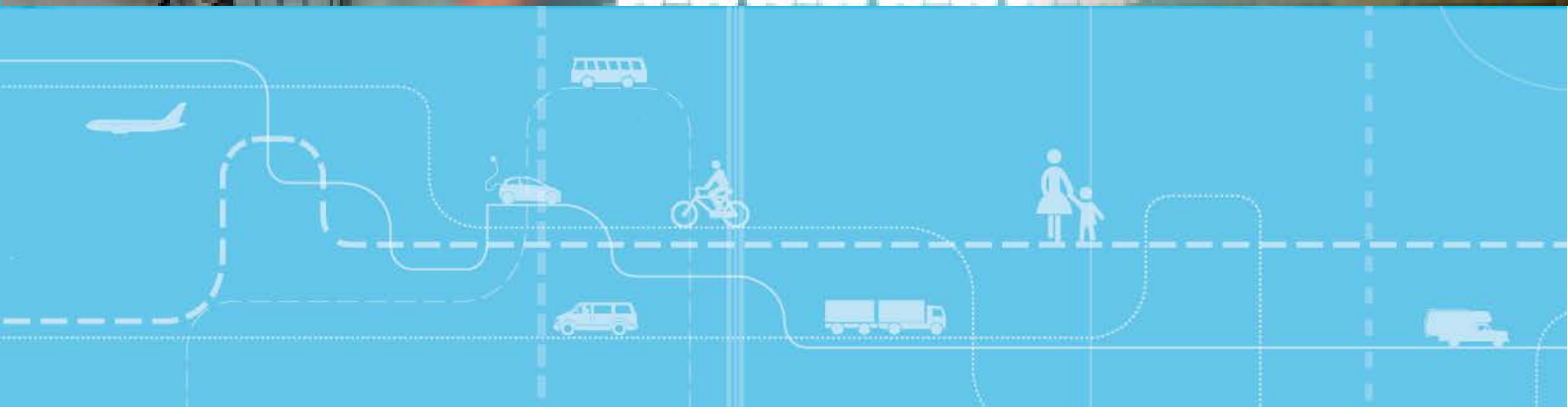


Work-related accidents in Norwegian road, sea and air transport

Roles and responsibilities



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Tor-Olav Nævestad

Karen Ranestad

Tittel: Arbeidsrelaterede ulykker i norsk veg, sjø og lufttransport: roller og ansvar

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Sammendrag:

Denne studien utforsker myndigheters og transportselskapers kunnskap om og kilder til informasjon om arbeidsrelaterede ulykker, syn på risikofaktorer knyttet til slike ulykker, og forståelser av roller og ansvar koblet til arbeidsrelaterede faktorer og ulykker innen tre ulike transportsektorer. Hovedfunnet i denne studien er at vegsektoren ser ut til å prestere dårligere enn sjøtransport og transport med lette innlandshelikoptre på disse tre aspektene ved ulykkesforebygging. Som en følge av dette, rangerte respondentene fra vegsektoren også egen innsats knyttet til forebygging av arbeidsrelaterede ulykker lavere enn respondenter fra de andre transportsektorene. Studien foreslår avslutningsvis hvordan vegsektoren kan forbedre egen praksis innen risikoforebygging ved å se til lovgivning og praksis i de to andre sektorene.

Summary:

The study examines regulatory authorities' and transport companies' knowledge of, and sources of information about work-related accidents, views on risk factors, and understandings of roles and responsibilities in relation to work-related risk factors and -accidents in three transport sectors. The main finding of the present study is that the road sector seems to perform poorer than the maritime sector and Inland Helicopter Operations on these three aspects of accident prevention. As a consequence, respondents from the road sector rate their own efforts to prevent work-related accidents as lower than respondents from the other sectors. The study concludes with suggestions on how the road sector can improve on these three aspects of risk prevention by learning from the other two sectors.

Language of report: English

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Preface

This report on work-related accidents in road, sea and air (light helicopter inland) transport is part of a larger research project “Work-related accidents in road, sea and air transport: Prevalence, causes and measures” which lasts for three years, from March 2014 to July 2017. The project is financed by the TRANSIKK program of the Research Council of Norway. Our contact persons at the Research Council of Norway have been Lise Johansen and Mette Brest Jonassen. The main aims of the project are to survey the prevalence, causes and understanding of work-related accidents in road, sea and air transport (light helicopter inland), and to provide a scientific knowledge base that can be used to develop measures against work-related risk factors. The continuation of the project suggests specific measures that both transport companies and authorities can implement to reduce the risk of work-related transport accidents.

The study is based on qualitative interviews (N=19) and a small scale survey (N=128) distributed to representatives from government agencies, NGO's, trade unions and employees in transport companies in the three sectors. We are very thankful to the people who were interviewed and the people who answered our survey.

Beate Elvebakk, Tor-Olav Nævestad and Karen Ranestad have written the report. Beate Elvebakk have conducted most of the interviews, some of them together with Tor-Olav Nævestad. Karen Ranestad has also conducted some of the interviews. Beate Elvebakk has analysed the qualitative and quantitative data.

Fridulv Sagberg is responsible for the quality assurance of the report, while Trude Kvalsvik has prepared the report for publication.

Oslo, April 2017

Institute of Transport Economics

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Managing director

Fridulv Sagberg
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Summary

Work-related accidents in Norwegian road, sea and air transport: Roles and responsibilities

TOI Report 1567/2017

Authors: Beate Elvebak, Tor-Olav Navestad & Karen Ranestad
Oslo 2017 68 pages English language

The study examines regulatory authorities' and transport companies' knowledge of and sources of information about work-related accidents, views on risk factors related to work-related accidents, and understandings of roles and responsibilities in relation to work-related risk factors and -accidents. The main finding of the present study is that the road sector seems to perform poorer than the maritime sector and inland helicopter operations on these three aspects of accident prevention. As a consequence, respondents from the road sector rate their own efforts to prevent work-related accidents as lower than respondents from the other sectors. 19 qualitative interviews were conducted with 22 people from companies, authorities, voluntary organisations and others from the road, sea and air transport sector. Also, a small-scale web-based survey (N=128) was distributed to representatives from government agencies, NGOs and employees in transport companies in the three sectors. The study summarizes regulatory practices and thoughts from respondents from the different sectors on what factors contribute to risk in their sector. Finally, it concludes with suggestions on how the road sector can improve on these three aspects of risk prevention by learning from the other two sectors.

Background and aims

Work-related accidents refer to accidents involving transport operators at work, both employees and self-employed transport operators. Work-related risk factors are all factors that can be traced to transport operators' work situation, and which may influence transport safety.

According to the accident statistics, substantial shares of accidents in road and maritime transport are work-related, but knowledge is lacking on the relationship between accidents and work-related risk factors in transport organisations. A recent Norwegian study shows that 36 % of fatal road accidents in Norway from 2005 to 2010 involved at least one driver who was "at work" at the time of the accident (Phillips & Meyer 2012). In 2010, 495 maritime accidents were registered by the Norwegian Maritime Authority (NMA) (2011). About half of these were labelled work/personnel accidents. Excluding offshore helicopter operations, nearly 20 years have passed since the last accident involving serious passenger injury or death on a Norwegian scheduled flight operation (Civil Aviation Authority 2013a). However, inland helicopter operations has for several years been considered to be the most accident prone sector within commercial aviation. Inland helicopter operations in this study do not include ambulance and police helicopters, military, foreign and offshore operators. Inland helicopter operations have 10 times higher risk than offshore helicopters.

An important precondition of the prevention of work-related accidents is that regulatory authorities and transport companies recognize the importance of work-related risk factors and see it as their responsibility to implement measures to prevent them.

The main aims of the study are to examine regulatory authorities' and transport companies':

- 1) Knowledge of and sources of information about work-related accidents
- 2) Views on risk factors related to work-related accidents
- 3) Understandings of roles and responsibilities in relation to work-related risk factors and -accidents.

The study documented in this report is part of a larger research project “Work-related accidents in road, sea and air transport: Prevalence, causes and measures”, financed by the TRANSIKK program of the Research Council of Norway. The project lasts for 3 years and 4 months, from March 2014 to July 2017.

Data sources and methods

We have conducted 19 qualitative interviews with 22 people to gain knowledge on the aims of the study. Interviewees were selected from transport companies, government agencies, regulatory authorities, accident investigation groups, NGOs, and other relevant actors from the road, maritime and aviation sector. A small-scale web-based survey was distributed to representatives from government agencies, NGO's, trade unions and employees in transport companies in the three sectors. 128 people responded to the survey.

Sources of information about work-related accidents

In order to prevent work-related accidents, it is essential that regulatory agencies have access to information about the prevalence and causes of accidents. The magnitude and type of available information about work-related accidents is also important because this information serves to frame the problem: Without information about organisational factors which may influence safety outcomes, it is unlikely that measures aimed at such factors will be developed. It is necessary with knowledge about the prevalence and causes of work-related accidents in order to develop targeted measures and campaigns, and assess the efficacy of measures. We found that the extent to which this is the case, varies considerably between sectors. The survey asked respondents from public agencies whether their organisations have knowledge of the extent of work-related accidents in the sector. Overall, 38 % answered “Yes”, 10 % “No”, and 52 % “To some extent”. Figure S.1 shows results by sector.

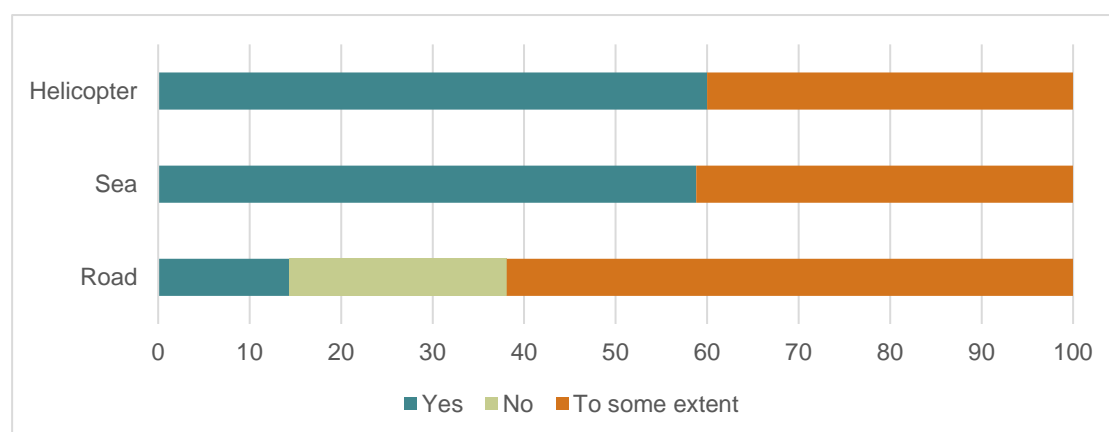


Figure S.1: Knowledge of extent of work-related accidents in the sector by sector. Percent (N=41)

The road sector was the sector with the lowest share of positive responses to this question about the extent of work-related accidents. This also applies to a related question about knowledge about accident causes.

Previous studies have recommended that work-related risk factors should be included in the database of the Accident Analysis Groups of the Norwegian Public Roads Administration, and that this database also should include a variable to identify drivers at work (Phillips & Meyer 2012; Nævestad & Phillips 2013). Such a measure could improve the knowledge about work-related accidents in the road sector. Interviewees also indicated that the quality of the Norwegian Maritime Authority database could be improved when it comes to causes. Generally, our study indicate that under-reporting of work-related accidents is a significant challenge in all studied sectors.

Views on risk factors related to work-related accidents

An important question for determining and defining responsibility and liability is what the causes of accidents are. Our study indicates that a vast majority of respondents across sectors, positions and organisations, regard risk factors related to operators/individual employees to be the most important cause of work-related accidents in their sector.

Furthermore, interviews indicate that in all the three sectors, small companies were mentioned as a possible risk factor, as they might lack the necessary resources or competence to focus on safety.

As previous research has shown that framework conditions may influence the safety level in transport industries, the survey included several questions measuring how respondents perceive framework condition to influence the level of safety in their sector. Survey data indicates that competition was viewed as the most important framework condition influencing safety in all three transport sectors.

Our previous research has also shown that the number of work-related accidents have been reduced in all the three sectors studied. Respondents were therefore asked to state what they believed to be the causes of this reduction. They believed safety improvement to be a consequence of targeted efforts, rather than random fluctuations or societal trends, especially the efforts of companies and operators. Respondents from the road sector, however, tend to place less emphasis on the safety efforts of companies and employees and more on technological development as a cause of improvement.

Understandings of roles and responsibilities

While risk factors say something about where efforts can be made to prevent future accidents, they do not in themselves locate responsibility for accidents. The survey therefore included questions about who is primarily responsible for the *occurrence* and for the *prevention* of work-related accidents; employees, company management, or authorities. Responsibility for the occurrence of work-related accidents is related to what Fahlquist (2006) refers to as blame responsibility, while responsibility for prevention is related to forward-looking responsibility.

Results indicate that a majority of respondents across sectors (55 %) believed the individual employee to be primarily responsible for the *occurrence* of work-related accidents, but 38 % held transport company managers responsible, and 7 % the authorities. This is in line with respondents' view on causes mentioned in the previous section; that risk factors related to

operators/individual employees is the most important cause of work-related accidents in their sector. A higher proportion of respondents from public agencies held companies primarily responsible.

When asked who is primarily responsible for the *prevention* of work-related accidents, the majority (64 %) believed transport company management to be primarily responsible for preventive efforts. Thus, respondents tended to attribute blame-responsibility to the individual operators and forward-looking responsibility to transport companies.

Respondents from the road sector, in particular, seem to put more emphasis on the responsibility of the individual operator than the other transport sectors. This is interesting, as research indicates that the risk of work-related accidents in transport is also influenced by operators' organisations and the framework conditions (e.g. regulating authorities, rules, competition) of these organisations (Nævestad et al., 2015). Thus, respondents could hypothetically have given transport organisations more blame-responsibility for the occurrence of work-related transport accidents.

Focus on the operator in the road sector

In the road sector, informants put more emphasis on the responsibility of the individual operator than informants in the other transport sectors. It was noted by informants that presently, drivers usually carry the entire responsibility due to the Road Traffic Act (Vegtrafikkloven). This approach differs from what is found in other parts of professional life. Informants pointed out that according to the Working Environment Act, employers have a wide-ranging responsibility for their workers' safety, but that this is rarely enforced in practice. On the other hand, the Road Traffic Act, which places all responsibility with the driver, is enforced through controls and in police investigations.

The Road Traffic Act seems to shape and legally frame the attribution of responsibility when it comes to road traffic accidents. This leads to blame-responsibility of the individual drivers when investigating accidents, instead of forward-looking responsibility where accountability is placed partly on the employer of the driver. Thus, it seems that in the road sector, responsibility is legally framed towards the driver rather than the employer, in contrast to the maritime sector, where for example the Maritime Safety Act focuses more on the shipping company's responsibility than the responsibility of the captain.

In conclusion, it seems that the "person view" on accident causation is more prevalent in the road sector than in the maritime sector and in inland helicopter operations, which lean more to the "system view" (Reason, 2000). There is a long-standing debate between safety researchers who point to risky operator behaviours to explain work place accidents, and researchers who hold that risky behaviours to a great extent are influenced by contextual factors. Reason (2000) refers to these two diverging positions as the person approach and the system approach, stating that each has its model of error causation and that each model gives rise to quite different philosophies of error management. According to the person approach, unsafe acts are primarily the result of inadequate mental processes like forgetfulness, inattention, poor motivation, carelessness, negligence, and recklessness. Accordingly, the counter measures that this view gives rise to aim to reduce unwanted variability in human behaviour, e.g. poster campaigns with information, procedures governing behaviour and disciplining measures.

The systems approach on the other hand, is based on the premise that it is human to err and that human errors are expected. The system approach views errors as consequences, rather than causes, and human errors are explained in light of systemic causes rather than a fallible human nature. As a consequence, the systems approach gives rise to prevention

strategies focusing on building “error tolerant” systems, e.g. introducing system defences involving barriers at many different levels: technological, organisational, cultural.

Unclear responsibilities in the road sector

Some of the informants in the road sector did not find responsibility to be sufficiently clearly defined for work-related road accidents. Others believed that in theory, responsibilities were well-defined, but that the practical follow-up was inconsistent.

Most of the informants in the road sector believed employers should take more responsibility for their employees’ behaviour. It was noted that presently, drivers usually carry the entire responsibility. This approach differs from what is found in other parts of professional life, where regulations in the Work Environment Act are more heavily applied. As noted, the Working Environment Act, give employers a wide-ranging responsibility for their workers’ safety, which is rarely enforced in practice, as the Road Traffic Act, placing responsibility with the driver, is enforced through controls and in police investigations.

In the survey, we asked whether responsibility for accident prevention was defined clearly enough in current regulations in the sector (cf. Figure S.2). 56 % of respondents across sectors found the responsibility clearly defined, whereas 21 % did not know. 23 % of respondents did not find responsibility to be defined clearly enough.

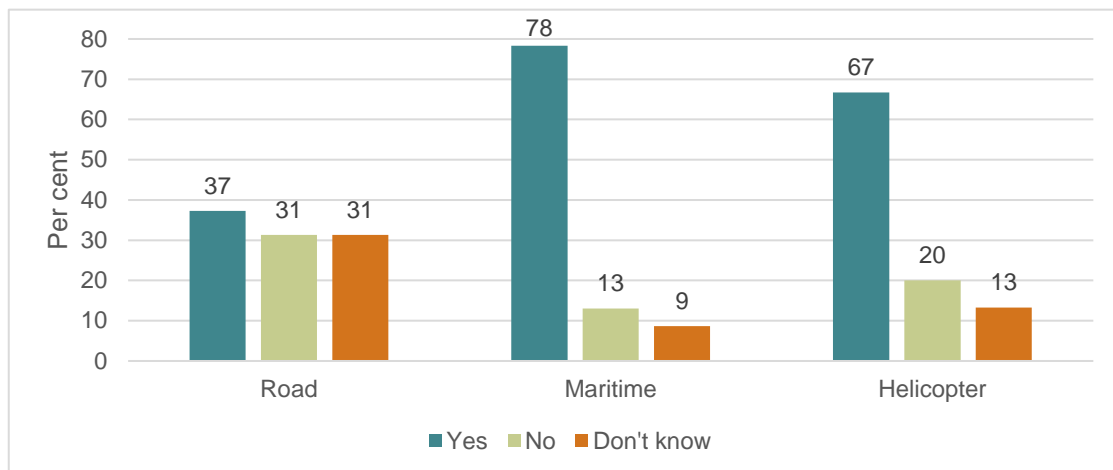


Figure S.2: Is responsibility for accident prevention sufficiently clearly defined in current regulations in the sector? Percent by sector

The road sector stands out with a relatively low share of respondents stating that responsibility is defined clearly enough; 37 %, versus 67 % in inland helicopter operations and 78 % in the maritime sector. The road sector also had a larger percentage of respondents stating that they do not know.

Respondents who explained their answers, pointed to the relationship between drivers and their organisations and/or their customers. The main concern was stress or pressure as a result of short deadlines, and the fact that drivers are held responsible even though they are not the ones defining route and speed. Additionally, several respondents saw the (legal) responsibility as a problem because it provides an opportunity for other stakeholders (managers or customers) to ignore their influence and liability. Thus, it seems that we see a distinction between legal versus practical accountability in the road sector.

What can the road sector learn from sea and air?

The road sector seems to perform poorer than the maritime sector and inland helicopter operations on the three aspects of accident prevention that we have examined in this report. Respondents from the road sector rate their own efforts to prevent work-related accidents as lower than respondents from the other sectors (cf. Figure S.3).

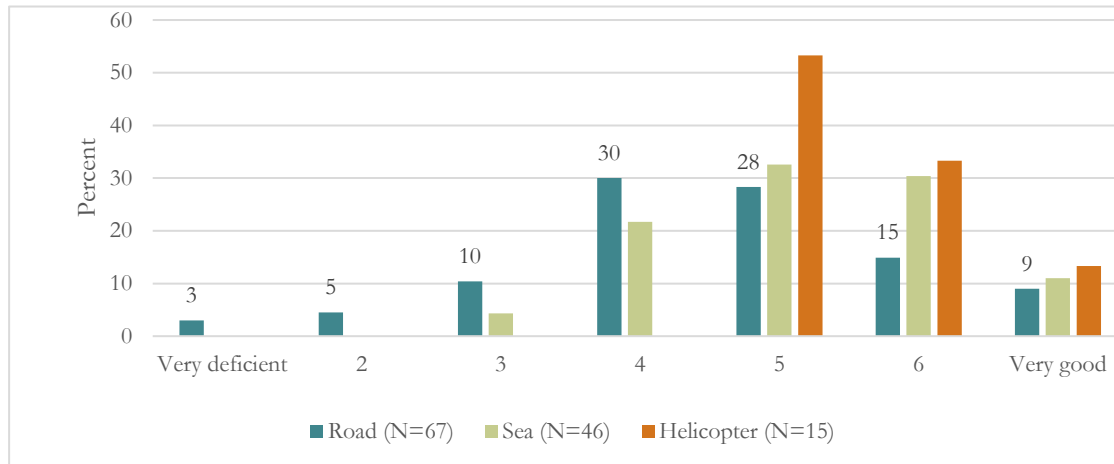


Figure S.3: How would you rate your own organisations' work with work-related accidents on a scale from 1 (=very deficient) to 7 (=very good), by sector. Percent (N=128)

In conclusion, it seems that efforts aiming to clearly define the responsibility for prevention of work-related accidents in the road sector are needed. Given that clearly defined responsibilities are a premise of effective prevention, we could assume that this would improve the efforts to prevent work-related accidents in the road sector.

Thus, given that the maritime respondents scored high on the questions related to a “clearly defined responsibility for work-related accidents”, perhaps the road sector could learn from the legislation in the maritime sector. In the road sector, transport operators seem to carry more responsibility than what is found in other parts of professional life.

One informant believed that regulations similar to those in the oil industry should be introduced for transport assignments, so that the largest actor involved (the actor hiring contractors) is responsible for safety for all contracting companies. Today, it is possible to avoid the regulations from the Working Environment Act through hiring drivers as independent contractors. Another solution to this, could be giving independent contractors requirements beyond those they face today.

Towards a system-based approach in the road sector?

The regulatory regimes in transport have been moving in the direction of more system-based approach, where they introduce ‘meta-rules’ that specify how organisations should deal with risk, for example by specifying the establishment of risk management systems that may include methodologies and processes of risk assessment (Kringen, 2009). System-based regulations focus on the process or system (May, 2007), and assess whether the systems that are put into place are acceptable in order to control for example risk. The authorities in the maritime and inland helicopter sector have a system-based approach to safety, where accountability is placed with the organisation, rather than the individual (Elvebakk, 2015). This is reflected in the laws and regulations in the maritime and aviation

sector, which are primarily based on functional international regulations which place much of the responsibility on the transport employer and infrastructure owner.

The Road Supervisory Authority is aware of their role as a system-based regulatory authority, but see it as a challenge to audit based on this approach because of the lack of international regulations in their sector, and the fact that the rules and regulations in the NPRA are mostly prescriptive, based on technical specifications in different handbooks rather than functional requirements (Elvebakk, 2015).

Furthermore, accountability is a central issue in safety work, as regulations typically task certain actors with the responsibility of securing the quality of a given service, and these actors are accountable to the authorities. Defining and designating relations of accountability, is therefore essential to the authorities' safety work. This is a challenge for the newly established Road Supervisory Authority (2012). An informant from the Authority observed in a recent study (Elvebakk, 2015) that they have a limited amount of safety regulations related to management, and that their inspections and recommendations were more readily understood by those working on a higher level in the NPRA, who are probably more used to thinking in terms of organisation and management tools. Also, the Road Supervisory Authority is responsible for supervising and regulating the NPRA, but at the same time are part of and report to the NPRA, so they have a limited authority and impact when it comes to recommendations and sanctions (Elvebakk, 2015). However, in January 2017 the Road Supervisory Authority became an independent regulatory authority, under the Ministry of Transport and Communication (Samferdselsdepartementet, 2016, 2017). It has been suggested that this will allow them to sanction the NPRA and follow up regulations in a more efficient manner than they could when they were subordinate to the NPRA. Further focus on a system-based approach, where both the infrastructure owner (NPRA), the transport organisations and clients are held accountable for organisational factors which may lead to work-related accidents, may shift the responsibility and accountability from the operators to organisations. A stronger focus on the fulfilment of requirements from the Work Environment Act may be a step in the right direction.

Measures to improve reporting rates in all sectors

In Sweden and Denmark, risk-based industries have a shared internet-portal for employers to report incidents, and this information is available to all relevant public authorities. In Norway, however, all authorities maintain their own registers, and one informant saw this sharp sectorial division as a problem, as it made learning across sectors more difficult.

Other suggested measures to improve the knowledge-base in the area included a coordinated effort from several authorities to make the police improve their reporting practices, and attempts to supplement police-reported data with other sources, such as research and information from insurance companies. One suggested approach was to try to create a more complete picture for certain groups, and use this as a basis for estimates for the total population.

Sammendrag

Arbeidsrelaterte ulykker i norsk veg-, sjø- og lufttransport: roller og ansvar

TØI rapport 1567/2017

Forfattere: Beate Elvebakke, Tor-Olav Navestad & Karen Ranestad

Oslo 2017 68 sider

Denne studien utforsker myndigheters og transportselskapers kunnskap om og kilder til informasjon om arbeidsrelaterte ulykker, syn på risikofaktorer knyttet til slike ulykker, og forståelse av roller og ansvar koblet til arbeidsrelaterte faktorer og ulykker innen tre ulike transportsektorer. Hovedfunnet i denne studien er at vegsektoren ser ut til å prestere dårligere enn maritim sektor og sektor for lett innlandshelikopter på disse tre aspektene ved ulykkesforebygging. Respondentene fra vegsektoren rangerte egen innsats knyttet til forebygging av arbeidsrelaterte ulykker lavere enn respondenter fra andre sektorer. Vi har utført 19 kvalitative intervjuer med 22 eksperter fra ulike myndighetsorganer, bedrifter, ikke-statlige organisasjoner og andre aktører innen veg, sjø og luftfart. I tillegg ble et spørreskjema (N=128) sendt til representanter fra myndighetsorganer, ikke-statlige organisasjoner og ansatte fra transportselskaper i de tre sektorene. Studien oppsummerer lovgivning og myndighetspraksis, samt tanker respondenter fra de ulike transportsektorene har rundt hvilke faktorer som bidrar til risiko i deres sektorer. Til slutt foreslår studien hvordan vegsektoren kan forbedre egen praksis innen risikoforebygging ved å se til lovgivning og praksis i de to andre sektorene.

Bakgrunn og mål

Arbeidsrelaterte ulykker er ulykker som involverer transportoperatører i arbeid, både ansatte og selvstendig næringsdrivende. Transportoperatører refererer til sjåfører i arbeid, folk som jobber på skip og helikopteroperatører. Arbeidsrelaterte risikofaktorer er faktorer som kan kobles til transportoperatørers arbeidssituasjon, og som kan påvirke transportsikkerhet.

I følge ulykkesstatistikk er en betydelig andel transportulykker på veg og sjø arbeidsrelaterte ulykker, men det mangler kunnskap om sammenhengen mellom ulykker og arbeidsrelaterte risikofaktorer i transportorganisasjoner. En studie gjennomført i Norge viste at sjåfører som var «på jobb» på ulykkestidspunktet var innblandet i 36 % av dødsulykker på veg i Norge mellom 2005 og 2010 (Phillips & Meyer, 2012). Sjøfartsdirektoratet (2011) registrerte 495 sjøulykker i 2010. Omtrent halvparten av disse ble karakterisert som arbeidsulykker. Når vi ser bort fra offshore helikopter, er det nesten 20 år siden noen ble alvorlig skadet eller døde i en kommersiell passasjerflyulykke (Luftfartstilsynet, 2013a). Imidlertid har lett innlandshelikopter i flere år blitt betraktet som den mest ulykkes utsatte sektoren innen kommersiell luftfart. Innenlands helikopter i denne rapporten inkluderer ikke luftambulans, politihelikopter, militære, utenlandske og offshore helikopter. Arbeidsoperasjoner med lett innlandshelikopter er ti ganger mer risikoutsatt enn offshore helikopter.

En viktig forutsetning for å forebygge arbeidsrelaterte ulykker er at tilsynsmyndigheter og transportselskaper anerkjenner viktigheten av arbeidsrelaterte risikofaktorer, og ser på det som deres ansvar å implementere tiltak for å forebygge disse.

Hovedformålene med denne studien er å undersøke tilsynsmyndigheters og transportselskapers:

- 1) Kunnskap om og kilder til informasjon om arbeidsrelaterte ulykker
- 2) Syn på risikofaktorer knyttet til arbeidsrelaterte ulykker
- 3) Forståelse av roller og ansvar knyttet til arbeidsrelaterte faktorer og -ulykker.

Datakilder og metoder

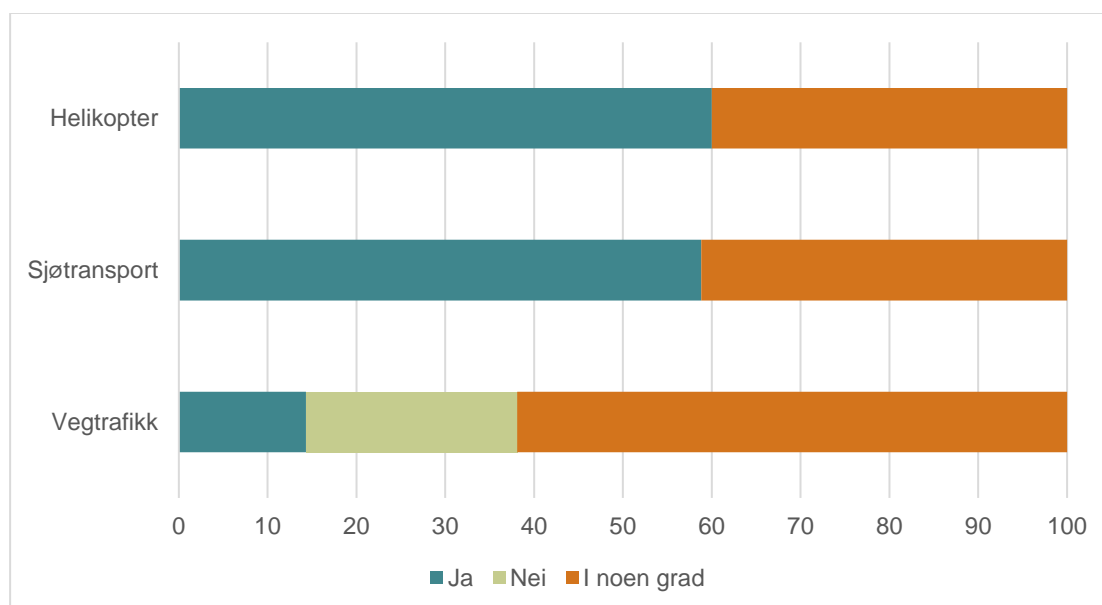
Vi har utført 19 kvalitative intervjuer med 22 eksperter for å få kunnskap om målene for studien. Ekspertene ble plukket ut fra ulike myndighetsorganer, bedrifter, interesseorganisasjoner og andre aktører innen veg, sjø og luftfart.

Et spørreskjema ble sendt til representanter fra ulike myndighetsorganer, ulykkesgranskingsgrupper, transportbedrifter, ikke-statlige organisasjoner og fagforeninger i de tre sektorene. 128 personer svarte på spørreskjemaet.

Kilder til informasjon om arbeidsrelaterte ulykker

For å forhindre arbeidsrelaterte ulykker er det avgjørende at tilsynsmyndigheter har tilgang til informasjon om forekomsten av og årsaken til ulykker. Mengden og typen tilgjengelig informasjon om arbeidsrelaterte ulykker er også viktig fordi det er usannsynlig at målrettede tiltak kan bli utviklet uten informasjon om organisatoriske faktorer som påvirker sikkerhetsutfall. Kunnskap om forekomsten av, og årsaker til arbeidsrelaterte ulykker er nødvendig for å utvikle målrettede tiltak og kampanjer, og for å evaluere effekten av tiltak. Vi finner vesentlig variasjon mellom sektorene når det gjelder dette.

I spørreskjemaet spurte vi respondenter fra myndighetsorganer hvorvidt deres organisasjoner har kunnskap om omfanget av arbeidsrelaterte ulykker i sektoren. Alt i alt svarte 38 % «Ja», 10 % «Nei», og 52 % «I noen grad». Figur S.1 viser resultatene per sektor.



Figur S.1: Kunnskap om omfanget av arbeidsrelaterte ulykker i sektoren per sektor. Prosent (N=41)

Vegsektoren er sektoren med lavest andel positive svar knyttet til spørsmålet om man kjenner omfanget av arbeidsrelatert ulykker i sektoren. Dette gjelder også for spørsmålet om man kjenner omfanget av arbeidsrelaterte ulykkesårsaker.

Tidligere studier har anbefalt at arbeidsrelaterte risikofaktorer bør inkluderes i UAG databasen, og at denne databasen bør ta med en variabel for å identifisere sjåfører i arbeid (Phillips & Meyer 2012; Nævestad & Phillips 2013). Et slikt mål vil kunne øke kunnskapen om arbeidsrelatert ulykker i vegsektoren. Informantene antydde også at datakvaliteten til Sjøfartsdirektoratets database kunne vært forbedret når det gjelder årsaker. Generelt antyder studien vår at underrapportering av arbeidsrelaterte ulykker er en vesentlig utfordring i alle tre sektorene.

Syn på risikofaktorer knyttet til arbeidsrelaterte ulykker

For å kunne fastsette og definere ansvar er det viktig å avdekke ulykkesårsaker. Studien vår antyder at flesteparten av respondentene, på tvers av sektorer, stillinger og organisasjoner, anser risikofaktorer knyttet til operatører eller hver enkelt ansatt som den viktigste årsaken til arbeidsrelaterte ulykker i sine sektorer.

Videre indikerer intervjufunnene fra alle tre sektorer at små bedrifter er en mulig risikofaktor fordi disse kanskje mangler tilstrekkelige ressurser eller kompetanse til å kunne fokusere tilstrekkelig på sikkerhet.

Siden tidligere forskning antyder at rammebetingelser kan påvirke sikkerhetsnivået i transportindustrien, inkluderte spørreskjemaet flere spørsmål som målte hvordan respondentene oppfatter at rammebetingelser påvirker sikkerhetsnivået i deres sektor. Resultatene fra spørreskjemaene fra alle tre sektorene tyder på at konkurranseutsetting ble oppfattet som den viktigste rammebetingelsen som har innvirkning på sikkerhet.

Vår tidligere forskning har også vist at antallet arbeidsrelaterte ulykker har blitt redusert i alle tre sektorer (Nævestad m.fl. 2015). Respondentene ble derfor spurt om å beskrive hva de mente var årsaken til denne reduksjonen. De mente at sikkerhetsforbedringene skyldtes målrettede tiltak fremfor tilfeldige variasjoner og samfunnstrender, spesielt pekte de på tiltak innført av bedrifter og operatører. Imidlertid hadde respondentene i vegsektoren en tendens til å vektlegge betydningen av teknisk utvikling fremfor sikkerhetsarbeidet til bedrifter og ansatte.

Forståelse av roller og ansvar

Risikofaktorer kan gi en pekepinn på hvor man bør satse på tiltak for å forhindre fremtidige ulykker, men de peker ikke nøyaktig på hvor ansvaret for ulykkene ligger. Spørreskjemaet inneholdt derfor spørsmål om hvem som har hovedansvaret for *forekomsten* og hvem som har hovedansvaret for *forebygging* av arbeidsrelaterte ulykker; ansatte, bedriftsledelsen, eller myndighetene. Ansvar for *forekomsten* av arbeidsrelaterte ulykker er knyttet til det Fahlquist (2006) kaller «blame responsibility», mens ansvar for *forebygging* er knyttet til «forward-looking responsibility».

Resultatene indikerer at hovedparten av respondentene på tvers av sektorene (55 %) mente at hver enkelt ansatt har hovedansvaret for *forekomsten* av arbeidsrelaterte ulykker, 38 % mente ansvaret lå hos transportbedriftenes ledelse, og 7 % mente myndighetene hadde ansvaret. Dette er i tråd med respondentenes syn på årsaker: Risikofaktorer knyttet til operatørene som den viktigste årsaken til arbeidsrelaterte ulykker i deres sektor. En større andel av respondenter fra myndighetsorganer mente bedriftene var ansvarlige.

Flesteparten (64 %) mente at bedriftsledelsen var hovedansvarlig for tiltak knyttet til forebygging av ulykker. Dermed hadde respondenter en tendens til å tilskrive den enkelte operatør ansvaret for forekomsten av arbeidsrelaterte ulykker («blame-responsibility»), og attribuere ansvaret for forebygging av arbeidsrelaterte ulykker («forward-looking responsibility») til arbeidsgiver. Sammenlignet med andre sektorer, la respondenter fra vegsektoren særlig stor vekt på ansvaret til den enkelte operatør.

Dette er et paradoks, siden forskning antyder at risiko for arbeidsrelaterte ulykker innen transport også påvirkes av operatørens organisasjoner og rammebetingelser (f.eks. tilsynsmyndigheter, regler og konkurranse) i disse organisasjonene (Nævestad m.fl. 2015). Dermed kunne respondentene, hypotetisk sett, gitt transportorganisasjonene mer «blame-responsibility» med tanke på arbeidsrelaterte ulykker.

Sjåførfokus i vegsektoren

I vegsektoren la informantene mer vekt på ansvaret til den enkelte operatør enn de andre transportsektorene. Informantene bemerket at per i dag ligger vanligvis hele ansvaret hos den enkelte sjåfør på grunn av Vegtrafikkloven. Denne ansvarliggjøringen av individet skiller seg fra det som er funnet i andre deler av arbeidslivet. Informantene påpekte at i henhold til Arbeidsmiljøloven, så har arbeidsgiver et omfattende ansvar for sin arbeidstakers sikkerhet, men at dette sjelden håndheves i praksis når det gjelder arbeidsrelaterte trafikkulykker. På den annen side blir Vegtrafikkloven, som plasserer alt ansvar hos sjåføren, regelmessig håndhevet gjennom kontroller og politietterforskning.

Vegtrafikkloven ser ut til å forme og juridisk sett ramme inn tillegnelsen av ansvar ved vegtrafikkulykker. Som oftest får den enkelte sjåfør skylden ved en ulykkesetterforskning, i stedet for at arbeidsgiver blir delvis ansvarliggjort. Dermed ser det ut til at ansvaret juridisk sett er vinklet mot føreren i stedet for arbeidsgiver i vegsektoren, i motsetning til hvordan ansvaret tillegges i maritim sektor, der for eksempel lovverket fokuserer mer på rederiets ansvar enn ansvaret til kapteinen.

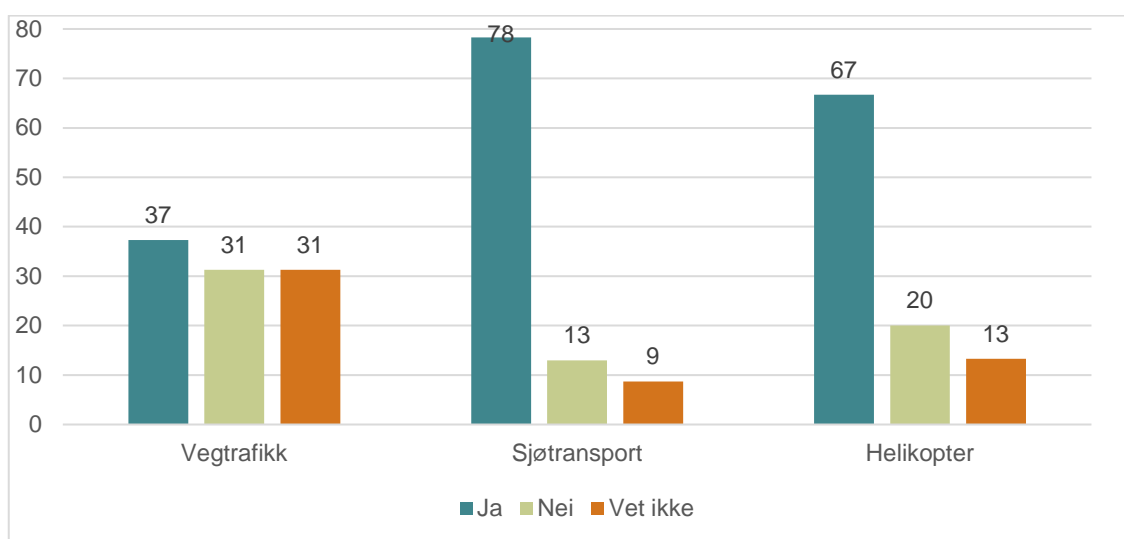
For å konkludere, ser det ut til at vegsektoren i større grad har et personfokus («person view») når det gjelder forklaring av ulykkesårsaker enn maritim sektor og innenlandshelikopter, som heller mer mot et systemfokus («system view») (Reason, 2000). En langvarig debatt foregår mellom sikkerhetsforskere, der den ene siden peker mot risikabel operatørferd for å forklare arbeidsulykker, mens andre forskere mener at risikofylt atferd i stor grad er påvirket av kontekstuelle faktorer. Reason (2000) refererer til disse to avvikende posisjonene som hhv personbasert tilnærming og systembasert tilnærming, og sier videre at hver av disse standpunktene har sin feilårsaksmodell og at hver modell gir opphav til helt forskjellige filosofier med tanke på håndtering av menneskelige feil. Ifølge persontilnærmingen er utrygge handlinger først og fremst et resultat av utilstrekkelige mentale prosesser, som glemsel, uoppmerksomhet, dårlig motivasjon, uforsiktighet, uaktsomhet og hensynsløshet. Tiltak som den personbaserte tilnærmingen ønsker å innføre vil ha som mål å redusere uønsket variasjon i menneskelig atferd, f.eks. plakatkampanjer med informasjon, prosedyrer som styrer atferd og disiplinerende tiltak. Systemtilnærmingen, på den annen side, er basert på premisset om at det er menneskelig å feile, og at menneskelige feil er å forvente. Systemtilnærmingen ser på menneskelige feil som konsekvenser av, snarere enn årsakene til, ulykker, og forklarer menneskelige feil i lys av systemiske årsaker snarere enn en feilbarlig menneskelig natur. Systemtilnærmingen gir opphav til forebyggende strategier med fokus på å bygge systemer som tolerer feil, f.eks. å innføre teknologiske, organisatoriske og kulturelle barrierer på mange ulike nivå (Reason 2000).

Uklare ansvarsforhold i vegsektoren

Noen av informantene i vegsektoren mente at ansvaret for arbeidsrelaterte ulykker ikke var tilstrekkelig tydelig definert. Andre mente at ansvaret var godt definert i teorien, men at den praktiske oppfølgingen var inkonsekvent.

De fleste informantene i vegsektoren mente at arbeidsgivere burde ta mer ansvar for de ansattes atferd. Det ble påpekt at det per i dag var sjåførene som bar på det meste av ansvaret. Dette er en tilnærming som skiller seg fra det vi finner i andre deler av arbeidslivet, der krav i Arbeidsmiljøloven i større grad legges til grunn.

I spørreundersøkelsen spurte vi om ansvaret for forebygging av ulykker var tilstrekkelig tydelig definert i gjeldende lovverk i sektoren (se Figur S.2). Totalt 56 % av respondentene på tvers av sektorer mente at ansvaret var tilstrekkelig tydelig definert, mens 21 % visste ikke. 23 % av respondentene mente at ansvaret *ikke* var tilstrekkelig tydelig definert.



Figur S.2: Er ansvaret for forebygging av ulykker tilstrekkelig tydelig definert i gjeldende lovverk i sektoren? Prosent per sektor. (N=128)

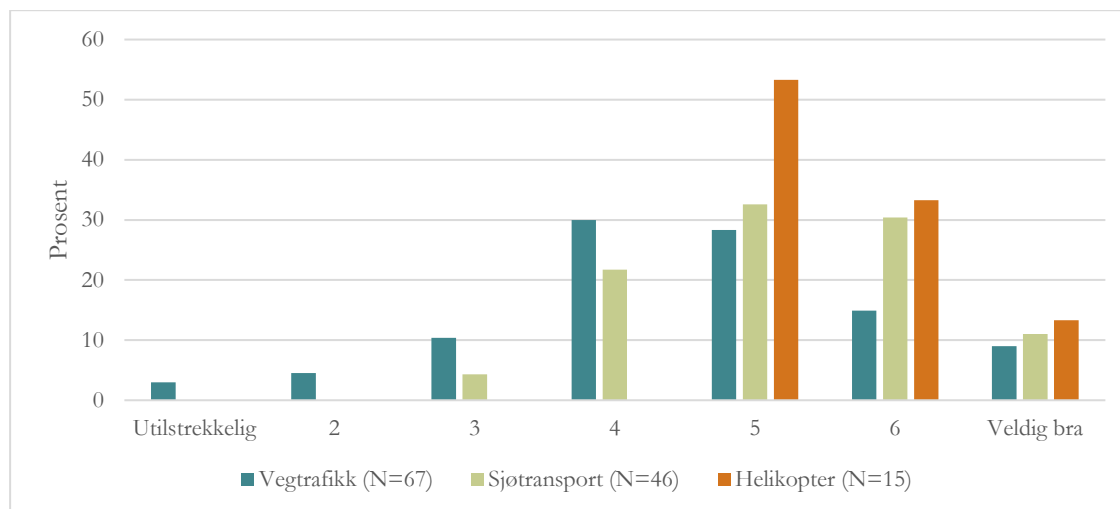
Vegsektoren skiller seg fra andre sektorer med at relativt få respondenter mener at ansvaret er tilstrekkelig tydelig definert (37 %). I motsetning til dette svarte 67 % av respondentene fra innlandshelikoptersektoren og 78 % i maritim sektor at ansvaret er tilstrekkelig tydelig definert. Vegsektoren hadde også en større andel respondenter som sa de ikke visste.

Respondentene i vegsektoren som utdypet svarene sine i fritekstfeltet pekte på forholdet mellom sjåfører og deres bedrifter og/eller kunder. Hovedbekymringen var stress eller press som et resultat av korte frister, og det at sjåfører blir holdt ansvarlig selv om de ikke er ansvarlige for å definere kjørerutene eller hastigheten. I tillegg mente flere respondenter at det (rettslige) ansvaret er et problem fordi det åpner for at andre interessenter (ledere og kunder) kan se bort fra sin innflytelse og ansvar for trafikksikkerheten. Dermed ser det ut til å være et skille mellom rettslig og praktisk ansvar i vegsektoren.

Hva kan vegsektoren lære av sjø- og luftfart?

Vegsektoren ser ut til å prestere dårligere enn maritim sektor og lette innlandshelikopter når det kommer til de tre aspektene ved ulykkesforebygging som vi har undersøkt i denne rapporten. Respondentene fra vegsektoren rangerte sin egen innsats når det gjelder å

forebygge arbeidsrelaterte ulykker som lavere enn respondentene fra andre sektorer (se Figur S.3).



Figur S.3: Hvordan vil du rangere din egen organisasjon sitt arbeid med arbeidsrelaterte ulykker på en skala fra 1 (=utilstrekkelig) til 7 (=veldig bra), per sektor. Prosent. Gjennomsnitt (N=128).

Resultatene tyder på at er behov for å tydeliggjøre ansvarsforhold når det gjelder forebygging av arbeidsrelaterte ulykker i vegsektoren. Siden en tydelig ansvarsfordeling er en forutsetning for effektiv forebygging, kan vi anta at en slik tydeliggjøring vil kunne forbedre arbeidet med forebygging av arbeidsrelaterte ulykker.

Gitt mangelen på tydelig ansvarsfordeling i vegsektoren kan det se ut til at vegsektoren kan lære noe fra lovgivningen innen maritim sektor. Resultatene tyder på at den enkelte operatør i vegsektoren bærer på et større ansvar enn ansatte i andre deler av arbeidslivet, primært på grunn av Vegtrafikkloven.

En informant mente at transportoppdrag i vegsektoren burde ta til seg noen av prinsippene fra lovverket i oljesektoren, slik at den største aktøren (aktøren som kontraherer leverandører) er ansvarlig for sikkerhet i alle leverandørselskapene. I dag er det mulig å unngå kravene i Arbeidsmiljøloven ved å hyre inn sjåfører som uavhengige leverandører. En annen mulig løsning er å stille strengere krav til uavhengige leverandører. Det å gi tansportkjøpere større ansvar for trafiksikkerhet ble også nevnt.

Mot en systembasert tilnærming i vegsektoren

Tilsynsmyndigheter i transportsektoren har beveget seg mot en mer systembasert tilnærming til tilsyn, der de introduserer 'meta-regler' som spesifiserer hvordan organisasjoner skal håndtere risiko, for eksempel ved å kreve etablering av risikostyringssystemer som inkluderer metoder og prosesser for risikovurdering (Kringen, 2009). Systembasert tilsyn fokuserer på prosesser eller systemer (May, 2007), og vurderer hvorvidt implementerte systemer er akseptable med tanke på å kontrollere for eksempel risiko. Tilsynsmyndigheter innen sjø og luftfart har en systembasert tilnærming til sikkerhet, der ansvaret er plassert hos organisasjonen fremfor hos den enkelte operatør (Elvebakk, 2015). Dette er gjenspeilet i lover og forskrifter i sjø- og luftfartssektoren, som hovedsakelig plasserer ansvaret hos arbeidsgiver og infrastruktureier.

Vegtilsynet er klar over sin rolle som et systembasert tilsynsorgan, men ser det som utfordrende å utføre systembasert tilsyn fordi vegsektoren ikke er regulert av internasjonale lover og avtaler. Videre er det utfordrende fordi Statens vegvesen for det meste følger normative regler i ulike håndbøker som er basert på tekniske spesifikasjoner fremfor funksjonsbaserte krav (Elvebakk, 2015).

Ansvar er et sentralt tema innen sikkerhetsarbeid fordi bestemmelser vanligvis plasserer ansvaret for å sikre kvaliteten til et produkt hos en aktør, og disse aktørene er igjen ansvarlige for å rapportere til tilsynsmyndigheter. Det er dermed vesentlig for tilsynsmyndigheters sikkerhetsarbeid at ansvarsforhold er klart og tydelig definert. En informant fra Vegtilsynet så på dette som en utfordring i et nylig gjennomført studie av tilsynsmyndigheter i transportsektoren (Elvebakk, 2015). Informanten fra Vegtilsynet opplevde at de hadde en begrenset mengde sikkerhetslovgivning knyttet til ledelse og styring, og at deres inspeksjoner og forbedringsforslag ble lettere forstått av ledelsen i Statens vegvesen som mest sannsynlig er mer vant til å forholde seg til organisasjons- og ledelsesverktøy enn av organisasjonen for øvrig. I tillegg var tidligere ansvarlig for å føre tilsyn hos Statens vegvesen, samtidig som de er del av Statens vegvesen organisasjonen og rapporterer til dem, noe som gjorde at de har begrenset autoritet og gjennomslagskraft når det gjelder å gi råd og pålegge sanksjoner (Elvebakk, 2015). Imidlertid ble Vegtilsynet fristilt fra Statens vegvesen i januar, 2017, og er nå et uavhengig tilsynsorgan direkte underlagt Samferdselsdepartementet (Samferdselsdepartementet, 2016, 2017). Det har vært antydnet at dette vil tillate dem å sanksjonere Statens vegvesen og følge opp regelverket på en mer effektiv måte enn de kunne da de var underlagt Statens vegvesen.

Et større fokus på en systembasert tilnærming, hvor både infrastruktureier (Statens vegvesen), transportbedrifter og kunder ansvarliggjøres for organisatoriske faktorer som kan føre til arbeidsrelaterte ulykker, vil kunne endre ansvarliggjøring fra den enkelte operatør til organisasjonene de jobber for. Et større fokus på etterlevelse av kravene i Arbeidsmiljøloven vil kunne være et steg i riktig retning.

Tiltak for å øke graden av rapportering i alle sektorer

I Sverige og Danmark har risikobaserte industrier en felles internettportal der ansatte kan melde fra om ulykker, og denne informasjonen er tilgjengelig for alle relevante offentlige myndigheter. I Norge har imidlertid alle myndighetene hvert sitt register. En informant fra maritim sektor mente at dette skarpe skillet mellom sektorer var et problem fordi det bidro til manglende læring på tvers av sektorer.

Andre tiltak som ble foreslått for å øke kompetansen på området inkluderte:

- En koordinert myndighetsinnsats for å få politiet til å forbedre sin praksis innen rapportering
- Forsøke å supplere politirapporterte data med andre kilder, slik som forskning og informasjon fra forsikringsselskapene

En foreslått tilnærming var å prøve å skape et mer komplett bilde for visse grupper, og bruke dette som grunnlag for estimater for den totale befolkningen.

1 Introduction

1.1 Background

1.1.1 Prevalence of work-related accidents

Statistics Norway's database on police reported traffic accidents with personal injury 2007-2012, indicates that about 287 drivers at work are injured each year in work trips on Norwegian roads (Nævestad, Phillips, & Elvebakk, 2015). Data from investigations of fatal accidents indicate that about 11 drivers at work are killed annually. An average of 1500 people per year are injured in accidents involving drivers at work. Thus, we see that most of the injured road users in accidents involving drivers at work are not at work, and that drivers at work to a lower extent than others are injured in the accidents that they are involved in. About 40 % of the road transport accidents is work-related. This supports an assertion found in EU-research (Copsey et al., 2010).

Nævestad et al. (2015) examined the number of deaths and personal injuries among crew members for fishing vessels, cargo ships and passenger ships with Norwegian (NIS/NOR) and foreign flags in Norwegian waters, and ships with Norwegian flags (NIS) in foreign waters for the period 2004-2013. They found that there were on average 15 dead and 424 injured per year for fishing, cargo and passenger vessels. In comparison, over 30 people are killed in leisure boat accidents each year. European statistics from the European Maritime Safety Agency show that between 2011 and 2013 there were 4015 ship casualties and 1801 occupational accidents reported. Most incidents occurred on cargo ships, followed by passenger ships, service ships and fishing vessels.

Excluding offshore helicopter operations¹, nearly 20 years have passed since the last accident involving serious passenger injury or death on a Norwegian scheduled flight operation (Luftfartstilsynet, 2013). However, inland helicopter operations has for several years been considered to be the most accident prone sector within commercial aviation. Inland helicopter operations in this study do not include ambulance and police helicopters, military, foreign and offshore operators. Inland helicopter operations have 10 times higher risk than offshore helicopters (Bye et al., 2013). Ten crew members were killed and sixteen injured in nineteen inland helicopter operations accidents in the period 2000-2012.

1.1.2 Responsibility and accountability

In work-related accidents, the question of responsibility and accountability is more complex than in other accidents, as a wider range of actors, private and public, are directly or indirectly involved in the transport activity. The complexity is caused by the fact that the operators involved in work-related transport accidents act within an organisational context, and these contexts may be more or less safe, and individual organisations may be more or less geared towards promoting safety. The organisations, in turn, operate within legal, economic and political frameworks which are to some degree defined and enforced by various public agencies. Knowledge about the relations between transport accidents and

¹ A Super Puma offshore helicopter with 13 people on board crashed at Turøy in Hordaland, April 29, 2016.

work-related risk factors is scarce, however, and these risk factors are not properly addressed by transport organisations or regulatory authorities (Bye et al., 2013; Norwegian Maritime Directorate, 2011; Nævestad & Phillips, 2013).

Shared and overlapping areas of responsibility between authorities may also hamper an efficient focus on organisational conditions for transport safety. There are important differences between transport sectors when it comes to how this work is organised and practiced. While neither regulators nor transport companies in the road sector seem to focus much on organisational conditions for transport safety (Nævestad & Phillips, 2013), the aviation industry's exemplary safety level is assumed to result from the strong focus on work-related risk factors among companies and regulators (Hudson, 2003). Light helicopter inland, however, being the aviation transport type with the highest accident risk, faces challenges related to work-related risk factors and framework conditions (Bye et al., 2013; Luftfartstilsynet, 2013). There is also potential for improvement when it comes to the maritime industry's focus on organisational risk factors (Norwegian Maritime Directorate, 2011).

The Norwegian Work Environment Act (WEA) of 1977 requires transport companies to facilitate good transport safety for their employees through their HSE work. The Internal Control (IC) Regulations of 1996 require the managing director of an enterprise to ensure that the enterprise obliges with the WEA and works systematically with HSE. Employees must actively participate in this. Working actively with HSE means for instance to set safety objectives, defining responsibilities, identifying HSE problems, obtaining overviews of laws, planning HSE measures, following up and undertaking annual reviews of the company's HSE work together with safety representatives. Both the WEA and the IC Regulations are largely purpose-based (Kringen, 2009). Such an approach is in line with the new ISO standard 39001 on traffic safety, which represents a new purpose-based proactive approach to safety management in road transport companies.

1.2 Aims

As knowledge is lacking on the relationship between accidents and work-related risk factors in transport organisations, these important risk factors are neither addressed properly by transport organisations, nor by regulatory authorities.

Moreover, an important precondition of the prevention of work-related accidents is that regulatory authorities and transport companies recognize the importance of work-related risk factors and see it as their responsibility to implement measures to prevent them.

The main aims of the study is therefore to examine regulatory authorities' and transport companies':

- 1) Knowledge of and sources of information about work-related accidents
- 2) Views on risk factors related to work-related accidents
- 3) Understandings of roles and responsibilities in relation to work-related risk factors and -accidents.

The study documented in this report is Work Package 2 of a larger research project called "Work-related accidents in road, sea and air transport: prevalence, causes and measures", financed by the TRANSIKK program of the Research Council of Norway. The main aims of the project as a whole are to survey the prevalence, causes and understanding of work-related accidents in road, sea and air transport (inland helicopter operations), and to provide a scientific knowledge base that can be used to develop measures against work-related risk factors. The project lasts from March 2014 to July 2017.

1.3 Abbreviations

This report includes several abbreviations linked to both regulations and authorities. Abbreviations used in this report are listed in the table below in order to facilitate the reading of the report.

Table 1.1: Abbreviations used in this report

Acronym	Definition
AAG	Accident Analysis Group (NPRA)
AIBN	Accident Investigation Board Norway
AIS	Automatic Identification System
CAA	Civil Aviation Authority (Norway)
CEE	Central and Eastern Europe
EASA	European Aviation Safety Agency (EU)
ECDIS	Electronic Chart Display and Information System
EU	European Union
EMSA	European Maritime Safety Agency
HSE	Health, Safety and Environment
IC	Internal Control
ICAO	International Civil Aviation Organisation (UN)
IMO	International Maritime Organisation (UN)
ISM	International Safety Management Code
ISPS	International Ship and Port Facility Security Code
LIA	Labour Inspection Authority (Norway)
MJ	Ministry of Justice (Norway)
MLC	Maritime Labour Convention
MoU	Memorandum of Understanding
MSA	The Maritime Safety Act
MTC	Ministry of Transport and Communication
NCA	Norwegian Coastal Administration
NGO	Non-Governmental Organisation
NIS	Norwegian International Ships Register
NMA	Norwegian Maritime Authority
NOR	Norwegian Ordinary Ship Register
NPRA	Norwegian Public Roads Administration
NTP	National Plan for Transport
SARP	Standards and Recommended Practices
SOLAS	International Convention for the Safety of Life at Sea
STRAKS	Registry on road accidents in Norway, administered by the NPRA
STWC	International Convention on Standards of Training, Certification and Watchkeeping for Seafarers
UN	United Nations
WEA	The Norwegian Working Environment Act

2 Methods

2.1 Key concepts

*Work-related accidents*² refers to accidents involving transport operators at work, both employees driving in connection with their jobs, and self-employed transport operators. The difference between the two is considerable, as working transport operators, unless self-employed, are employed by organisations committed through the Working Environment Act to facilitate good transport safety for their employees through HSE work. Thus, although the context of employed and self-employed transport operators are very different, for instance in terms of safety measures, we focus on both in this report, as several of the databases and investigation reports focus on transport operators “at work” (defined by the purpose of the trip), and do not discern between employed and self-employed.

Risk factors. In this report, we follow the terminology from road safety work, where the term “risk factor”, rather than the term “cause” is normally used to explain accidents (Sørensen, Nævestad, & Bjørnskau, 2010). Risk factors are divided into accident factors and injury factors. Accident factors are factors contributing to the occurrence of the accident, while injury factors are factors contributing to the accident’s serious consequences. Risk factors are also divided into factors associated with safety behaviour of transport operators, technology/vessel/vehicle, work-related risk factors and risk factors related to framework conditions.

Work-related risk factors. Work-related risk factors refer to all factors that are influenced by transport operators’ work situation, and which may in turn influence transport safety. These can be traced back to management and organisation, and also to more general factors which are usually not associated with HSE, e.g. pay systems, work scheduling systems, and organisation of drivers’ contact with forwarding agents and customers (Nævestad & Bjørnskau, 2014).

2.2 Interview data

We have conducted 19 qualitative interviews with 22 people to gain knowledge on the aims of the study. Interviewees were selected from transport companies, the Labour Inspection Authority, the Public Roads Administration, including personnel from the Accident Analysis Groups, the Norwegian Maritime Directorate, the Accident Investigation Board, The Norwegian Coastal Administration, the Civil Aviation Authority, Fly Safety Forum for Inland Helicopter Operations, and other relevant actors.

The interviews were conducted face-to-face, and by telephone. The interviews generally lasted for between one and one and a half hours. We used a semi structured interview

² Work-related accidents are accidents involving transport operators at work, including for example personal accidents aboard ships, accidents related to fishing and accidents related to the loading and unloading for drivers.

guide (cf. Appendix 1), and the themes and questions in the guide focused on the three aims of the study.

The purpose of the interviews was to give us more insight into the interviewees’ understanding of their organisations’ knowledge and information sources about work-related accidents, views on risk factors and thoughts on roles and responsibilities. It is important to note that interviewees were encouraged to “think out loud” and they were assured that the purpose of the interview was to provide us with nuanced viewpoints and thoughts that we cannot collect by means of survey methods. Although the themes in the interviews were fairly similar to those in the survey, the qualitative interviews involved open ended questions which allowed the interviewees to elaborate freely when answering.

2.3 Survey data

A small-scale web-based survey was distributed to representatives from government agencies, NGO’s and employees in transport companies in the three sectors. Relevant representatives from government agencies were identified with assistance from the project’s reference group. The survey was sent to relevant persons in the AIBN, The Ministry of Transport and Communications, The Norwegian Public Road Directorate, The Norwegian Maritime Authority, The Civil Aviation Authority, The Norwegian Labour Inspection Authority, and The Norwegian Public Roads Administration’s Accident Analysis Groups. The survey was sent to transport companies in all three sectors, and they were asked to distribute the survey among elected safety officials and trade union representatives.

While the method of distribution makes it impossible to calculate the response rate, it is obvious that it has been very low. This, in addition to the limited number of responses, means that results must be treated with considerable caution.

2.4 Sample

There were 128 individual respondents. The majority of respondents (60 %) were employed in transport companies, but sizeable groups were affiliated to inspection authorities or directorates, as shown in Figure 2.1.

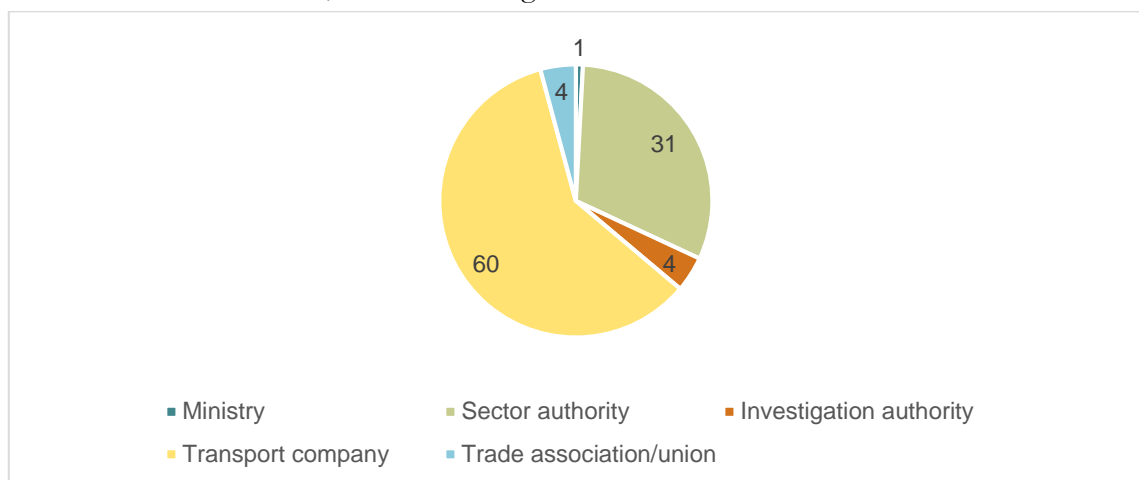


Figure 2.1: Respondents’ organisational affiliations. Percent (N=128)

Figure 2.2 shows organisational affiliation by sector.

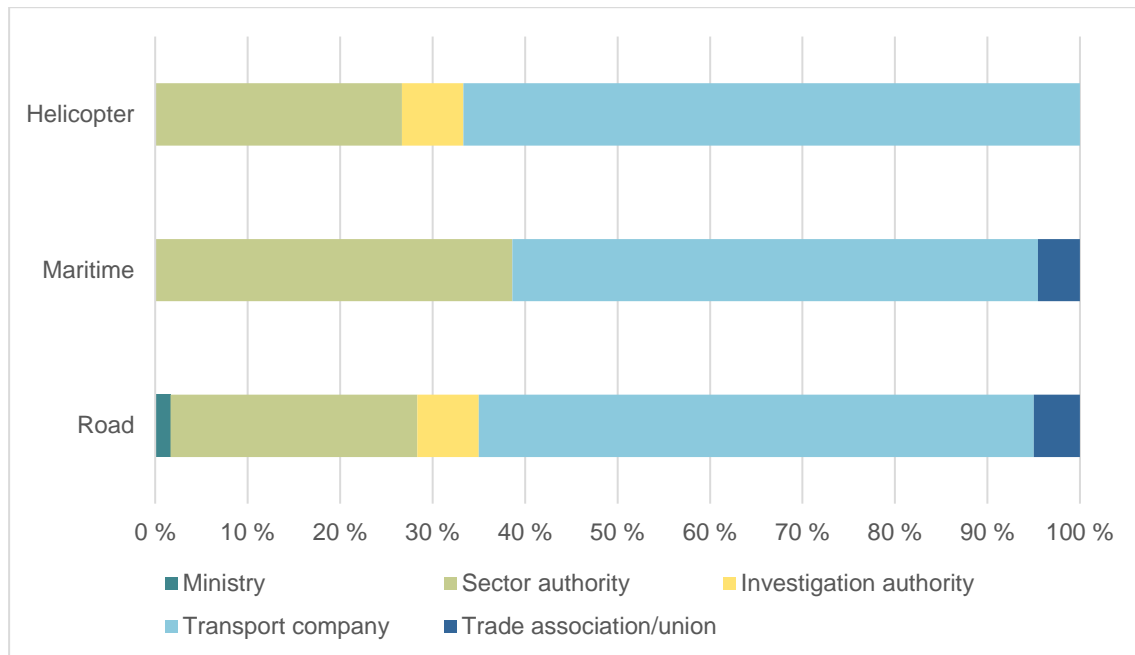


Figure 2.2: Respondents' organisational affiliation by sector. Percent. (N=128)

The most important conclusion to draw from Figure 2.2. is that the distribution of respondents from authorities and companies is relatively similar in each sector.

Figure 2.3 shows respondents' positions.

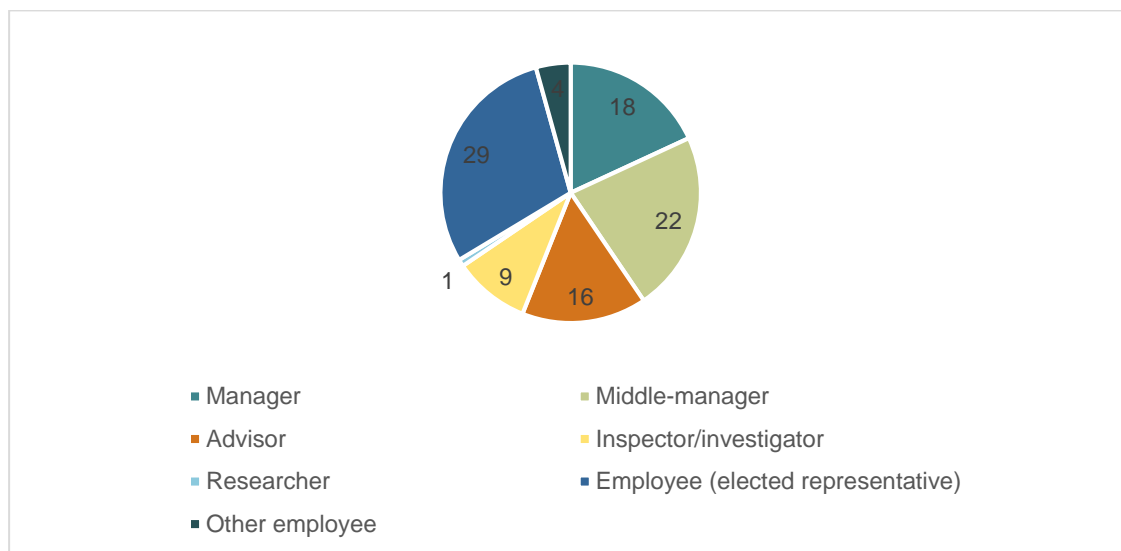


Figure 2.3: Respondents' positions. Percent. (N=128)

Figure 2.3 indicates that the largest group of respondents (29 %) was elected employee representatives, but there were also considerable shares of middle managers (22 %), managers (18 %) and advisors (16 %).

Employees and managers in transport companies were also asked about company size. The mean organisation size was close to 800 employees, and the median 200. The composition in the sample is shown in Figure 2.4.

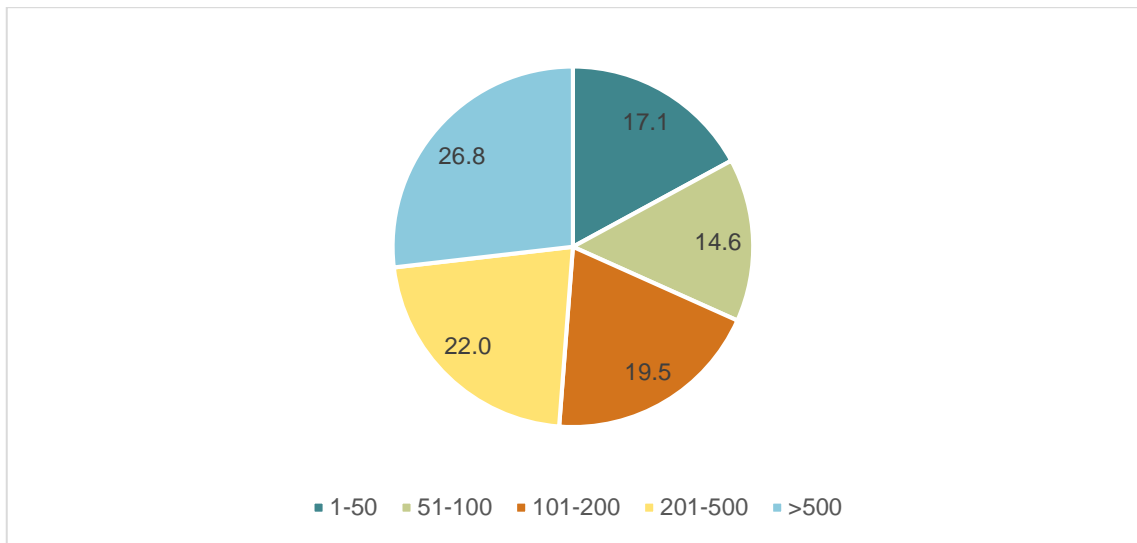


Figure 2.4: Respondents' company size. Percent. (N=128)

3 Conceptual clarifications

Accountability and responsibility are central terms for making sense of the present form of organisation of transport safety work, but also for understanding the system, identifying weaknesses and improving the organisation. A conceptual clarification is in order just to understand and keep apart the different potential meanings of the terms, and how they can be fruitfully applied in different settings. Conceptual clarity is essential for a description to be appropriate and unambiguous, but it is at least equally important for prescriptive activities, as it contributes to transparency and order in analysis and planning.

3.1 Responsibility

Responsibility is a complex concept: while it is widely used in everyday speech, it also serves as a technical term in academic disciplines such as law and ethics. This means that in order to avoid confusion, it is necessary in each instance to define the sense in which the concept is used.

Fahlquist (2006) discusses the ambiguity of the concept *moral responsibility*. She distinguishes between causal responsibility, blame responsibility and forward-looking responsibility. Even the seemingly most straight-forward of these, causal responsibility, is not a neutral concept. Since any event is typically preceded by a number of potential causes, singling out one of them is a normatively coloured activity. Whether an accident with a drunk driver is caused by the driver's choice to drink and drive, or by the lack of an alcohol interlock in the vehicle, for instance, will be a matter of normative judgment. A related, but theoretically distinct kind of responsibility is blame responsibility. Blame responsibility is a kind of backward-looking responsibility where we blame individual actors for having caused a certain undesirable event. Causal responsibility is typically seen as a necessary, but not sufficient condition for blame responsibility.

Further conditions could be such factors as whether the agent in question had a choice, and whether the act was knowingly performed. For example, we may distinguish between different kinds of human error. James Reason's (1990) taxonomy of human error is probably the most commonly used analytical scheme to discern between different forms of errors. First, slips are the most prevalent type of errors, referring to actions which were guided by a correct plan or intention, but which failed to produce the expected outcome. Second, lapses are missed actions or omissions, e.g. because of inattention or memory failure. Third, a mistake is an action which is carried out properly, but which was guided by a wrong plan or intention. Mistakes typically involve inappropriate or unrequired actions. Fourth, violations are actions deviating from accepted rules, standards or procedures. Violations may be carried out either intentionally or unintentionally (Reason 1990). By making these distinctions, it may be easier to find the cause of the error and introduce efficient measures to counter them. For further discussion on Reason's view of human error and error management, see chapter 3.3.

Forward-looking responsibility, in contrast to backward-looking responsibility, does not concern itself with past events, but with future events, and is frequently associated with social problems. The aim of ascribing forward-looking responsibility is to contribute to a

solution to the problem. This means that a responsibility can be given to an actor who is not to blame for the existence of a problem. This kind of responsibility is not the same as a duty, as duties can be fully specified, whereas a responsibility cannot. Goodin (1986) describes this difference as “Duties dictate actions. Responsibilities dictate results.” He also notes that responsibilities “allow agents to choose between alternative actions having the same overall consequences”. This description renders visible the close connection between forward-looking responsibility and accountability, discussed below. An important factor to note here, is that if agent A is to be given the forward-looking responsibility to achieve result R, “A must have it in her power to actually influence events in such a way as to achieve R” (Goodin, 1986, p. 116). If the result is not achieved, however, the agent will be responsible in a backward-looking manner, as discussed above.

Another concept that might be of use for understanding the prevention of public problems, is *complicity*. Actors involved in monitoring or shaping a process leading to harm (such as accidents) may feel complicit in this harm, even if they have not in any way caused the harm. Elvebakk, Hesjevoll, and Julsrud (2016) seem to suggest that once public authorities have developed policy tools that may prevent harm, the failure to apply these tools can create an experience of complicity. Thus the complicity is not a consequence of having caused the harm, but a consequence of a certain kind of involvement and knowing that you might have prevented it.

The relationship between accountability and various forms of responsibility is complex. When we hold someone to be morally responsible for their actions, we typically also hold them to be accountable. In the case of a drunk driver, for instance, we will ascribe moral blame to the driver, and also hold the driver accountable for the action. If we imagine that the driver in question was a drunk gorilla, however, we would typically see the animal as causally responsible, but neither morally responsible nor accountable for the action. When endowing someone with a forward-looking responsibility, however, they are also made accountable in the same movement.

3.2 Accountability

Accountability can be defined as the duty to give account for one’s actions (Scott, 2000) or answerability to someone for expected performance (Romzek & Ingraham, 2000).

Accountability is a central issue in safety work, as regulations typically task certain actors with the responsibility of securing the quality of a given service, and these actors are accountable to the authorities. Defining and designating relations of accountability, is therefore essential to the authorities’ safety work. It is important to note that relationships of accountability will always involve (at least) two agents: on the one hand, there is the agent who is accountable, on the other, the agent to whom the account is due. In a well-defined system of accountability, both agents must be aware of the relation, must have a common understanding of the nature of the relation, and there must be an appropriate system for interaction between the two agents.

Accountability is an effect of a *forward-looking responsibility ascription*. The agent who is ascribed forward-looking responsibility for something, as a consequence becomes accountable. Note that this ascription of forward-looking responsibility may or may not coincide with an pre-existing (potential) causal or blame responsibility for the same domain: if a professional driver is explicitly given the forward-looking responsibility for driving safely (for instance through a contract with the employer), this could be said to merely articulate an already existing relationship of responsibility, as drivers are already required by law to drive safely. The contractual obligation to the employer, would,

however, entail that the driver was now accountable to the employer (in addition to the authorities) for this pre-existing responsibility.

However, you could also conceivably have a situation in an organisation where an administrative employee, who had previously only worked on finances, was also ascribed the (forward-looking) responsibility for keeping all vehicles safe and in working order. Through this ascription, one would construct a completely new relation of responsibility, that did not already exist. The responsibility is not an inherent part of the responsible agent's own actions, but something that has been added to those actions. This is frequently the situation when public authorities have their domain of responsibility expanded. There is a sliding scale between these two situations, where an ascription of responsibility more or less also involves the *construction* of a relation of responsibility.

Public intervention for managing and reducing risks usually takes the form of regulation, and the magnitudes, means, and methods of regulation vary (Kringen, 2009). The study of risk regulation concerns, apart from the nature of the risks involved, how public policies and priorities emerge, how they are transformed into rules and policy instruments, how these are enforced and practically implemented, how regulated parties respond, and so forth (Kringen, 2009). Decisions about regulatory interventions may be reactive (based on experience with past incidents) or proactive (based on imagined incidents that may occur). The road sector traditionally leans towards the former, while aviation leans towards the latter approach.

With the changing institutional framework in the transport sector, new structures of responsibility and accountability have also been introduced (Cf. Elvebakk, 2015). According to Aucoin and Heintzman (2000), various pressures have led to changes in the structures of accountability:

- A desire for debureaucratization
- Greater degree of shared management
- Demands for results and demonstrated performance

The last point is especially relevant to the case of safety work. Obvious examples of such structures are the safety inspectorates in aviation and maritime transport, as they demand documented performance relative to safety work. The operator organisations are thus constantly accountable to an external entity (the inspectorate) when it comes to their safety management, and not only for their safety outcomes. The accounts in this setting are usually documentation of safety work.

In Norway, the part privatisation of the transport sector, along with the establishment of independent safety inspectorates, can be considered a new “regulatory regime” (May, 2007).

“One can think of a regulatory regime as a means for achieving regulatory goals[...]. A regime comprises an institutional structure and assignment of responsibilities for carrying out regulatory actions. The institutional structure is made up of rules that prescribe expected behaviors or outcomes, standards that are benchmarks against which compliance can be measured, a mechanism for determining the degree of regulatory compliance, and sanctions for failure to comply with the rules.” (ibid).

May (2007) distinguishes between three ideal types of regulatory regimes: prescriptive regulation, system-based regulation, and performance-based regulation. Prescriptive regulation focuses on prescribed actions, and adherence to these, and regulations are detailed and particularistic specifications. System-based regulation focuses on process or system, and assesses whether systems are acceptable. The standards used are process oriented, and the goal is to achieve appropriate system controls. Performance-based

regulation focuses on results of outcomes, and its standards are goal-oriented. While the regulatory regimes in transport have been moving in the direction of system- and performance-based systems, they still contain elements from all three ideal types. There is a tendency in current safety regulation towards self-regulation, introducing ‘meta-rules’, indicating and specifying how organisations should deal with risk, by requiring the establishment of risk management systems that may include methodologies and processes of risk assessments, internal monitoring arrangements and so forth (Kringen, 2009, p. 6). This, of course, is one kind of system-based regulation.

Accountability is meant to secure control, assurance and continuous improvement (Aucoin & Heintzman, 2000). A main dilemma associated with accountability is how to give actors with delegated authority sufficient autonomy while ensuring adequate degree of control. Control and accountability are thus linked concepts; there is managerial control *ex ante*, accountability-based control *ex post* (Scott, 2000). From the viewpoint of accountability as control, the most critical perspective is risk planning and risk management without micro-managing, while from the perspective of assurance, auditing becomes important. From the perspective of improvement, however, learning (as opposed to blaming) is central (Aucoin & Heintzman, 2000).

There is also a long-standing debate on the relative merits of rule-based regulation and purpose-based regulation (Burgemeestre, Hulstijn, & Tan, 2009). While purpose-based regulations formulate norms as guidelines, leaving the exact implementation open to the subject of the norm (e.g. “drive responsibly”), rule-based regulation prescribes in detail how to behave (“the speed limit is 80 km/h”). Although most regulatory regimes comprise a mixture of rules and purposes, it is argued that there is an increasing tendency to adopt purpose-based regulation, as the latter is more flexible and allows for more innovation when it comes to adopting best practices. Thus purpose-based regulations can be considered a solution to the problem of balancing control and autonomy, as control concerns outcomes, rather than specific procedures. However, it presupposes that the regulations are unambiguous and clearly formulated so that they are interpreted as intended.

Goodin’s description of responsibility (see Section 3.1) links up nicely with purpose-based regulations – such regulations can be seen as ascribing a responsibility, rather than evoking a duty. This means that the nature of accountability also changes, because it is no longer just a question of *whether* a duty has been fulfilled, but primarily a question of *how* a responsibility has been carried. The account required is therefore more comprehensive.

3.3 System approach versus person approach

There is a long-standing debate between safety researchers who point to risky operator behaviours to explain work place accidents, and researchers who hold that risky behaviours to a great extent are influenced by contextual factors. Reason (2000) refers to these two diverging positions as the person approach and the system approach, stating that each has its model of error causation and that each model gives rise to quite different philosophies of error management. According to the person approach unsafe acts are primarily the result of inadequate “mental processes such as forgetfulness, inattention, poor motivation, carelessness, negligence, and recklessness.” (Reason, 2000, p. 768). Accordingly, the counter measures that this view gives rise to aim to reduce unwanted variability in human behaviour. Such measures could be poster campaigns with information, procedures governing behaviour, disciplining measures and so forth. According to Reason (2000), this approach tends to view human error as a moral issue.

The systems approach on the other hand, is based on the premise that it is human to err and that human errors are expected. The system approach views errors as consequences, rather than causes, and human errors are explained in light of systemic causes rather than a fallible human nature. As a consequence, the systems approach gives rise to prevention strategies focusing on building “error tolerant” systems. This is done by introducing system defences involving barriers at many different levels, e.g. technological, organisational, cultural.

3.4 Summing up

In conclusion, we may say that while responsibility is a wide term, which encompasses backward-looking and forward-looking responsibility, causal responsibility, formal responsibility, and moral responsibility, accountability has a somewhat more narrow meaning. Accountability can be defined as the duty to give account for one’s actions or answerability to someone for expected performance. Accountability is therefore a term that is appropriately applied to organisational actors, who have a defined area of responsibility, and belong in a formal hierarchy that defines to whom they should give account of their actions.

Still, the term has different meanings. There is legal accountability, bureaucratic accountability, professional accountability, and political accountability, depending on who you are accountable to. This means that for any given event, many different actors can be held accountable, on different levels, and in different ways. While an employee in an operator organisation may be professionally accountable, usually only the organisation (unless there is gross misconduct on the part of the employee) will be legally accountable. On the highest level, in case of huge disasters, the Minister, who shoulders the political accountability, might have to resign.

Romzek and Ingraham (2000) further describes legal accountability as concerning compliance with established performance mandates, and being typically reactive, concerning relatively autonomous actors. Instead of bureaucratic accountability, they label the second type hierarchical, as it involves close supervision, low work autonomy, obedience, rules and regulations. In larger professional organisations, there will of course always exist some degree of this kind of accountability, which guides and specifies the work of employees. Professional accountability, on the other hand, implies that the source of accountability is the actors’ own standards, involves a high degree of autonomy, and concerns internalized norms and appropriate practice. Finally, political accountability concerns responsiveness to key stakeholders.

4 Regulation of transport safety

4.1 The road sector

Road traffic in Norway is regulated through the Road Traffic Act, which is enforced by the Police. Road safety work is generally organized on three levels; national level (Ministries, the Norwegian Public Roads Administration (NPRA) and directorates), regional level (counties and regions) and municipal levels. In addition, various public bodies and NGOs contribute considerable efforts on all three levels.

At the level of government, the Ministry of Transport and Communications has the primary responsibility for road safety and driver training, while the Ministry of Justice is responsible for enforcement, and the Ministry of Education for traffic education in schools. Technical road safety work is the remit of the Norwegian Public Roads Administration. In practice, the work has traditionally been divided into three separate spheres; on the one hand, there is the judicial sphere, encompassing law-making and enforcement by the traffic police. Secondly, there is the Norwegian Council for Road Safety (Trygg Trafikk), which is an umbrella organisation for voluntary road safety work and serves as a link between voluntary associations and the road safety authorities. Thirdly, there is the Norwegian Public Roads Administration which has sectorial responsibility for roads and road traffic. When it comes to road safety, the agency is, among other things, responsible for planning, building and maintaining state and county roads, and developing regulations and guidelines for road design, road traffic, driver education and vehicles. It also performs controls of workshops, vehicles, hours of service and seat belt use, and conducts driving tests and supervises driving schools. The organisation has an overarching responsibility to actively promote road safety, for instance through measures such as traffic safety campaigns. A summary of the responsibilities of different authorities related to accident prevention work for all road accidents is presented in Table 4.1.

Table 4.1: Actors committed to accident prevention work for all road accidents

Authority	Acronym	Responsibility
Ministry of Transport and Communications	MTC	Primary responsibility for road safety Responsible for driver training
Ministry of Justice		Responsible for enforcement
Ministry of Education		Responsible for traffic education in schools
Police		Enforcing the Road Traffic Act

The above describes the actors involved in accident prevention work for all types of road accidents. In the case of professional accidents, however, the number of actors increases. For one thing, the employer organisation has a certain responsibility for road safety. According to the Norwegian Working Environment Act, transport organisations are obliged to promote transport safety for their employees through their health, safety and environment work. The Working Environment Act is enforced by the Labour Inspection Authority (LIA), which is subordinate to the Ministry of Labour and Social Affairs. The LIA should also be notified about any fatal accidents, but was in fact informed about less

than half of fatal accidents involving drivers at work in the period 2005-2010 (Phillips & Meyer, 2012). The LIA has defined the transport sector as an “exposed industry”, and the sector was subject to special attention in the period 2013-2016.

The NPRA is responsible for technical vehicle control and for overseeing and controlling compliance with the hours-of-service regulations in transport companies together with the LIA. The LIA and NPRA organise joint roadside controls and company controls, and they share responsibility for supervising the compliance with the provision regulating professional driver’s working hours. The police are also involved in roadside controls of vehicles, and often cooperate with the NPRA. The Accident Analysis Groups of the NPRA have investigated all fatal accidents on Norwegian roads since 2005, but their database includes little information on work-related causes of transport accidents (Nævestad & Phillips, 2013). The investigations of the Accident Investigation Board Norway (AIBN) on the other hand, take both organisational risk factors and framework conditions into account, but the AIBN-road studies only a handful of accidents each year. A summary of the responsibilities of different actors committed to accident prevention and investigation involving professional road accidents is shown in the table below. As is clear from table Table 4.2 some authorities share certain responsibilities.

Table 4.2: Actors committed to accident prevention work, and accident investigation, involving professional road accidents

Authority	Acronym	Responsibility
Labour Inspection Authority	LIA	Enforce the Work Environment Act and investigate work-related accidents
Labour Inspection Authority and The Norwegian Public Roads Administration	LIA and NPRA	Responsible for technical vehicle control and for overseeing and controlling compliance with the drive- and rest rules in transport companies
Police and The Norwegian Public Roads Administration	Police and NPRA	Roadside controls of vehicles
Accident Investigation Board Norway and The Accident Analysis Groups of the NPRA	AIBN and AAG (NPRA)	Accident investigations

In a recent study, the majority of expert interviewees claimed that work-related factors with potential implications for road safety are insufficiently monitored in controls and inspections of road transport organisations (Nævestad & Phillips, 2013). Interviewees also called for a more proactive, purpose-based regulatory approach to road safety. This has also been requested by AIBN-Road and by the Road Supervisory Authority (2013), which oversees the Public Roads Administration (NPRA).

4.2 Maritime transport

The Norwegian Maritime Authority (NMA) is the government agency responsible for life, health, and working conditions for Norwegian registered ships and ships at Norwegian ports. A notable difference to other sectors is that the authority is subordinate to the

Norwegian Ministry of Trade, Industry and Fisheries and the Ministry of Climate and Environment, rather than to the Ministry of Transport and Communications. The Maritime Authority is responsible for, among other things, the quality of maritime education, various forms of inspections, following up recommendations from the Accident Investigating Board, developing regulations, and maintaining and developing the Norwegian International Ships Register (NIS) and the Norwegian Ordinary Ship Register (NOR). The NMA is also in charge of active safety work such as information and awareness campaigns. Table 4.3 presents the different Norwegian authorities and groups connected to maritime safety.

Table 4.3: Norwegian authorities and groups connected to maritime safety

Authority	Acronym	Responsibility
The Ministry of Trade, Industry and Fisheries		Administers the Maritime Safety Act Oversees security in relation to vessels Accident investigation
The Norwegian Maritime Authority (subordinate to the Norwegian Ministry of Trade, Industry and Fisheries)	NMA	The main agency responsible for safety for ships and crew Responsible for life, health, and working conditions for Norwegian registered ships and ships at Norwegian ports Responsible for, among other things, the quality of maritime education, various forms of inspections, following up recommendations from the Accident Investigating Board, developing regulations, and maintaining and developing ship registers Responsible for active safety work such as information and awareness campaigns
The Ministry of Transport and Communication		Administers the Port and Fairway Act Administers the Pilotage Act
The Norwegian Coastal Administration (subordinate to the Ministry of Transport and Communication)	NCA	Responsible for maritime infrastructure and services for safe navigation, including: Aids to Navigation Vessel Traffic Centres The Pilotage Service ("lostjenesten") Responsible for supervision of terminals for loading and unloading of bulk cargo
Labour Inspection Agency	LIA	Responsible for working conditions in ports
Accident Investigating Board Norway	AIBN	Accident investigation

As mentioned above, NMA is in charge of active safety work such as inspections regulated by international law. There exist many types of inspections in the sector, many of them regulated through international agreements such as International Convention for the Safety of Life at Sea (SOLAS) (which includes the International Safety Management Code (ISM) and International Ship and Port Facility Security Code (ISPS)), the Maritime Labour Convention (MLC), and the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW). A certain share of the inspections, however, have been outsourced to approved classification societies or consultancies. The Norwegian Maritime Authority, in its turn, is responsible for inspecting the approved sub-contractors.

Safety at sea is to a large degree internationalised. Safety work is circumscribed by the International Maritime Organisation (IMO). The IMO is a specialized agency of the United Nations whose primary purpose is to develop and maintain a comprehensive regulatory framework for shipping. The International Convention for the Safety of Life at Sea (SOLAS) is an international maritime safety treaty which ensures that ships flagged by signatory states comply with minimum safety standards in construction, equipment and operation.

The International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) sets qualification standards for masters, officers and watch personnel on seagoing merchant ships. The Maritime Labour Convention (MLC) is an International Labour Organisation (ILO) convention established in 2006, which also regulates safety relevant aspects of shipping, such as the safety training of personnel. The European Maritime Safety Agency (EMSA) monitors port state control regimes, assesses classification societies and checks on the work of notified bodies (Groenleer, Kaeding, & Versluis, 2010).

The Norwegian Maritime Authority is specifically required in the allotment letters from the Ministry of Trade, Industry and Fisheries to participate in international meetings, such as the IMO, ILO, EU and Paris MoU (Memorandum of Understanding). Promoting Norwegian interests in these forums is considered an essential task in the Ministry, as this touches on the delicate balance between safety and competition: it is broadly assumed that the correct way to improve safety is to tighten international requirements, as this would simultaneously increase the competitiveness of the Norwegian fleet, which tries to compete in terms of quality, rather than price (Elvebakk, 2015).

Safety in the maritime sector in Norway is regulated through the relatively new Ship Safety and Security Act (2007). According to this act:

“The company has an overall duty to see to that the construction and operation of the ship is in accordance with the rules laid down in or pursuant to this Act, including that the master and other persons working on board comply with the legislation”. (§6)

This act has been considered by actors in the sector to clarify responsibilities, through its increased focus on shipowners (Elvebakk, 2015).

As described above, the Maritime Authority is the main agency responsible for safety for ships and crew. However, maritime companies are subject to a complex web of government responsibilities. The Ministry of Trade, Industry and Fisheries administers the Maritime Safety Act, working and resting times, staffing, etc. The Ministry of Transport and Communication administers the Port and Fairway Act and the Pilotage Act, both with safe navigation as objectives. The Norwegian Coastal Administration, which is subordinate to the Ministry of Transport and Communication, is responsible for maritime infrastructure and services for safe navigation. This includes Aids to Navigation Vessel Traffic Centres and the Pilotage Service. This work is also aimed at preventing some of the accidents and incidents in the sector and it has significance for the working environment, but is not designed specifically to this purpose. The Ministry of Transport and Communications is not responsible for accidents at ports, the interface between port and vessel or for harbours in their capacity as terminals for loading and unloading. Working conditions in ports is subject to the Labour Inspection Agency. However, the Ministry of Transport and Communication is responsible for regulations on supervision of terminals for loading and unloading of bulk cargo, and the Maritime Authority is responsible for supervision of the bulk vessel's handling of loading and unloading operations. These supervision responsibilities were given to the Coastal Administration and the Maritime

Authority after a series of inexplicable shipwrecks in the 1990's, when it was concluded that the likely cause was structural damages to ships from loading or unloading of bulk cargo.

The Ministry of Transport and Communications also administers ISPS regulations, which relate to port security, while the Ministry of Trade, Industry and Fisheries oversees security in relation to vessels.

The AIBN-Sea investigates about 10-15 maritime accidents each year. The Norwegian Maritime Authority does not investigate as the AIBN, but carries out hundreds of registrations and follow-ups of accidents that are reported to them. Furthermore, the NMA performs inspections of shipwrecks and damaged ships after an incident.

4.3 Inland Helicopter Operations

The Civil Aviation Authority (CAA) issues regulations, lays down standards for civil aviation activities in Norway, grants licences and operating permits to persons and companies intending to conduct aviation and related activities, and oversees compliance with regulations and conditions. It is mandatory to report all aviation accidents and incidents to the Civil Aviation Authority Norway, and the authority receives about 6000 reports on accidents and incidents annually (Luftfartstilsynet, 2014). This provides valuable information, which is used when key safety issues are followed up, and when planning and conducting safety inspections. The information is confidential, it cannot be used as a basis for sanctions from employers, nor in criminal proceedings. The Civil Aviation Authority nevertheless suspects that incidents (that could have led to an accident) are underreported from some airports and from some small airlines.

The CAA reports to the Ministry of Transport and Communications. According to the instructions, the main objectives of the Authority are to be responsible for the supervision of Norwegian aviation and to be a driving force for safe and socially beneficial air traffic in accordance with the overarching goals of the government's transport policy. Among the more specific requirements, they are to oversee that actors in civil aviation abide by regulations; pay attention to safety-related challenges associated with changing framework conditions, ensure that regulations are updated, clear and complete, and follow up safety recommendations from the Accident Investigation Board Norway. The Authority's inspection work is based on systems-oriented reviews, complemented by physical inspections of aircrafts. Most inspections are scheduled, but there are occasional unscheduled inspections. If requirements from the CAA are not properly addressed, the Authority has access to a number of sanctions, such as suspension or confiscation of licences, certificates or authorizations. However, these measures are rarely deemed necessary.

Table 4.4 summarises which authorities and groups are responsible for different parts of safety in the inland helicopter sector.

Table 4.4: Norwegian authorities and groups connected to Inland Helicopter Operation safety

Authority	Acronym	Responsibility
The Civil Aviation Authority (subordinate to the Norwegian Ministry of Transport and Communication)	CAA	issues regulations, lays down standards for civil aviation activities in Norway, grants licences and operating permits to persons and companies intending to conduct aviation and related activities, and oversees compliance with regulations and conditions
Accident Investigation Board Norway	AIBN	Accident investigation

Safety work in aviation is predominantly determined by the UN's International Civil Aviation Organisation (ICAO). ICAO works to develop international Standards and Recommended Practices (SARPs) which are then used by individual states when they develop their legally binding national civil aviation regulations. As a member of the European Economic Area, Norway is also member of the EU agency European Aviation Safety Agency (EASA), which has three main tasks; rule-making, certification and standardisation (Groenleer et al., 2010). Aviation regulations used to be national, but are now subject to European regulation. There are still some exceptions, though, for instance for ambulance helicopters, which are still subject to national regulation. The AIBN-aviation investigated 17 aviation incidents in 2012.

4.4 Summing up

There is a range of different national and international authorities and regulations involved when it comes to safety within the road sector, the maritime sector, and inland helicopter sector. The Accident Investigation Board Norway is responsible for investigating accidents in all three sectors.

In the road sector, there are both national authorities and other actors involved in accident prevention work and accident investigation, involving both all road accidents and professional road accidents. The sector is primarily regulated by national laws, namely the Road Traffic Act (enforced by the police) and the Norwegian Working Environment Act (enforced by the Labour Inspection Authority).

Safety at sea is to a large degree internationalised. Safety work is circumscribed by the International Maritime Organisation (IMO). The IMO is a specialized agency of the United Nations whose primary purpose is to develop and maintain a comprehensive regulatory framework for shipping. The European Maritime Safety Agency (EMSA), on the other hand, monitors port state control regimes, assesses classification societies and checks on the work of notified bodies (Groenleer et al. 2010). The Norwegian Maritime Authority (NMA) is the government agency responsible for life, health, and working conditions for Norwegian registered ships and ships at Norwegian ports. The NMA is also in charge of active safety work such as inspections regulated by international law. The Norwegian Coastal Administration is mainly responsible for maritime infrastructure and maritime safety services, while the Labour Inspection Agency is responsible for working conditions in ports.

Lastly, within Inland Helicopter Operations, the regulations and authorities involved with safety are fewer than in the road and maritime sector. The Civil Aviation Authority is responsible for mainly issuing regulations, granting licences and permits to companies and people that intend to conduct aviation and overseeing compliance with rules and regulations. Safety work in aviation is predominantly determined by the UN's International Civil Aviation Organisation (ICAO). ICAO works to develop international Standards and Recommended Practices (SARPs) which are then used by individual states when they develop their legally binding national civil aviation regulations.

5 Knowledge and information sources

5.1 Organisations' knowledge about the extent of work-related accidents

In order to prevent work-related accidents, it is essential that regulatory agencies have access to information about the prevalence and causes of accidents. The survey therefore asked respondents from public agencies whether their organisations had knowledge of the extent of work-related accidents in the sector. Overall, 38 % answered “Yes”, 10 % “No”, and 52 % “To some extent”. All the negative responses were from the road sector, and this was also the sector with the lowest share of positive responses (cf. Figure 5.1). This is as expected, as it probably is easier to keep an overview of relatively few accidents in Inland Helicopter Operations, compared to the many thousand accidents in the maritime and road sector. Note that the number of respondents in Figure 5.1 and 5.2 is very low, and that the shares must be interpreted with caution, although they are in line with results from the interviews.

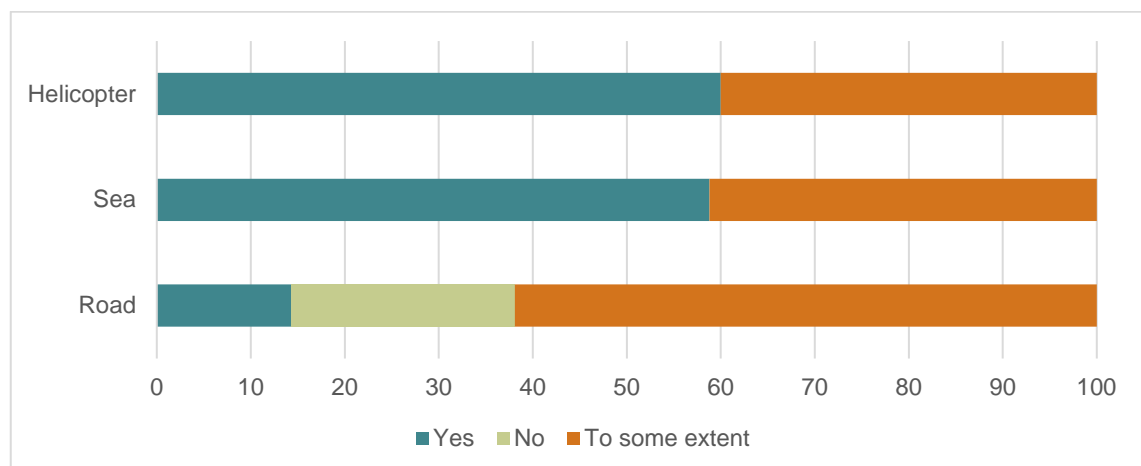


Figure 5.1: Knowledge of extent of work-related accidents in the sector by sector. Percent (N=43, Road: 21, Sea: 17, Helicopter: 5)

Second, respondents from public agencies were asked whether their organisations had knowledge of the causes of work-related accidents in the sector.

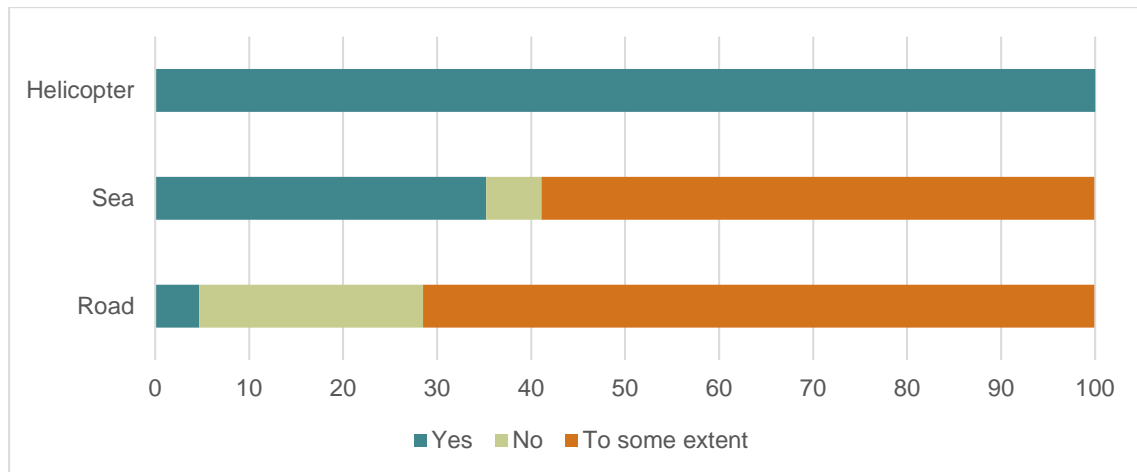


Figure 5.2: Knowledge of accident causes by sector. Percent (N=43, Road: 21, Sea: 17, Helicopter: 5)

As can be seen in Figure 5.2, the differences between sectors is very notable. While all respondents from the aviation sector answer “Yes”, this is only the case for 5 % of respondents from the road sector. In both the road and maritime sector, a majority of respondents replied “To some extent”. Possibly, the reason for the perceived degree of knowledge of causes in the helicopter sector can be explained by the relatively recent “Helicopter study” commissioned by the Government (Bye et al., 2013). Whatever the reason for the sectorial differences, it is evident that this will create very different starting points for working with accident reduction within the different sectors.

5.2 Sources of information about work-related accidents

5.2.1 The road sector

The main source of information on road accidents in Norway is maintained by Statistics Norway, which records data from all police-reported traffic injuries. The keeping of statistics on road accidents with injuries to persons or major material damages dates back to 1939 in Norway, while from 1964, only accidents with injuries to persons have been reportable to the police. From 1977, a joint form for reporting accidents has been shared between the Police, Statistics Norway, and the road authorities. About 9000 accidents are reported annually (www.ssb.no). Originally, data was recorded in a physical form filled out by the police, but the reports are now computer-registered.

The database includes the variable “Purpose of journey”, which makes it possible to identify drivers at work. In addition, the NPRA’s accident analysis groups (AAG) investigate all fatal accidents, their investigations are documented in reports, and key data entered into a database. This database does not contain variables that pertain to whether the driver was working, but these accidents have been identified in previous research (Nævestad & Phillips, 2013; Phillips & Meyer, 2012).

These databases both contain a lot of factual information, but the AAG database also includes information about contributing causes, which may be important for the development of preventive measures. The NPRA has access to both of these databases, and work is under way to give the LIA access to the AAG-database.

Several informant pointed out that the Statistics Norway database has certain weaknesses, as the quality of the database depends on the amount of labour put into the registration by the Police. For instance, some boxes may be ticked “no”, if the Police does not know

whether or not a factor was present, or the alternative “Unknown” may be overused. One of the informants also drew attention to the fact that the very definition of “work-related” is unclear: even if we have a reasonably accurate image of the number of professional drivers involved in accidents, there are many grey areas, such as vans used in a professional capacity, or other trips taken while at work. These latter categories are largely unaccounted for. Thus it is likely that the number of work-related accidents on roads is underestimated.

Generally, information on fatal accidents in road traffic is more complete and comprehensive than information on other accidents. The LIA, for instance, finds it difficult to get an overview of severe injuries in road traffic. According to the Working Environment Act’s §15, all fatal accidents and serious working injuries are reportable directly to the LIA, but in practice, this registry is far from complete. This is a problem for the LIA, as the information is necessary for their preventive efforts, for development of regulations, auditing and guidance.

Organised knowledge about the *causes* of work-related accidents in road traffic is more scarce, and generally limited to what is found in or developed on the basis of AAG-reports. In addition, the AIBN’s accident investigations frequently focus on accidents in professional transport, which means that their reports have uncovered a number of causes and risk-factors, and they also look into organisational factors. This information is not available at an aggregated level, however, and only covers a very small share of accidents. Previous studies have recommended that work-related risk factors are included in the AAG database (Nævestad & Phillips, 2013; Phillips & Meyer, 2012).

5.2.2 The maritime sector

The Norwegian Maritime Authority maintains a registry of accidents at sea in the form of a database. All shipping companies are required by law to report accidents to the Authority within 72 hours. A work-related accident is defined by the NMA as an event in connection with the performance of work which has resulted in injury to the persons working on board (Sjøfartsdirektoratet, 2013). Serious injuries are defined by the NMA as injuries leading to at least 72 hours sick leave or medical treatment beyond “simple outpatient treatment”. “Ship accidents”, on the other hand, are defined as “an incident that has occurred in connection with the operation of a ship where:

- 1) there is loss of life or serious personal injury;
- 2) the ship has been, or must be assumed to be, lost, or the ship is abandoned;
- 3) the ship sustains significant damage;
- 4) the ship has run aground or been involved in a collision or incident that results in the ship no longer being seaworthy; or
- 5) there is significant environmental damage or there is a danger of environmental damage as the result of damage sustained by the ship.” (Norwegian Maritime Code, §472).

The database was admitted by representatives of the Authority to have room for improvement. The case officers’ interpretations of accidents and incidents may be subjective, and it can therefore be demanding to recognize recurring categories, such as fatigue. The Authority makes an ongoing effort to improve data collection, and actively request data where it is not granted by the companies. Since the duty to report accidents may not be known to foreign flagged vessels, the statistics for this group could be less accurate. The Authority tries to compensate by harvesting information from other sources, however, including automated media searches, and information from Lloyd’s. They also try to improve coverage through approaching specific groups, such as fishermen, and through collaborating with other actors such as The Rescue Coordination Centre, and with other

flag states. In general, they believe there is some underreporting of accidents, especially on board smaller and foreign vessels, and that coverage is probably better for ship accidents than work-related accidents.

Causes of accidents are also entered into the database. The NMA uses data from reported accidents to create accident statistics. After an event, the NMA receives a subjective accident report, which together with other available information is registered in an accident database. Since most cases are not investigated, but rely on subjective assessments, the cause of the incidents can be difficult to determine and they are imbued with some uncertainty. It can be challenging to aggregate causes, as they sometimes are entered as free text in the forms. The best data on causes is thus available for accidents that have been investigated by the AIBN.

Other actors, such as the AIBN and the Labour Inspection Authority do not keep their own accident statistics over maritime accidents. The AIBN do not have access to NMA databases. However, since 2008 they have received daily overviews of accidents that are registered in the accident database, including the accident reports that are sent to the NMA. Serious work-related accidents that take place on the interface between land and sea are reportable to the LIA within 24 hours. Given that the maritime sector has not been considered a high-risk area, there exists no systematic presentation of accidents or risk-profiles; instead, accidents have been processed “one by one”.

5.2.3 Inland Helicopter Operations

In aviation, all accidents and incidents are reportable to the CAA, which is the national centre for aviation reporting. The CAA receives information from “the sharp end”, and on the basis of this, they assess the state of safety, and follow development for certain indicators, etc. This information is also used as the basis for CAA inspections. The work involves a lot of coding and classification, so as to be able to compare between sectors and over time.

In addition to accidents and incidents, other occurrences with relevance to safety are also reported to the CAA. These reports usually concern minor deviations and known problems. More serious incidents are given more attention by the Authority. All accidents and serious incidents are also reported to the AIBN, and it has been discussed whether the CAA and the AIBN should carry out a joint review of all incidents in the database to look for recurring problems.

It is assumed that there is some degree of underreporting of incidents (that could have led to an accident) in the case of Inland Helicopter Operations, as they report far fewer incidents than offshore helicopters. While this is probably due to the lower level of professionalism, the CAA still believed they had a fairly representative picture of the risk profile in the business.

Causes are given for accidents and serious incidents, if they can be identified. In some cases this is not possible, especially when the causes are of a technical character. A report on helicopter safety was published by Safetec a few years ago, which described the conditions in the industry in great detail, and looked into causes of accidents (Bye et al., 2013). This report is still widely used by all affected parties.

5.2.4 Under reporting of work-related accidents

Reporting to LIA is generally – across sectors – quite low. One of the interviewees said that a few years ago, a researcher found that reportable work-related accidents were only reported in 25 % of cases. However, in cases where companies do not report accidents, the

LIA sometimes receive reports from the police. The regulations for reporting might also be unclear: while accidents with ship crew is only reportable to the NMA, land-based companies report to the LIA, but the correct procedure might be unclear. The LIA does not systematically exchange information with the AIBN, but may offer them access to reports if they investigate the same accident. They are not routinely alerted about AIBN investigations, however.

5.3 Summing up

Summing up, respondents from governmental agencies were asked whether they had knowledge of the extent of work-related accidents in the sector, and only 10 % answered “No”. Those who answered “No” were all from the road sector. This aligns with the informants’ view that the road accident registry of Statistics Norway is not always filled with sufficient information relating to an accident. It is likely that the number of work-related accidents on roads is vastly underestimated. Also, causes of work-related accidents in work traffic is limited to what is found in or developed on the basis of AAG-reports and AIBN’s accident investigations. However, because few accidents are investigated in order to find causes and this information on causes is not available on an aggregated level, there is much room for improvement in the road sector when it comes to accident registration.

The maritime sector is more strictly regulated and has more specific criteria than the road sector when it comes to what accidents are to be registered and reported to the authority. However, there is also some underreporting of accidents in this sector, especially relating to work-related accidents on board smaller and foreign vessels. The NMA uses data from reported accidents to create accident statistics. After an event, the NMA receives a subjective accident report, which together with other available information is registered in an accident database. Since most cases are not investigated, but rely on subjective assessments, the cause of the incidents can be difficult to determine. The best data on causes in the maritime sector, just as in the road sector, is found in the accident reports from AIBN. However, accidents in the maritime sector are processed “one by one”, thus the sector lacks a systematic overview of accidents or risk profiles. This is most likely because the marine sector has not been considered a high-risk area.

It is believed that incidents (that could have led to an accident) involving Inland Helicopter Operations are to some degree underreported to the CAA, because the reporting rate is significantly lower than for offshore helicopters. Causes are noted when reporting accidents and serious incidents, but they are often difficult to discern when they are of a technical nature. A helicopter study was published by Safetec (Bye et al., 2013) a few years back which explore the causes.

6 Risk factors

An important question for determining and defining responsibility and liability is what the causes of accidents are. In this report, we have chosen to operationalise accident causes in terms of risk factors.

6.1 Survey data on risk factors in work-related accidents

The survey asked whether the majority of work-related accidents in the respondents' own sector were associated with operators, companies or individual employees.

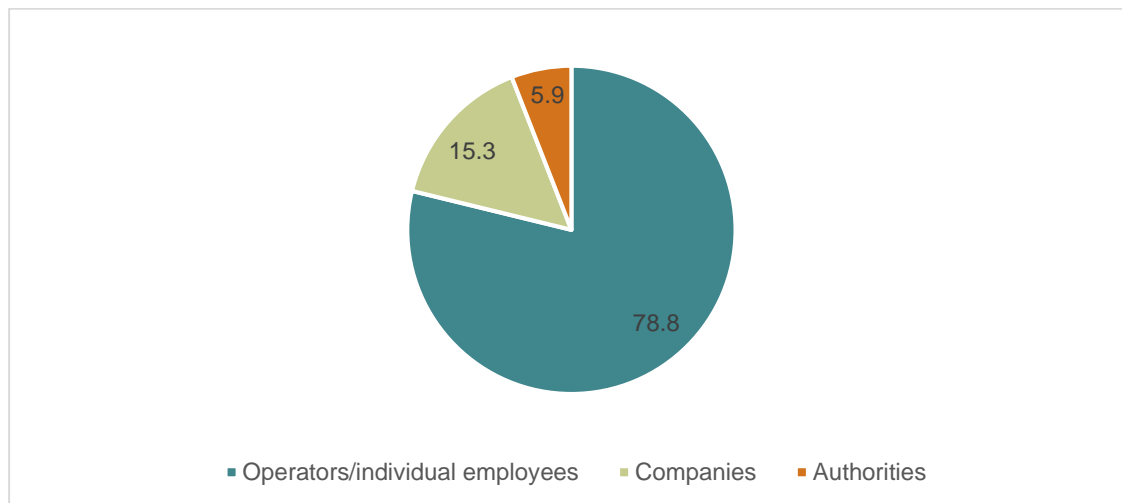


Figure 6.1: Answers to the question: "The majority of work-related accidents in the sector is caused by risk-factors associated with..." Percent. (N=128)

As illustrated in Figure 6.1, the vast majority of respondents believed risk factors to be mainly associated with employees.

While this was the view of all respondents in the aviation sector, minorities in both the road sector and the maritime sector believed accidents to be mainly caused by risk-factors related to companies or authorities, as shown in Figure 6.2.

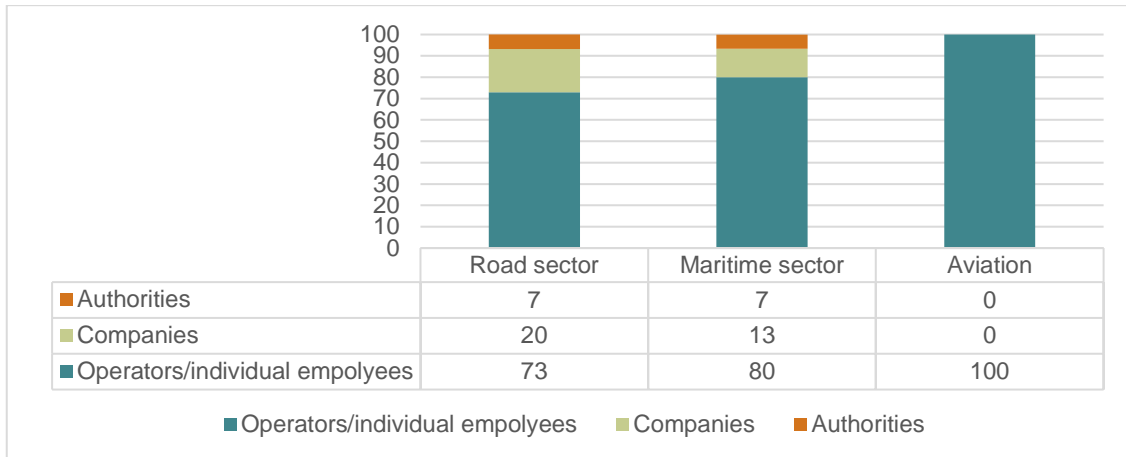


Figure 6.2: Answers to the question: “The majority of work-related accidents in the sector is caused by risk-factors associated with...” by sector and organisation type. (N=128)

Managers and employees in transport companies were more likely to see accidents as being caused by risk-factors associated with individual employees than respondents from public authorities and trade associations/unions.

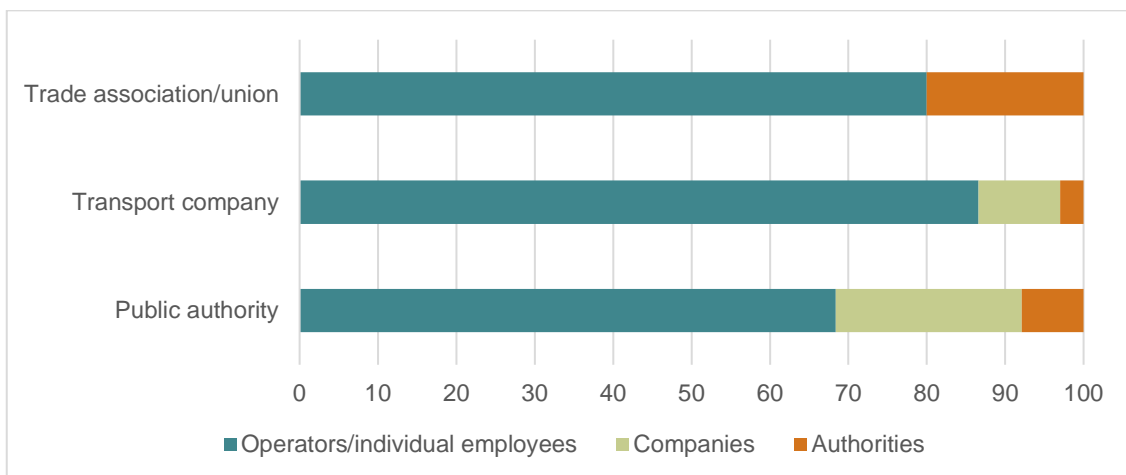


Figure 6.3: Answers to the question: “The majority of work-related accidents in the sector is caused by risk-factors associated with...” by organisation type. (N=128)

6.2 Risk factors highlighted in the interviews

6.2.1 The road sector

Small businesses were identified by several informants as a potential risk factor. The LIA has observed that businesses with fewer than 20 employees have higher risk (Arbeidstilsynet, 2013). In the road sector, 86 % of Norwegian goods transport businesses have five or less employees (Steen Jensen et al., 2014; Nævestad, 2016). It was assumed that the reasons for the higher risk in small companies were related to resources available for safety work, but also the fact that small companies tend to employ vulnerable workers with higher risk, such as foreigners, temporary staff, and young people. Businesses are required to have work descriptions and procedures for safe practice, but these are often purchased from external suppliers, and small businesses may not have the resources and

competence to adapt them properly to their own situation. These routines may also be very general.

A general risk factor for road traffic mentioned by several informants, is that many of the workers in the industry have a very practical approach to their tasks, and learn from experience, rather than engaging in preventive activities. Safety regulations often require documentation and bureaucratic work, which may be challenging for this group. A related issue is that requirements and regulations can be quite general, while more specific instructions could be easier to follow. It was noted that requirements are more specific when it comes to transport of dangerous goods, and this is the safest part of the industry.

Foreigners and young drivers were also considered risk factors in their own right. Whereas young drivers are inexperienced, foreigners may be unfamiliar with the language and the environment, or have a different safety culture.

Among the more specific risk factors that were mentioned in interviews were:

- Employers' scheduling, if it implies that employees are hurried.
- Cargo, loading and unloading. A central risk factor is ignorance of or failure to comply with regulations for securing cargo. One informant believed that these regulations should be more specific in order to be more accessible to the group of users.
- One informant believed that in spite of controls of compliance with hours-of-service regulations, there is not sufficient focus on working times, which is an important cause of fatigue.
- Technical issues related to the vehicle and equipment and its proper use has reportedly played a role in a number of accidents.

6.2.2 The maritime sector

One of the most frequently mentioned risk factors in the maritime sector, was minimal crews. It was claimed that while companies are required to make sure that staffing is adequate, many tend to use the NMA's minimum requirements as a default standard, which could lead to exhaustion and fatigue. The NMA therefore, in 2016, executed time-limited campaigns focusing on resting time and staffing to battle this problem.

The risk factor most frequently identified by the AIBN is lack of or insufficient risk assessment. This was perceived to probably be more due to ignorance than unwillingness on the part of the companies. However, the representative from the AIBN emphasised that safety is an effect of *adhering* to risk assessments, rather than of producing them, and that the actual effects of documented risk assessments were unknown.

The informants seemed to agree that lack of adherence to standards and regulations was still a problem in the sector, and that this was primarily the responsibility of the companies and ship-owners, as crews usually make use of the tools that are available. However, in many cases the lack of adherence was also seen as a function of ignorance of regulations.

Loading and unloading was also mentioned as a potential risk factor, especially for fishing vessels. In the terminals, loading and unloading can be processes involving multiple actors, and according to the Working Environment Act, a responsible party is required to helm the coordinating responsibility. If this does not happen, that might be a risk factor.

Other factors mentioned by several informants included fatigue, human-machine interaction, safety culture, and various organisational factors.

Interestingly, one of the informants mentioned that safety work may also have detrimental effects on safety standards. This was based on the observation that with the increased focus on safety management systems, the number of work-related accidents had been

reduced, whereas other accidents had increased, which might indicate that the paper work associated with the safety management systems might require too many resources, and reduce focus on other types of safety efforts.

6.2.3 Inland Helicopter Operations

Several informants mentioned that pilots of inland helicopters are frequently young and inexperienced, and use this as a steppingstone for their further career in aviation. In combination with demanding customers and complicated manoeuvring, this could lead to problems. The lack of experience could for instance explain that many accidents are related to bad weather, which might not have been acknowledged.

Inland helicopter pilots fly primarily based on visual references to the terrain. In marginal visibility this could lead to loss of control.

Aerial work operations are demanding, and there have been cases of loss of load. Pilots performing aerial work without accompanying task specialist are more exposed to accidents and incidents.

Surprisingly, passenger flights have been more accident-prone than more complicated flying operations. It was hypothesized that this might be because the awareness of risk is higher in more complicated operations.

Informants were divided over whether smaller companies were at higher risk than larger organisations. Some believed that larger companies were better at measuring discipline, that they were more transparent, and that they had a better support system for pilots. However, the activities of the companies could also explain different risk profiles, as rein herding, for instance, is usually done by small companies operating helicopters with marginal performance. The very fact that these are often “thin” organisations, could also lead to less organisational learning and development. In general, it was claimed that organisations that were less characterised by routines tended to have higher accident rates, and that, at least earlier, there was widespread use of freelance pilots, who were only paid if the flight was carried out. This was believed to have changed.

Various models of employment may still have an influence on safety, however. While all kinds of employees are protected against negative consequences of reporting, for instance, this could be more complicated to enforce in cases where the reporting party is not a permanent employee.

Another informant believed company size to be immaterial to the risk profile, and that the higher risk of Inland Helicopter Operations is attributable to culture and attitudes. In offshore operations, there are always two persons in the helicopter, and the flights are performed by instrument flight rules (IFR), whereas inland helicopter operations are performed by visual flight rules (VFR) mostly by a single pilot. Without clearly defined company policies and active verification of pilot adherence to company regulations, this can lead to bad and unsafe habits. The informant described this as a “cowboy mentality” in this part of the industry. Others also mentioned that the lack of safety culture in the companies had played a role in the past, along with lack of communication, planning and good systems for contact with customers.

6.3 Framework conditions

6.3.1 Survey data on framework conditions

Previous research (Nævestad, Phillips, Levlin, & Hovi, 2016) has shown that framework conditions may influence the safety level in transport industries. The survey therefore included a series of questions measuring how respondents perceive framework condition to influence the level of safety in their sector. The questions were fashioned as five statements, with which respondents were required to state their level of agreement on a scale from 1 = “completely disagree” to 5 = “completely agree”. The statements and mean response score are presented in Figure 6.4. As can be observed, the highest score was given to the statement “Severe competition between companies is detrimental to safety in my sector”, which had a mean score of 4.13. The lowest degree of agreement was found for the statement “Society accepts the current number of accidents in my sector”, which has an average score of slightly below 3; the “neutral” point on the scale.



Figure 6.4: Degree of agreement with statements about respondents own sector. Mean scores on a scale from 1 (totally disagree) to 5 (totally agree)

A comparison between sectors reveal that the patterns for the different questions are comparable (Figure 6.5).

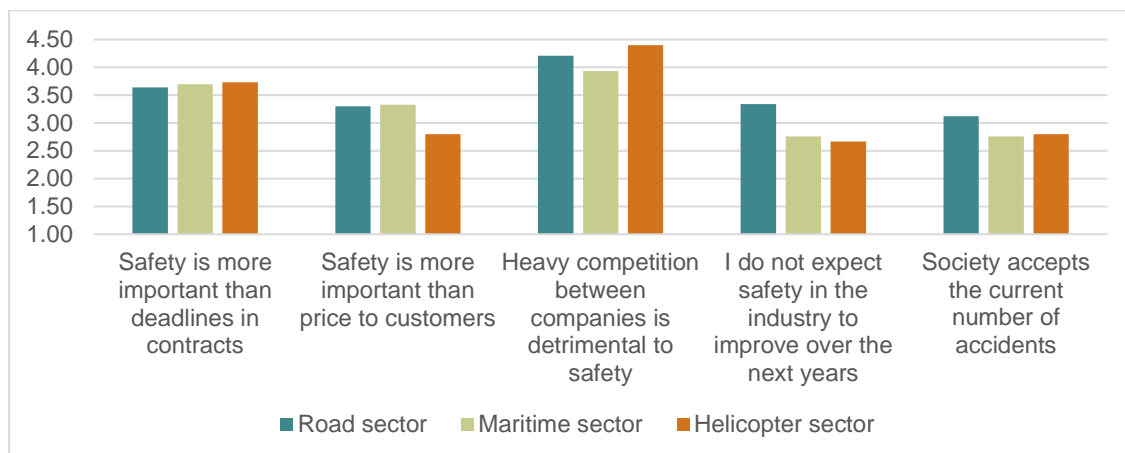


Figure 6.5: Degree of agreement with statements about respondents own sector. Mean scores on a scale from 1 (totally disagree) to 5 (totally agree)

6.3.2 Views on framework conditions in the interview data

Interview data indicates that the framework conditions to which transport workers in the road sector relate, are different from those in other industries, in that individual workers and companies work more independently than in many other industries and sectors. This also applies to training/education, as trainee drivers work independently in their own vehicles, rather than in teams as in most professions. This means that they are probably not given the same amount of feedback and support as in other professions, and there is often no special training programme for trainees. Given the present financial framework conditions with increased international competition, this is unlikely to change.

Framework conditions in the maritime sector vary considerably. On the one hand, there is the international fleet, which competes on the international market. On the other hand, there are small fishing vessels, or ferry companies, which can be very local. These actors face very different challenges.

The fact that safety at sea is also seen in the context of international trade and competitiveness means that safety regulations are perhaps more explicitly weighed against cost than in other sectors, as (some) shipowners are free to opt out of the regulations. This means that countries tend to avoid introducing special, national regulations. This was especially seen as relevant to the question of staffing. It was claimed that today, companies sometimes use minimum staffing as default standard, though this varies in the sector. However, staffing should be based on prior risk assessments. One solution would be stricter international requirements with regard to staffing and working times, but such changes take time.

Some of the informants believed the present organisation of the sector to be suboptimal, as the Ministry of Trade, Industry and Fisheries is seen to be lobbying for shipowner interest, and should thus not be in charge of safety in the sector.

On a structural level, the borderlines between the NCA and NMA can be demanding to negotiate, especially in relationship to ISPS, which is a shared regulation. Somebody must helm the responsibility for coordination questions like who has the coordinating roles as facilitators for harbours and shipowners respectively.

Financial competition could also be a problem when it comes to ferries. It was observed that most tenders focus on price, rather than safety, and that requirements for very frequent departures could also jeopardize safety.

Loading and unloading has also become subject to competition. It used to be the prerogative of dockworkers, but this has been changed through a verdict, so that companies are now at liberty to use their own crews for this work. The work may thus be taken over by actors who are less professional, and who are less accustomed to these kinds of operations, or less familiar with the physical environment.

The most frequently mentioned framework condition in inland helicopter operations, was finances. A substantial part of the industry runs a deficit, and safety, such as training, for instance, requires financial resources. Since customers tend to focus on price, there is a strong incentive to cut costs. This competition could also influence actual flying practices, as the pilots are faced with customer expectations which might jeopardize safety, and meet customers without a supporting apparatus.

Customer demands could also cause stress, when they must be weighed against weather, technical conditions and cargo. Such situations should ideally be managed by companies. Safety levels are generally higher in offshore and ambulance helicopter, where customer demands for safety are stricter, and the industry is less pressed on finances.

Informants agreed that there was greater accept for risk in this industry than in other parts of aviation. One speculated that the risk associated with inexperienced pilots had led to an implicit acceptance. As a matter of fact, offshore helicopters are subject to stricter regulation when it comes to motors, equipment and pilot training. Offshore helicopters also have computer-based, pre-programmed routes, which the helicopter follows automatically, whereas pilots of inland helicopter operations pilots fly manually all the time.

6.4 Causes of accident reduction

Our previous research (Nævestad et al., 2015) has shown that the number of work-related accidents have been reduced in all the three sectors studied. Respondents were therefore asked to state what they believed to be the causes of this reduction. In addition to seven pre-defined categories, it was also possible to choose the “other” option, and give a free-text answer. The categories were not mutually exclusive, and the replies presented in Figure 6.6 presents percentages relative to the total number of causes indicated (not relative to number of respondents).

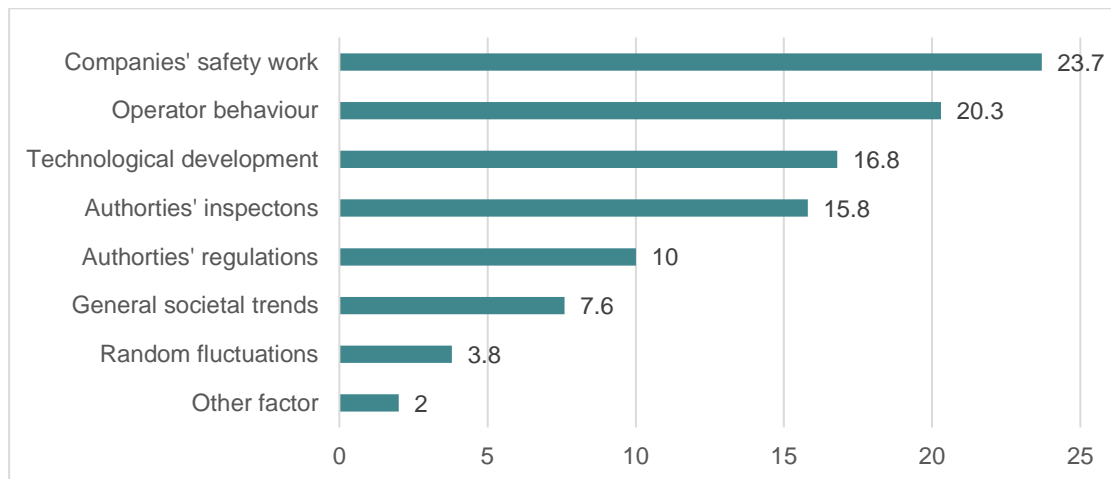


Figure 6.6: Causes of accident reduction (“What do you think are the causes of the decline in work-related accidents in your sector in recent years?”) Percent. (N=128)

As we can see, the general picture suggests that respondents believe safety improvement to be a consequence of targeted efforts, rather than random fluctuations or societal trends, and especially the efforts of companies and operators.

When we look at the distribution between sectors (Figure 6.7), we see that the respondents from the road sector tend to place less emphasis on the safety efforts of companies and employees and more on technological development.

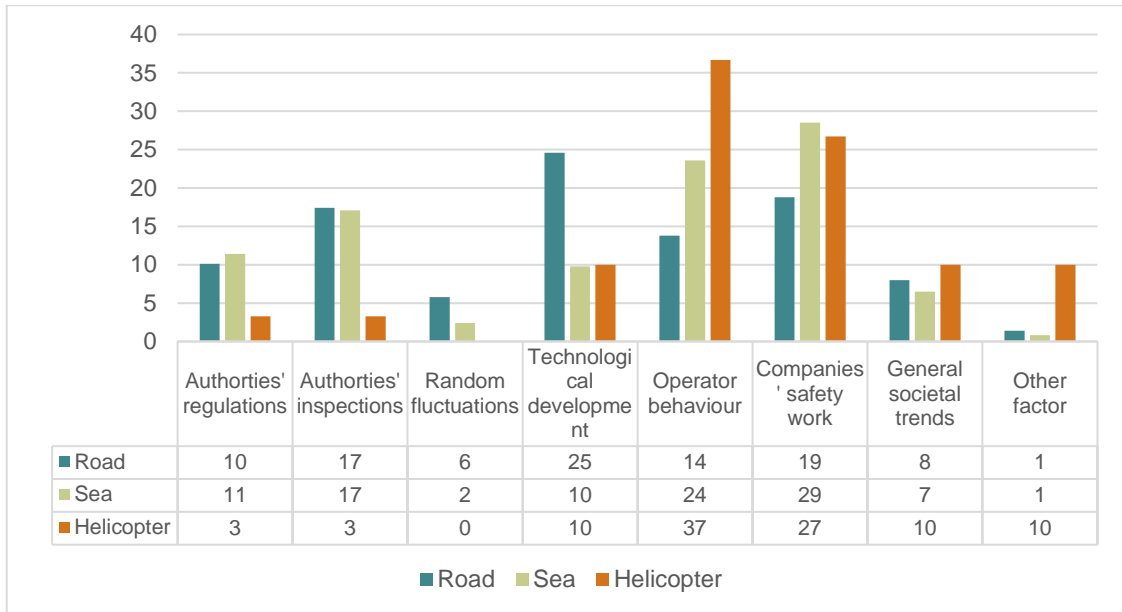


Figure 6.7: Causes of accident reduction, by sector (“What do you think are the causes of the decline in work-related accidents in your sector in recent years?”) Percent. (N=128)

Six respondents also provided free-text answers. Two of them disputed the premise (one attributed the reduction to changes in accident registration), two accentuated cooperation between authorities and operators, one learning from investigations, and one attitudes, safety focus, pro-active thinking and risk analyses.

There was a tendency that respondents from transport companies emphasised operator behaviour and companies’ safety work more than respondents from the relevant authorities.

6.5 Summing up

An important question for determining and defining responsibility and liability is what the causes of accidents are. Our study indicates that a vast majority of respondents across sectors, positions and organisations, regard risk factors related to operators/individual employees to be the most important cause of work-related accidents in their sector.

Furthermore, interviews indicate that in all the three sectors, small companies were mentioned as a possible risk factor, as they might lack the necessary resources or competence to focus on safety.

In terms of framework conditions, informants believed severe competition between companies to most heavily affect safety in their sector. The lowest degree of agreement was found for the statement “Society accepts the current number of accidents in my sector”. Finally, the general picture suggests that respondents believe safety improvement to be a consequence of targeted efforts, rather than random fluctuations or societal trends, and especially the efforts of companies and operators. The respondents from the road sector tend to place less emphasis on the safety efforts of companies and employees and more on technological development.

7 Responsibility and accountability

7.1 General views on responsibility

While risk factors indicate where efforts can be made to prevent future accidents, they do not in themselves locate *responsibility* for accidents. We therefore also included a survey question about who is primarily responsible for the occurrence of work-related accidents; employees, company management, or authorities. The alternatives were mutually exclusive.

A majority of respondents across sectors (55 %) believed the individual employee to be primarily responsible for the *occurrence* of work-related accidents, but 38 % held transport company managers responsible, and 7 % authorities. A higher proportion of respondents from governmental agencies held companies primarily responsible (cf. Figure 7.1).

However, within transport companies, a higher share of employees (67 %) than managers and middle managers (51 %) held transport company management responsible, and a higher share of managers and middle managers (21 %) than employees (5 %) held authorities responsible. Note, however, that these results are based on a small sample.

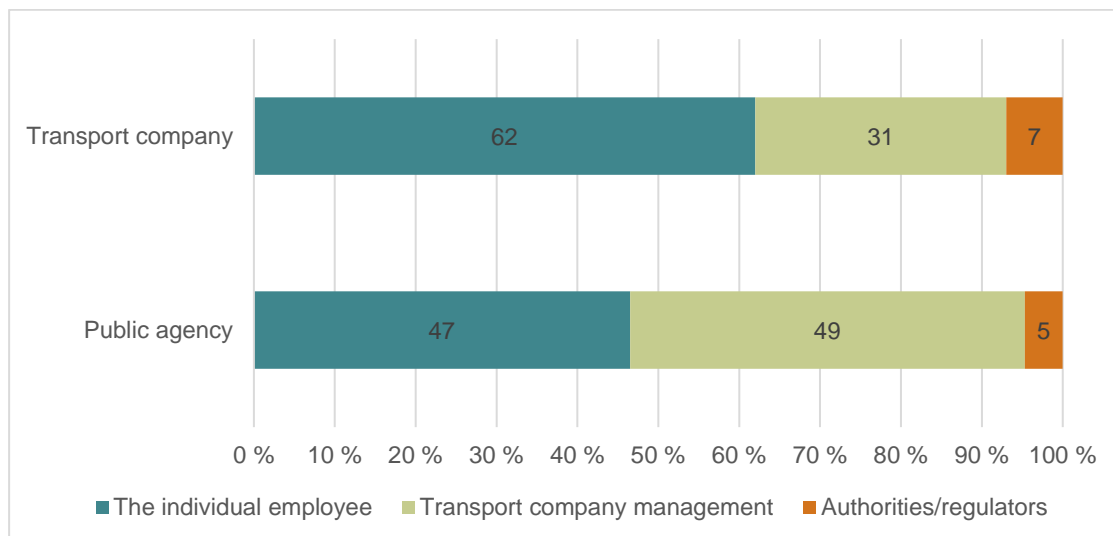


Figure 7.1: Who is primarily responsible for the occurrence of work-related transport accidents; employees, company management, or authorities? (excluding unions and trade associations). Percent.

We also asked who is primarily responsible for the *prevention* of work-related accidents. Interestingly, the pattern of answers is quite different for this question, thus it seems that respondents distinguished between responsibility for individual accidents and more systematic efforts for prevention. The majority (64 %) believed transport company management to be primarily responsible for preventive efforts (cf. Figure 7.2). This holds true for both governmental agency respondents and respondents from transport companies.

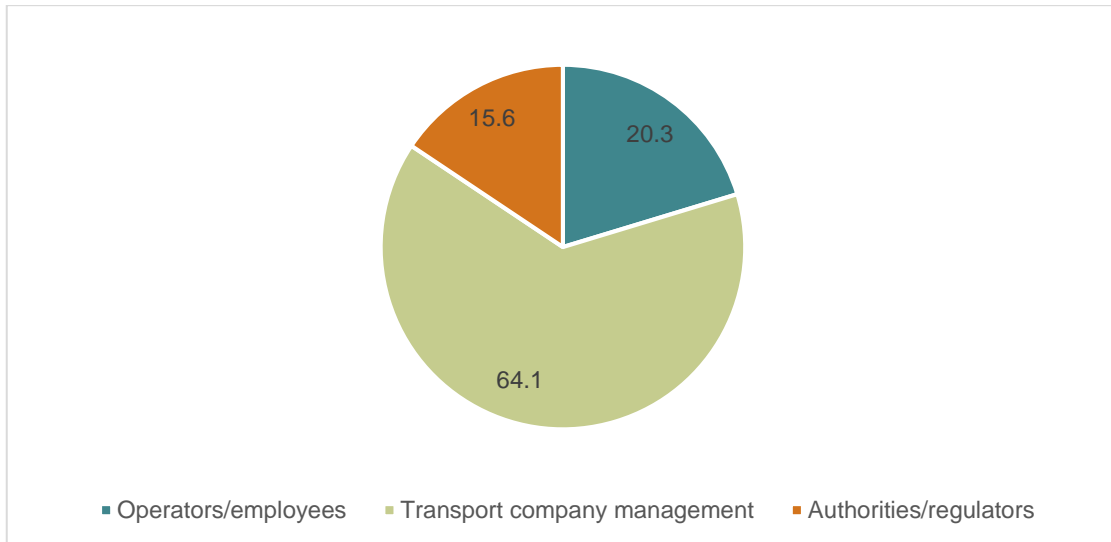


Figure 7.2: Who is primarily responsible for the prevention of work-related transport accidents; employees, company management, or authorities? Percent

7.2 Views on responsibility in the interviews

7.2.1 The road sector

The road sector is characterised by a high number of individual actors, small accidents, and a lower degree of union organisation than the other transport sector. In spite of this, many road users are on the road in a professional capacity, either because they are professional drivers, or because they are driving at work. In Norway, 36 % of fatal road accidents involve drivers at work (Nævestad et al., 2016).

In the road sector, international safety regulation of work-related factors is extremely limited, and does not really give much direction to national safety work. This, of course, means that the sector largely avoids the problem of global regulations that are not adapted to local requirements and environments. EU rules with relevance to road transport and safety apply to Norway, however, and it must be noted that there is some debate over many of these rules in Norway (e.g. rules on cabotage).

Counties, municipalities and the Norwegian Public Roads Administration (NPRA) are responsible for Norwegian roads. The NPRA's accident analysis groups (AAG) investigates all fatal accidents. Road accidents are also investigated by the Accident Analysis Board (AIBN). The LIA is the authority responsible for professional accidents.

The NPRA takes responsibility for roads, and for communicating the situation and collaborating with other relevant actors when it comes to accidents and accident risk. So far, they have not gone beyond this, for instance through looking into purchasers' role in relation to safety.

Most of the informants believed employers should take more responsibility for their employees' behaviour and safety in traffic, and that this should be part of their ongoing work with HSE. Work assignments should be based on prior risk assessments, which include an analysis of the road and conditions. Employers should also have routines, procedures and guidelines in place that promote safety. The AIBN found that many of the firms did not fulfil these requirements. It was noted that presently, drivers usually carry the entire responsibility, a fact which differs from what is found in other parts of professional

life. Some informants stated that the companies have – or should take on – the overarching responsibility for the interplay between the various elements in road traffic.

Some of the informants found that responsibility was not defined clearly enough in this area. For one thing, some of the requirements were too loosely defined, such as HSE-requirements or safety standards (eg. ISO 9000). Others believed that in theory, responsibilities were well-defined, but that the practical follow-up was inconsistent. It was pointed out that according to the Working Environment Act, employers have a wide-ranging responsibility for their workers' safety, but that this is rarely enforced in practice. While the Road Traffic Act – which places all responsibility with the driver – is enforced through controls and in police investigations following accidents, the same is not the case for the responsibility of the firms. Thus, while the responsibility is divided between different actors according to the law, this is not the case in practice.

Certain groups of actors were also seen as especially problematic when it comes to employer's responsibility for accident prevention– these would be actors who have a more tenuous relation with the profession, such as foreign employees, self-employed drivers, and temporary staff.

7.2.2 Maritime sector

As noted, the responsibility for the maritime sector is divided between the Ministry of Trade, Industry and Fisheries, which is responsible for the safety and security for ships and crew, and the Ministry of Transport and Communications, which is responsible for the maritime infrastructure and services for safe navigation in Norwegian waters and port security through The Norwegian Coastal Administration.

According to some informants, there are grey areas between the two ministries' zones of influence, and the organisation of the sector could be questioned. When it comes to security, for instance, it can be difficult to know whether threats are aimed at vessels or ports, and the interface between the two may be a challenge. Other informants, however, pointed out that aviation is internationalised at least to the same degree as maritime transport, and that trade interests are separated from transport policy in this sector. The organisation of the sector has, however, been subject to evaluations several times, but the current structure has been retained, with reference to the importance of viewing safety in relation to trade and competitiveness, and the degree of internationalisation in the sector.

While the NMA is responsible for safety for ships and crew, other actors have a certain responsibility for maritime safety in those cases where it has an interface with other areas. Thus, the Labour Inspection Authority has a responsibility for activities in ports, such as loading and unloading. Similarly, they are responsible for construction works carried out at sea, as this is considered a land-based activity.

An inspector from the LIA was recently at an accident scene at the harbour in Oslo, where a crew member had been injured during unloading. The captain did not have a duty to report to other authorities than the NMA. But in this case, the company on land reported the incident to the LIA, although none of their employees had been injured. The Labour Inspection was also called by the police. The LIA conducted audits together with a representative from the Norwegian Maritime Directorate, where they talked to the captain and the NMA went through documentation etc. Afterwards, they audited the company on land, where the LIA checked how safe operation was facilitated. This company had taken on responsibility, but they used crew from the ship to operate machinery and had responsibilities for coordinating the operation. The company received an order (“pålegg”) to better their procedures for coordination, including an order to appoint one person responsible for unloading.

The company violated the rules. But because the accident happened on the ship, and it was not perceived as their responsibility, no one intervened. The captain probably reported the incident to the NMA, but given their notification deadlines, the ship would have been at sea again before auditing could take place. It is unclear what companies think about these types of situations, when it comes to reporting and interfaces between agencies.

7.2.3 Inland helicopter operations

In terms of regulation, the allocation of responsibilities is considered to be very clear in the aviation sector. Accountability for accidents is usually placed with the organisations, who should make sure that regulations are followed, and make independent risk assessments.. The final responsibility lies with the accountable manager who delegates responsibility to the flight operations manager. Responsibility in the sector has been transferred from the pilot to the company. However, the role of the pilot is more crucial in inland helicopter operations than in other parts of aviation, as they often operate alone, with marginal knowledge of the missions they are going to perform.

An interesting feature of the helicopter industry is the existence of the Flight Safety Forum (Fysikkerhetsforum). This organisation, established in 2009, is run and financed by the CAA, and is tasked to be “a driving force directed towards government, customer groups and operators in matters that can promote safety for Inland Helicopter Operations”. Thus, the organisation has no formal responsibility, but it is still considered a very important actor in aviation safety work. Membership in the forum is optional, but all Norwegian inland helicopter operators are presently members of the forum, and thus obliged to participate in a minimum of three out of four annual meetings.

One of the informants pointed out that the use of functional regulations and requirements for safety managements systems could be seen as a sign of the state, as regulator, taking one step back from the scene when it comes to inspections and involvement in safety. From this perspective, the Flight Safety Forum is perhaps a way for the state to take on a more active role in safety work, although not one requiring formal responsibility.

7.3 Is the responsibility for prevention clearly defined?

Another survey question asked whether responsibility for accident prevention was defined clearly enough in current regulations in the sector. A total of 56 % of respondents across sectors found the responsibility clearly defined, whereas 21 % did not know. 23 % of respondents did not find responsibility to be defined clearly enough. A comparison of responses given in the different sectors (Figure 7.3), show that the highest share of respondents who believe responsibility to be clearly defined are found in the maritime sector. This may be connected to the relatively new Ship Safety and Security Act (2007). The road sector stand out with a relatively high share of respondents stating that responsibility is not defined clearly enough, and also a larger percentage of respondents stating that they do not know.

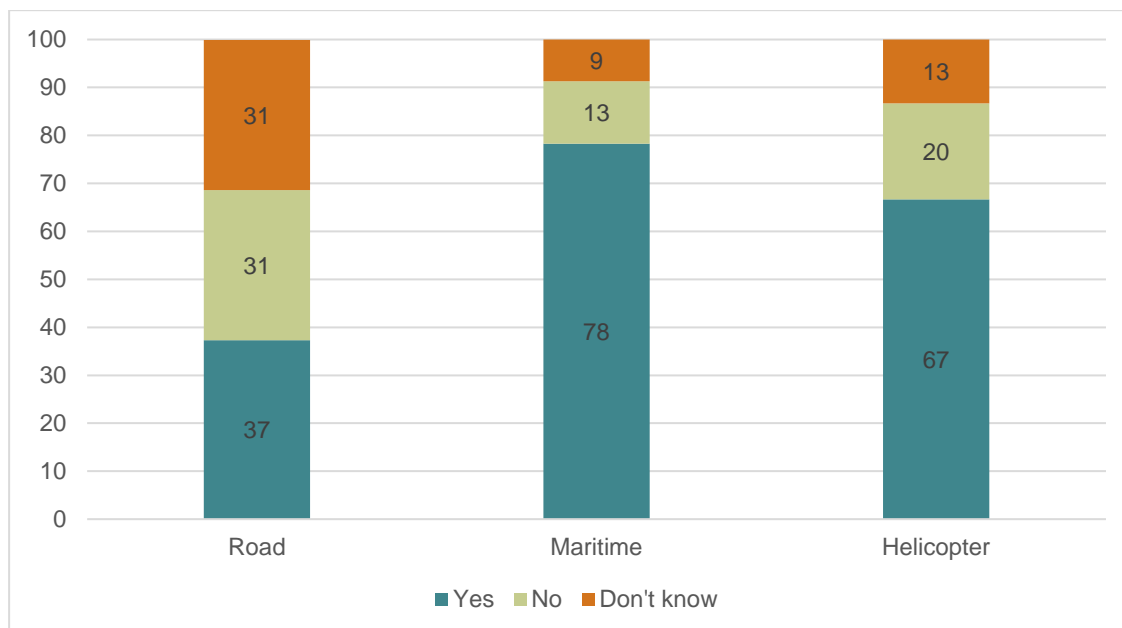


Figure 7.3: Is responsibility for accident prevention defined clearly enough in current regulations in the sector? Percent by sector

It is notable that in transport companies, less than half of respondents of the survey (44 %) found responsibility defined clearly enough, whereas a further 28 % did not know.

For those who responded “No” to this question, it was followed by the open question “In what way is responsibility unclearly defined?”. This was answered by twenty respondents from the road sector, five respondents from the maritime sector, and three respondents from the aviation sector.

Within the road sector, three responses justified their position with reference to regulations being unclear, or regulations and enforcement being divided between different authorities. Some of the respondents pointed out the lack of coordinated action, and the fact that different actors blamed each other. One respondent simply stated that responsibility is an ethical or legal concept, whereas prevention is practical, making the most powerful actors most relevant.

Several answers referred to the relationship between drivers and their organisations and/or their customers. The main concern was stress or pressure as a result of short deadlines, and the fact that drivers are held responsible even though they are not the ones defining route and speed. One of the respondents also mentioned lack of training in this context. As a more general comment, several respondents saw the (legal) responsibility as a problem because it provides an opportunity for other stakeholders (managers or customers) to ignore their influence and liability. This was also linked to governmental authorities’ responsibility:

“When authorities do not take responsibility, for example through stricter regulations, companies or operators must be responsible. In these situations, responsibility often evaporates. For instance, who is responsible for securing cargo in a van used for work? The operator must take day to day responsibility, but has the employer taken responsibility by telling and informing about the importance of properly securing cargo, not to mention how to secure cargo safely?”

One respondent claimed that road development or black spot modification did not properly adapt infrastructure to the requirements of long or heavy vehicles. Another mentioned that the responsibility for the standard of vehicles was not properly defined.

One of the respondents linked the unclear responsibility to a lack of information about compliance with regulations, and another with a lack of individual follow-up from authorities.

In the maritime sector, a much higher percentage found responsibility for accident prevention to be clearly defined, but those who disagreed, all expressed that authorities choose to ignore their responsibility for the consequences (in terms of manning and equipment, for instance) of cutting costs. The quote below sums up all of the issues raised:

“The authorities should clarify what is expected unambiguously, what is “good enough”. Now it looks as if consequences are the only thing that matters – everything is good enough until an accident happens, then nothing is good enough.”

There were only three open answers from the aviation sector, and these dealt with three separate issues. One echoed the complaints from the road sector, in saying that in spite of the aircraft commander being responsible for the vessel, behaviour is shaped by management expectations. Another stated the everyday operations of the industry are not covered by the current regulations. A third respondent claimed that there is too much bureaucracy involved in this work.

We also asked respondents to state their agreement (on a scale from 1 = “completely disagree” to 7 = “completely agree”) with two statements about public agencies’ responsibility for safety in their sector. The first statement was “Sharp distinctions between public agencies impede effective prevention of work-related accidents in my sector”, whereas the second was “Unclear roles between governmental agencies is a safety problem in my sector”. The distribution of responses across sectors is shown in Figure 7.4. While there is somewhat more agreement with the first statement, the differences are not very notable.

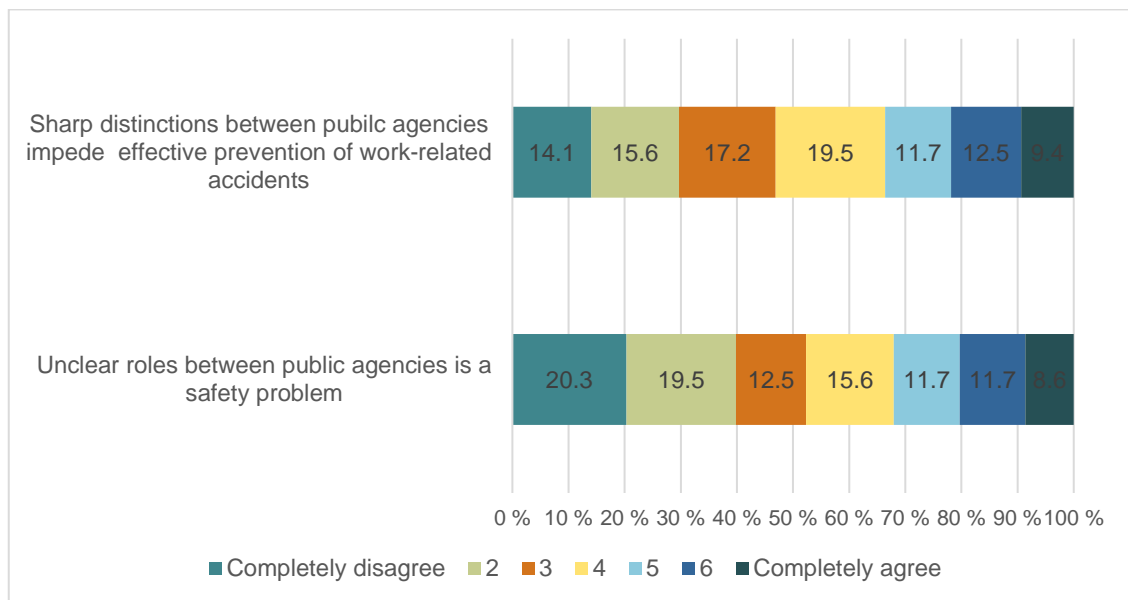


Figure 7.4: Respondents’ agreement with two statements: “Sharp distinctions between public agencies impede effective prevention of work-related accidents in my sector”, and “Unclear roles between public agencies is a safety problem in my sector” Scale from 1 = “completely disagree” to 7 = “completely agree”. Percent. (N=128)

If we compare the average score for the statements in different sectors, we find that the relative distribution is similar, but the shares agreeing is higher for both questions in the road sector, where the mean scores are 4 and 4,3 respectively. (Figure 7.5).

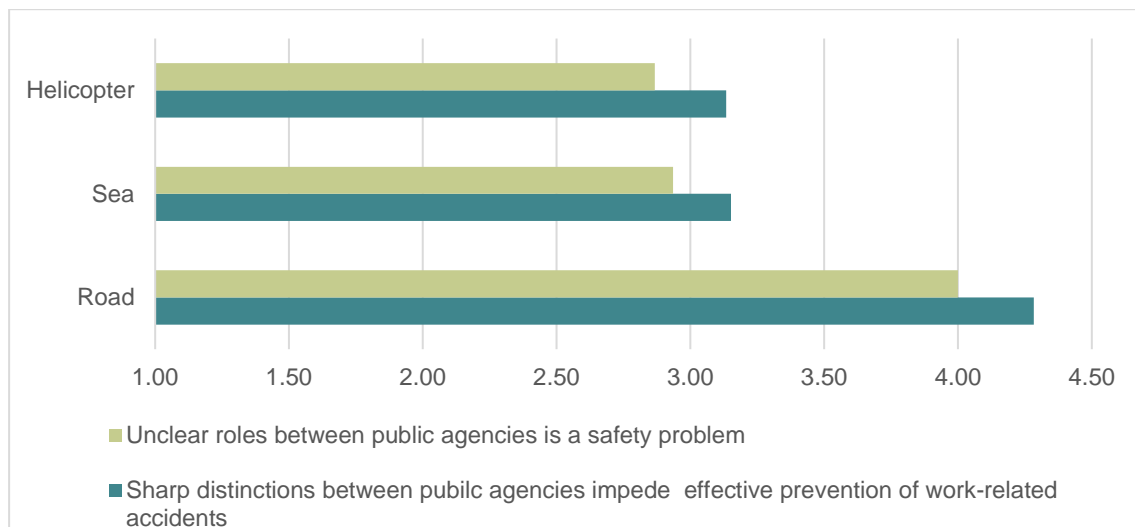


Figure 7.5: Respondents' agreement with two statements, by sector: "Sharp distinctions between public agencies impede effective prevention of work-related accidents in my sector", and "Unclear roles between public agencies is a safety problem in my sector" Scale from 1 = "completely disagree" to 7 = "completely agree". Mean scores. (N=128)

7.3.1 Complex interfaces and grey zones

The interview findings suggest that the different transport sectors are subject to complex interfaces such as the balance between safety and efficiency across transport sectors, ownership of ferry companies, as well as the effect that framework conditions, tenders, and contracts may have on safety outcomes.

The interviews indicated a complex interface between maritime transport safety and the road sector in the case of car ferries. The Norwegian Public Roads Administration enters into contract with ferry companies on the basis of tenders. There is now a concern that the tender system may contribute to reducing the level of safety in the ferries as companies cut costs in order to compete in terms of price. Informants observed a tendency that ferries are now older, and that crew has been cut. At the same time, they witness a relatively high number of minor incidents, which they worry might indicate reduced safety margins.

For the NPRA, uninterrupted ferry service is also a question of emergency preparedness and safety, as many highway ferries can be essential for ambulance services, for instance. For that reason, they prefer to avoid interruptions to the service, and fine companies accordingly. However, a balance needs to be struck between uninterrupted ferry service on one side and safety on the other, as safety dictates that ferry services should be interrupted if the captain is not convinced the journey can be conducted safely and that the vessel and crew are fit.

While informants conceded that safety is the responsibility of the companies and the NMA as sectorial directorate, they also considered ferries to be parts of the road system, and recognised their role in shaping the framework conditions of the industry as purchasers. They have, therefore, been looking into the possibilities for adapting tenders and contracts in such a way as to not be detrimental to safety, for instance through route-planning or fining systems. For instance, companies should not encourage captains to take risks in order to avoid fines for service interruption. In addition they have been considering such measures as additional score for safer vessels beyond the minimum requirements, redundant systems, and financing bridge crew training for complex waters.

As an example of potential conflicts, they mentioned a ferry trafficking a route on the western coast of Norway, where the NPRA had wanted more frequent departures. However, they also observed that the route in question was complicated, with demanding currents and winds and that the route requires the captain’s continuous presence on the bridge. The fact that the tender included a shorter turnaround time, might thus have an impact on safety.

We should note that after the administrative reform in 2012, the NPRA is only responsible for 18 Norwegian ferry services, out of a total of about 100. The rest are the responsibility of the counties, and hence, they also have a role in shaping maritime safety.

While responsibilities in the maritime sector seem to be clearly circumscribed in the Ship Safety Act, the regulation is characterised by complex interfaces between different actors and authorities. Some actors also complain about grey areas, such as the one between the two coordinating ministries. One informant also meant that the responsibility for prevention of accidents is not defined clearly enough, as it is unclear whether the state, the company or the single individuals carry the main responsibility.

The Ship Safety Act removed the focus from individuals to organisations, which is in line with how many safety workers prefer to approach accidents – through relating to underlying factors, complex and multifactorial causal processes. However, one informant also believed that these regulations can be used to protect organisations, as companies can cover behind their documented procedures, and blame the crew.

7.4 Measures to prevent work-related accidents in organisations

Respondents from all organisation types were asked whether their organisation worked to prevent work-related accidents. Figure 7.6 indicates that for all sectors and organisation types, 91 % answered “yes”, and 5 % answered “No”.

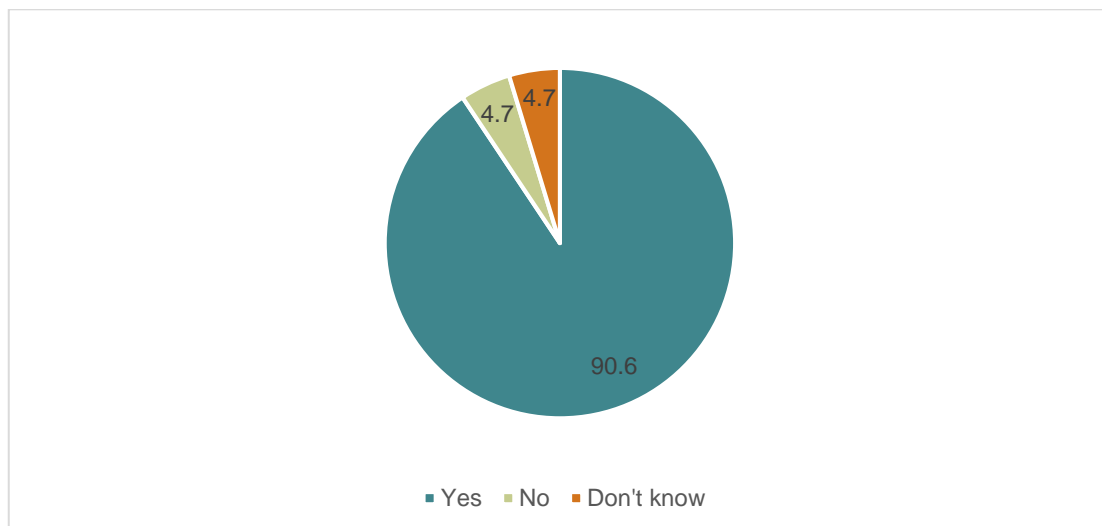


Figure 7.6: Does your organisation work to prevent work-related accidents? Percent. (N=128)

Those who replied in the positive, were asked to list the measures implemented and the factors addressed. It was possible to list up to three measures.

Among respondents from transport companies in the road sector, the most frequently mentioned measures were courses and training, focus on driving styles, HSE work, and various measures to address fatigue and stress. The latter category was quite diverse, and included such things as focus on fatigue, breaks and hours of service. Also, structural measures were listed, such as route planning, working times, employment status, collective agreements, industry regulations regarding tenders, cabotage and working conditions, and “influence employer to create working plans that do not promote stress”. Some representatives from companies also mentioned developing reporting systems for incidents and deviations and risk assessment procedures. Apart from this, respondents reported specific measures such as cash-free buses, speed limiters, improved equipment, alcohol tests, fire and accident drills, and working towards improving attitudes to safety.

Respondents from governmental agencies related to the road sector frequently reported that they worked with accident prevention through inspections and controls. The controls targeted various factors, such as transport companies, routines and organisational frameworks, hours of service and working hours, roads, vehicles, use of vehicles and equipment. Next, they are involved in various forms of guidance, supervision and courses and training (including driver training). Many also mentioned various kinds of cooperation, with other public agencies as well as with the industry. Some respondents referred to development and enforcement of regulations, and some work with physical measures in the road system. There were also a few who worked to improve safety through accident analyses, learning, improving culture, increasing awareness and imparting knowledge. A couple of respondents referred to the safety management standard NS-ISO 39001, and on promoting companies as examples of good practices.

In the maritime sector, companies frequently referred to routines, procedures and instructions, sometimes as part of safety management systems, and also continuous development of procedures. Many mentioned risk assessment, job planning, safe job analysis and quality assurance. A number of respondents mentioned reporting of incidents and experience exchange, or new measures as a result of these. Many mentioned campaigns, awareness-raising measures, HSE efforts, and continuous focus and meetings, especially Toolbox talks. As in the road sector, some respondents referred to courses and training. More specifically, use of safety equipment, drills, new technology and “Stop the job” were mentioned. One respondent referred to having raised structural safety issues with the Norwegian Maritime Authority.

Among the respondents from public agencies related to the maritime sector, the measures that were most frequently mentioned were inspections, regulations, information, and risk assessments. Inspections may target vessels, companies, equipment, operations, operators, crew or classification companies. Many of the respondents emphasized how inspections were now risk-based. Work with regulations included clarifying existing regulations (or making them stricter) as well as working with international organisations, and introducing new standards and certificates. Information to the industry also included targeted safety campaigns, training of crew, and awareness-raising measures. In addition to these measures, various ways of promoting risk-assessments, for instance through guiding, supervision and training, and the net-based tools fiskrisk.no and lastrisk.no were highlighted. Some respondents also mentioned focus on use of safety equipment and protective gear, improvement of fairway and marking system, and use of pilotage services (“lostjenesten”) along the coast. Generally, several respondents highlighted that their safety work was more systematic and evidence-based, including assessing effects of measures.

The helicopter companies referred to safety managements systems, risk assessments of procedures, commissions, and organisation, work on reporting, reporting culture and learning from incidents, and focus on human constraints. In addition, working with

attitudes, training and selecting crew, making internal procedures stricter, and using new technology (planning tools, usage monitoring, flight following), and use of safe job analysis were all mentioned. On a structural level, one respondent mentioned contracts, insurance etc. for all employees.

In the aviation sector, the public agencies highlighted inspections and guidance, and, as in the maritime sector, the new risk-based approach. They also emphasized cooperation with the industry, especially through the Aviation Safety Forum (“Flysikkerhetsforum”). In addition, improving national and international regulations, following up the study of the safety of Inland Helicopter Operations” “Sikkerhetsstudie Innlandshelikopter” (Bye et al., 2013), and use of safer technology was mentioned.

Finally, respondents were asked to rate their own organisation’s work with work-related accidents on a scale from 1 (= very deficient) to 7 (= very good). Overall, the mean score was 4.92, and the median 5 (Figure 7.7).

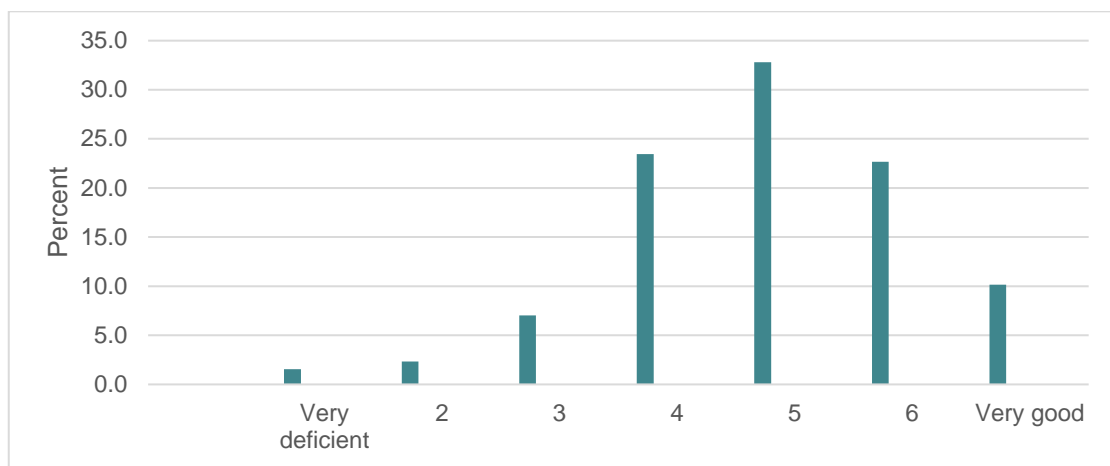


Figure 7.7: How would you rate your own organisation’s work with work-related accidents on a scale from 1 (= very deficient) to 7 (= very good). Percent. (N=128)

If we compare the different sectors (Figure 7.8), the helicopter industry has the highest score with 5.6, followed by the maritime sector (5.2). The road sector has the lowest score, with a mean score of 4.6. This is also the only sector where some respondents used the two lowest categories.

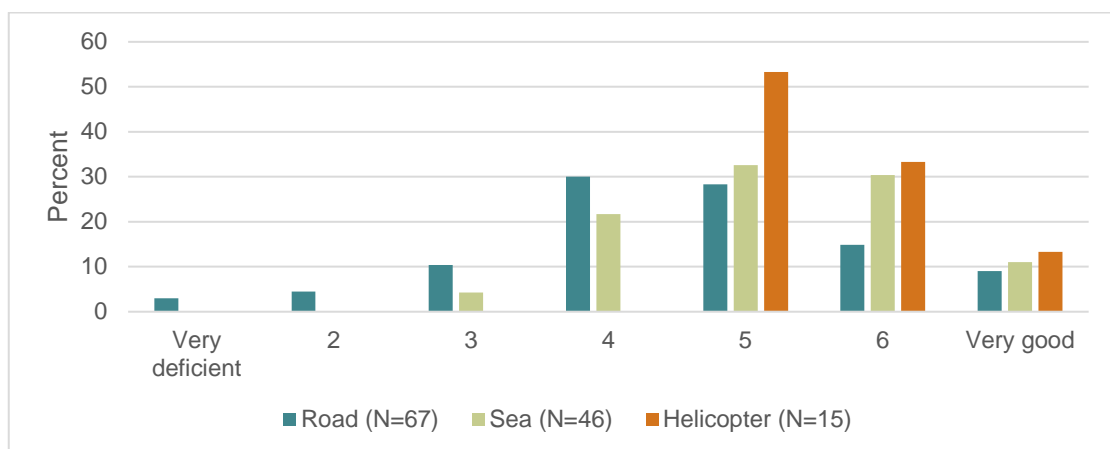


Figure 7.8: How would you rate your own organisation’s work with work-related accidents on a scale from 1 (= very deficient) to 7 (= very good), by sector. Percent. (N=128)

Respondents from transport companies (disregarding organisational position) ranked their organisations somewhat higher (mean 5.2) than respondents from public agencies (4.7), cf. Figure 7.9.

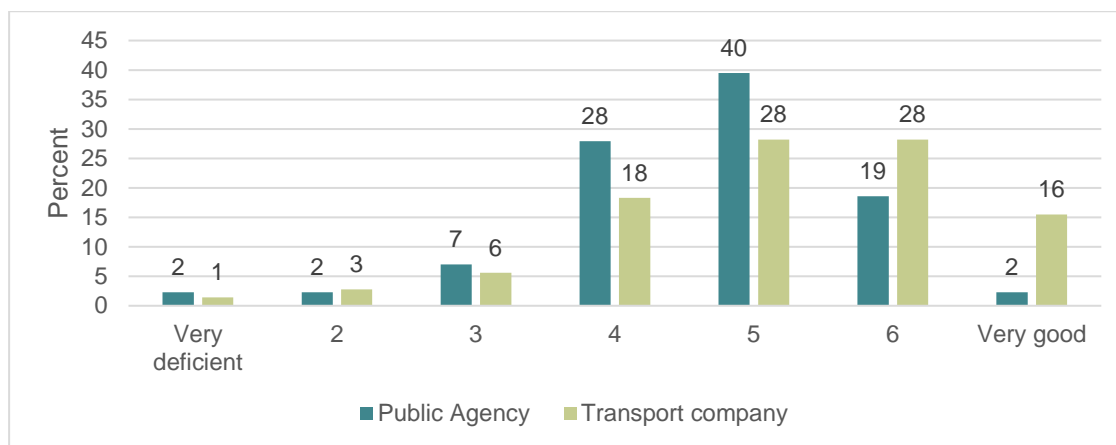


Figure 7.9: How would you rate your own organisation's work with work-related accidents on a scale from 1 (= very deficient) to 7 (= very good). Public agencies versus private companies. Percent. (N=128)

The highest rankings came from management in transport companies (employers in transport companies ranked their companies' effort at 4.94 on average).

7.4.1 Views on essential measures against work-related accidents in the sector

All respondents were asked to list the (up to three) most important measures against work-related accidents introduced in their sector by other organisations than their own, during the previous decade. For the road sector, representatives from public agencies and transport companies alike most frequently mentioned control measures, especially controls of hours of service. However, other specific controls were also listed, such as controls of foreign companies, controls of alcohol or substance use, controls of vehicles, vehicle technology, tyres and equipment, and controls directed at companies. A number of respondents, from companies as well as authorities, also emphasized the importance of improved regulations (such as EU-regulations, and new regulations for apprentices), or improved enforcement of regulations. Several respondents mentioned new public actors, or improved collaboration and sharing of information between authorities, particularly the Labour Inspection Authority's increased focus on professional drivers. One specific regulation that was repeatedly brought up, was the EU directive relating to professional driver training.

Other recent measures in the road sector were various factors relating to vehicle technology, and to improved infrastructure. Vehicle technology measures ranged from the general safety level of heavy vehicles (and testing regimes to assist purchasers in making safe choices) to specific technologies such as alcohol interlocks, speed limiters, digital tachographs and dashboard cameras. For infrastructure, respondents mostly referred to the general safety of the road system, but also to median guard rails and the separation of public transport from other types of traffic. Several respondents also pointed to improved knowledge and information about work-related accidents through for instance accident analyses and investigations, or the advice from members of the Norwegian Haulier Association.

Among the measures that were mentioned by more than one respondent were also developments in the system of tenders (such as the project Better Bus Tenders), and the safety management standard NS 39001. In addition to these measures, respondents also mentioned work on safety culture, Vision Zero, awareness and competence development in the industry, environmental regulations, spearhead transport companies, focus on nutrition, specific measures for the transport of dangerous goods, and securing loading areas.

In the maritime sector, the measures mentioned by the highest number of respondents were related to regulations. On a general level, several respondents reported that national regulations had been improved or clarified, notably through the Maritime Safety Act, and they specifically mentioned requirements for safety management systems, HSE regulation (also on land), and minimum manning. Also international regulations such as ISM were listed. More respondents in this sector listed general focus, culture and awareness as important measures in their own right, and also as a consequence of official efforts. This especially pertained to reporting culture, to the fishing industry, routines and equipment, and certain accident types. There were also several comments specifically on collaboration within the industry or between the industry and the authorities. Only two respondents in the maritime sector specifically mentioned controls (of equipment and companies, respectively) as important recent measures. A few commented on education or courses, and a couple on improved tenders. In addition, the work of The Norwegian Coastal Administration, in terms of improvement of fairway and marking systems, use of Pilot Exemption Certificates, and vessel traffic services was also cited by several of the informants. There were a few mentions of specific technologies, geographical information and tracking systems such as ECDIS and AIS, and fleet management systems such as Shiplog. Finally, one person mentioned investigations, and one the new regulations on safety vests in recreational vessels.

There were not one or two stand-out measures highlighted by the respondents from the helicopter sector. However, there was a stronger focus on culture and attitudes in the industry than in the other sectors, which included answers such as “holding management responsible for safety” and “willingness to pay for safety”. This was also mentioned in connection with customers, whose increased awareness and competence when it comes to safety was listed as an improvement in several cases. In line with this focus on awareness, there were several mentions of the Air Safety Forum. In addition, the implementation of the EASA-requirements for Safety Management Systems was seen as an important measure, and there was more frequent mention of research or analyses than in the other sectors. This is probably because of the active use of the relatively recent helicopter safety study (Bye et al., 2013), which formed part of the background for the establishment of the Air Safety Forum. Two respondents mentioned The Civil Aviation Authority’s inspections, and to better information from or communication with authorities. One respondent referred to “Moving maps”, one to increased use of collision warnings, and one to new technology in general. In addition, there was one general reference to regulation, one to shared standards, and one to improved training.

7.5 Summing up

Results indicate that a majority of respondents across sectors (55 %) believed the individual employee to be primarily responsible for the occurrence of work-related accidents, but 38 % held transport company managers responsible, and 7 % authorities. This is in line with respondents' mentioned view on causes. A higher proportion of respondents from public agencies held companies primarily responsible. When asked who is primarily responsible for the prevention of work-related accidents, the majority of respondents believed transport company management to be primarily responsible for preventive efforts. The road sector stand out with a relatively low share of respondents stating that responsibility is defined clearly enough, compared with the other sectors.

8 Discussion and Conclusion

The main finding of our study is that the road sector seems to perform poorer than the maritime sector and light helicopter inland on the three aspects of accident prevention that we focus on in this report:

- 1) Knowledge of and sources of information about work-related accidents
- 2) Views on risk factors related to work-related accidents
- 3) Understandings of roles and responsibilities in relation to work-related risk factors and accidents.

Respondents from the road sector rate their own efforts to prevent work-related accidents as lower than respondents from the other sectors. We expand on this below, and discuss what the road sector may learn from the maritime sector and Inland Helicopter Operations. Finally, we will discuss what common challenges the three sectors face when it comes to work-related accidents.

8.1 How can knowledge about work-related accidents be improved?

In order to prevent work-related accidents, it is essential that regulatory agencies have access to information about the prevalence and causes of accidents. The magnitude and type of available information about work-related accidents is also important because this information serves to frame the problem: without information about organisational factors which may influence safety outcomes, for instance, it is unlikely that measures aimed at such factors will be developed.

It is necessary with knowledge about the prevalence and causes of work-related accidents to develop targeted measures and campaigns, and to assess the efficacy of measures. We found that the extent to which this is the case, varies considerably between sectors. The road sector was the sector with the lowest share of positive responses to this question about the extent of work-related accidents. This also applies to a related question on knowledge of accident causes.

Previous studies have recommended that work-related risk factors should be included in the AAG database and that this database also should include a variable to identify drivers at work (Nævestad & Phillips, 2013; Phillips & Meyer, 2012). Such a measure could improve the knowledge about work-related accidents in the road sector. Interviewees also indicated that the quality of the NMA database could be improved when it comes to causes.

Our report indicates that under-reporting of work-related accidents is a key challenge to obtaining sufficient knowledge, analyses and countermeasures. In Sweden and Denmark, risk-based industries have a shared internet portal for employers to report incidents, and this information is available to all relevant public authorities. In Norway, however, all authorities maintain their own registers, and one informant saw this sharp sectorial division as a problem, as it made learning across sectors more difficult. Even though the police, Statistics Norway and the National Road Administration share a joint form of registering road accidents, the AIBN and the LIA is not included in this joint venture. Also, work-

related accidents are not systematically categorized. Only when all relevant actors across sectors have access to the same database, with the same set of principles when it comes to accident registration, can all the actors learn from work-related accidents and implement reasonable and effective safety measures.

Other suggested measures to improve the knowledge-base in the area included a coordinated effort from several authorities to make the police improve their reporting practices, and attempts to supplement police-reported data with other sources, such as research and information from insurance companies. One suggested approach was to try to create a more complete picture for certain groups, and use this as a basis for estimates for the total population. However, a prerequisite for registering causes is that the cause of the accident is known, and that there is a set of sensible categories to choose from.

8.2 Why does the road sector focus more on the operator?

Survey results indicate that a majority of respondents across sectors (55 %) believed the individual employee to be primarily responsible for the *occurrence* of work-related accidents, but 38 % held transport company managers responsible, and 7 % authorities.

When asked who is primarily responsible for the *prevention* of work-related accidents, the majority (64 %) believed transport company management to be primarily responsible for preventive efforts. Thus, respondents tended to attribute blame-responsibility to the individual operators and forward-looking responsibility to transport companies.

This is interesting, as research indicates that the risk of work-related accidents in transport is also influenced by operators' organisations and the framework conditions (e.g. regulating authorities, rules, competition) of these organisations (Nævestad et al., 2015). Thus, respondents could hypothetically have given transport organisations more blame-responsibility for the occurrence of work-related transport accidents.

It seems that this particularly applies to the road sector, which seems to put more emphasis on the responsibility of the individual operator than the other transport sectors. It was noted by informants that presently, drivers usually carry the entire responsibility due to the Road Traffic Act (Vegtrafikkloven). This approach differs from what is found in other parts of professional life. Most of the informants in the road sector believed employers should take more responsibility for their employees' behaviour.

The Road Traffic Act (Vegtrafikkloven) seems to shape and legally frame the attribution of responsibility when it comes to road traffic accidents. This leads to blame responsibility of the individual drivers when investigating accidents, instead of forward-looking responsibility where accountability is placed partly on the employer of the driver. Thus, it seems that in the road sector, responsibility is legally framed towards the driver rather than the employer, in contrast to the maritime sector, where for example the Maritime Safety Act focuses more on the shipping company's responsibility than the responsibility of the captain.

In conclusion, it seems that the "person view" on accident causation is more prevalent in the road sector than in the maritime sector and in Inland Helicopter Operations, which lean more to the "system view" (Reason, 2000). The former point to risky operator behaviours to explain work place accidents, and researchers who hold that risky behaviours to a great extent are influenced by contextual factors. According to the person approach, unsafe acts are primarily the result of inadequate mental processes like forgetfulness, inattention, poor motivation, carelessness, negligence, and recklessness.

The systems approach on the other hand, is based on the premise that it is human to err and that human errors are expected. The system approach views errors as consequences, rather than causes, and human errors are explained in light of systemic causes rather than a fallible human nature. As a consequence, the systems approach gives rise to prevention strategies focusing on building “error tolerant” systems, e.g. introducing system defences involving barriers at many different levels: technological, organisational, cultural.

Although it is evident that professional transport operators are culpable of a certain share of categories of unsafe behaviours (e.g. intentional violations), research indicates that most categories of human error in the work place not are gross errors for which operators can be blamed (Reason, 2000). Marx (1997, cited in Reason, 2000) for instance, indicates that in about 90 % of the quality lapses in aviation maintenance, maintenance personnel were judged as blameless. Nevertheless, it is important to note that culpable errors must be sanctioned. Defining this boundary means to develop a “just culture”:

“Effective risk management depends crucially on establishing a reporting culture. Without a detailed analysis of mishaps, incidents, near misses, and “free lessons,” we have no way of uncovering recurrent error traps or of knowing where the “edge” is until we fall over it. [...] Trust is a key element of a reporting culture and this, in turn, requires the existence of a just culture—one possessing a collective understanding of where the line should be drawn between blameless and blameworthy actions. Engineering a just culture is an essential early step in creating a safe culture” (Reason, 2000, pp. 768-769).

8.3 Why are responsibilities unclear in the road sector?

Some of the informants in the road sector did not find responsibility to be defined clearly enough for work-related road accidents. Others believed that in theory, responsibilities were well-defined, but that the practical follow-up was inconsistent.

In the survey, we asked whether responsibility for accident prevention was defined clearly enough in current regulations in the sector. A total of 56 % of respondents across sectors found the responsibility clearly defined, whereas 21 % did not know. 23 % of respondents did not find responsibility to be defined clearly enough.

The road sector stands out with a relatively low share of respondents stating that responsibility is defined clearly enough; 37 %, versus 78 % in light helicopter inland and 67 % in the maritime sector. The road sector also had a larger percentage of respondents stating that they do not know.

The varying enforcement of requirements in the Working Environment Act and the Road Traffic Act may explain why the informants from the road sector find the responsibilities in the sector not clearly enough defined. Informants pointed out that according to the Working Environment Act, employers have a wide-ranging responsibility for their workers’ safety, but that this is rarely enforced in practice. On the other hand, the Road Traffic Act, which places all responsibility with the driver, is enforced through controls and in police investigations.

8.4 What can the road sector learn from sea and air?

In conclusion, it seems that efforts aiming to clearly define the responsibility for prevention of work-related accidents in the road sector are needed. Given that clearly defined

responsibilities are a premise of effective prevention, we could assume that this would improve the efforts to prevent work-related accidents in the road sector.

All respondents were asked to list the (up to three) most important measures against work-related accidents introduced in their sector by other organisations than their own, during the previous decade. For the road sector, representatives from public agencies and transport company alike most frequently mentioned control measures, especially controls of hours of service.

In the maritime sector, the measures mentioned by the highest number of respondents were related to regulations. On a general level, several respondents reported that national regulations had been improved or clarified, notably through the Maritime Safety Act, and they specifically mentioned requirements for safety management systems, HSE regulation (i.e. NMA, 2005), and minimum manning. Thus, given that the maritime respondents scored high on the questions related to a “clearly defined responsibility for work-related accidents”, perhaps the road sector could learn from the legislation in the maritime sector.

There are not one or two stand-out measures among the respondents from the helicopter sector. However, there was a stronger focus on culture and attitudes in the industry than in the other sectors.

One informant believed that regulations similar to those in the oil industry should be introduced for transport assignments, so that the largest actor involved (the actor hiring contractors) is responsible for safety for all contracting companies. Today, it is possible to avoid the regulations from the Working Environment Act through hiring drivers as independent contractors. Another solution to this, could be giving independent contractors requirements beyond those they face today.

A problem with foreign firms is that they cannot be controlled by Norwegian authorities. It is also, according to one informant, somewhat unclear whether all regulations in the Norwegian Working Environments Act apply to foreign workers. The LIA mentioned that their collaboration with other European authorities could be improved to address the problem of foreign drivers. They do, however, collaborate with Nordic authorities, and authorities in Poland and Latvia.

Several informants meant that the LIA should take a greater responsibility for accidents in transport, including carrying out thorough investigations. The fact that different authorities operate in relative isolation, may hamper the potential for learning, and it was thus suggested, for instance, that the LIA should take part in accident analysis groups, when accidents were relevant to their domain.

Since the Police typically only follow up the Road Traffic Act, with its exclusive focus on drivers when investigating road accidents, it was also suggested that other relevant regulations should be enforced after road accidents.

8.5 Two parallel systems in aviation

One of our informants provided us with an interesting line of reasoning. He said that even though the road sector is likely to benefit from a further system focus, where both the work context, the organisation, the road design, maintenance and support systems are included, it is hard to determine the potential of such a development. Small and “lean” organisations struggle more when it comes to organisational learning. This notion is supported by, and may be exemplified by pilots within private aviation. Although this is an extreme example, it is useful, as it illustrates transport operators lacking the organisational context. This narrow group of private pilots in inland helicopter operations have a far

worse safety performance than the most accident-prone commercial aviation pilots within inland helicopter operations, which are made up of small and medium-sized organisations in slow maturation.

The informant also said that when it comes to knowledge of and prevalence of information sources related to work-related accidents within sectors and across sectors, there is an essential difference between the systems in the road and aviation sector. One example of this is car speeding. If a person drives a car too fast, it is not rational for this individual to report this information to anyone, with documentation and explanations tied to this behavior. At least not to the police. But when an aviation pilot does the same thing flying an airplane, he or she has nothing to lose, and therefore they tell the Civil Aviation Authority when they have a higher speed than the aircraft's limit in given configuration, or if they exceed the speed limit from the air traffic services which serve to ensure safe distances from other aircrafts.

The informant said that the reason is that the aviation pilots is part of a learning culture. The aviation sector has established two parallel systems, where one of these systems, the learning system, is based on "just culture" and "non-punitive", which is not based on guilt and punishment / sanctions. Meanwhile, the other system, the traditional system of society, with police and prosecutors, sanctions and criminal liability, is more fundamentally understood by the public, the media and the legal expertise which is heavily applied in government administration and the authority in all three sectors that are studied in this report. Criminal liability as a main function in safety management in the traditional system is widespread in Norway. This informant suggested however that we culturally seem to have a slightly larger opening for accepting the alternative learning system than for example southern European countries.

This informant underlined that it has proved difficult to create both good safety information with contributing factors for learning, and legal accountability, in one system. The explanation from the maritime sector after the Sleipner accident, where the captain received a prison sentence, may be an example of this. Additionally, it seems that the road sector and the health sector are the most challenging sectors today, with individual accountability and the traditional punitive system as the dominant way of thinking. In the aviation sector, on the other hand, it is important not to give people a reason to doubt that the learning system and the traditional system are kept separate. People must be encouraged to report e.g. near misses to contribute to learning without fearing legal consequences of the traditional punitive system.

Summing up ten years' experience of the Accident Investigation Board for Transport in Norway (AIBN), Mellum (2015) argues that a future improvement in traffic safety requires an increased focus on safety culture, and learning from other sectors' (e.g. aviation) work on organisational learning and establishing a "just culture". Moreover, recent Norwegian studies show that companies and authorities in road transport wish to use the safety culture perspective in their work on safety, but lack proper information and tools (Nævestad & Phillips, 2013).

8.6 Towards a system-based approach in the road sector?

The regulatory regimes in transport have been moving in the direction of more system-based approach, where they introduce 'meta-rules' that specify how organisations should deal with risk, for example by specifying the establishment of risk management systems that may include methodologies and processes of risk assessment (Kringen, 2009, p. 6). System-based regulations focus on the process or system (May, 2007), and assess whether

the systems that are put into place are acceptable in order to control for example risk. The authorities in the maritime and inland helicopter sector have a system-based approach to safety, where accountability is placed with the organisation, rather than the individual (Elvebakk, 2015). This is reflected in the laws and regulations in the maritime and aviation sector, which are primarily based on functional international regulations which place much of the responsibility on the transport employer and infrastructure owner.

Even though the Norwegian Public Roads Administration in many ways also has a system-based approach, for example increasing focus on risk assessments when deciding which safety measures to implement, most safety measures are prescriptive and not formulated as functional requirements. The Road Supervisory Authority is aware of their role as a system-based regulatory authority, but see it as a challenge to audit based on this approach because of the lack of international regulations in their sector, and the fact that the rules and regulations in the NPRA are mostly prescriptive, based on technical specifications in different handbooks rather than functional requirements (Elvebakk, 2015). This kind of prescriptive regulation minimizes the degree of interpretation and thereby eases standardization of safety measures, but at the same time makes it difficult for the Authority to practice their system-based approach because of the large degree of detail. As the Road Supervisory Authority is responsible for supervising and regulating the NPRA, but at the same time are part of and report to the NPRA, they have a limited authority and impact when it comes to recommendations and sanctions (Elvebakk, 2015). However, in January 2017 the Road Supervisory Authority became an independent regulatory authority, under the Ministry of Transport and Communication (Samferdselsdepartementet, 2016, 2017). It has been suggested that this will allow them to sanction the NPRA and follow up regulations in a more efficient manner than they could when they were subordinate to the NPRA.

A large portion of accident investigations related to the road sector still mostly holds the drivers responsible. The Accident Analysis Groups of the NPRA investigate all fatal accidents on Norwegian roads, but their database includes little information on work-related causes of transport accidents (Nævestad & Phillips 2013). The fact that the informants from the road sector responded that they had less knowledge of causes of work-related accidents than informants from the other sectors, serves to support this notion. The investigations of the Accident Investigation Board Norway (AIBN) on the other hand, take both organisational risk factors and framework conditions into account, i.e. a system-approach, but the AIBN-Road studies only a handful of accidents each year. Enforcement and investigations by the police also focus on the drivers' responsibility rather than organisational conditions, as they enforce the Road Traffic Act which holds the driver responsible for accidents on the road. This focus leads to a lack of information about organisational factors which may influence safety outcomes. The Labour Inspection Authority enforces the Work Environment Act, which places accountability with the employer (organisations), but the informants in this study perceived them to not enforce the law in the same degree as the police. Therefore, more attention is placed on making operators rather than the organisations accountable for accidents.

Accountability is a central issue in safety work, as regulations typically task certain actors with the responsibility of securing the quality of a given service, and these actors are accountable to the authorities. Defining and designating relations of accountability, is therefore essential to the authorities' safety work. This is a challenge for the newly established Road Supervisory Authority (2012), as an informant from the Authority observed in a recent study (Elvebakk, 2015) that they have a limited amount of safety regulations related to management, and that their inspections and recommendations were more readily understood by those working on a higher level in the NPRA, who are

probably more used to thinking in terms of organisation and management tools. Further focus on a system-based approach, where both the infrastructure owner (NPRA), the transport organisations and clients are held accountable for organisational factors which may lead to work-related accidents, may shift the responsibility and accountability from the operators to organisations. A stronger focus on the fulfilment of requirements from the Work Environment Act may be a step in the right direction.

8.7 What common challenges do the three sectors face?

The LIA has observed that businesses with fewer than 20 employees have higher risk (Arbeidstilsynet, 2013). In the road sector, 86 % of Norwegian goods transport businesses have less than five employees (Nævestad, 2016). It was assumed that the reasons for the higher risk in small companies were related to resources available for safety work, but also the fact that small companies tend to employ vulnerable workers with higher risk, such as foreigners, temporary staff, and young people.

Interviews indicate that in all the three sectors, small companies were a possible risk factor, as they might lack the necessary resources or competence to focus on safety. In addition, authorities connected to all sectors suspected some underreporting of incidents (that could have led to an accident) in smaller companies. Three different characteristics of small businesses, which may affect the risk of small companies, will be discussed in the section below: challenges with bureaucracy, young operators and lone operators. These are suggestions from our qualitative data, and represent hypotheses which may be examined in further research.

One explanation can be bureaucratic framework conditions, both when it comes to the knowledge of proactive safety work in the sector, time and resources spent on paperwork and how the regulations are formulated. First of all, in all three sectors, the operators are driven by their practical knowledge and expertise, where they manage safety through reactive rather than proactive interventions. Their behaviour and choices are driven by their experience (and sometimes lack thereof, i.e. young operators), not by formalized processes such as risk assessments prior to an operation. As was noted in the maritime sector, this lack of adherence to the results of risk assessments is probably not due to unwillingness, but due to ignorance when it comes to the importance of reflecting on what could go wrong, and what “formal” measures to take to reduce the risk of something going wrong.

Next, both national and international safety regulations require a large amount of resources and paper work in order for businesses to comply. This may reduce the focus on other types of safety efforts, as was mentioned by an informant in the maritime sector. Some small businesses in the road sector, for example, purchase procedures from external suppliers in order to comply with safety regulations, and therefore do not have an ownership of the procedure and knowledge of the importance of these. Several AIBN aviation and AIBN maritime reports point to underdeveloped safety management systems in small transport organisations (Nævestad et al., 2015).

Also, respondents from the road sector mentioned that several regulations are too general and thereby difficult to comply with. This was exemplified by informants in all three sectors when they mentioned the risk relating to loading, unloading and securing cargo. A study by Nævestad et al. (2015) illustrates the hazards related to loading/unloading, as it found that a third of all accidents in the maritime sector occurred at the dock, which is probably due to the large amount of work that has to be done within a limited time frame, for instance loading and unloading cargo. This current study shows that loading and

unloading cargo is seen as one of the most risky operations in all three sectors, because of both the lack of coordination responsibility in the maritime sector, pilots of Inland Helicopter Operations being alone when securing cargo, and ignorance or failure to comply with regulations to secure cargo in the road sector. A respondent from the Inland Helicopter Operations noted that everyday operations are not covered by regulations, thereby making it difficult to operate safely. Operations which are performed rarely, are fairly complex or require coordination between several actors, such as loading and unloading cargo, will require more detailed procedures than operations which the workers are more familiar with (Antonsen, Almklov, & Fenstad, 2008). However, in order to successfully implement procedures which are followed by the operators, the operators themselves should be able to give feedback to the management related to the procedures, and the changes which are suggested should be implemented reasonably fast (Wold & Laumann, 2015).

In sum, additional training of operational staff in proactive interventions such as risk assessments, simplifying regulations to minimize paper work, free time for other safety efforts, and specifying rules or procedures related to safety-critical operations may contribute to reducing the risk introduced by overzealous bureaucracy.

Secondly, informants from the road sector and Inland Helicopter Operations mentioned young operators as possible risk factors. First, young operators constituted a higher risk than more experienced operators in the road sector and Inland Helicopter Operations. Inland helicopter organisations were comprised of many young operators, as it is seen as a stepping stone into an aviation career. However, the lack of experience and a tendency for risky behaviour made them more vulnerable to risk. Studies show that young operators have a tendency to take short-cuts in order to get the work done, in addition to believe that they have the adequate skills and knowledge to operate outside of the rules (Reason et al. 1995, cited in Hale, Heijer, & Koornneef, 2003). However, in order to make quick and effective decisions in operations characterized by time pressure, lack of information and complexity, the operator has to have sufficient experience and knowledge (Klein, 1997), i.e. appropriate schemas to guide decision-making, something young operators and novices lack.

Third, most professional drivers (especially heavy transport vehicle operators) and operators in inland helicopter operations work alone. Operators of inland helicopters, as well as heavy transport vehicle operators on the road, are vulnerable to risky situations because they mostly work alone, seldom with a safety department as support. Pilots of inland helicopter operations are often alone performing aerial work, in contrast with the more heavily regulated offshore helicopter industry. The fact that they often are alone may cause the pilots to take unnecessary risk in order to uphold time limits and efficiency targets. Interviews show that professional drivers in the road sector also are vulnerable when loading and unloading cargo, and may be subject to more risky behaviour when operating alone. Thus, the fact that the road sector and Inland Helicopter Operations are characterized by young operators who are more vulnerable to accidents, and the lack of a safety department and support in small companies, suggest that more effort should be targeted towards regulating the companies' responsibilities and safety management.

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Appendixes

Appendix 1: Interview guide

D) Introduksjon:

-Transportøkonomisk institutt gjennomfører en undersøkelse om «Arbeidsrelaterte ulykker i veg, sjø- og lufttransport: omfang, årsaker og tiltak»

(<https://www.toi.no/forskningsomraader/transportikkerhet/arbeidsrelaterte-ulykker/>) .

Prosjektet er finansiert av Norges Forskningsråd, og utføres av TØI, i samarbeid med Sintef og Safetec. Målet for prosjektet er å utvikle en kunnskapsbase for utvikling av effektive sikkerhetstiltak rettet mot arbeidsrelaterte transportulykker. Tiltakene vil være rettet mot offentlige myndigheter og mot transportorganisasjoner i veg og maritim sektor, og innen lufttransport. I tillegg skal prosjektet beskrive hvordan offentlige instanser og transportselskapene forstår sin rolle og sitt ansvar når det gjelder arbeidsrelaterte risikofaktorer og ulykker.

Det er frivillig og du kan trekke deg når du vil. Du er anonym og vi nevner ikke ditt navn i rapporten. Du vil få vår beskrivelse av den informasjonen du gir i intervjuet til gjennomlesning, slik at du kan kommentere eller korrigere før det publiseres.

Bakgrunnsspørsmål:

Hva er din stilling?

Hvilke sektorer arbeider du mot?

Luftfart

Sjøfart

Jernbane

Vegtransport

Kartlegging av omfang og årsaker:

Har dere oversikt over omfanget av arbeidsrelaterte ulykker?

Registrerer dere slike ulykker?

Ev..Hvor får dere oversikten fra?

Hvordan kunne denne oversikten forbedres?

Har dere oversikten over årsakene til arbeidsrelaterte ulykker?

Hvilke arbeidsrelaterte risikofaktorer anser du som de viktigste:

Er det andre risikofaktorer du mener er viktige?

Hvilken rolle spiller næringens rammebetingelser, inkludert regelverk og tilsyn inn som mulig årsak til slike ulykker?

Ansvar:

Hvem har hovedansvaret for at arbeidsrelaterte transportulykker inntreffer?

Hvem har hovedansvaret for å forebygge arbeidsrelaterte transportulykker?

- a. Fører
- b. Arbeidsgiver
- c. Myndigheter/lovgivere

Er ansvaret for forebygging av disse ulykkene klart definert i dag

Tiltak/forebygging:

Gjør dere noe for å forebygge arbeidsrelaterte ulykker?

Hvilke tiltak har dere?

Hvilke forhold retter de seg mot?

Hva er de viktigste tiltakene mot arbeidsrelaterte transportulykker som har blitt innført de siste årene?

Hvilke er de viktigste tiltakene som kunne innføres for å forebygge arbeidsrelaterte transportulykker innenfor din sektor?

I en ideell verden, hvordan ville dere arbeidet med bedriftene i din sektor for å forebygge arbeidsrelaterte ulykker?

Syn på formålsbasert vs. regelbasert regulering,

Hvordan vil du rangere den innsatsen din organisasjon gjør mot arbeidsrelaterte transportulykker?

EVENTUELT: om opplevelsen av ståå i sektoren:

3) Risikoanalyser

3a) Ut fra din erfaring, har du inntrykk av at transportbedrifter jevnlig gjennomfører risikoanalyser av spesielt kritiske operasjoner?

4) Arbeidsbeskrivelser/prosedyrer

4a) Ut fra din erfaring, har transportbedrifter fokus på å ha arbeidsbeskrivelser og prosedyrer for transportoppdrag?

5) Opplæring

5a) Ut fra din erfaring, får nyansatte sjåfører god nok opplæring?

6) Føreratferd

6a) Ut fra din erfaring, ser man i transportbedrifter på føreratferd som førernes individuelle anliggende, eller som organisasjonens anliggende?

6b) Er det vanlig at transportbedrifter har en policy på føreratferd, og ev. tiltak for å motivere eller sanksjonere i forhold til det?

7c) Førers atferd kan også være influert av tidspress, stress, osv. Ut fra din erfaring, er dette med stress og tidspress som en mulig årsak til trafikkulykker noe man har fokus på i transportbedrifter?

10c) Er det din erfaring at oppdragsgivere og speditører presser/stresser førere i dag?

IV) Generelt: hvordan identifisere arbeidsrelaterte forhold som er negative for trafikksikkerhet

11a) Hvordan tror du man kan avdekke bedrifter i faresonen, ev. før de for eksempel har vært involvert i alvorlige ulykker

11c) Hvilke sektorer, bransjer har de største problemene i dag?

11e) Hvilke indikatorer tror du det er best å bruke? (eks. sikkerhetskultur, arbeidsmiljø, helhetsinntrykk)

11 f) Har du inntrykk av at temaene vi har diskutert over følges godt nok opp i kontroller, tilsyn og granskninger? (risikoanalyser, arbeidsbeskrivelser, opplæring, bilbeltebruk, fart og kjørestil, kjøre- hviletid og vedlikehold og kjøretøyskontroll)

11g) Hva skal til for at disse temaene evt. skal følges bedre opp?

V) Hvordan påvirke arbeidsrelaterte forhold som er negative for trafikksikkerhet

12) Ut i fra din erfaring, hva mener du er det viktigste transportbedrifter kan gjøre for å forebygge ulykker?

13) Har myndighetene gode nok virkemidler i dag, overfor bedrifter som ”er i faresonen”?

16) Synes du at resultatene fra Arbeidstilsynet, SHT og UAG sine undersøkelser får tilstrekkelig gjennomslag hos myndigheter og i bedrifter?

17) Synes du kravene til bedriftene strenge nok? Kan man knytte krav til system for sikkerhetsledelse ved utdelingen av transportløyver for å stenge ute useriøse aktører, for eksempel? Er regelverket (Internkontrollforskriften) og oppfølgingen av det godt nok?

VI) Avslutning

Er det noe annet du mener vi burde tatt opp, eller har du noen kommentarer til spørsmålene våre?

Tusen takk for din hjelp!

Appendix 2: Survey

Ansvar og roller

Preview of version 5.0

Stilling	Hva er din stilling (tittel)?
♦ range:*	
Leder	<input type="radio"/> 1
Mellomleder	<input type="radio"/> 2
Rådgiver	<input type="radio"/> 3
Inspektør/gransker	<input type="radio"/> 4
Forsker	<input type="radio"/> 5
Ansatt (tillitsvalgt/verneombud)	<input type="radio"/> 6
Annen ansatt	<input type="radio"/> 7
	Open

Organisasjon	Hvilken type organisasjon jobber du i?
♦ range:*	
Departement	<input type="radio"/> 1
Direktorat	<input type="radio"/> 2
Fylkeskommune/kommune	<input type="radio"/> 3
Tilsynsmyndighet	<input type="radio"/> 4
Granskningsmyndighet	<input type="radio"/> 5
Transportbedrift/rederi/helikopterselskap	<input type="radio"/> 6
Bransjeforening/fagforening	<input type="radio"/> 7

Organisasjon	Hvilken type organisasjon jobber du i?
Open	

Label28	Ca hvor mange ansatte jobber i bedriften din?
<p>♦ filter:\Stilling.a=6;7;8</p> <p>♦ range:*</p>	
<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> 1	

Sektor	I det følgende vil vi stille en del spørsmål som tar utgangspunkt i transportsektorer. Angi derfor hvilken transportsektor du PRIMÆRT jobber innenfor/mot, og ta utgangspunkt i denne i de påfølgende spørsmålene. Dersom det er umulig for deg å velge én sektor, vennligst ta kontakt med Beate Elvebakk - bel@toi.no
♦ range:*	
Vegtrafikk	<input type="radio"/> 1
Sjøtransport	<input type="radio"/> 2
Luffart (helikopter)	<input type="radio"/> 3

HvemAArsak	Tror du størstedelen av de arbeidsrelaterte ulykkene i sektoren er forårsaket av risikofaktorer knyttet til
♦ range:*	
Operatør/den enkelte ansatte?	<input type="radio"/> 1
Bedrift?	<input type="radio"/> 2
Myndigheter?	<input type="radio"/> 3
Open	

KunnskapAnta II Veg	Hva tror du er det omtrentlige årlige antallet dødsulykker innenfor vegsektoren som involverer minst én sjåfør i arbeid i Norge?
♦ filter:\Sektor.a=1	
♦ range:*	
Mindre enn én	<input type="radio"/> 1

KunnskapAnta IIVeg	Hva tror du er det omtrentlige årlige antallet dødsulykker innenfor vegsektoren som involverer minst én sjåfør i arbeid i Norge?
	Mellom én og fem <input type="radio"/> 2
	Mellom fem og ti <input type="radio"/> 3
	Mellom ti og tjue <input type="radio"/> 4
	Mellom tjue og femti <input type="radio"/> 5
	Mellom femti og hundre <input type="radio"/> 6
	Mellom hundre og to hundre <input type="radio"/> 7
	Mer enn to hundre <input type="radio"/> 8

KunnskapAnta IISjo	Hva tror du er det omtrentlige årlige antallet arbeidsrelaterte dødsulykker innenfor sjøfart i Norge?
	♦ filter:\Sektor.a=2 ♦ range:*
	Mindre enn én <input type="radio"/> 1
	Mellom én og fem <input type="radio"/> 2
	Mellom fem og ti <input type="radio"/> 3
	Mellom ti og tjue <input type="radio"/> 4
	Mellom tjue og femti <input type="radio"/> 5
	Mellom femti og hundre <input type="radio"/> 6
	Mer enn to hundre <input type="radio"/> 7

KunnskapAnta IILuft	Hva tror du er det omtrentlige årlige antallet arbeidsrelaterte dødsulykker innenfor lett innlandshelikopter i Norge?
	♦ filter:\Sektor.a=3 ♦ range:*
	Mindre enn én <input type="radio"/> 1

KunnskapAnta IILuft	Hva tror du er det omtrentlige årlige antallet arbeidsrelaterte dødsulykker innenfor lett innlandshelikopter i Norge?
	Mellom én og fem <input type="radio"/> 2
	Mellom fem og ti <input type="radio"/> 3
	Mellom ti og tjue <input type="radio"/> 4
	Mellom tjue og femti <input type="radio"/> 5
	Mellom femti og hundre <input type="radio"/> 6
	Mer enn to hundre <input type="radio"/> 7

Nedgang	Antallet arbeidsrelaterte ulykker i din sektor har sunket kraftig de senere årene. Hva tror du er årsakene til denne nedgangen?
♦ range:*	
Myndighetenes reguleringsarbeid	<input type="checkbox"/> 1
Myndighetenes tilsynsarbeid	<input type="checkbox"/> 2
Tilfeldige svingninger	<input type="checkbox"/> 3
Teknologisk utvikling	<input type="checkbox"/> 4
Operatørenes atferd	<input type="checkbox"/> 5
Firmaenes sikkerhetsarbeid	<input type="checkbox"/> 6
Generell samfunnsutvikling	<input type="checkbox"/> 7
	Open

Hovedansvar	Hvem har hovedansvaret for at arbeidsrelaterte transportulykker inntreffer i din sektor?
♦ range:*	
Den enkelte ansatte	<input type="radio"/> 1
Ledere i transportselskaper	<input type="radio"/> 2
Myndigheter/lovgivere	<input type="radio"/> 3

HovedansvarForebygging	Hvem har hovedansvaret for å forebygge arbeidsrelaterte transportulykker?
♦ range:*	
Den enkelte ansatte	<input type="radio"/> 1
Ledere i transportselskaper	<input type="radio"/> 2
Myndigheter/lovgivere	<input type="radio"/> 3

DefinertAnsvar	Er ansvaret for forebygging av disse ulykkene klart definert i regelverket i dag?
♦ range:*	
Ja	<input type="radio"/> 1
Nei	<input type="radio"/> 2
Vet ikke	<input type="radio"/> 3

HvordanUklart	På hvilken måte er ansvaret uklart?
♦ filter:\DefinertAnsvar.a=2	
	Open

HoldnOverblikk	I hvilken grad er du enig i påstandene under?							
♦ range:*								
	Helt uenig						Helt enig	
	1	2	3	4	5	6	7	
Vi har et godt overblikk over forekomsten av arbeidsrelaterte ulykker og skader innen min sektor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	1
Skarpe skiller mellom ulike offentlige etater hindrer effektiv forebygging av arbeidsrelaterte	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	2

HoldnOverblik k	I hvilken grad er du enig i påstandene under?							
ulykker innenfor min sektor								
Utydelige roller mellom offentlige etater er et sikkerhetsproblem i min sektor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	3
Transportbedriftene i min sektor rapporterer alle hendelser de skal rapportere	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	4
♦ filter:\Stilling.a=1;2;3;4 Våre tiltak er basert på grundige studier av forskning.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	5

Forebygging	Gjør din organisasjon noe for å forebygge arbeidsrelaterte ulykker?	
♦ range:*		
Ja	<input type="radio"/>	1
Nei	<input type="radio"/>	2
Vet ikke	<input type="radio"/>	3

Beskrivelsefor ebygging	Kan du si hvilke tiltak dere har iverksatt, og hvilke forhold de retter seg mot?	
♦ filter:\Forebygging.a=1		
		Open
		Open
		Open

Oversikt	Har din organisasjon oversikt over omfanget av arbeidsrelaterte ulykker innenfor sektoren(e)?	
♦ filter:\Organisasjon.a=1;2;3;4;5;7		
♦ range:*		

Oversikt	Har din organisasjon oversikt over omfanget av arbeidsrelaterte ulykker innenfor sektoren(e)?
Ja	<input type="radio"/> 1
Nei	<input type="radio"/> 2
I noen grad	<input type="radio"/> 3
Vet ikke	<input type="radio"/> 4

KildeOversikt	Hva er kildene til denne oversikten? (du kan velge mer enn ett alternativ)
<ul style="list-style-type: none"> ◆ filter:\Oversikt.a=1;3 ◆ range:* 	
Egne databaser	<input type="checkbox"/> 1
Ekstern database	<input type="checkbox"/> 2
Forskningspublikasjoner	<input type="checkbox"/> 3
Aviser/media	<input type="checkbox"/> 4
	Open

OversiktAarsaker	Har dere oversikt over årsakene til arbeidsrelaterte ulykker innenfor sektoren?
<ul style="list-style-type: none"> ◆ filter:\Organisasjon.a=1;2;3;4;5;7 ◆ range:* 	
Ja	<input type="radio"/> 1
Nei	<input type="radio"/> 2
I noen grad	<input type="radio"/> 3
Vet ikke	<input type="radio"/> 4

ViktigsteTiltak	Hva er de viktigste tiltakene mot arbeidsrelaterte transportulykker som er blitt innført av ANDRE enn din egen organisasjon de siste ti årene?
	Open
	Open

ViktigsteTiltak	Hva er de viktigste tiltakene mot arbeidsrelaterte transportulykker som er blitt innført av ANDRE enn din egen organisasjon de siste ti årene?
Open	

ViktigsteMuligeTiltak	Hva er de viktigste tiltakene mot arbeidsrelaterte transportulykker som kunne innføres innen ditt arbeidsfelt?
Open	
Open	
Open	

RangeringInnsats	Hvordan vil du rangere din organisasjons innsats mot arbeidsrelaterte ulykker?									
♦ range:*										
	Svært mangelfull									Svært god
	1	2	3	4	5	6	7	8	9	10
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	1

Sikkerhetsskala	Se for deg en skala fra 1 til 10 som angir sikkerhetsnivå, der 10 tilsvarer sikkerhetsnivået i internasjonal kommersiell luftfart. Hvordan vil du rangere din sektor?									
♦ range:*										
	1	2	3	4	5	6	7	8	9	10
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Regjeringsskala	Se for deg en skala fra 1 til 10 som angir myndighetenes fokus på sikkerhet, der 10 tilsvarer myndighetenes fokus på sikkerhet i internasjonal kommersiell luftfart. Hvordan vil du rangere din sektor?									
♦ range:*										
	1	2	3	4	5	6	7	8	9	10
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Kundeskala	Se for deg en skala fra 1 til 10 som angir kundenes fokus på sikkerhet, der 10 tilsvarer kundenes fokus på sikkerhet i internasjonal kommersiell luftfart. Hvordan vil du rangere din sektor?									
♦ range:*										
1	2	3	4	5	6	7	8	9	10	
1	2	3	4	5	6	7	8	9	10	
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

regelskala	Se for deg en skala fra 1 til 10 som angir omfanget av sikkerhetsregelverk, der 10 tilsvarer mengden sikkerhetsregelverk i internasjonal kommersiell luftfart. Hvordan vil du rangere din sektor?									
♦ range:*										
1	2	3	4	5	6	7	8	9	10	
1	2	3	4	5	6	7	8	9	10	
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Enighet	Vennligst marker hvor enig du er i de følgende påstandene					
♦ range:*						
	Helt uenig	Litt uenig	Verken enig eller uenig	Litt enig	Helt enig	
	1	2	3	4	5	
Sikkerhet er viktigere enn tidsfrister i kontrakter i min sektor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	1
Sikkerhet er viktigere enn pris for kundene i min sektor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	2
Hard konkurranse mellom selskaper skader sikkerheten i min sektor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	3
Jeg forventer ikke at sikkerheten i sektoren vil bli bedre de nærmeste årene	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	4
Samfunnet aksepterer det ulykkesomfanget vi har i min sektor i dag	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	5

Kommentarer	Har du noen kommentarer til temaet eller undersøkelsen? Hvis ikke, trykk "neste" for å avslutte, og tusen takk for hjelpen!
Open	

Institute of Transport Economics (TØI) Norwegian Centre for Transport Research

Established in 1964, the Institute of Transport Economics is an interdisciplinary, applied research centre with approximately 70 professionals. Its mission is to develop and disseminate transportation knowledge that has scientific quality and practical application.

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