B5 **Cultural factors in maritime accidents**

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Abstract

In the Baltic Sea marine area there are about 2,000 ships at any given moment, and each month around 3,500-5,000 ships ply the waters of the Baltic. The geographical circumstances for seafarers especially in Finnish sea areas are challenging; fairways are narrow and sea areas are rocky and shallow. Furthermore, the northern part of the Baltic Sea is covered with ice for nearly half of the year. These winter conditions set special requirements for the technology and equipment of vessels and place particular demands on the competence and skills of the maritime personnel.

During 2011 altogether 121 accidents occurred in the Baltic Sea. According to statistics, the main cause of accidents - 50 % of the total - was human error. Worldwide, it is estimated that from 43 to as much as 96 % of maritime accidents are caused by human error. Depending on the source one can define human factors in a number of ways. One approach is found in reports produced by institutes researching maritime safety culture, where the main human features are divided into three levels: design, personnel and organizational. At the first level, design, the ever-increasing technical sophistication of today's seagoing vessels means that along with advantages, certain disadvantages, such as cognitive overload and cognitive reluctance to learn new behaviors, are apparent. On the level of personnel we encounter such factors as fatigue, stress, demands of health, situation awareness factors, decision making and cognitive demands, communication, and issues related to language and cultural diversity. The organizational level encompasses issues concerning company policy such as safety training, safety climate and safety culture.

While scrutinizing Finnish maritime accident reports from recent years one can find most of above-mentioned features. For example, decreased alertness and fatigue are common in the present-day maritime culture due to increased marine traffic, shortened sea passages and reduced manning. However, besides causes attributed to personnel or organizational factors or occupational circumstances on board there are features which are not so evident and straightforward. By this I refer to certain models of behavior which can be described as a maritime culture that has been passed down from the time of sailing ships.

The most evident traditional attributes of sailors' culture are strong power distance factors, an emphasis on masculinity, a lack of communication and tacit knowledge as a means of occupational learning. These features are based on times when sailors spent several months or even years isolated onboard with a solely male crew. Hierarchy was essential to keep balance and control over the crew and rough seas taught young boys to be rough men. Even though the 'turn' (working period)

is nowadays much shorter and sailors with internet live more a connected life, the image of the traditional sailor and sailing life, I would argue, lives on. There are subconscious traditional rules, values, operational models and even a certain role model for a good – or bad – captain or officer that is based on narratives inherited or learned from films, memoirs and fiction. My study aims to describe and analyze the characteristics of maritime culture that can have an effect on present-day seafaring habits. As my main sources I use ethnographic fieldwork, personal letters and maritime fiction.

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Cultural factors in maritime accidents

The Baltic Sea marine area is one of the busiest sea areas in the world. According to HELCOM (Baltic Marine Environment Protection Commission - Helsinki Commission), there are about 2,000 ships in the Baltic Sea marine area at any given moment, and each month around 3,500-5,000 ships ply the waters of the Baltic. [1] The Baltic Sea is also a very vulnerable sea area. It is narrow and shallow, and the water is brackish with a salinity of less than 7%. Due to these circumstances the Baltic Sea has very special flora and fauna, and only a small number of species are capable of living in the area. [2] Therefore, maritime traffic poses a major threat to the delicate marine ecosystems as disappearance of a single key species could affect the functioning of the whole system.[3]
Sea areas especially around Finland with its rocky fairways set special challenges for seafarers. It is often said that without proper navigational equipment and skills it would be difficult if not impossible to enter the area. Today we can readily cope but in times before the compass, chronometer and reliable sea charts passing through the Baltic Sea from Danish straits to St Petersburg was more or less a matter of good fortune. The proof of these demanding conditions can be found in the thousands of wrecks that litter the Baltic Sea bed.

In time of sailing ships Gulf of Finland's fragmented coastline forced ships to sail in open waters, and when sailing in the archipelago was necessary it was performed only during daylight. In addition, before ice breakers became more common in the early 20th century, the sailing season was limited to months when the sea was open. The northern part of the Baltic Sea was, and still is, more or less covered with ice for nearly half of the year. During cold winters all harbours in the Gulf of Finland are ice-bound between December and April.[4] These winter conditions were for a long time a hindrance to most shipping and even today they place special demands on the technology and equipment of vessels as well as on the competence and skills of maritime personnel.[5]
Due to the challenging winter and navigational conditions the safety level of seafaring in the Baltic must be maintained at a high level. Having said that, during 2011 altogether 121 accidents occurred in the Baltic Sea, this being an average number for the last few decades. Since 2004 the number of accidents has varied slightly from 105 in 2009 to 146 in 2005. Most accidents during the period 2002-2011 were either collisions (34 %) or groundings (39 %). [6]
In recent years studies have pointed out that the main reason for maritime accidents lies in human factors. Although there are no worldwide standardized accident reporting systems in the maritime domain to summarize causal themes from accident data, some retrospective research has evaluated

[1] Report on shipping accidents in the Baltic Sea area during 2011, 1.
[2] Helle, I., et al 2011, 185.
[3] IMO (2005a).
[4] Viertola 2013, 14.
[5] Lappalainen 2008, 17
[6] Report on shipping accidents in the Baltic Sea area during 2011, 7–9.

the causes of shipping accidents in a more general sense. [7] A US Coast Guard report states that between 75–96% of marine casualties are caused at least in part by some form of human error. 8 On the other hand, data from New Zealand shows human failure to be the cause in 49% of shipping incidents.[9] In the Baltic, according to statistics from 2011, human error caused 50 % of the total number of 121 seaborne accidents, and this was similar to previous years. [10] However, the International Convention for the Safety of Life at Sea (SOLAS) from 1974 (the first version was adopted in 1914, in response to the Titanic disaster) based its Annex 24 on the fact that according to investigations human error contributes to 80% of navigational accidents.

Accidents are not usually caused by a single failure or mistake, but by the confluence of a whole series, or chain, of errors. Human error is sometimes described as being an incorrect decision, an improperly performed action, or an improper lack of action (inaction).[11] There are a number of ways to describe human faults and several ways to organize them. One approach is found in a report concerning safety in shipping produced by the Industrial Psychology Research Centre of Kings Collage of Aberdeen, where the main human features are divided into three levels: design, personnel and organizational (FIGURE). At the first level, design, the ever-increasing technical sophistication of today's seagoing vessels means that along with advantages, certain disadvantages, such as cognitive overload and cognitive reluctance to learn new behaviours, are apparent. As the study also points out, accidents may, in the case of increased automation, be a result of over reliance on machines. On the personnel level we find such factors as fatigue, stress, demands of health, situation awareness factors, decision making and cognitive demands, communication, and issues related to language and cultural diversity. The organizational level encompasses issues concerning company policy such as safety training, safety climate and safety culture.[12]
In a report ordered by the Finnish Maritime Administration in 2007 about the need to improve co-operation of bridge personnel to improve safety at sea [13] a model for organizing human error was adapted from flight operations. In their study on threat and error in aviation five types of errors were found.[14] Erkama et al utilizes 52 investigation reports of waterborne accidents affecting Finnish vessels as well as several interviews with maritime experts about safety culture. In type 1 , intentional noncompliance errors, offences include neglecting the route plans, lack of watch keeping or lack of extra lookouts, and working with too little rest. Procedural errors (type 2) include slips, lapses, or mistakes in bridge routines e.g. forgetting to switch between manual and automatic rudder, misunderstanding sea marks and setting wrong directions for the autopilot.

[7] Hetherington et al 2006, 402.
[8] Rothblum, 2000, 1.
[9] Hetherington et al 2006, 402.
[10] Report on shipping accidents in the Baltic Sea area during 2011, 24.
[11] Rothblum, 2000, 1.
[12] Hetherington et al 2006, 403.
[13] Erkama et al 2007
[14] Helmreich et al 1999, 679

The third type, communication errors, seems to be the most common human failure in Finnish maritime accidents. These errors occur when information is incorrectly transmitted or interpreted between the crew or between the crew and the pilot or external sources such as VTS (Vessel Traffic Service). According to most investigation reports, the bridge seems to be a very silent place: it is not the failure of communication that is significant, it is the lack of communication. The most typical situation that causes problems is lack of the communication between the two navigators, i.e. the ship's officer and the pilot that is often manifested in a situation in which the pilot is not familiar with the ship, or the officer with the navigational or weather circumstances of the route. There are also problems with roles, namely whether the pilot or the officer in command has the ultimate authority over the direction or the route the ship takes.

Even though many of the interviewed experts were worried about increased automation on board, proficiency error or a lack of knowledge or stick and rudder skill (4) was the cause of accidents in only a few cases. Instead, errors in operational decision (5) were found on several occasions. Journey was carried out even though conditions for safe navigation and steering were not ideal or even satisfactory. Also mooring was attempted when wind conditions were too strong or routing was not altered to a safer course in line with the prevailing heavy winds. According to experts the pressure to keep to schedules is often hard.

Another factor is the notion of "masculine identity", namely the belief that a true professional can keep his ship in line in any weather.

Despite the fact that during the last few decades improvements have been made to reduce communication failures with e.g. closed loop control (the message or command is replicated out loud) and the legal requirement for both the pilot and the officer in command to provide a passage plan[15] communication errors appear to be the most characteristic and frequent in maritime life. As emphasized in recent studies concerning crews and safety, communication is a key issue especially when it comes to international crews. [16] Due to the ever-increasing number of international crews, which e.g. in Nordic countries most often means officers from Scandinavia and a crew from the Philippines, most of the studies discussing communication difficulties and maritime safety concentrate on problems over cultural differences between nationalities and the question of language. As Pyne and Koester[17] point out, there is a risk of misunderstanding even when crewmembers speak the same language. When to this is added people who have English as a second language as well as possible cultural differences the risk of miscommunication increases manifold.

[15] Finnish Pilotage Act 2003, Section 8:1, amendment 2010; IMO 2000.
[16] Berg et al 2013.
[17] Pyne, R. & T. Koester 2005, 4.

However, limiting cultural factors to national differences reveals only part of the picture. As already mentioned, within the maritime domain there has always been a strong culture inherited from times past. The most evident traditional attributes of sailors' culture are strong power distance factors, an emphasis on masculinity, tacit knowledge as a means of occupational learning, - and a lack of communication. As emphasized in the accident investigation of the Finnish passenger-car ferry M/S Isabella's grounding in the Åland archipelago in 2001 (FIGURE), historical background and traditions can have an impact on safety culture onboard.[18]

The reason for a ship's grounding is often not a single error but, as in the case of the Isabella, a chain of events. The accident occurred while one of the ship's mates was carrying out a test as part of his line pilot certificate. In keeping with traditions, the pilot test was arranged so that the examinee was not allowed to use his printed or ship's integrated navigation system's electronic route plan. Also, the fact that the information content of the radar display was reduced even for the rest of the bridge crew led to a situation in which the location of the ship was unclear to most of the officers. The background for the tradition of piloting – here the line piloting test –is connected to a historical emphasis on individualism. In earlier days piloting skills represented power and financial benefit; navigational information was not commonly shared and particularly for reasons of security was kept to a minimum. As accident investigators also pointed out, the piloting test onboard the Isabella established the traditional principle of performing individualism.[19] And, to return to earlier discussion about communication culture, as in several international accident studies have stated, high individualism or poor team performance has its root causes - as well as adverse consequences in a lack of communication and understanding between team members. [20]

The situation onboard the bridge of M/S Isabella also raises the issue of the roles of officers and pilots. At the time of the watch crew on the bridge consisted of the officer of the watch, the examinee and a line pilot, who acted as a lookout. In addition, a pilot inspector from the Finnish Maritime Administration was supervising the pilot test. All of them were basically placed under the same cognitive demands in this situation. The most interesting finding of this investigation was that those involved were not aware of their status with respect of each other. Due to the almost total silence on the bridge – fellow officers did not want to comment during the piloting test for fear of the examinee's disqualification – the danger was not communicated. As the investigators pointed out, bridge team co-operation and communication are traditionally minimal.

Lack of communication and cooperation are often connected to features such as authority gradient or high power distance, uncertainty avoidance, – and masculinity. It is said that masculinity refers to a preference for achievement, heroism, assertiveness, and material success and that high masculine

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[18] Passenger-car ferry MS Isabella, grounding near Staholm in Åland archipelago on December 20, 2001.

[19] Passenger-car ferry MS ISABELLA, grounding near Staholm in Åland archipelago on December 20, 2001, B1/2001M Report, 88.

[20] Hänninen 2008, 12.

societies place a low value on caring for others, inclusion, cooperation and solidarity. Hence,cooperation is considered a sign of weakness.[21] When it comes to maritime culture, an emphasis on masculinity, along with the features mentioned above, sounds familiar. Habits and qualities are based on times when sailors spent several months or even years isolated onboard with a solely male crew. Hierarchies were essential to maintain balance and to keep control over the crew, and the underlying ethic was that rough seas taught young boys to be rough men.
In the light of cultural analysis, observations onboard contemporary shipping[22] show clear evidence of hierarchy and masculine identity. Practical tasks and the division of work reveal a constant vertical system where everyone knows his place. When asked in interviews, officers as well ordinary seaman reconfirm the necessity of power distance. Captains who are younger than their fellow seamen, they say, can during leisure time onboard act as equals, but while working everyone knows his place in the hierarchy. On the grounds of ethnographic fieldwork, one might say that the evidence is overwhelming that the captain is still god onboard. And, as one can notice from the respectful tones of the crew, this isn't necessarily a bad thing.

The tradition of the high status of a captain lies in subconscious rules, values, operational models and even a certain role model for a good – or bad – captain or officer. We are all aware of image of tattooed sailors as real men with a girl in every port. Although this is, of course, a stereotype, stereotypes can nevertheless embody a grain of truth and reflect images sailors have of themselves. Sea literature and novels of the sea maintain a fascination with the life of seafarers and can influence young boys in their dreams of a seafaring as my interviews have confirmed. This influence is partly explained by the fact that sea novels are thought to be realistic.
In 2004 a doctoral thesis by Kirsi Uola analysed Finnish sea literature from the late 19th century to the beginning of the 21st century (1889–2002). According to her, the strength of sea literature is that it is believed to be based on real life. Even though novels are known to be fiction, the stories behind them "might have happened to someone". This is also the reason why sea novels often take the form of memoirs and the language is full of maritime jargon as though written to other seafarers. As is the case in many fields, such as the military, the use of technical terminology strengthens a sense of professional identity.

The concept of roles takes our mind to the world of theatre. Being a seaman or a captain means performing a role. According to performance theory elaborated by North American theatre scholar Richard Schechner among others, most performances, in daily life and otherwise, do not have a

[21] Lu et al 2012, 460.
[22] The author is preparing a dissertation on cultural reasons behind marine accidents based on ethnographic fieldwork, personal letters and maritime fiction

single author but embody a sort of collective “Anonymous” or “Traditional” identity. In a sense one could say that all behaviour is restored behaviour.[23] It consists of information we have collected in different phases of our lives and that we use subconsciously whenever needed.

As cultural analysis has suggested, performance in the sense of restored behaviour is intertwined with all aspects of culture: tensions exist between personal and societal structure, personal experience and universal norms, and private and collective identity.[24] From the perspective of performance, scrutinizing a seafarer’s orientation to be a sailor or an officer can bring to light such features as authority gradient, communication difficulties, intersectional roles on the bridge and even the part played by fatigue, stress and decreased situation awareness in maritime accidents.

[23] Schechner 2013, 34-35.
[24] Ehn & Löfgren 2001, 13.

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