

NR 2000:3

# Promoting implementation of safety measures

Long-term follow-up of a participatory method

*Marianne Törner,<sup>1</sup> Mats Cagner,<sup>2</sup> Bertil Nilsson<sup>2</sup> and Per-Olov Nordling<sup>3</sup>*

1. National Institute for Working Life/West, P.O. Box 8850, SE-402 72 Göteborg, Sweden
2. Hälsa Sverige, Occupational Health and Safety Services, Borås and Falkenberg
3. Lindholmen Development, Göteborg

ARBETE OCH HÄLSA | VETENSKAPLIG SKRIFTSERIE

ISBN 91-7045-553-8 ISSN 0346-7821 <http://www.niwl.se/ah/>

The National Institute for Working Life is a national centre of knowledge for issues concerning working life. The Institute carries out research and development covering the whole field of working life, on commission from The Ministry of Industry, Employment and Communications.

The goals of the National Institute for Working Life are to contribute to:

- Renewal and development of working life
- Long-term accumulation of knowledge and competence
- Reduced risk of ill-health and accidents

Research and development are concentrated into three main areas: the labour market, the organisation of work and the work environment. Research is multidisciplinary and arises from problems and trends in working life. Operations are carried out in around 20 programmes. Communication and the spreading of information are important aspects of our work.

It is in the meeting between theory and practice, between researcher and worker, that new ideas are created that lead to development. It is an important task for the National Institute for Working Life to create the conditions needed for these meetings. The Institute collaborates with the social partners, the business world, universities and university colleges, with international partners and with others active in the field of working life.

Different regions in Sweden have unique conditions for the development of working life. The National Institute for Working Life is found in Bergslagen, Göteborg, Malmö, Norrköping, Solna, Stockholm, Söderhamn, Umeå and Östersund.

For more information, or to come into contact with us, visit our website [www.niwl.se](http://www.niwl.se)

#### ARBETE OCH HÄLSA

---

Editor-in-chief: Staffan Marklund  
Co-editors: Mikael Bergenheim, Anders Kjellberg,  
Birgitta Meding, Gunnar Rosén och Ewa Wigaeus  
Hjelm

© National Institut for Working Life & authors 2000

National Institute for Working Life  
S-112 79 Stockholm  
Sweden

ISBN 91-7045-553-8  
ISSN 0346-7821  
<http://www.niwl.se/ah/>  
Printed at CM Gruppen

# Content

Introduction	1
Assessment of risk probability	2
Determination of risk consequences	2
Understanding of necessary precautions	2
Recognition of risk and participation of the fishermen	2
Results of short term follow-up	3
Methods	3
Results	4
Discussion	7
Conclusions	10
Acknowledgements	11
Summary	12
Summary in Swedish	13
References	14

## Introduction

Costs of occupational injuries to different stakeholders, in suffering and in monetary terms, create a vast problem. Much effort has been spent on research for developing effective strategies for combating occupational injuries (e.g. McAfee and Winn, 1989; Streff et al., 1993; Döös and Backström, 1997; Ray et al., 1997; Zwerling et al., 1997) and the issue is seriously addressed by many companies. In branches of occupational life with a predominance of small companies safety work, however, often has low priority. This is a condition which is mirrored by injury statistics (e.g. Jeong, 1999). Fishery is one example of such a trade. Statistics of the Swedish Labour Market No-fault Liability Insurance (AMF-TFA) covering the period July 1983 - September 1994, showed that an average of 0.8% of the Swedish fishermen each year were the victims of non-lethal accidents leading to more than 30 days of sick listing or permanent disability, excluding accidents to and from work, (Svensson, 1994). As for lethal accidents the Swedish Work Environment Commission 1989 stated a standardised incidence ratio (SIR) of approximately 10 for such accidents among Swedish fishermen. The problem is of similar or even greater magnitude in other fishery nations (e.g. Aasjord, 1992; 1997; Pröpper, 1992). In spite of this, safety work usually has low priority among the fishermen themselves (Hughes, 1994) and the degree of implementation of safety measures is low (e.g. Aasjord and Silseth, 1995). The reasons for low activity in safety work in such small companies may be many, one being limited resources in terms of money, time and competence. Other reasons are of a motivational character. Hathaway and Dingus (1992) stated that the following factors must be taken into account in the context of making decisions concerning safety actions: recognition of risk, assessment of risk probability, determination of risk consequences and understanding of necessary precautions. Consequently, strategies for increasing activity in safety work among these professionals must, to be effective, address all these aspects. Having acknowledged this it becomes obvious that solutions developed and presented by 'experts' have little chance of being accepted and implemented. A participative approach must be applied. This is further emphasised by the fact that for safety measures to be accepted and used the cost of compliance must be relatively low (Hathaway and Dingus, 1992). Obviously there is a close relationship between the parameters 'cost of compliance' on the one hand and 'assessment of risk probability' and 'assessment of risk consequences' on the other. If the latter two are assessed as high a higher 'cost of compliance' is likely to be acceptable. It is our experience that this is highly relevant in fishery.

The purpose of the present study was to evaluate the long-term effects of a method aimed at increasing implementation of technical safety measures in fishery, based upon the elements stated above. The method itself and its short-term effects are presented elsewhere (Törner and Nordling 2000; Törner et al.,

2000). In the method the above-discussed elements were dealt with in the following manner:

### **Assessment of risk probability**

An analysis was performed of all serious accidents in fishery (>30 days of sick listing, permanent disability or death) reported to the Swedish Labour Market No-fault Liability Insurance in a 12-year period. The analysis identified e.g. common sequences of events, specific causes of accidents and presented frequency of such accidents in fishery as a whole and in trawl fishing specifically.

### **Determination of risk consequences**

A cost analysis was made based on the median value of days of sick listing due to each direct cause of a serious accident as defined above, as well as on other economics parameters defining typical conditions in three common types of fishery.

### **Understanding of necessary precautions**

This obviously can only be obtained by the user himself. The contribution of the method applied was to present *possible* precautions in terms of technical solutions commercially available or developed and implemented by single fishermen. These technical measures were gathered in an 'idea-bank' presenting also the approximate cost of each such measure as well as, when applicable, where and how the necessary piece of equipment could be acquired. The 'idea-bank' was continuously up-dated by the project co-ordinator.

### **Recognition of risk and participation of the fishermen**

The interventive part of the method consisted of personal visits to 101 fishing vessels by one of the three safety engineers of the project team. During these visits the safety engineer together with the fishermen, usually only the skipper, made a safety inspection of the vessel following a checklist encompassing known risk factors in fishery. During the visits the data gathered in the previous parts of the project, concerning risk probability and risk consequences (see above) were presented to the fisherman in connection to each risk factor identified on his own vessel. Possible solutions to each specific problem were also presented by using the idea-bank. The fisherman and the safety engineer together discussed the problems and possible solutions and the inspection resulted in a list of safety risks on board each vessel, to be used as a basis for an action plan. The fisherman was informed of the safety engineers intention to contact him again for a six-month follow-up.

## **Results of short term follow-up**

At the six-month follow-up 160 of 1482 safety deficiencies had been corrected and 82 of the 101 vessels had implemented at least one measure.

Thus, the six-month follow-up showed promising effects of the method. The fishermen were also generally satisfied with the function of measures taken and the chance of discussing safety and possible technical measures with an 'out-side' expert was highly appreciated. Short-term effects may be relatively easy to obtain but with time behaviour may return to 'the old groove', see e.g. Streff et al. (1993). A method like this which is based on personal contact is relatively resource demanding and must in order to be cost-effective result in long-term effects.

## **Methods**

Two and a half years after the safety inspections of the fishing vessels, i.e. two years after the short-term follow-up, All participating fishermen were contacted anew for a telephone interview. The fishermen had not been notified in advance of this long-term follow-up of the method. At this time 20 of the 101 vessels participating in the safety inspections had been sold or broken up. Two ships could not be reached for an interview and one fisherman did not wish to take part in the follow-up study. These 23 vessels were excluded from the present study. The person who performed the interview was the same safety engineer who performed the safety inspection of the respective vessel and who also performed the six-month follow-up. As a basis for the interview he had the list of safety deficiencies identified at the inspection. At the interview the fisherman was asked if the measures taken already at the six-month follow-up were still in use and the extent to which the fishermen were satisfied with their function. Questions were also asked about each one of the remaining safety deficiencies listed at the inspection, but which had not been dealt with at the six-month follow-up. These questions concerned if listed, or other, measures had been taken, and what the reasons were if this was not the case. The fishermen were also asked to state which safety measures they themselves considered as most urgent in fishery, if they nurtured plans for further measures and which prerequisites they considered necessary for taking further measure to improve safety. The interviewer also asked if the fishermen felt that participating in the project in any way had influenced their way of considering safety at work and whether it had influenced methods of work or routines. Finally, the fishermen were asked if they were interested in continuous contact with the safety engineers of the OHS services in order to improve safety on board. Questions of the interview are presented in Appendix 1.

## Results

Concerning the 78 fishing vessels encompassed by the 2.5-year follow-up the fishermen stated that out of the 123 measures taken at the six-month follow-up, 118 were still in use. Among those the fishermen were entirely satisfied with the function of 110 and partially satisfied with 16. Discontent was expressed by one fisherman in connection to a slip resistance measure, which was not considered effective enough. This slip resistance aid was, however, still in use. Since the six-month follow-up 45 of the 78 vessels had taken measures against additionally one or more safety deficiencies identified at the safety inspections. All in all another 85 such deficiencies had been dealt with. Additional to this another 49 measures to improve safety or ergonomics on board, not listed at the inspection, had been taken. All together 60 vessels had taken measures within either (or both) of these categories. The character of these new measures taken is presented in Table 1. Fifty-two fishermen held the opinion that there was a need for further safety measures on their own ship, and 39 fishermen claimed to nurture plans for such actions (Table 1).

**Table 1.** Safety measures taken since the six-month follow-up as well as measures that the fishermen considered urgent to implement on their own ship, or were actually planning to implement, respectively.

Type of measure	No of implemented measures	No of fishermen stating urgency	No of fishermen stating plans
<i>General safety arrangements:</i>			
Slip resistance device	2	7	5
Permanently installed safety ladder outside hull	7	5	3
Strengthened or secured steel rods inserted in bulwark (sorting trawl wires when hauling trawl onto hydraulic drum)	2	3	2
Hydraulically manoeuvred steel rods for sorting trawl wires when hauling		1	
Safer arrangement of equipment on deck	1	1	
Hydraulic device for spinning trawl wires onto drum	2	3	2
Protections of wires, shackles or pulleys in working areas	8	2	1
Safe securing of ladders	10	2	2
Safe securing of doors and hatches when open	3	2	1
Noise level in working areas low enough to allow normal speech and perception of called out warnings	1	2	2
Two-way electronic communication between bridge and deck	1		
Increased space around the trawl drum		1	1
Sufficiently high rails or bulwarks by working areas on open deck	8	1	4
Handle for grasping at critical sites, in order to avoid injury by e.g. the trawl drum	1	1	
Protection from moving parts of machinery	4	1	1
Ladder for embarking and disembarking the vessel	8	1	
Emergency stop for winch, trawl drum, net hauling- or shaking machines	1	1	
Double controls for winch or drum	2		
Improved field of vision from bridge over working deck	1	1	1

**Table 1** cont.

<b>Type of measure</b>	<b>No of implemented measures</b>	<b>No of fishermen stating urgency</b>	<b>No of fishermen stating plans</b>
Effective catching device for trawl lift when taking aboard the catch	2	1	
Improved lighting conditions in working areas	4	1	1
Life line and harness in exposed positions on deck	1	1	
Life line and harness in one man fishing	1	1	1
Abandoned one man fishing	2		
Safety education	2	1	1
Improved radar system		1	1
Split winches	1		2
Improved safety of winches	2		
Acquisition of new vessel, lengthening or substantial rebuilding of vessel to acquire better working space	5		4
Additional life boats			1
<i>Personal safety equipment:</i>			
Personal floating device, permanently worn			2
Use of hearing protection devices	3		
Use of safety helmets	1	2	
Use of safety boots	4		
Immersion suits	6	1	1
<i>Ergonomics:</i>			
Installation or improvement of shelter deck (weather protection on working deck)	2		3
Improved ergonomics in connection to handling catch and fishing equipment	22	2	1
Installation of hydraulic lifting winch	2		1
Job rotation or access to stand ins	3		
Installation of standing support stools	1		
Skipper's chair of better ergonomics design	4		2
Pump for loading or unloading catch	4		1
<i>Total</i>	<i>134</i>	<i>46</i>	<i>47</i>

Note: For a number of planned measures the fishermen have not expressed the need for these measures. It is, however, obvious that these actions would not be planned if the need for them had not been identified.

Fourteen fishermen stated that members of another fishing crew had shown interest in a safety measure taken on board.

In those cases where the fishermen had chosen not to take any or some of the measures listed at the inspection 37 stated a reason for this (one did not). 18 of these fishermen gave as the reason that they considered all or the remaining measures unnecessary. Eight fishermen gave strained economy as a main reason for not taking further measures. Other determining reasons were that no practical solution was considered available (3 persons), that they had forgotten or not 'got around to it' (5 persons), plans on purchasing a new boat (1 person), lack of time (1 person) or lack of interest (1 person). Forty-four fishermen had an opinion on



what would be needed for them to take further safety measures on board. Their answers are presented in Table 2.

**Table 2.** On the question ‘What do you consider as necessary for you personally to take further safety measures on board?’ the 44 fishermen responding to this question gave the following answers.

<b>Necessary prerequisites</b>	<b>no</b>
Improved personal economy	24
An accident to occur	13
Good, useful ideas on how to improve safety	6
Legislation	2
Younger crew	1
Conviction of risk existence	1

Fifty-five of the interviewed fishermen held an opinion as to which areas are most urgent to address in order to improve safety in fishery in general, see Table 3.

**Table 3.** Most urgent areas to address to improve safety in fishery in general, as stated by the fifty-five fishermen responding to the question.

<b>Prioritised measure</b>	<b>No of spokesmen</b>
Efforts to improve safety in connection to handling the trawl and wires	9
Less risk taking among the fishermen	9
Safety education for fishermen	8
Better boats, improved stability	7
Improved profitability to allow allocation of more resources for safety improvements	6
Effective slip resistance devices	4
Regulations forbidding on-man crews	4
Immersion suits for all aboard	2
Larger crew sizes	1
Lower fishing intensity	1
Noise reduction	1
Weather protection (such as shelter constructions)	1
Improved radar system	1
Reintroduction of full scale rescue service	1

Note: The Table presents urgent areas for improved safety given by the fishermen in the open interview. Thus, the areas that ‘fell out’ are of varying character and may to some degree be overlapping. Some fishermen stated more than one area.

Sixty-four of the fishermen held the opinion that participation in the project had made them more perceptive of risks in their job. One of these men considered this to be merely a short-term effect. Eight fishermen felt that participation had not influenced their risk perception. Six fishermen had no opinion in this matter. Nine fishermen stated that participation had made them change their working routines in order to obtain better safety, while 33 of the men said that this did not apply to them. Thirty-six fishermen had no opinion in this matter. 74 of the 78 fishermen said that they wished to maintain continuous contacts with the safety engineers of the OHS services, with the objective of improving safety on board. The preference among 37 persons was that this would be obtained through regular visits to their

vessels approximately once a year. Fifteen men would prefer such visits to take place on demand at their own initiative, while 11 fishermen felt that telephone consultancy would be sufficient. Eleven persons had no opinion on how the contacts would best be organised. Thirteen persons considered it difficult to afford to pay for safety visits.

## Discussion

Long-term effects of the method for increasing implementation of safety measures in fishery were evaluated through the present study. A shortcoming of the method itself was the lack of a control group of fishing vessels. Optimally such a control group would have consisted of a group of vessels that had not been presented to the information developed through the accident analysis and the cost-benefit analysis, respectively, and that had not been informed of the result of a safety inspection of their vessels. Such a control group had been beneficial for evaluating effects of the actual method. However, a control group of this kind was considered difficult to obtain, since it would have been hard to motivate the fishermen to allow the project team to perform a safety inspection of their vessels without informing skippers and crews about the result. It would also be difficult to prevent a discussion on safety matters between the fishermen and the representative of the project team in performing the inspection. This shortcoming presents a limitation in interpreting the results concerning safety measures taken since the six-month follow-up, since nothing can be stated about what measures would have been taken had the fishermen not participated in the project. Our own experience (e.g. Törner et al., 1995) as well as that of others (e.g. Aasjord and Silseth, 1995) indicates, however, that the degree of implementation of safety measures in fishery usually is low while both the short-term follow-up of the method (Törner et al., 2000) and the present long-term follow-up show a relatively high degree of implementation of safety measures. These results are of a magnitude, which, in our opinion, clearly demonstrates good effects of the applied method. A main aim of the present study was to evaluate the long-term duration of measures taken at an early stage of the project. For this purpose the absence of a control group was not considered a serious draw back.

At the six-month follow-up of the intervention technical measures had been taken against 160 of the risks identified at the safety inspection of the 101 vessels. Out of these, 56 consisted of purchasing or taking up the use of hearing protections or safety glasses (e.i. during handling of certain hand held power tools). The rest of the measures taken were fairly evenly distributed over most of the 36 items of different complexity contained in the check-list covering all major safety risks on board fishing vessels known to the project team (Törner et al., 2000). Of the 123 technical safety measures taken after the safety inspection and before the six-month follow-up, onboard the 78 vessels available for the 2.5-year follow-up, 118, i.e. 96% were still in use and the interviewed fishermen expressed satisfaction with most of these measures. This shows a high degree of continued use for safety

solutions that are developed and adapted on the basis of the expertise of the users, in this case the fishermen.

The fact that on 80% of the vessels an average of two planned safety measures had been implemented at the six-month follow-up is highly encouraging and indicates that the method used was successful. At the time of the safety inspection the fishermen were aware of the fact that a six-month follow-up of implementation would take place. It is therefore possible that this constituted a temporary pressure on the fishermen, a 'thumb-in-the eye', so in order to avoid the shame of not having acted at this short term follow-up, measures were implemented. However, at the six-month follow-up it was not made known to the fishermen that a second, long-term, follow-up was being planned. A total of 147 new measures had then been taken on board the 78 vessels available and, as mentioned above, measures taken earlier were to a large extent still in use. Our interpretation of this is that measures were not taken in order to 'please' the research team or in order to avoid 'shame'.

Forty-five of the 78 vessels (58%) had subsequent to the six-month follow-up taken, on average, additionally two measures against safety risks identified at the safety inspection. At the six-month follow-up 66 of the then participating 101 fishermen stated that they nurtured plans for further safety measures. At the 2.5-year follow-up ten of these 66 vessels had been sold or broken up and another two could not be reached for an interview. Of the remaining 54 vessels, on which safety measures were intended, 44 had actually had such measures taken. Additional to these, eight vessels for which the skipper at the six-month follow-up had not specified plans to improve safety, had still had such measures implemented. At the 2.5-year follow-up 52 of the 78 fishermen were of the opinion that there was a need for further safety improvements on their own ship and 39 (50%) claimed that they had plans to implement such improvements. Based on the degree of implementation between the six-month and 2.5-year follow-ups there is reason to believe that a large portion of these planned measures actually will be realised. The conclusion is that participation in the project has contributed to increased activity in safety work on board. In this context it must be pointed out, however, that participation was not based upon a random selection of fishermen or vessels. Recruitment to the project was accomplished via personal contacts with fishermen and with representatives of the fishermen's professional association where the fishermen were offered the opportunity to participate. Therefore there is reason to believe that the fishermen who accepted this offer had a more profound interest in safety matters than others did. The fishermen who are interested in improving their working situation are often carriers of change in fishery on the whole, since this process relies upon some people daring to try new ideas which subsequently, if they prove to be useful, are adapted also by many of the more conservative fishermen. Thus, even if the scientific evaluation of the method is impaired by the non-random selection of participants, the bias as such probably has a promoting effect for implementation of safety measures in fishery in general. Fourteen fishermen stated at the 2.5-year follow-up that some other

fisherman had shown interest in an implemented safety measure, within the project. This points at this spreading potential for good solutions.

On the question why the fishermen had refrained from implementing measures against identified risks, the most frequent answer was that the measure was considered unnecessary (18 fishermen). Further, being asked what would be a necessary prerequisite for the fishermen to take further safety measures on board, 13 of the 78 fishermen answered that an accident would first have to happen and one that he needed to be more convinced of the presence of risk. This points at risk being perceived as low among some fishermen (see Hathaway and Dingus, 1992). Contrary to this, accident statistics in fishery show a high risk probability (e.g. Torsteinsrud and Larsson, 1997; Törner and Nordling, 2000). A questionnaire study of risk perception among 92 Swedish fishermen showed that risk awareness in general in this group was relatively high, whereas a smaller portion of the respondents made a low risk assessment (Eklöf and Törner, 2000). Obviously further efforts should be made to raise risk awareness in this group. This can be done by continuously paying attention to and analysing accidents that do occur. It is important, however, in order not to unnecessarily add stress to the individual fisherman, that efforts to raise risk perception is closely accompanied by support to the fishermen in developing and implementing means of combating safety risks. Raising the perception of risk or threat in a situation will increase the potential of this situation as being a source of stress. This raised risk perception should then be accompanied by a corresponding sense of manageability, in order not to upset the balance between stress and a possibility to cope. If the sense of manageability is not raised in parallel with raised risk perception the coping strategy may be adaptive in such a way that the main issue (e.g. a specific hazardous condition) is put out of focus and efforts are concentrated on minor issues or selected parts of the main problem, i.e. 'tunnel vision', (Lazarus and Folkman, 1984). This is supported by the study of Eklöf and Törner (2000) which showed that one of two factors most closely related to high activity in safety work in fishery was faith in effectiveness of technical measures (the other being sufficient technical knowledge to handle technical equipment on board).

Avoiding a generic approach in favour of developing and selecting good solutions to specific safety risks in close co-operation with the fishers themselves is particularly well motivated when the cost of investment is high, since strained economy was the second most common reason given for not having taken measures against identified risks on board.

Slipperiness is a severe problem in fishery and one that often has serious consequences e.g. Törner and Nordling, 2000). The fishermen often request good, durable solutions to this problem (Table 1). It is worth stating that the one measure with which one fisherman expressed discontent was a presently often used slip resistance measure, namely mixing sand in the paint on deck. This measure initially has good effects, but wearing quality is low. This was the type of slip resistance measure with which one fisherman expressed discontent. Better solutions to the problem of slipping are presently being developed and evaluated within another project.

Seventy-four of the 78 fishermen were interested in continued contact with work environment experts. This is an important task for the OHS services and programs should be developed for direct support to specific fishing crews without high costs for each one of these small enterprises. Regular safety meetings at the fishing harbours with a few crews present at the time and where specific ships can be discussed and studied is one approach which in a pilot study has shown good potential in safety work (Törner and Eklöf, 2000).

Using the vocabulary of Hathaway and Dingus (1992) the method being evaluated through the present study dealt primarily with the elements 'recognition of risk (sequence of events data from accident statistics; safety inspection), 'assessment of risk probability' (frequency data from accident analysis), 'determination of risk consequences' (cost-benefit analysis) and 'understanding of necessary precautions' (safety inspection; idea-bank). Our experience from the interventive part of the project was that the elements most easily embraced by the fishermen were those showing high frequency and severity of actual accidents in fishery as well as the assistance in approaching safety issues on board their own vessels obtained through the discussions with the safety experts. The presentation of cost-benefit analysis data, demonstrated that the fishermen were unused to reflecting over accidents and safety from this perspective. The strained economy in several types of fishery, and the restraining effect this has on activity in safety work, makes it important to clarify the possibility of keeping down costs for the fishers in a long perspective through investing in safety measures. A more widespread understanding and acceptance of this way of thinking is highly desirable. In our opinion this is an area where educational efforts could give rewarding results. It is suggested that cost-benefit analysis of safety work be integrated in safety courses for the fishermen.

Insurance agencies play an important part in aiding in the implementation of technical safety measures by developing strategies to reward such work. This may prove beneficial in a cost-benefit analysis of both parties.

Sixty-four of the 78 fishermen stated the opinion that they had become more aware of safety risks through participation in the study. The results of the present study also show that a substantial portion of planned safety measures had actually been implemented since the six-month follow-up and further measures were being planned. These results together indicate that safety work based on direct contact and a high degree of participation by the users may become self-generating for activity in safety work.

## Conclusions

- The methodology for supporting implementation of preventive safety measures based on direct contact and a high degree of participation by the users was found to be effective both in increasing implementation of safety measures and in long-term use of these measures in fishery.

- The approach seems to be to a certain extent self-generating since planned measures to a substantial degree actually became implemented, project participants expressed increased observance to risks at work and further measures were being planned.
- Efforts should be made to demonstrate the good effects of specific safety measures, especially in those cases where the investment cost is high.
- The high risks in fishery should continuously be pointed out parallel to the presentation of effective means of reducing such risks.
- Efforts are needed to develop the fishermen's understanding of cost-benefit relevance to safety issues.
- Authorities, insurance companies and the fishermen's organisations have good opportunities to support activity in safety work in fishery by developing strategies to support such work economically.
- OHS services in fishery should develop a strategy to satisfy the fishermen's requests for continuous contacts with work environment experts, without great costs for the individual fisherman.
- Results gained from the present study motivates continued application of the methodology in fishery as well as introduction of the approach also in other branches of occupational life with a similar structure, such as agriculture and other sectors with a dominance of small enterprises.

## Acknowledgements

Financial support was given by the Swedish Labour Market No-fault Liability Insurance Fund for Research, which is hereby gratefully acknowledged.

## Summary

Törner M, Cagner M, Nilsson B and Nordling P-O. *Promoting implementation of safety measures. Long-term follow-up of a participatory method.* Arbete och Hälsa 2000:3.

The aim of the present study was to evaluate the long-term effects of a method for promoting implementation of safety measures in fishery. The evaluation was performed through an interview investigation 2.5 years subsequent to the safety inspection of 101 fishing vessels that constituted one step of the implementation study. Seventy-eight vessels participated in the long-term follow-up. The interview aimed at investigating whether the effects of the implementation study were of lasting character, if any further safety measures had been taken or were being planned, as well as factors which were considered as decisive for the fishermen's activity in safety work. On the 78 vessels that were available for the 2.5-year follow-up 96% of the measures that had been taken previous to the six-month follow-up which constituted part of the implementation project, were still in use. The functionality was considered satisfactory for 81% of all measures taken at this early stage of the project. Since the six-month follow-up 60 of the 78 vessels had taken measures to reduce another 134 safety or ergonomics deficiencies. The reasons given for not having taken measures against known risk factors were mainly that the measure was considered not necessary, lack of money, or that available measures were not considered good enough. Information was gathered concerning which safety measures that were considered as most urgent by the fishermen, in fishery in general as well as on their particular vessels. The fishermen were also requested to state what they considered a necessary prerequisite for them to take further measures to promote safety on board. Eighty-two percent of the fishermen were of the opinion that participation in the implementation project had made them more observant of risks at work and 95% of the fishermen wanted a continuation of regular direct contacts with work environment experts, for example through the occupational health services.

## Summary in Swedish

Törner, M., Cagner, M., Nilsson, B. and Nordling, P-O. *Promoting implementation of safety measures. Long-term follow-up of a participatory method.* *Arbete och Hälsa* 2000:3.

Syftet med föreliggande projekt var att utvärdera långtidseffekter av en metod för att öka implementeringen av säkerhetshöjande åtgärder i fisket. Utvärderingen genomfördes som en intervjuundersökning 2,5 år efter den säkerhetsinspektion på 101 fiskefartyg, som utgjorde avslut i genomförandefasen i metodprojektet. Sjuttioåtta fartyg deltog i uppföljningen. Intervjun avsåg att undersöka i vilken utsträckning effekter av metodprojektet var bestående, om ytterligare åtgärder vidtagits eller planerades samt vilka faktorer som styr hur aktiv man är i säkerhetsarbete ombord. På de 78 fartyg som var tillgängliga för 2,5-årsuppföljningen var 96% av de åtgärder som vidtagits före den sexmånadersuppföljning som gjordes av implementeringsprojektet fortfarande i bruk. Man var helt nöjd med funktionen hos 81% av dessa åtgärder som vidtagits tidigt i projektet. Sedan sexmånadersuppföljningen hade 60 fartyg åtgärdat ytterligare sammanlagt 134 säkerhetsbrister eller brister i ergonomi. Som orsak till att man inte åtgärdat kända brister angavs främst att man ansåg åtgärden onödig, otillräckliga ekonomiska resurser, eller att man ansåg att befintliga lösningar på problemet inte var tillräckligt goda. Fiskarnas synpunkter på vilka som är de mest angelägna åtgärderna för att förbättra säkerheten i fisket generellt respektive på den egna båten inhämtades, liksom vad man ansåg skulle krävas för att man skulle vidta ytterligare säkerhetsåtgärder. Åttiotvå procent av de intervjuade fiskarna ansåg att deltagande i projektet lett till att man blivit mer uppmärksam på risker i arbetet och 95% av fiskarna ville ha fortsatta kontinuerliga, riktade kontakter med arbetsmiljöexperter från exempelvis företagshälsovården.



## References

- Aasjord H (1992) Accidents in the Norwegian fisheries. *Proc 2<sup>nd</sup> Int Symposium on Safety and Working Conditions aboard Fishing Vessels*. Centro de Formación Ocupational Marítima de Bamio, Spain, 15-17 Sept.
- Aasjord H (1997) *Presentasjon av personulykker i den norske fiskeflåten, perioden Januar 1985-Oktober 1997*. (In Norwegian), Marintek, Trondheim, Norge.
- Aasjord H and Silseth A (1995) *Tiltakspakke for økt sikkerhet i fiskerflåten*. (In Norwegian), MT40 F95-0124, Marintek, Sintef-gruppen, Trondheim, Norway.
- Döös M and Backström T (1997) The RIV method: a participative risk analysis method and its application. *New Solutions*, pp 53-60.
- Eklöf M and Törner M (2000) Perception and control of occupational injury risks in fishery – a basis for intervention. *Submitted*.
- Hathaway J A and Dingus T A (1992) The effects of compliance cost and specific consequence information on the use of safety equipment. *Accident Analysis and Prevention*, 24, 6, pp577-584.
- Hughes L J (1994) Vessel safety program. *Proc. National Fishing Industry Safety and Health Workshop, Anchorage, Alaska, Oct 1992*, NIOSH, publ no 94-109, pp 180-188.
- Jeong B Y (1999) Comparisons of variables between fatal and nonfatal accidents in manufacturing industry. *Industrial Ergonomics*, 23, pp 565-572.
- Lazarus R S and Folkman S (1984) *Stress, appraisal and coping*. Springer, New York.
- McAfee R B and Winn A R (1989) The use of incentives/feedback to enhance work place safety: a critique of the literature. *Safety Research*, 20, pp 7-19.
- Pröpper H P (1992) An analysis and evaluation of occupational accidents and possible solutions for technical safety improvements on Dutch beam trawlers. *Proceedings of the 2nd international symposium on safety and working conditions aboard fishing vessels*, Centro de Formación Ocupational Marítima de Bamio, Spain, 15-17 Sept.
- Ray P S, Bishop P A and Wang M Q (1997) Efficacy of the components of a behavioural safety program. *Industrial Ergonomics*, 19, pp 19-29.
- Streff F M, Kalsher M J and Geller E S (1993) Developing efficient workplace safety programs: observations of response covariation. *Organizational Behaviour Management*, 13, 2, pp 3-14.
- Svensson E (1994) Personal communication, Sveriges Fiskares Riksförbund (Swedish Fishermen's Federation) Göteborg.
- Swedish Work Environment Commission (1989) *Rapport inom arbetsmiljökommissionens kartläggning: Arbeten utsatta för särskilda hälsorisker, bilagedel B: Allvarliga olycksfallsskador*, (Occupations subjected to particular health hazards, appendix B: Serious occupational injuries), (In Swedish), Allmänna förlaget, Stockholm.
- Torsteinsrud K and Larsson T (1997) *Allvarliga arbetsskador i Sverige 1994-1995*. (In Swedish) AMF trygghetsförsäkring, Stockholm.
- Törner M, Cagner M, Nilsson B and Nordling P-O (2000) Occupational injury in Swedish fishery: 2. Promoting implementation of safety measures. *Occupational Ergonomics*. In press.
- Törner M and Eklöf M (2000) Kartläggning av riskmedvetande följt av lokalt förankrat åtgärdsarbete – utveckling av metod samt tillämpning i fisket. Slutrapport till Rådet för arbetslivsforskning och Fiskeriverket. Lindholmen Utveckling, Göteborg. (In Swedish) Manuscript.
- Törner M, Karlsson R, Saethre H and Kadefors R (1995) Analysis of serious occupational accidents in Swedish fishery. *Safety Science* 21, pp 93-111.

- Törner M and Nordling P-O (2000) Occupational injury in Swedish fishery:1. Analysis of injury statistics. *Occupational Ergonomics*. In press.
- Zwerling C, Daltroy L H, Fine L J, Johnston J J, Melius J and Silverstein M (1997) Design and conduct of occupational injury intervention studies: a review of evaluation strategies. *Am J Industrial Medicine*, 32, pp 164-179.