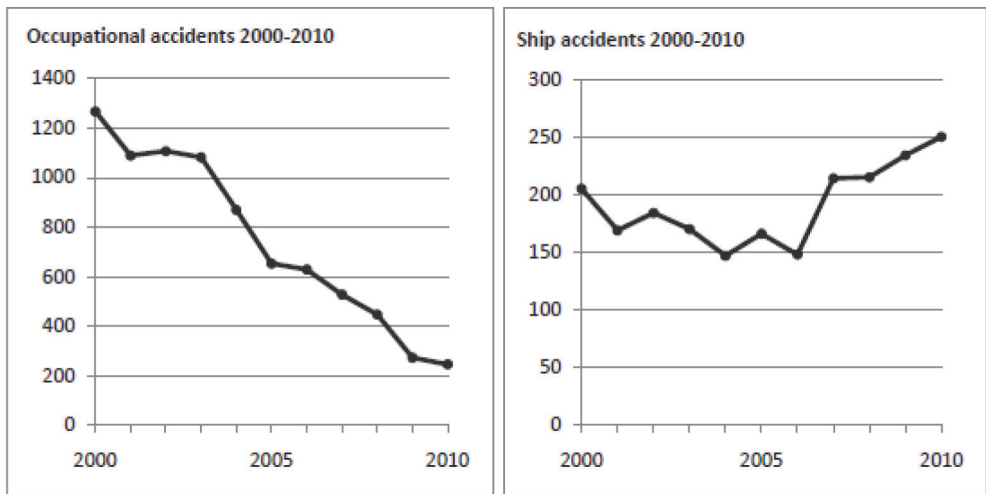


FIGURE 3. Occupational accidents in the Norwegian publication (NMD 2010). Corresponding data is published also in Norwegian (NMA 2011).

The Swedish statistics are comprised of accidents that are reported to the Authority and the numbers of seamen that are in active duty according to the national Seafarer’s Register. The data is output as number of accidents per 100 persons on active duty.

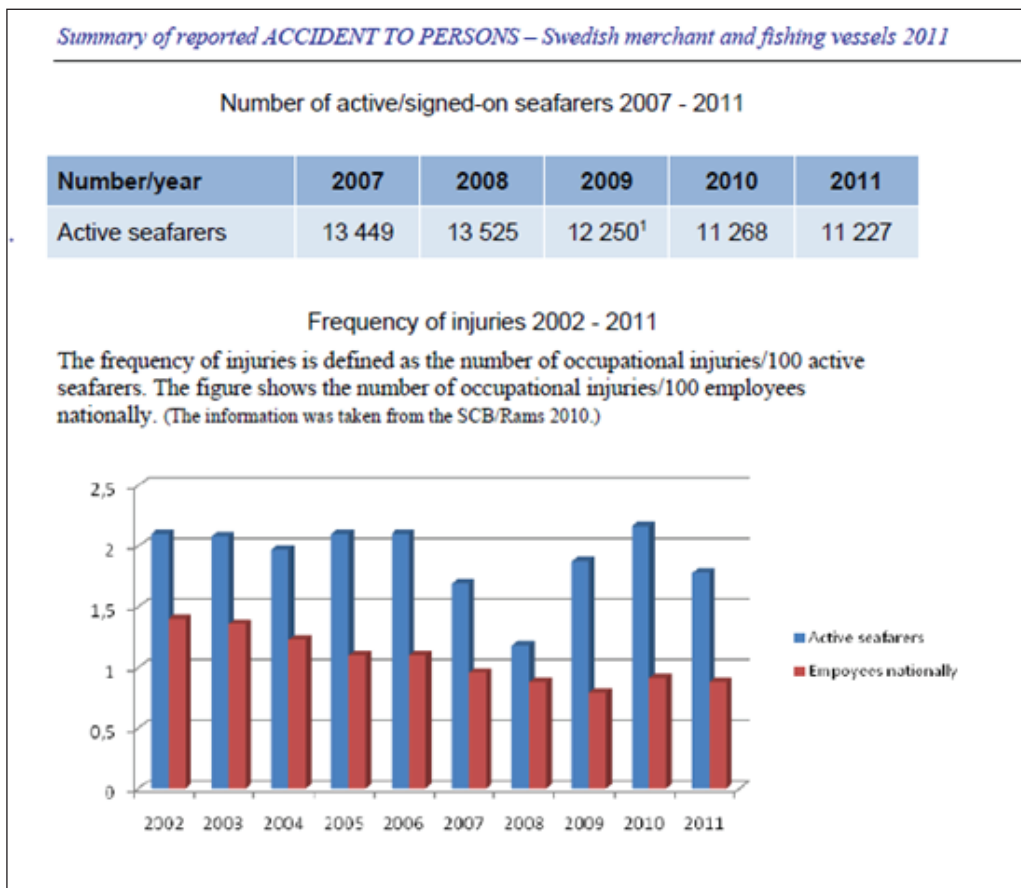


FIGURE 4. Frequency of injuries in the Swedish public report (Swedish Transport Agency 2011).

The Swedish trends for accidents are less well defined than those reported in Denmark and Norway. The sudden drop of the rate to about half in 2008 in the above graph may refer to changes in reporting practices in addition to improvements in safety. The “occupational injury” graph above also includes the occupational illnesses as per definition “Occupational injuries mean accidents and sicknesses, which are the result of injurious influence at work” (STA 2011). The time at risk, as well as ship and traffic types could be discerned more, although such sub-grouping might increase the scatter of data for each group due to relatively small numbers of cases in Sweden. With Nordic co-operation, however, the amount of data in such sub-groups could be increased. Further, more specific reports on injuries can be ordered from Swedish Work Environment Authority.

From the previous graphs it can be seen that comparing the occupational safety in Nordic countries is currently difficult. Further, changes of crew nationality on board will most likely change the number of accidents (Hansen et al. 2008) and the reporting practices may change as well (Pedersen 2012). In the following, some factors that attribute to the differences are discussed.

2.1 REPORTING PRACTICES OF OCCUPATIONAL ACCIDENTS

In the Danish reporting, occupational accidents relate to all employment at sea which have to be reported to the Danish Maritime Authority, regardless of the causes, including the marine accidents. If an accident is fatal, the accident is only registered as a fatal accident. There are two categories of accidents of which serious work related accidents include accidents resulting in fractures, loss of a limb or injuries on large parts of the body. The other category is “work-related accidents” that cover the rest. There is also a category of “not reportable accidents” which includes the accidents with less than one day absence.

In Finland, the official statistics are based on the broad definition of waterborne traffic, and include the office personnel as well. All accidents that result in claims to insurance companies are reported. Fatalities and injuries due to maritime accidents are included in the statistics.

In the Norwegian publications, occupational accidents relate to people who carry out work on board, but also others, such as passengers and pilots, are included separately. Injuries due to marine accidents are not included in the statistics. Similarly injuries to people on board foreign ships in Norwegian waters are included in principle, but in practice very few accidents are reported and recorded. Some reporting occurs though, mainly from tankers. In Norway, to improve the focus on more serious cases, the reporting requirement for the smallest incidents was dropped in 2005 (Pedersen 2012).

For the Swedish publication, the definition of occupational injury is wider than in the other countries as it also covers occupational illnesses. The coverage and effects to Nordic comparisons could be checked. The Swedish system has been subject to change, and reporting practices are under development.

2.2 SIZES AND TYPES OF SHIPS AND TRAFFIC AREAS IN STATISTICS

The composition of fleets and the traffic vary considerably in the Nordic countries. For example, the coastal traffic in Norway is much more extensive than in the other countries, and also fishing vessels are included in the general statistics. However, there are matching ship types and traffic patterns in the data of all countries.

2.3 TIME AT RISK

The personnel are at risk the whole time they are on board although they may have assigned work hours and free periods. Naturally, the risk varies based on their activities. From the statistical perspective, instead of the actual time at risk, an assumption is used. The selection of the estimation method by the authorities is probably based on the availability of suitable data.

In previous years, the Danish statistics have been based on millions of work hours and the assumption has been 10 hours of work per day. The number of seafarers is based on the number of seafarers signed on per end of September each year. Some of the statistics are based on 10,000 work days, as well as on 1000 seafarers. Hansen et al. (2002) refer to Danish recording practices where the actual mustering days are recorded.

In Finland, the salaried work hours are reported by the shipping companies to their insurers who use the data in their statistics for time at risk. In Norwegian report, time at risk is not used but numbers of accidents are used as the metric directly. In Sweden, respectively, the number of work accidents is given per 100 active seafarers occupied in the industry, which is obtained similarly from seamen's register. An "active seafarer" has worked on board at least 3 of the preceding 18 consecutive months.

2.4 SUMMARY TABLE OF THE CURRENT SITUATION OF PUBLIC REPORTING

In the following table, the current situation is summarised. The most important issue that affects the results are the reporting practices. As reporting from ships is known to be subject to fluctuations, automatic reporting from insurance cases may produce the least variation of results. Further, it can be said that the current reporting could be made better for in-house benchmarking by the shipping companies. It might also reduce the workload on the ships as multiple reports are not needed. As all the nations have good electronic databases of accidents, improvements by Nordic co-operation could be rather easy. However, more research on compatibility of insurance reporting is needed.

TABLE I. *Summary of reporting in Nordic countries.*

	Denmark	Finland	Norway	Sweden
Authority in charge	Maritime authority	Ministry of Social Affairs	Maritime authority	Maritime authority
Authority which collects the statistics	Maritime authority	Federation of Accident Insurance Institutions	Maritime authority	Maritime authority
Reporting practices	Compulsory reporting of shipping companies	Automatically from insurance claims	Compulsory reporting of shipping companies	Compulsory reporting of shipping companies
Time at risk	Per million hours, based on 10 hours on-board per day, Also per 1000 crew-members is used	Per million salaried hours	Not used in publication	Per 100 active sea farers
Sizes and types of ships in statistics	All waterborne traffic under Danish and DIS flags, excl. fishing	All waterborne traffic under Finnish flag, excl. fishing	All waterborne traffic under NIS and Norwegian flags, incl. fishing and some foreign ships in Norwegian waters	All waterborne traffic under Swedish flag
Are office personnel included	No	Yes	No	No
How well are the current publications suitable for benchmarking by the shipping companies	Useful for generic benchmarking, but ship size, traffic type and ship type could be included	Publicized analyses are less useful than the specific reports that can be requested	Could be made more useful by including time at risk, ship size, traffic type and ship type	Could be made more useful by including ship size, traffic type and ship type
Are there instructions how the publications could be used for benchmarking by the shipping companies	Currently not	Currently not	Currently not	Currently not

3 SUMMARY AND PROPOSED CO-OPERATION

The reporting practices currently differ in the Nordic countries. In Norway, Sweden and Denmark, the statistics are composed of accidents reports that are collected from the ships, but in Finland the accident information comes from the insurance companies and is based on recorded insurance cases. Of the statistics that are based on ships' reporting to maritime authorities, it is known that the actual number of accidents is higher than reported (DMA 2011, NMD 2010, Ellis et al 2009). Use of compensation data from insurance companies for statistics could be considered, as the input could show less variation and reduced amount of reporting could ease the workload on board.

For time at risk, lowest common denominator for the Nordic countries could be a system where the true manning of the ships would be used, and the time at risk would be calculated as 24 hours per manning position – according to the system that is common in oil transportation today. This could produce a sufficiently accurate Nordic reference of Lost Time Incident Frequency (LTIF) for occupational accidents as

$$LTIF = \frac{\text{Number of insurance cases} \times 1000.000}{\text{No. of manning positions} \times 24 \times 365}$$

This could serve as benchmark for shipping companies who could easily calculate their own status with their internal information. It should be noted that the number of seafarers on board (true manning) that the shipping companies use is often larger than the minimum safe manning that is recorded by the maritime authorities. This could introduce a bias for the data unless true manning is obtained. The effort required from the authorities for extracting and recording the true average yearly manning of ships should be rather small, though. The proposed system would provide a simple model for comparisons, and there would be no limitation of providing additional information nationally, such as near misses.

In all countries, more detailed reports of the statistics are available for the authorities as all have access to electronic databases that allow data extraction. These could be used for joint benchmarking for a couple of ship and traffic types, such as ferry operations, ro-ro traffic and tanker shipping. It is proposed also that

the benchmarking should be limited in ship size to remove the variation caused by accidents on smallest vessels. A practical limit could be 3000 GT, which is already used in Denmark.

Based on comparisons, it is proposed that a Nordic occupational accident comparison could be carried out as follows:

1. occupational accident frequencies for statistics could be extracted from insurance case data instead of on board reporting
2. risk exposure could be based on true manning data and 24 hours per day
3. accident rates (LTIF) could be calculated per million exposure hours.

Some ship types that could be interesting for first trials include ferry operations, ro-ro traffic and tanker shipping.

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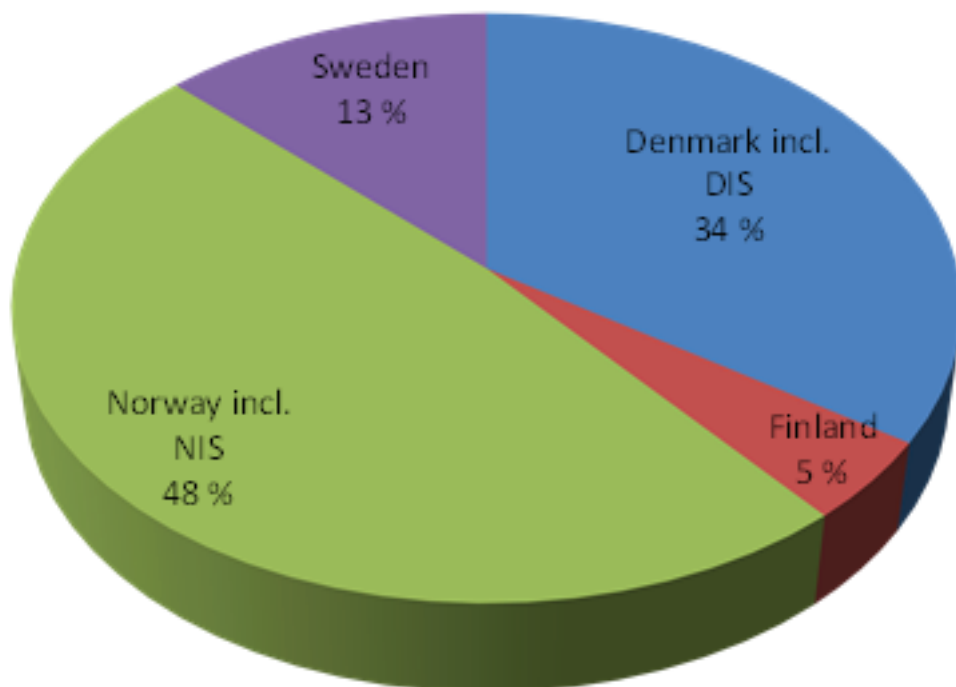
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APPENDIX

SIZE OF THE MERCHANT FLEETS IN FOUR NORDIC COUNTRIES

Size of the merchant fleets in four Nordic countries (GT)



Relative size of the merchant fleets in four Nordic countries (based on gross tonnages of national and International Register fleets, the data is from Danish Maritime Authority (2011). About half of the tonnage controlled by each of the four Nordic countries is flying the national or its international register flag.