Traps and tricks of safety management at sea

Kristine Størkersen, Trine Thorvaldsen
Postprint, Safety Science 2021

Abstract

Safety management regulation was introduced almost twenty years earlier for Norwegian seafarers than coastal fishers, although both groups work in industries with high accident frequencies. In this study, seafarers and fishers' perspectives on safety management requirements is studied, through empirical data from interviews and observation conducted over several years, with the aim of informing the future development of safety management, especially in fishing. Results show that the fishers have practical skills and an operational orientation, while the seafarers experience ill-fitting procedures, extensive documentation, and shore management that the coastal fishers lack. The suggestions for future safety management are related to development of procedures, a safe working environment, safeguards and safety management skills.

1. Introduction

Maritime safety management regulation, like the International Safety Management (ISM) Code (IMO, 2018) and relating national regulations, holds shipowners responsible for ensuring safety in their activities, and to implement safety management systems.

While safety management has been mandatory in Norwegian coastal transport since 1999, this was not introduced in Norwegian coastal fishing before 2018. The coastal fishers thus have no tradition for formal safety management: Disconnected from life ashore, often with no on-shore management, measures to ensure safety have largely been up to each independent fishing crew (Davis, 2012; Knudsen & Grøn, 2010; McGuinness & Utne, 2014; Morel, Amalberti, & Chauvin, 2008; Thorvaldsen, 2013b).

At the same time period, most seafarers have experienced poor safety management requirements with unfitting procedures and extensive documentation, which have made 'safe practices' become a parallel task competing with 'safety management' (Anderson, 2003; Bhattacharya, 2009; Bye & Aalberg, 2020; Oltedal, 2011; Størkersen et al., 2017).

In this article, we argue that safety management developers should recognize the traps the seafarers have met and tackled, and that knowledge of seafarers' and fishers' perspectives is crucial for increasing the likelihood that safety management will be perceived as a positive contribution to safety at sea. We thus ask: *How can seafarers' and fishers' perspectives on safety management requirements inform the development of future safety management, especially among fishers?*

The analysis is based on empirical data from interviews and observation conducted over several years. The motivation for combining data from both coastal fishers and seafarers to support safety management development was the similarities between them and the fact that seafarers' have more experience with safety management systems than fishers. To find out how

these experiences could be of value for the fishers, the analysis aims to describe the perspectives on safety management requirements in both groups. Our study finds that fishers often have an operational orientation and lack shore managements, while seafarers have more systematic orientation towards the shore management, transport system and safety management. Still, safety management development in any industry could be inspired by fishers' practical orientation and simple industry structure.

The next section introduces the two costal industries and their accident statistics, while section 3 describes the theoretical approach, safety management research and safety management regulation, suggesting four main safety management requirements. In section 4 the methodological approach is presented followed by results in section 5, and a discussion of how the study informs future safety management development in section 6.

2. Background: The coastal transport and fishing industries

2.1 About the industries

Both the coastal transport and the coastal fishing industries consist of mostly small companies with small vessels and small crews.

In coastal transport, a ship owner often has more than one vessel and a shore office responsible for working conditions through crewing, shift rotation, watch schedules, equipment and safety management. The vessel type and age determine contracts, sailing schedules, and port frequencies. The buyers are private charterers or government procuring public transport, usually are not interested in increasing costs, not even to prevent accidents (Gullestad, 2013; Sampson, Walters, James, & Wadsworth, 2014). A consequence of the industry structure is for example that tasks are added without increasing the resources, which may cause a high work pressure (Lappalainen, 2016, p. 116; Österman & Hult, 2016).

A coastal fishing vessel owner usually has one vessel, that he/she is the skipper of. There is rarely a shore office. Fishers are mainly self-employed and get paid according to catch, which influence their work patterns (Morel, Amalberti, & Chauvin, 2009). They may fish close to their home ports, making daily trips to the fishing grounds, but many also travel to participate in seasonal fisheries like the annual cod fisheries in northern Norway. Fishers who work alone or on small vessels sometimes follow each other at sea (McDonald & Kucera, 2007; Morel et al., 2008; Saldanha et al., 2020; Thorvaldsen, 2013b, 2017b).

> The coastal fishing industry has … large numbers of small fishing boats with a low degree of formal organization, high degree of personal freedom and a tradition to engage in risky activities. (Lindøe, Engen, & Olsen, 2011, p. 96)

Accidents involving fishers and seafarers receive limited public attention, which influences the resources available to those industries and their regulators for accident prevention (Lindøe, Engen, et al., 2011).

2.2 Safety statistics

Workers at sea are in risk of health problems, and have mortality rates many times higher than the averages for those working on shore (e.g., Smith, Allen, and Wadsworth (2006).

Ship accidents involve groundings, collisions, fires, and engine breakdowns. Between 1998 and 2017, 2828 accidents involving transport vessels and 1086 involving fishing vessels were registered (Norwegian Maritime Authority, 2018).

In Norway from 2004 to 2013, an average of 15 seafarers and fishers were killed and 424 injured annually, and there was an approximately 60 % reduction in injuries during this period for both transport and fishing (Nævestad, Phillips, Elvebakk, Bye, & Antonsen, 2015).

Commercial fishing has higher fatality and injury frequencies than other occupations (McGuinness, Aasjord, Utne, & Holmen, 2013). Between 1990 and 2017, 315 fishers lost their lives (Thorvaldsen et al., 2018). The majority worked on coastal vessels, and many worked alone. The most frequent fatality causes were capsizing, falling overboard, drowning in port, and entanglement with machinery on vessels (McGuinness et al., 2013). A survey among 830 fishers found that coastal fishers had a higher prevalence of sickness absence than fishers on larger vessels, and that work-related injuries were the most common reason for absence (Sønvisen et al. 2017).

3. Theoretical approach

Practitioners strive for smooth and efficient operations without accidents. Still, they must regularly make critical choices between trade and safety (Amalberti, 2013), and the organizations need multiple safety measures to prevent accidents (Reason, 1997). Safety measures include regulation and formal requirements, along with the resources to improvise and handle variability in operations (Dekker, 2017; Hollnagel, 2017).

3.1 General safety management research

The purpose of regulation is to reduce potential risk coming from i.e. market mechanisms (Reason, 1997; Walters et al., 2011). A central part of today's safety management regulation, and topic for safety management research, are procedures to support safe practices. The intention of procedures is, of course, that they should show how operations must be performed in practice (Dekker, 2015; Grote, 2012; Hale & Borys, 2013). However, procedures and practices rarely go hand in hand (i.e. Hollnagel, Woods, & Leveson, 2006). Procedures are often detailed for one situation, or standardized because they cover several units or tasks (Almklov & Antonsen, 2014). Employees in many industries have found procedures too complicated and demanding extensive documentation, which can result in accidents (Amalberti, 2013; Bieder & Bourrier, 2013; Dahl, 2014). This has influenced a line of authors to urge companies not to *trap safety into rules* (Bieder & Bourrier, 2013) and Almklov et al. (2014) to warn that a one-sided focus on safety management could risk marginalizing safe practices.

One common reason for unfitting procedures, is that practitioners need to handle variability, while procedures are narrower. The practitioners must use situated knowledge to make safe decisions when an operation depart from the plans, so procedures should include discretionary space and flexibility (Dekker, 2017; Grote, 2015; Hale & Borys, 2013).

Another reason why procedures are overly detailed and complicated, is linked to bureaucracy (Dekker, 2014). It is common to add procedures after accidents or audits (Hale & Borys, 2013; Provan, Dekker, & Rae, 2017; Rae, Provan, Weber, & Dekker, 2018). Independent decision-making and improvisation are undervalued or even disparaged in audits, so even when

practical procedures are created, they may be accompanied by impractical and theoretical procedures to ensure auditability (Størkersen et al., 2020).

3.2 Maritime safety management

Maritime safety is hampered by the industry's structure, social organization, and economic pressure (Hetherington, Flin, & Mearns, 2006). Maritime regulation is challenging, as vessels and ship owning organizations can be registered in a line of countries (Almklov & Lamvik, 2018). Industries with narrow economic margins and many small entities, like coastal fishing and transport, have less opportunity to make ambitious safety investments than industries with greater profit and larger organizations (Lindøe, Baram, & Braut, 2011; Lindøe, Engen, et al., 2011; Nilsen & Størkersen, 2018). Still, the Norwegian Maritime Authority "finds systematic safety management to be an important instrument in order to prevent accidents" (Maritime Authority, 2016, p. 9).

The International Management Code for the Safe Operation of Ships and for Pollution Prevention (the ISM Code) was first adopted in 1993 (IMO, 2018). Norway implemented it for transport in 1999. Safety management systems also became mandatory for coastal fishing vessels below 500 gross tons through national regulations in 2018.

The ISM Code addresses the operator of each vessel, and §1.2.2 states (our emphasizing):
"Safety management objectives of the Company should, inter alia:
1. *provide for safe practices in ship operation and a <u>safe working environment</u>;*
2. *assess all identified risks to its ships, personnel and the environment and <u>establish appropriate safeguards</u>; and*
3. *continuously improve <u>safety management skills</u> of personnel ashore and aboard ships, including preparing for emergencies related both to safety and environmental protection."*

Following, according to § 1.4, the ISM Code's objectives should be accomplished through a safety management system (on each vessel) with a safety and environmental-protection policy; levels of authority and lines of communication between, and amongst, shore and shipboard personnel; and <u>procedures</u> to ensure safe operation of ships and protection of the environment, reporting of accidents, emergency situations, internal audits, and documentation to control all relevant documents and data (IMO, 2018). The Norwegian Maritime Authority and recognized organizations audit and issue ISM certificates to the ship-owning companies or vessel owners.

Soon after the ISM Code was implemented in transport operations, research revealed it contributed to seafarers' frustrations of bureaucracy, poor communication, empowerment, incompatible goals, and inappropriate procedures (Anderson**,** 2003, p. 276). Seafarers and researchers blamed shipowners for creating procedures without seafarer involvement (Bhattacharya, 2009; Lappalainen, 2016; Oltedal & Engen, 2011). As a result, some seafarers see written procedures as the opposite of common sense and seamanship (e.g., Anderson (2003); Bhattacharya (2009); Christophersen (2009); Knudsen (2009); Kongsvik, Haavik, Bye, and Almklov (2020); Røyrvik, Skarholt, Lamvik, and Jonassen (2015); Vandeskog (2015)). They rather value practical experience and flexibility to work safely, and that professional

judgement guide decisions (Antonsen, Almklov, & Fenstad, 2008; Knudsen, 2009). Seafarers' safety engagement often correlates with the safety levels on vessels (Bhattacharya, 2012). Top management at poorly performing shipping companies have been found to be not committed to safety issues (Lappalainen, 2016). Yet, seafarers often try to ensure that their employers will not lose contracts, miss deadlines, or disrupt schedules (Sampson et al., 2014; Aalberg & Bye, 2017).

More positively, Nordic research shows that seafarers might benefit from the ISM Code due to systematic safety knowledge, safety routines and safety investments (Lappalainen, 2016; Størkersen et al., 2017). Also in Croatia, seafarers' views of safety management implementation is improved, if they experience properly designed procedures, positive work environment and adequate communication (Mišković, Jelaska, & Ivče, 2019).

Among the coastal fishers, that have had no mandatory safety management, studies show that regulations are seen as undermining their occupational experience and judgement (Bye & Lamvik, 2007; Knudsen & Grøn, 2010; Thorvaldsen, 2015). Fishers value safety knowledge, but are reluctant to the paperwork that follows increased regulation (Grøn, Rasmussen, & Poulsen, 2014; Thorvaldsen, 2017b). It is described how fishers rather rely on their *native resilience* – experience and embodied work which guide how and when the job can be done (Morel et al., 2008).

3.3 Safety management requirements

Based on the ISM Code's § 1.2.2 and § 1.4 (ISM Code, 2018) and relevant research presented above, the results section is structured according to four main maritime safety management requirements for seafarers and fishers:

- **Procedures for safe practices.** The procedures should support primary tasks. They must provide flexibility and discretionary space to make situated decisions and ongoing risk assessments. This also involves 'secondary tasks' such as documentation, reporting and focus audits etc.
- **Safe working environment**. Different types of onboard and company relations can contribute to a safe working environment. This also includes clear communication.
- **Appropriate safeguards**. The ship-owner company is required to facilitate for safe practices through framework conditions or structures like personnel, time, tasks, salary and investments.
- **Safety management skills**: Competence and training for all crew members.

4. Methodological approaches and limitations

4.1 Data material

This study's data material is interviews of a broad selection of seafarers and fishers (see Table 1), as well as participant observations carried out onboard 30 vessels. The data has been collected in a series of research projects related to the safety of seafarers or fishers in 2004-2017. All projects were conducted separately, but overlap in topics, approaches and perspectives, exploring qualities related to safety practices and safety management and/or the

interaction between regulators and practitioners. All informants were ensured anonymity during data gathering, processing, and publishing.

Table 1: Description of interviewees categorized by industry sector

Industry sector	Interviewees	Year	Project	Financed by	Publications employing this data (combined with other data)
Coastal transport	11 seafarers on 3 cargo vessels in 3 companies	2009	Aquaculture and intelligent transport systems	The Research Council of Norway	Fenstad, Osmundsen, and Størkersen (2009); Størkersen (2012, 2018)
	77 seafarers on 15 cargo vessels in 14 companies	2010	Analysis of operational and work-related conditions on cargo vessels	The Norwegian Maritime Authority	Bye, Rosness, and Røyrvik (2015); Størkersen (2017); Størkersen, Bye, and Røyrvik (2011)
	16 seafarers from 5 passenger vessels in 2 companies	2011 and 2012	Regulative rationalities and safety culture development	The Research Council of Norway	Almklov, Rosness, and Størkersen (2014); Kongsvik, Antonsen, and Størkersen (2014); Størkersen (2015, 2018); Størkersen, Antonsen, and Kongsvik (2017); Størkersen and Johansen (2014)
	16 seafarers from 5 cargo vessels in 3 companies	2013			
	10 seafarers on ten cargo vessels in 6 companies	2017	Safety culture in private and professional transport: examining its influence on behaviours and implications for interventions	The Research Council of Norway	Nævestad, Størkersen, and Phillips (2018); Størkersen, Laiou, Nævestad, and Yannis (2018); Størkersen, Thorvaldsen, Kongsvik, and Dekker (2020)
Coastal fishing	33 fishers from 13 coastal fishing vessels	2004-2014	Risk and safety in fishing (PhD-project, part of project Future catch platform for the Norwegian fishing fleet)	The Research Council of Norway	Thorvaldsen (2013b, 2015a, 2017)
	19 fishers from 12 costal fishing vessels	2011	Safe communication on board	Norwegian Seafood research fund	Thorvaldsen & Sønvisen (2014b)
	6 fishers from 6 costal fishing vessels	2016	Prevention of accidents at work in Nordic fisheries	Nordic Council of Ministers	Thorvaldsen et al. (2018)
Totally	130 seafarers and 58 fishers				

The *seafarer* data was collected on vessels transporting cargo and passengers along the Norwegian coast. In four explanatory multiple-case studies we studied how safety is ensured, through participatory observation and interviews. The semi-structured research interviews were carried out on board in breaks or during sailing and lasted for one to two hours. Seafarers were able bodied seafarers and other types of deck personnel; engineers and engine men; and ship masters and other types of navigators. The vessels were sand boats, oil tankers, live fish carriers, general cargo vessels, and high-speed passenger vessels, all with Norwegian ownership. Ten vessels had foreign registration and multinational crews, but most had Norwegian registration and crews.

The *fisher* data is gathered through several studies, including a multi-sited anthropological fieldwork on board fishing vessels and in different arenas onshore (Bernard, 2006; Clifford, 1986). On board fieldwork consisted of participant observation on two coastal

vessels. Fieldwork at the first vessel lasted for two months, the other for two weeks. Both included informal interviews with the crews. In addition, onshore participant observations and informal interviews with fishers have been performed in several local communities, in connection with unannounced inspections from the authorities and at meetings, conferences, and the safety training for fishers (Thorvaldsen, 2013a, 2015, 2017a). The empirical descriptions also draw on semi-structured interviews with coastal fishers conducted in connection with a project about safe communication on board, and an interview survey focused on fishers' perceptions of safety measures (Thorvaldsen et al., 2018; Thorvaldsen & Sønvisen, 2014). Informants included both skippers, crew members and fishers who work alone on board.

4.2 Data analysis

As a foundation for the analysis, we focus on four main safety management requirements, based on safety management research and the ISM Code (see Section 3.3).

Interview notes and transcripts (Table 1) were searched manually for commonalities, differences, and patterns (Coffey & Atkinson, 1996, p. 29). During this process, we discarded statements that could potentially be outdated. A data reduction was necessary due to the large amounts of data (Coffey & Atkinson, 1996). Most of the data material concerned safety and work practices and were relevant to the four analytical categories (see Section 3.3 and Table 2). The authors had to go through the selected data several times to extract only the most essential findings.

In the descriptions of the extracted data in Section 5 the content is majorly condensed. Thick descriptions are left out, and representative interview quotes are used to illustrate meanings of a line of fishers or seafarers, through the fishers' and seafarers' own words.

The exercises of pattern analysis, data reduction and display resulted in information about fishers' perspectives on safety in operations, how they consider safety management requirements, and how safety management requirements are valued and handled by the seafarers and their companies. Coffey and Atkinson (1996, p. 163) argue that "qualitative data, analyzed with some attention to detail, understood in terms of their internal patterns and forms, should be used to develop theoretical ideas … that have relevance beyond those data themselves." In this spirit, we tried to move from specific conditions to generic levels, and …

"… go beyond the data themselves, to locate them in explanatory or interpretive frameworks…. There is thus a repeated interaction among existing, ideas, former findings and observations, new observations, and new ideas." (Coffey & Atkinson, 1996, p. 156)

An understanding of both fishers' and seafarers' perspectives thus provided a solid basis to propose suggestions for fishers and other maritime companies that want to develop and improve their safety management.

4.3 Data strengths and limitations

This article is based on data from several projects over the years, which leads to both strengths and weaknesses. One strength is the quantity of data, from both interviews and participant observation on board. Contact with coastal fishers and seafarers over more than a decade has provided thorough insights into their perspectives and the developments in safety management.

A limitation coming from the wide range of data, is that there naturally are contradictions within the data, in some occasions making it challenging to simplify and extract data.

5. Results

In this section, we present empirical accounts from Norwegian coastal transport and fishing about the safety management requirements provided in Section 4.3. An overview of the results is presented in Table 2.

Table 2: Seafarers' and fishers' perspectives of safety management requirements

Safety management requirements	Fishers without safety management	Seafarers after two decades of safety management
Procedures for safe practices	Procedures and documentation of safety practices is not commonly used	Value practical procedures, dislike impractical procedures and extensive documentation
Safe working environment	Rely on the crew and onboard relations. No shore management	Rely on the crew, but also relations with shore management
Appropriate structural safeguards	Operational orientation, the vessel crew handles the external structures as they are, since facilitation of safeguards from a company is rare	System orientation, the vessel crew handles the external structures and also expect the shore management to facilitate
Safety management skills	Value experience-based skills	Value experience-based skills and safety management skills

5.1 Procedures

Fishers

While some fishers acknowledge the need for safety regulation, they may also question the extent, costs, and usefulness of safety management systems. Some, as the fisher below, express resistance to more safety regulations and the demands for documentation that follows:

> Is there really no limit for the bureaucracy's right to, in detail, regulate our private lives and our assessments of our own safety?

Because there have been few requirements for safety management in coastal fishing, fishers are not used to having work procedures or complying with them. Written procedures, based on documented risk assessments, thus differ from fishers' traditional, oral, and practical way of working and transferring knowledge.

Seafarers

The demands for safety management systems has been part of seafarers' reality for two decades, and one of the seafarers describe the shift in a way many other seafarers also recalled:

> You talk about a collision between an old and a new culture. My experience through these years is that a skipper like me will say: "ISM, what the heck is that strange thing, do I really have to follow it? I've always done my job. Suddenly I have to comply with something on paper." There was great resistance. Some actually quit sailing because of the ISM Code.

Procedures that are practical and useful are valued by the seafarers, as opposed to impractical procedures which limit their discretionary space. For example, some seafarers cannot change course to save fuel and make a voyage less turbulent.

> [The safety management system] says how to plot the course for each of the company's routes. But they don't consider current or weather. And experienced navigators want to—and will—choose the course appropriate according to wind and current. But that's actually not allowed.

It is still common for seafarers to perform their operations according to their professional judgment, without recourse to formal procedures. This results in some procedures being followed and others being violated.

> You know what's in the procedures and the [system], but anyway you do things in your own way in the daily business.

Documentation is also seen as a drawback, as many seafarers experience that they spend too much time on documentation, and that some tasks must be documented twice.

> If you have so much reporting and governmental surveillance, and there's no rational reason, that's a safety risk.

5.2 A safe working environment

Fishers

The working environment on board fishing vessels can be described as close-knit. Different vessels may have its own norms and ways of doing things, and newcomers learn their work through onboard socialization processes and conducting the work. Fishers emphasize the importance of stable relations on board as important for a safe working environment. Observations show that the fishers look out for their crewmates on deck, as by shouting to warn others of possible hazards that they observe. Fishers who work alone may stay in touch with other fishers visibly or via radio or telephone during fishing.

The skipper is important for safety and safety related decisions. The skipper has a prominent role, oversees all fishing activities and is responsible for all decisions made. One crewmember described the situation as follows:

> There are two rules onboard. Rule number one: the skipper is always right. Rule number two: if the skipper is not right, follow rule number one.

Still, the hierarchy on smaller coastal vessels is not always readily apparent. Observations on board show that when skipper and crew live and work closely together, the skipper may lean on crewmembers when safety-related decisions are made. Also, fishers' associations, insurance companies and regulators provide some resources that contribute to safe working environments (e.g templates and guidelines for safety management).

Seafarers

Like fishers, seafarers also highlight their crews' experience, communication and trust as important for providing a safe working environment. An important part of the transport skipper's job is to translate formal and informal demands from shore and regulations, into practical, manageable, and safe practices for all those onboard a vessel.

> when you're permanent on a vessel with a steady crew, you learn to know that crew very well. Which I see as an advantage. And then you might perform well in critical situations – when you're confident in the persons you work with.

Relations with shore management and chain of logistics were also emphasized by the seafarers. Overall, the majority of seafarers describe shore managements as key to the safety measures that the crews have available. There are close personal relations and a strong feeling of belonging on coastal vessels, while larger vessels feature more business-like relations. Anyway, on most transport vessels, the seafarers emphasize that they are a small part of a system.

5.3 Appropriate safeguards

Fishers

The last forty years, national regulations have regulated the season, location, quantity, and way fish may be harvested. These regulations aim to decrease the risk of overfishing, but some fishers find that these structures may in fact have negative consequences for onboard safety. For instance, so-called Olympic fishing, in which fishers share a single overall quota and fish until it is reached, may have negative consequences for safety. Even when there are maximum quotas for individual vessels, fishers may feel pressured to catch as much of the total quota as rapidly as possible to save expenses such as fuel.

Fishers think that vessel maintenance and safety equipment is important for safety. They may still be concerned with the costs of safety equipment, especially if they do not perceive the equipment as necessary for staying safe:

> Overall, there are reasonable people on the vessels; the problems are costs, we want safety.

Work tasks on fishing vessels vary with the vessel's gear and size. On small vessels, fishers work until the job is done. As profits depend on the catch and freedom is highly valued by many fishers, some prefer to work alone on board, which is never the case among seafarers on transport vessels.

Seafarers

There is variance as to how satisfied seafarers are with the facilitation of safeguards in their company. Some shore managements are perceived to facilitate thoughtfully, through equipment, schedules, or workload, while others leave safety to the onboard practitioners. In general, most transport vessels have tight schedules with frequent port calls.

> Our schedule is a stress factor. They plan for it to be a stress factor. Everything is on the spot; you have no margins.

Some crewmembers expressed concern about workload. Navigators, in particular, have many tasks: steering the vessel, planning port calls and tasks for upcoming days, reporting to harbors and costumers, logging and documenting their actions, all while dealing with calls, visits, and emails from management, costumers, or even passengers.

> My job is to take care of the cargo and the vessel, but I'm a safety officer and fire chief, loader and discharger, partly purchasing manager and chasing away that Al Qaida. Oh, yes, and I'm going to steer the vessel too, of course.

On some vessels there are always two navigators on the bridge, as redundancy. This extra resource is viewed very positively by the navigators:

> If you're out in the dark and there's a vessel in my blind spot, he'll say he can see the vessel. And I can ask, "Yes, can you see the vessel coming?" Not to correct, but to … watch out for each other, to say it like that, all the time.

5.4 Safety management skills

Fishers

The only formal requirement to work on a fishing vessel is certified safety training. Many fishers value and appreciate this training because it is practice orientated. The fishers emphasize competence that is tacit, embodied, practical, and drawn from experience. They talk about the importance of common sense and "using one's head" – and one's body to stay safe. For instance, a basic skill on a fishing vessel is to find the 'sea legs' to maintain balance while handling the fishing gear. One fisher explained that:

> It is important that one never turns ones back to the ocean. One must watch the ocean and show respect for it.

Experience is also related to decisions that fishers must make in a split second, such as moving the feet away from a rope to avoid falling. They describe several potential dangers that exist at different stages of the operations and what they do to avoid accidents. Observations on board show that experienced fishers evaluate potential risks in risky situations as they occur. Fishers often draw on their previous experiences in similar situations, evaluate the consequences, and determine the steps needed to reduce risk. The on-the-job training given onboard is highly important for learning the nuances of fishing operations. Still, fishers acknowledge that there may sometimes be a lack of time to provide proper training because of the rapid tempo and efficiency demands onboard.

Seafarers

The seafarers' knowledge is also embodied; they can feel the rhythm of the sea, the wind, and the vessel. They have internalized a set of decision alternatives for most situations and usually do not have time to analyze before they determine which action would be best:

> So, it's pretty important that you know the signals of the boat.

Some worry that safety management competence is disconnected from practical skills and seamanship:

> Before, you had to be able to find your way—one criterion was that you were familiar with [your region]. Now you have to know about papers and computers and all this.

Nowadays, most seafarers see some benefits with safety management, such as risk considerations, maintenance plans, safety meetings, and training. This have given seafarers a more systematical understanding of their safety measures.

> I feel that safety is much better taken care of now than before. It was more at random before, even though it was okay back then, too.

For seafarers, the practical skills and system competences have been integrated. They expect a systematic way of running a vessel and maintaining safety, with practice and safety management intertwined. Seafarers – and fishers – always have worked to prevent accidents, watched out for their companions, but through safety management, today's seafarers also have the benefit of increased knowledge about the underlying causes of accidents and how to prevent it. The seafarers are thus complementing existing practices with support from the system and shore managements.

6. Discussion

The studied fishers' and seafarers' perspectives on safety management provide valuable knowledge for development of safety management, which is something even the experienced seafarers still struggle with. In this section, we discuss the safety management perspectives, organizational conditions for safety management, and some suggestions for the development of safety management.

6.1 The safety management perspectives

The empirical results in Section 5 showed both similarities and differences within the coastal fishers' and seafarers' perspectives (see Table 2), which are further explored here.

The coastal fishers, on their side, are not used to safety management requirements, and find written procedures and documentation a contrast to their embodied and oral work practices and experience-based skills. They rely on their crews and onboard relations for a safe working environment and handle the external structures with operational orientation. This correlates with the structures of the coastal fishing industry, where the owner and crews of each fishing vessel often are independent and take care of their own business. Their internal organization of work has not before been subject of safety regulation, and historically, fishing accidents have not received much attention from the public or regulators (Lindøe, Engen, et al., 2011). Thus, the enforcement of safety management regulation will be a leap for most fishers. Although some fishers engage in risky activities (Lindøe, Engen, et al., 2011; Morel et al., 2008), they also have a range of practices to stay safe (Thorvaldsen, 2013b, 2017b; Thorvaldsen et al., 2018). Their exceptional skill and know-how are known to prevent accidents (Morel et al., 2008). The empirical results show that the fishers' operational and onboard orientation should

be considered when implementing their safety management; since safety management should support work operations and the coastal fishers usually have no shore organization to facilitate their safety management.

On the seafarers' side, years of experience with safety management have changed their perspectives. They now balance practical knowledge and safety management skills. Although the seafarers' crews are the primary relations, they expect the shore management to facilitate for them. The seafarers thus have a more system-oriented perspective than the coastal fishers, corresponding with both the system dependence in transport logistics, and the fact that the seafarers have been under safety management for two decades (as also found by Kongsvik et al. (2020)). Many have grave experience with impractical procedures, extensive documentation demands and marginal working conditions. As in previous maritime research (Kongsvik et al., 2020; Lappalainen, 2016; Mišković et al., 2019), we see that this traditionally has given resistance against safety management, but that it now is common to value safety management that support their work and safety in practice. Generally, the seafarers' perspective on safety management matches with results from other industries: Safety management should support the safe practices in the organization and leave discretionary space for situated decisions (Bieder & Bourrier, 2013; Dekker, 2015; Grote, 2012). This include practical procedures, safe working environment, appropriate structural safeguards, and safety skills. Such requirements can be achieved through careful development with the crews, and will be difficult to achieve in standardized safety management systems made with auditability or compliance as primary concern (Almklov et al., 2014; Oltedal & Engen, 2010; Størkersen et al., 2020).

This study along with earlier research give insight in the safety management status of seafarers and fishers. Seafarers have systematic perspectives about their work, employers, the chain of logistics, skills, and safety management knowledge. Although many seafarers have shore organizations that facilitate their safety management, they may experience that it becomes impractical and involves too much secondary tasks, like documentation and reporting, in addition to primary tasks. Fishers are more oriented towards the operations on the vessel, many have safe working environments, but perhaps lack systematized routines. Coming safety management should preferably not have complicating procedures and troublesome bureaucracy, but rather support the existing safe practices, like next section elaborates on.

6.2 Organizational qualities for safety management

Last section revealed information useful for development of safety management, but also indications that some organizational conditions should be present in an industry when implementing safety management. A direct transfer from seafarers' safety management to fishers will not be possible or valuable, as seafarers still experience many traps in their safety management, and there are some differences between the fishers and the seafarers.

In industries with safety management, it is common that shore managements provide the safety management requirements. Small organizations could be tempted to hire safety management services, even though e.g. Almklov et al. (2014) have warned not to buy standardized systems. However, also seafarers in organizations with shore management have experienced poor procedures, working environment and safeguards. This suggests that company size is not necessarily a success criterion for safety management, although the

initiative for safety management may come easier for large organizations. Fishers are often self-employed (Morel et al., 2008; Thorvaldsen, 2013a), but have and need to have some financial capacity and abilities to provide common safeguards and safety investments. Independent of organizational size, fishers describe safety skills and a safe working environment. They also can possess a positive work environment, adequate communication and make properly designed procedures, as Mišković et al. (2019) show is important to value safety management.

Following the general and maritime safety management research and the understanding of fishers' and seafarers' perspectives it seems that organizational conditions for safety management are not linked to company size. Organizational qualities positive for safety management are rather openness and abilities for systematic approaches to work procedures, work environment, structural safeguards, and competence. Based on this, we in Section 6.3 summarize some suggestions for safety management development.

6.3 Suggestions for future safety management

Many industries and companies could benefit by suggestions for improved safety management. This study focuses on the fishers so they can avoid the safety management problems that other industries have experienced. The analysis has given insights in how to avoid known traps, so we can suggest some tricks (as in solutions and methods) on how to achieve truly useful safety management.

Development of procedures for safe practices

The ISM Code § 1.4 requires ship operators to implement procedures to ensure safe operation of the ship and protection of the environment. The results in Section 5.1 showed that many seafarers have ill-fitting procedures, while most coastal fishers have no written safety procedures. To support safe practices, procedures should be flexible, as described by for example Bieder and Bourrier (2013); Dekker (2015); Grote (2012). In order to be flexible and practical, procedures should be simple and few, concentrating on operations that the crews know involve risk and where guidelines will help prevent accidents (Antonsen et al., 2008). Further, procedures should be tailor-made for the crews to be useful, but studies have seen that many companies still implement standardized safety management that most easily can be approved by auditors (for example, Almklov et al. (2014); Antonsen et al. (2008); Oltedal and Engen (2011)). In this situation, a potential trick could be to develop practical procedures and then discuss with auditors or regulators how to get them approved in an audit (Størkersen et al., 2020).

Development of a safe working environment

Vessel operators are required to provide a safe working environment (the ISM Code, § 1.2.2). Section 5.2 explains that coastal fishers are mostly oriented towards their crewmates, including the shipowner that often work onboard, while some seafarers have shore managements. Many of the described working environments include safe practices and risk considerations, although the studied seafarers consider some of their practices as parallel with or conflicting with formal 'safety management'. Other studies of seafarers' first safety management experiences, showed that seafarers' shore management made safety management that was not useable in the

operations, making safety management a "paper exercise" while operations were carried out as before (also showed by i.e. Anderson, (2003); Bhattacharya (2009)). Such a gap between 'safety management' and 'safe practices' procedures can even potentially decrease safe practices (Almklov et al., 2014; Hale & Borys, 2013).

Safety management should support existing safe practices (IMO, 2018). 'Safe practices' and 'safety management' can be bridged through procedures that support safe practices. These procedures can be made together with a third party organization, but procedures that marginalize the practices must be avoided (Almklov et al., 2014). Based on the current data and previous research, it seems that development of a safe working environment would involve the onboard crews, and procedures that support safe practices that may be practiced already. This do not need to include a shore office or a line of administrative personnel, since the key is onboard experience. Yet, it could be fruitful that practitioners, employers, regulators, associations, or consultants within an industry (for example coastal fishing) discuss how to document a safe working environment and safe practices, to prevent that 'safety management' competes with 'safe practices'. Using this trick, fishers may even benefit by their crew relations and practical onboard management to develop useful safety management.

Development of appropriate safeguards

It is mandatory for vessel operators to provide appropriate safeguards for safe onboard practices (the ISM Code § 1.2.2). Safeguards are here understood as framework conditions or structures like personnel, time, tasks, salary, and investments. How this can be provided, depends partly on the resources in the company and industry. The empirical data in Section 5.3 illustrate differences in coastal fishing and transport, but that none of these industries gain high profit nor have much potential for safety investments. Fishers are often paid according to the seasonal catch, and rarely have a company that facilitate their safeguards (as also found by Morel et al. (2008)). Many seafarers work in a larger company or transport system, and are familiar with the concept of safety management (as also described by Kongsvik et al. (2020) and Størkersen et al. (2018)). Seafarers, in this and other studies, often have employers that they try to convince to invest in new equipment or extra personnel. Yet, they describe poor safety management, and that safety management is far from adapted to their operations. Thus, having a shore office is not a guarantee for good procedures, a safe work environment, nor appropriate safeguards. Independent of company size, coastal fishers and seafarers are used to busy operations with small time margins, resulting in few safety barriers (Lindøe, Engen, et al., 2011). Based on the previous research and the empirical data presented here, development of optimal safeguards would be valued, but perhaps utopic, since large parts of the maritime industry is violating this requirement due to costs. To decrease time pressure, one trick would be to avoid additional secondary tasks – for example by reducing demands of documentation and reporting. Further solutions could involve changes in maritime policies.

Development of safety management skills

The safety management skills of the onboard personnel should be continuously improved (the ISM Code § 1.2.2). Section 5.4 describes that fishers and seafarers both value experience-based skills, and that seafarers also appreciate safety management skills. Over time, safety

management have made seafarers merge their practical skills with a more systematic understanding of safety (as also described by Kongsvik et al. (2020); Størkersen et al. (2017)). Good procedures and valued routines like safety meetings and maintenance plans have increased systematical safety knowledge. This has led seafarers, and may lead fishers, to see how the safety management regulation can support and increase their safety skills. Fisher can thus use their operational orientations to implement realistic safety management, which in turn will result in improved skills.

7. Conclusions

In this study, we have examined how existing safety management perspectives of seafarers and fishers can inform future safety management development, especially for coastal fishers that are currently developing their safety management. It is imperative to recognize the traps met in many industries, and not implement 'safety management' that conflicts with 'safe practices'.

The synthetized knowledge from previous and current research indicate that safety management requirements may be violated in the pursuit of approved safety management. This study's findings contribute to the general safety management research field, through pinpointing how the specific safety management requirements are translated by the companies – and how safety management can support safe practices instead of clashing with them.

Sharing experiences across industries, provides tricks that will help avoid these traps in safety management at sea. Fishers and other safety management debutants have a unique opportunity to make safety management that will contribute to safe working environments.

Acknowledgements

References

Almklov, P. G., & Antonsen, S. (2014). Making work invisible: New public management and operational work in critical infrastructure sectors. *Public Administration, 92*(2), 477-492.

Almklov, P. G., & Lamvik, G. M. (2018). Taming a globalized industry – Forces and counter forces influencing maritime safety. *Marine Policy, 96*, 175-183. doi:https://doi.org/10.1016/j.marpol.2018.08.023

Almklov, P. G., Rosness, R., & Størkersen, K. V. (2014). When safety science meets the practitioners: Does safety science contribute to marginalization of practical knowledge? *Safety science, 67*, 25-36.

Amalberti, R. (2013). *Navigating Safety: Necessary Compromises and Trade-offs--Theory and Practice*. Heidelberg: Springer.

Anderson, P. (2003). *Cracking the code: The relevance of the ISM code and its impact on shipping practices*. London: Nautical Institute.

Antonsen, S., Almklov, P. G., & Fenstad, J. (2008). Reducing the gap between procedures and practice: Lessons from a successful safety intervention. *Safety science monitor, 12*(1), 2-XX.

Bernard, HR (2006) Research methods in anthropology: qualitative and quantiative approaches. Alta Mira, Walnut Creek CA.

Bhattacharya, S. (2009). *The impact of the ISM code on the management of occupational health and safety in the maritime industry.* (PhD Doctoral dissertation), Cardiff University, Cardiff, Wales.

Bhattacharya, S. (2012). The effectiveness of the ISM Code: A qualitative enquiry. *Marine Policy, 36*(2), 528-535.

Bieder, C., & Bourrier, M. (2013). *Trapping safety into rules: How desirable or avoidable is proceduralization?* Farnnham, United Kingdom: Ashgate.

Bye, R. J., & Lamvik, G. M. (2007). Professional culture and risk perception: Coping with danger on board small fishing boats and offshore service vessels. *Reliability Engineering & System Safety, 92*(12), 1756-1763. doi:10.1016/j.ress.2007.03.024

Bye, R. J., Rosness, R., & Røyrvik, J. O. D. (2015). 'Culture'as a tool and stumbling block for learning: The function of 'culture'in communications from regulatory authorities in the Norwegian petroleum sector. *Safety science*.

Bye, R.J, Aalberg, A.L (2020) Why do they violate the procedures? An exploratory study within the maritime transportation industry. Safety Science

Christophersen, J. G. (2009). *Sikkerhetsstyring i skipsfarten 1998-2008 : bakgrunnsfaktorer for reguleringsmessig etterlevelse og overtredelse av ISM-koden.* (Doctoral dissertation), University in Oslo, Oslo, Norway.   (22)

Clifford, G. (1986) Contemporary problems of ethnography in the Modern World system. Writing culture: the poetics and politics ethnography. University of California press, Berkley, pp. 165-193

Coffey, A., & Atkinson, P. (1996). *Making sense of Qualitative Data: Complimentary research strategies*. Thousand Oaks, California: Sage Publications.

Dahl, Ø. (2014). *Behind Safety Violations: Understanding the antecedents of safety-compliant behaviour in the oil and gas industry.* (Doctoral dissertation PhD), Norwegian University of Science and Technology, Trondheim, Norway. Retrieved from http://brage.bibsys.no/xmlui/handle/11250/268795

Davis, M. E. (2012). Perceptions of occupational risk by US commercial fishermen. *Marine Policy, 36*(1), 28-33. doi:10.1016/j.marpol.2011.03.005

Dekker, S. (2014). The bureaucratization of safety. *Safety science, 70*, 348-357.

Dekker, S. (2015). *Safety differently: Human factors for a new era*. Boca Raton, Florida: Taylor & Francis.

Dekker, S. (2017). *The safety anarchist: Relying on human expertise and innovation, reducing bureaucracy and compliance*. London, United Kingdom: Routledge.

Fenstad, J., Osmundsen, T. C., & Størkersen, K. V. (2009). *[Danger on the netpen? Need for changed safety work at Norwegian fish farms]*. Trondheim, Norway: NTNU Samfunnsforskning.

Grote, G. (2012). Safety management in different high-risk domains: All the same? *Safety science, 50*(10), 1983-1992.

Grote, G. (2015). Promoting safety by increasing uncertainty: Implications for risk management. *Safety science, 71*, 71-79.

Grøn, S., Rasmussen, H. B., & Poulsen, T. R. (2014). *Safety in the Danish fishing industry*. Retrieved from Esbjerg, Denmark:

Gullestad, J. (2013). *Sikkerhetsstyring i anbudsutsatt hurtigbåtvirksomhet – en kvalitativ studie.* (Master's thesis), University of Stavanger, Stavanger, Norway.

Hale, A. R., & Borys, D. (2013). Working to rule, or working safely. In C. Bieder & M. Bourrier (Eds.), *Trapping safety into rules. How desirable or avoidable is proceduralization.* (pp. 43-68). Farnham, United Kingdom: Ashgate.

Hetherington, C., Flin, R., & Mearns, K. (2006). Safety in shipping: The human element. *Journal of safety research, 37*(4), 401-411.

Hollnagel, E. (2017). Why is work-as-imagined different from work-as-done? *Resilient Health Care, Volume 2* (pp. 279-294): CRC Press.

Hollnagel, E., Woods, D. D., & Leveson, N. (2006). *Resilience engineering: Concepts and precepts*. Farnham, United Kingdom: Ashgate.

ISM Code. International safety management code with guidelines for its implementation. , (2018).

Knudsen, F. (2009). Paperwork at the service of safety? Workers' reluctance against written procedures exemplified by the concept of 'seamanship'. *Safety science, 47*(2), 295-303.

Knudsen, F., & Grøn, S. (2010). Making sense of fishermen's risk perception. *Policy and Practice in Health and Safety, 8*(2), 77-94.

Kongsvik, T. Ø., Antonsen, S., & Størkersen, K. V. (2014). The relationship between regulation, safety management systems and safety culture in the maritime industry. In R. D. J. M. Steenbergen, van Gelder, P. H. A. J. M. , S. Miraglia, & A. C. V. M. Vrouwenvelder (Eds.), *Safety, reliability and risk analysis: Beyond the horizon* (pp. 467-473). London, United Kingdom: Taylor & Francis.

Kongsvik, T. Ø., Haavik, T., Bye, R., & Almklov, P. (2020). Re-boxing seamanship: From individual to systemic capabilities. *Safety science, 130*, 104871.

Lappalainen, J. (2016). *Finnish maritime personnel's conceptions on safety management and safety culture.* (Doctoral dissertation), University of Turku, Turku, Finland.

Lindøe, P., Baram, M. S., & Braut, G. S. (2011). Empowered agents or empowered agencies?: Assessing the risk regulatory : regimes in the Norwegian and US offshore oil and gas industry. In C. Berenguer, A. Grall, & C. G. Soares (Eds.), *Advances in safety, reliability and risk management: ESREL 2011* (pp. 1717-1724). Boca Raton, Florida: CRC Press.

Lindøe, P., Engen, O. A., & Olsen, O. E. (2011). Responses to accidents in different industrial sectors. *Safety science, 49*(1), 90-97.

Maritime Authority. (2016). *Focus on risks 2017*. Haugesund, Norway.

McDonald, M. A., & Kucera, K. L. (2007). Understanding non-industrialized workers' approaches to safety: How do commercial fishermen "stay safe"? *Journal of safety research, 38*(3), 289-297. doi:10.1016/j.jsr.2006.10.009

McGuinness, E., & Utne, I. B. (2014). A systems engineering approach to implementation of safety management systems in the Norwegian fishing fleet. *Reliability Engineering & System Safety, 121*(0), 221-239. doi:http://dx.doi.org/10.1016/j.ress.2013.08.002

McGuinness, E., Aasjord, H., Utne, I. B., & Holmen, I. M. (2013). Fatalities in the Norwegian fishing fleet 1990–2011. *Safety science, 57*(0), 335-351. doi:http://dx.doi.org/10.1016/j.ssci.2013.03.009

Mišković, D., Jelaska, I., & Ivče, R. (2019). Attitudes of Experienced Seafarers as Predictor of ISM Code Implementation: A Croatian Example. *Promet-Traffic & Transportation, 31*(5), 569-579.

Morel, G., Amalberti, R., & Chauvin, C. (2008). Articulating the differences between safety and resilience: the decision-making process of professional sea-fishing skippers. *Human factors, 50*(1), 1-16.

Morel, G., Amalberti, R., & Chauvin, C. (2009). How good micro/macro ergonomics may improve resilience, but not necessarily safety. *Safety science, 47*(2), 285-294.

Nilsen, M., & Størkersen, K. V. (2018). Permitted to be powerful? A comparison of the possibilities to regulate safety in the Norwegian petroleum and maritime industries. *Marine Policy, 92*, 30-39.

Norwegian Maritime Authority. (2018). *Ulykker med næringsfartøy og fritidsfartøy i perioden 1981 - 2017*. Retrieved from: https://www.sdir.no/sjofart/ulykker-og-sikkerhet/ulykkesstatistikk/

Nævestad, T.-O., Phillips, R., Elvebakk, B., Bye, R. J., & Antonsen, S. (2015). *Work-related accidents in Norwegian road, sea and air transport: prevalence and risk factors*. Retrieved from

Nævestad, T.-O., Størkersen, K. V., & Phillips, R. (2018). Procedure negligence in coastal cargo: what can be done to reduce the gap between formal and informal aspects of safety? *Safety, 4*(3), 34.

Oltedal, H.A (2011) Safety culture and safety management within the Norwegian-controlled shipping industry: State of art, interrelationships, and influencing factors. University of Stavanger.

Oltedal, H. A., & Engen, O. A. (2010). Tanker versus dry cargo:The use of safety management systems within Norwegian dry cargo shipping. In B. J. M. Ale, I. A. Papazoglou, & E. Zio (Eds.), *Reliability, Risk and Safety: Back to the Future* (pp. 2118-2125). London, United Kingdom: Taylor & Francis.

Oltedal, H. A., & Engen, O. A. (2011). Safety Management in Shipping: Making sense of limited success. *Safety science monitor, 15*(3), 19-XX.

Provan, D. J., Dekker, S. W. A., & Rae, A. J. (2017). Bureaucracy, influence and beliefs: A literature review of the factors shaping the role of a safety professional. *Safety science, 98*, 98-112. doi:https://doi.org/10.1016/j.ssci.2017.06.006

Rae, A. J., Provan, D., Weber, D., & Dekker, S. (2018). Safety clutter: the accumulation and persistence of 'safety'work that does not contribute to operational safety. *Policy and Practice in Health and Safety, 16*(2), 194-211.

Reason, J. (1997). *Managing the risks of organizational accidents*. Aldershot: Ashgate.

Røyrvik, J. O. D., Skarholt, K., Lamvik, G. M., & Jonassen, J. R. (2015). Risk management in anchor-handling operations: The balance between control and autonomy. In T. Nowakoski, M. Mlyńczak, A. Jodejko-Pietrucuzuk, & S. Werbińska-Wojciechowska (Eds.), *Safety and Reliability*. London: Taylor & Francis.

Saldanha, M. C. W., de Carvalho, R. J. M., Arcuri, R., Amorim, A. G., Vidal, M. C. R., & Carvalho, P. V. R. d. (2020). Understanding and improving safety in artisanal fishing: A safety-II approach in raft fishing. *Safety science, 122*, 104522. doi:https://doi.org/10.1016/j.ssci.2019.104522

Sampson, H., Walters, D., James, P., & Wadsworth, E. (2014). Making headway? Regulatory compliance in the shipping industry. *Social & Legal Studies, 23*(3), 383-402.

Smith, A., Allen, P., & Wadsworth, E. (2006). *Seafarer fatigue: The Cardiff Research Programme*. Retrieved from http://orca.cf.ac.uk/48167/1/research_report_464.pdf

Sønvisen, S. Thorvaldsen, T. Holmen, IM., Øren, A (2017) Work environment and health in the fishing fleet: results from a survey amongst Norwegian fishers. International Maritime Health 68.

Størkersen, K. V. (2012). Fish first: Sharp end decision-making at Norwegian fish farms. *Safety science, 50*(10), 2028-2034.

Størkersen, K. V. (2015). Fungerer sikkerhetsreguleringa? In S. Antonsen & T. Kongsvik (Eds.), *Sikkerhet i norske farvann* (pp. 171-197). Oslo, Norway: Gyldendal Akademisk.

Størkersen, K. V. (2017). Coastal cargo work: How can safety shout instead of whisper when money talks? In M. Cepin & R. Bris (Eds.), *Safety and Reliability. Theory and Applications* (pp. 3075-3087). Contributions presented at the 27th European Safety and Reliability Conference (ESREL 2017, Portorož, Slovenia, June 18-22, 2017): CRC Press.

Størkersen, K. V. (2018). *Bureaucracy overload calling for audit implosion: A sociological study of how the International Safety Management Code affects Norwegian coastal transport.* (PhD), Norwegian University of Science and Technology, Trondheim, Norway.

Størkersen, K. V., Antonsen, S., & Kongsvik, T. Ø. (2017). One size fits all? Safety management regulation of ship accidents and personal injuries. *Journal of Risk Research, 20*(9), 1154-1172. doi:10.1080/13669877.2016.1147487

Størkersen, K. V., Bye, R. J., & Røyrvik, J. O. D. (2011). *Sikkerhet i fraktefarten: analyse av drifts- og arbeidsmessige forhold på fraktefartøy*. Trondheim, Norway: NTNU Samfunnsforskning.

Størkersen, K. V., & Johansen, J. P. K. (2014). No swans in sight. Analyzing the resilience in Norwegian water passenger transport. In R. D. J. M. Steenbergen, P. H. A. J. M. van Gelder, S. Miraglia, & A. C. V. M. Vrouwenvelder (Eds.), *Safety, Reliability and Risk Analysis: Beyond the Horizon* (pp. 1619-1626). London, United Kingdom: Taylor & Francis.

Størkersen, K. V., Laiou, A., Nævestad, T.-O., & Yannis, G. (2018). Production and protection. Seafarers' handling of pressure in gemeinschaft and gesellshaft. *Safety and Reliability–Safe Societies in a Changing World. Proceedings of ESREL 2018, June 17-21, 2018, Trondheim, Norway*.

Størkersen, K. V., Thorvaldsen, T., Kongsvik, T., & Dekker, S. (2020). How deregulation can become overregulation: An empirical study into the growth of internal bureaucracy when governments take a step back. *Safety science, 128*, 104772. doi:https://doi.org/10.1016/j.ssci.2020.104772

Thorvaldsen, T. (2013a). The importance of common sense: How Norwegian coastal fishermen deal with occupational risk. *Marine Policy*. doi:http://dx.doi.org/10.1016/j.marpol.2013.02.007

Thorvaldsen, T. (2013b). The importance of common sense: how Norwegian coastal fishermen deal with occupational risk. *Marine Policy, 42*, 85-90.

Thorvaldsen, T. (2015). Managing risk in the Norwegian fishing fleet. *Policy and Practice in Health and Safety, 13*(1).

Thorvaldsen, T. (2017a). *Fra frie menn til trygge arbeidere En antropologisk studie av sikkerhet, regulering og yrkesfiskeres arbeidspraksis.* (Thesis for the degree of Philosophiae doctor), NTNU, Trondheim.

Thorvaldsen, T. (2017b). *Fra frie menn til trygge arbeidere. En antropologisk studie av sikkerhet, regulering og yrkesfiskeres arbeidspraksis.* (Doctoral dissertation), Norwegian University of Science and Technology, Trondheim, Norway.

Thorvaldsen, T., Kaustell, K. O., Mattila, T. E. A., Høvdanum, A. á., Christiansen, J. M., Hovmand, S., . . . Holmen, I. M. (2018). What works? Results of a Nordic survey on fishers' perceptions of safety measures. *Marine Policy, 95*, 95-101. doi:https://doi.org/10.1016/j.marpol.2018.06.022

Thorvaldsen, T., & Sønvisen, S. A. (2014). Multilingual crews on Norwegian fishing vessels: Implications for communication and safety on board. *Marine Policy, 43*, 301-306.

Vandeskog, B. (2015). The Legitimacy of Safety Management Systems in the Minds of Norwegian Seafarers. *TransNav, the International Journal on Marine Navigation and Safety of Sea Transportation, 9*(1), 101-106.

Walters, D., Johnstone, R., Frick, K., Michael, Q., Baril-Gingras, G., & Thébaud-Mony, A. (2011). *Regulating workplace risks: a comparative study of inspection regimes in times of change*. Cheltenham: Edward Elgar Publishing.

Österman, C., & Hult, C. (2016). Administrative burdens and over-exertion in Swedish short sea shipping. *Maritime Policy & Management, 43*(5), 569-579. doi:10.1080/03088839.2016.1154994

Aalberg, A. L., & Bye, R. J. (2017). Violation enhancing conditions: A study of Norwegian car ferry workers' compliance of safety-related procedures. In M. Cepin & R. Bris (Eds.), *Safety and Reliability. Theory and Applications* (pp. 3153-3161). Contributions presented at the 27th European Safety and Reliability Conference (ESREL 2017, Portorož, Slovenia, June 18-22, 2017): CRP Press.