An Issues Faced by Fishermen on the Implementation of (STCW-F 1995): Northern Region of Malaysia

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Abstract*— The STCW-F stand for Standards of Training, Certification and Watch keeping for Fishing Vessel Personnel, 1995 (STCW-F 1995), is set to enter into force on 29 September 2012. The 1995 STCW-F Convention sets the certification and minimum training requirements for crews of seagoing fishing vessels of 24 metres in length and above. Safety of fishermen is one of the STCW-F objectives and to prevent casualties during at sea. Thus implementation of STCW-F in Malaysia fishery industry is a must, but before authorities/government want to implement this convention to fishermen, issues faced by fishermen are important to discover so that authorities/government may counter when the issues take place. This paper used statistical analysis such as chi-square test, friedman test, wilcoxon signed ranks test and bonferroni correction to extract the variables that have been collected from fishermen using questionnaires. The finding major fishermen significantly agree all factors are related to each other if government want to implement the convention for example, fishermen awareness, government roles, consequences of implementation, cost and fees and lack of training center. The biggest challenges for fishermen on this implementation is cost and fees. The factors that has been extract with statistical analyses shows the issues faced by fishermen on the implementation of STCW-F 1995.

***Keywords*—** *Delphi, International Maritime Organisation (IMO), ISPS Code, SOLAS Convention, Qualitative Content Analysis*

1. Introduction

The International Convention on Standards of Training, Certification and Watch-keeping for Fishing Vessel Personnel, 1995 (STCW-F 1995), is an International Maritime Organisation (IMO) convention under United Nation. This convention (15 Articles and 4 Chapters) sets the certification and minimum training requirements for crews of seagoing fishing vessels of 24 meters in length and above [1]. Department of Fisheries Malaysia concurring the total number of registered fisherman in Malaysia fishing sector approximated roughly 239653[2]. Typically fishermen classes by their boat length or weight because there are numerous number of types and sizes. STCW-F 1995 is for fishing vessel above 24 meter and above, as a result of the statement not all the fishermen involve with this convention.

Fishing has been regarded as one the most lethal occupations in the world, an enormously uncomfortable assumption in the international fishing industry (International Labor Organization ILO, IMO and Food and Agriculture Organization of United Nations FAO). Human error influence 80% of accidents [3], triggered by the carelessness on the part of administration staff should undertake training and performance improvement. All the critical mechanical devices used e.g. hull, machineries and other fishing gear must be maintained for finest competency

It is vital for boats and vessel to have sea worthiness prepared with adequate machineries and outfitting. Moreover, a sound governing system should be designed to monitor the appropriate safety operation in terms of maintenance and crew inspection. The ethics, in turn, should be universal in nature, which are bound to international contracts. Although the Members of IMO definite that the collection and analysis of statistical evidence on casualties of fishing vessels and fatalities of crewmembers should be ready on annual basis, they accepted in 1999 that there had been a very narrow response. This absence of information is the most probably to be affected by the informal employment arrangement is fishing.

International Journal of Supply Chain Management
IJSCM, ISSN: 2050-7399 (Online), 2051-3771 (Print)

The "human factor" has been named as the cause of many accidents, which can be attributed to inadequate training, lack of experience and skills, recklessness and fatigue.

1.1.1 The 1995 STCW-F convention

This STCW-F 1995 convention is opposite to the Torremolinos Protocol through the formation of regulatory scheme for the training and proper certification of the fishing crew. STCW-F is an addition to the 1978 STCW Convention. The revised convention spesifies the essential training and certification standard for skipper and watch keepers on fishing vessels with the dimension beyond 24 meters, for engineers on vessels yielding more than 750kW, and for crew responsible for radio communications. In addition, this convention also adopts the fundamental (pre-sea) safety training for all personnel on fishing vessels. In brief, the idea of this convention is on competency-based training [4], [5].

1.1.2 The fisheries industry in north Malaysia

Combination of Kedah and Pulau Pinang fisheries industry recorded third highest fish landed after Sabah with 181,078 MT in 2013. In Malaysia majority fishermen using trawler beside purse seines, in term of value of fish landed. Conventionally, the fisheries industry consists of two major components which are marine-capture fisheries and aquaculture. Marine-capture fishing was categorized into two main types, namely coastal or inshore fishing, and deep-sea fishing. Fisheries sector had contributed RM11,466.53 million to the nation's economy in the year 2013, increasing of 0.23% compared to 2012. The Food fish sector showing an increase 2.09% in term of value and a decrease of 1.73% in term of quantity compared to 2012. The Food fish sector which are combination of marine capture, inland fisheries and aquaculture (excluding seaweed) produced 1,749,314 tonnes worth RM10,818.60 million. Non-Food fish sector also decreased by 23.11% compared to 2012. Non-Food which are combination of seaweed, ornamental fish and aquatic plants contributed RM647.92 million. The nation GDP (Gross Domestic Product) in 2013 shown fish production from fisheries sector contributed 1.1% or RM7.91 billion. The Malaysia's aim is to reach a high income level by 2020. In order to fulfill that aim, The Malaysian fishing industry-in particular deep-sea fishing and aquaculture is required to grow further into large-scale commercial industry [6].

1.3 Safety issue and training requirement

Safety has always been the main issue in just about any field for many years. Exposure to risks is sometimes too unbearable that leads to many conventions being created by respective organizations [7]. This condition happens in marine field as well. Safety is the most talked about issue involving various range of populace in this industry. One of the most affected groups of population is fishermen [8]. International Maritime Organization (IMO) estimated that safety crises among seagoing fishing vessel crews have cost more than 24000 lives per year. To address this problem, the responsible party shall take appropriate action and to ascertain the causes of the accident-prone sea according to data and statistics that have been provided. Lack of information also makes it difficult for authorities to investigate the effects and causes of accidents and the number of accidents that occur in an area. The training of fishermen is a way to channel the results of teaching and learning better. Historically, the training of fishers has been limited to skippers, mates and engineers in developed countries. IMO Protocol to the Standards of Training, Certification and Watchkeeping for Seafarers (1978) provided a standard for states to follow, but it was never confirmed and was replaced by the Convention on Standards of Training, Certification and Watchkeeping for Fishing Vessel Personnel (1995) (STCW-F).

1.2 5 Variables in the questionnaires

The possible issues faced by fishermen regarding the implementation of stcw-f are cost and fees for stcw-f courses, fishermen awareness towards safety courses, government roles and lack of exposure about safety at sea, consequences implementation of stcw-f to fishermen and lack of training centre for fishermen. The cost and fees for stcw-f courses will affect the fishing communities if there any fees that apply to them. Fishing communities are known as low living conditions, low levels of education and poor access to services like schools, health care and infrastructure such as road or markets. Malaysian government efforts to initiate in the

1990s to reduce the poverty level in Malaysia, still many population groups and areas in Malaysia require government support [9]. The fishermen awareness towards safety courses, the fisherman must have their own mind setting to prevent accident during working on board. Malaysian fisherman mostly really cares about their safety but only based on experience, no training or class taken. Safety attitude among Fisherman measures how concerned the fisherman about their own safety. Time saving to performing any job makes the employee takes a shortcut to finish their jobs, this lead to one of the major causes of accidents [7] [22] [23].

The government roles and lack of exposure about safety at sea, the total of fishing vessel is 689 for C C2 class and the rest 2348 for A&B class [10]. This show Sabah and W.P Labuan fishing industry have potential to expand due to high number in catch and fishing vessel, so government must make a change in term of facilities, exposure about safety and involvement from young generation. The consequences implementation of stcw-f to fishermen, in 2006 until 2015, Department of Fishery (DOF) statistic recorded 509 accidents involving fishing boats in Malaysia. A very disturbing number of accidents worries the DOF itself [11] [23]. Proper implementation of safety law for fishing vessel will resolve the casualty problem and accident. Fishermen worried the fishing boat personnel will increase once the government implement this convention to them. Furthermore the price of catch maybe will increase due to the cost that fishermen bear to attend the courses. Finally, the lack of training centre for fishermen. In Malaysia, there is only one fishing training academy which is located in Chendering, Kuala Terengganu, Terengganu, and eastern coast of Peninsular Malaysia. Due to the training centre that suitable for SCTW-F courses located for to the eastern cost of peninsular Malaysia, it is quite burden to fishermen all over Malaysia to attend the course. [23].

Thus, this research paper objective are to find significant different between fishermen about the implementation of STCW-F and to find the biggest challenges in the implementation of STCW-F from fishermen point of view.

2 Research Method

MATEC Web of Conferences **2** (2012) 01001, **2** corresponding to the volume and 01001 to the number of the article (replacing thus the page number). A questionnaire was used to conduct this study. Through a multi-stage random sampling, a total of two fishing districts in Kedah (north region of Malaysia) were selected. The time taken to carry out this study was about 15-20 minutes for each respondent. The chosen 44 respondents consisted of the members of the fishermen's association. For each of the questions asked, they were given a five-Likert scale option, whereby one represents strongly disagree, two represents disagree, three represents moderate, four represents agree and five represent strongly agree. To achieve the objectives of the study, descriptive statistics, such as frequency, percentage and mean, were employed in order to describe the general data of the study. The data gathered was processed and analyzed using Statistical Package for the Social Sciences (SPSS) Version 21.

2.1 Reliability analysis (cronbach alpha)

The analysis part begins with reliability analysis to check whether the selected items are reliable to the element in the questionnaire. Cronbach's alpha which is based on the average correlation within items was used in this study. The value of Cronbach's alpha of 0.92 or higher is considered as excellent where George and Mallery (2003) provide the following rules of thumb: "_ > .9 – Excellent, _ > .8 – Good, _ > .7 –Acceptable, _ > .6 – Questionable, _ > .5 – Poor, and _ < .5 – Unacceptable" (p. 231)[19]. In this analysis the value of Cronbach's alpha is considered as excellent and suggesting that the items have relatively moderate internal consistency.

2.2 Chi-square and friedman test assumption

The data has been collected are suitable to use Chi-square and Friedman test based on the data has follow all the assumption rules. The analysis conducted using Chi-square method because of these several assumption; the sampling method is random sampling, the variable under study is categorical and the expected (f_e) value of the number of sample observations in each level of the variables is at least 5 [15]. The questionnaires are

given to random fishermen, the researcher do not have target by some rank. Secondly, the variables in the questionnaires is categorical due to the variables using five-Likert scale option. The formula is expected value (f_e), observed value (f_o) and χ^2 is chi-square value. The chi-square formula was used is

$$\chi^2 = \sum \frac{(f_e - f_o)^2}{f_e} \quad (1)$$

Table-2. Chi-Square test (5 factors and years Fishermen involve)

	Pearson Chi-Square χ^2	Assumption Significant(2 sided)	Pass (Yes/ No)
Year involve and Fishermen Awareness	10.737	.097 (the minimum expected is 0.05)	Yes
Year involve and Government Roles	15.407	.052 (the minimum expected is 0.05)	Yes
Year involve Consequences of Implementation	10.875	.092 (the minimum expected is 0.09)	Yes
Year involve and Cost and Fees	3.654	.723 (the minimum expected is 0.05)	No
Year involve and Lack of Training Center	1.524	.958 (the minimum expected is 0.05)	No

Finally, after calculation has made, 3 out of 5 variables have f_e more than 5 **Table-2.** Chi-Square test (factors and years Fishermen involve). All the assumption to use Chi-square is tally with the data, hence the researcher will use the Chi-square as one of analysis method.

The Friedman test is also non-parametric test for analyzing randomized complete block designs [16]. there are 4 assumptions before using Friedman test: one group that is measured on three or more different occasions, group is a random sample from the population, one dependent variable that is either ordinal, interval or ratio and sample do not need to be normally distributed [17]. First assumption for using Friedman test is data for this research have more than 3 occasions. The population of fishermen respondent that the researcher found for collecting data are randomly. Lastly the data that researcher get measured by ordinal it is comply with the Friedman test assumption. All the 4 assumptions before using Friedman test are comply with the data.

2.3 Wilcoxon signed ranks test and bonferroni correction

The Wilcoxon Signed Rank test is also used for this research paper. It is used for statistically compared of two dependent samples(the average) and to find out for the significant differences. The Wilcoxon sign is used for non-parametric alternative of the dependent samples t-test. There are 3 assumption of The wilcoxon signed ranks test: data comes from two matched/dependent/populations, the data is continuous, because it is non-parametric test it does not require a special distribution of the dependent variable in the analysis. The data meets all the assumption requirement so the researcher used the Wilcoxon Signed Rank test for analysis. [20]

The bonferroni correction is used to support the multiple-comparison correction, because the data have several factors that being statistical tests are performed simultaneously. (since while a given alpha value α). In order to avoid a lot of spurious positives, the alpha value needs to be lowered to account for the number of comparisons being performed. The simplest and most conservative approach is the Bonferroni correction, which sets the alpha value for the entire *set* of n comparisons equal to α by taking the alpha value for *each* comparison equal to α/n. Explicitly, given n tests T_i for hypotheses H_i ($1 \leq i \leq n$) under the assumption H_0 that all hypotheses H_i are false, and if the individual test critical values are $\leq \alpha/n$, then the experiment-wide critical value is $\leq \alpha$. In equation form, if [21]

$$P(T_i \text{ passes } | H_0) \leq \frac{\alpha}{n}$$

(3)

for , $1 \leq i \leq n$ then

$$P(\text{some } T_i \text{ passes } | H_0) \leq \alpha,$$ [21] (4)

3 Analysis of Results

Respondents' demographic data

The results showed that most of the fishermen are Malays, and that prevalence of men in the fishing industry was still high. Respondent's highest age group is 20 to 29 years old and above. This shows that fishermen is an 'old-timer' job accepted by younger generation. The percentage score recorded for experience showed that the majority of the respondents interviewed can be considered to be experienced fishermen as shown in (**Table-1.** Demographic data)

Table-1. Demographic data

Items		**Fre-quency**	**Percentage**
Age	20 to 29 years old	2	4.5
	30 to 39 years old	10	22.7
	40 to 49 years old	27	61.4
	50 to 60 years old	5	11.4
Experience in Fishing Industry	5 to 10 years	2	4.5
	10 to 20 years	23	52.3
	20 to 30 years	19	43.2
Boat length(feet)	12 to 25	18	40.8
	26 to 40	26	59.2

Factor frequency

Five factor has been group based on the data that researcher collected. Based on the factor frequency fishermen mostly agree with the 5 factor that researcher put in the questionnaires. Fishermen awareness towards safety courses, factor number 1 received 31 agree for 70.5%. Government roles and lack of exposure about safety at sea courses, factor number 2 received 28 agree for 63.6%. Consequences implementation of STCW-F to fishermen, factor number 3 received 26 agree for 59.1%. Cost and fees for STCW-F courses, factor number 4 received 32 strongly agree for 72.7%. Lack of training centre for fishermen, factor number 5 received 23 agree for 52.3%.

3.1. Chi-Square Analysis

The Chi-square test is used for two is called the Chi-square test for independence (also known as the test of homogeneity). It used to analyses the relationship between two variables in nominal or ordinal scale (data which can be categories into several independent groups), for example, the gender variables has two independent categories (male and female), the race variables has three categories (race A, race B, and race C) [14]. **Table-3.** Chi-Square test for 5 factors, from the result researcher created hypothesis Ho and H_1. H_0 = there is no significantly different from the respondent perception on the 5 factors of implementation of STCW-F.H_1 = there is significantly different from the respondent perception on the 5 factors of implementation of STCW-F. All Ho will be reject since the p-values of each factor equal to 0.00

Table-3. Chi-Square test for 5 factors

	Fishermen Awareness	Government Roles	Consequences of Implementation	Cost and Fees	Lack of Training Center
Chi-Square	71.682[a]	59.864[a]	32.364[b]	35.091[b]	31.273[b]
df	4	4	3	3	3
p-value	.000	.000	.000	.000	.000

Based on the test results **Table-4.** Fishermen Awareness, the researcher reports that there is a significant difference where the biggest contributor to this different is disagree (Standard residual value = 22.2) this means the Fishermen prefer disagree the most whereas strongly agree is the least preferred by local fishermen [can be seen clearly through the observed frequency / observed N: disagree = 31, strongly disagree = 6, neutral = 2, agree = 4, strongly agree = 1) and the residual value (disagree = 22.2 , strongly disagree = -2.8 , neutral = -6.8, agree = -4.8, strongly agree = -7.8) for the two groups]

Table-4. Fishermen Awareness

	Observed N	Expected N	Residual
Strongly Disagree	6	8.8	-2.8
Disagree	31	8.8	22.2
Neutral	2	8.8	-6.8
Agree	4	8.8	-4.8
Strongly Agree	1	8.8	-7.8
Total	44		

Based on the test results, **Table-5.** Government Roles the researcher reports that there is a significant difference where the biggest contributor to this different is disagree (Standard residual value = 19.2) this means the Local fishermen prefer disagree the most whereas Agree is the least preferred by local fishermen [can be seen clearly through the observed frequency / observed N: disagree = 28, strongly disagree = 11, neutral = 2, agree = 1, strongly agree = 1) and the residual value (disagree = 19.2 , strongly disagree = 2.2 , neutral = -6..8, agree = -7.8, strongly agree = -6.8) for the two groups]

Table-5. Government Roles

	Observed N	Expected N	Residual
Strongly Disagree	11	8.8	2.2
Disagree	28	8.8	19.2
Neutral	2	8.8	-6.8
Agree	1	8.8	-7.8
Strongly Agree	2	8.8	-6.8
Total	44		

Based on the test results, **Table-6.** Consequences of Implementation the researcher reports that there is a significant difference where the biggest contributor to this different is disagree (Standard residual value =15) this means the local fishermen prefer disagree the most whereas Agree is the least preferred by local fishermen [can be seen clearly through the observed frequency / observed N: disagree = 26, strongly disagree = 4, neutral = 12, agree = 2, strongly agree = 1) and the residual value (disagree = 15 , strongly disagree = -7.0 , neutral = -1, agree = -9.0) for the two groups]

Table-6. Consequences of Implementation

	Observed N	Expected N	Residual
Strongly Disagree	4	11.0	-7.0
Disagree	26	11.0	15.0
Neutral	12	11.0	1.0
Agree	2	11.0	-9.0
Total	44		

Based on the test results **Table-7.** Cost and Fees, the researcher reports that there is a significant difference where the biggest contributor to this different is disagree (Standard residual value = 13)

this means the local fishermen prefer disagree the most whereas strongly agree is the least preferred by local fishermen [can be seen clearly through the observed frequency / observed N: disagree = 24, strongly disagree = 17, neutral = 2, agree = 1) and the residual value (disagree = 13.0 , strongly disagree = 6.0 , neutral = -9.0, agree = -10) for the two groups.

Table-7. Cost and Fees

	Observed N	Expected N	Residual
Strongly Disagree	17	11.0	6.0
Disagree	24	11.0	13.0
Neutral	2	11.0	-9.0
Agree	1	11.0	-10.0
Total	44		

Based on the test results **Table-8.** Lack of Training Center, the researcher reports that there is a significant difference where the biggest contributor to this different is disagree (Standard residual value = 12) this means the local fishermen prefer disagree the most whereas strongly agree is the least preferred by local fishermen [can be seen clearly through the observed frequency / observed N: disagree = 23, strongly disagree = 17, neutral = 3, agree = 1) and the residual value (disagree = 12 , strongly disagree = 6 , neutral = -8, agree = -10) for the two groups]

Table-8. Lack of Training Center

	Observed N	Expected N	Residual
Strongly Disagree	17	11.0	6.0
Disagree	23	11.0	12.0
Neutral	3	11.0	-8.0
Agree	1	11.0	-10.0
Total	44		

4 Result

The result of Chi-Square test shown all hypothesis H_0 have been rejected due to P- value equal to 0.000. Each factors have their own hypothesis for Fisherman Awareness: H_0=Most of the fishermen significantly disagree that fishermen aware about their safety while working on the sea, H_1=Most of the fishermen significantly disagree that fishermen not aware about their safety while working on the sea. For Government Roles: H_0 = Most of the fishermen significantly disagree that Government roles are related to implement the STCW-F, H_1= Most of the fishermen significantly disagree that Government roles are not related to implement the STCW-F. Consequences of Implementation: H_0 = Most of the fishermen significantly disagree that Consequences of Implementation will affect the lives of fishermen, price of catch and etc. after the implementation of STCW-F., H_1= Most of the fishermen significantly disagree that Consequences of Implementation will not affect the lives of fishermen, price of catch and etc. after the implementation of STCW-F. Cost and Fees: H_0 = Most of the fishermen significantly disagree that Cost and Fees are the problem for fishermen if government implement the STCW-F H_1= Most of the fishermen significantly disagree that Cost and Fees are the problem for fishermen if government implement the STCW-F.

Lack of Training Center: H_0 Most of the fishermen significantly disagree that Malaysia have not enough training centre for to train Malaysian fishermen. H_1= Most of the fishermen significantly disagree that Malaysia have enough training centre for to train Malaysian fishermen. All of H_0 for each factor have been rejected due to p-value = 0.000, so the result (Table-10.) show the finding of the research. The finding in the table is H_1 that have been accepted.

Table-10. Chi-Square test result (5 factors)

Factors	Findings
Fishermen Awareness	Most of the fishermen significantly disagree that fishermen not aware about their safety while working on the sea.
Government Roles	Most of the fishermen significantly disagree that Government roles are not related to implement the STCW-F. (in other way related)
Consequences of Implementation	Most of the fishermen significantly disagree that Consequences of Implementation will not affect the lives of fishermen, price of catch and etc. after the implementation of STCW-F. (in other way it will affect)
Cost and Fees	Most of the fishermen significantly disagree that Cost and Fees are not the problem for fishermen if government implement the STCW-F(in other way it will cause problems)
Lack of Training Center	Most of the fishermen significantly disagree that Malaysia have enough training centre for to train Malaysian fishermen. (in other way not enough)

Comparison of the repeated measures was performed using Friedman's test showing a statistically significant different in the preferable factor of STCW-F implementation for the fishing vessel in Northern Malaysia, $\chi 2(4) = 62.792$, $p < 0.000$. Post-hoc analysis with Wilcoxon signed-rank test was conducted with a Bonferroni correction applied, resulting in a significance level set at $p < 0.005$. The results of Post-hoc analysis with Wilcoxon signed-rank test as below:

Table-11 : Post-hoc analysis with Wilcoxon signed-rank test.

	Fisherman Awareness	**Government Roles**	**Consequences Of Implementation**	**Cost and Fees**	**Lack of Training Center**
Fisherman Awareness	-				
Government Roles	-1.147 (0.251)	-			
Consequences Of Implementation	-2.138 (0.033)	-2.600 (0.009)	-		
Cost and Fees	-4.943 (0.000)	-4.838 (0.000)	-5.147 (0.000)	-	
Lack of Training Center	-2.696 (0.007)	-1.895 (0.058)	-3.527 (0.000)	-3.024 (0.002)	-

The mean rank for Fisherman Awareness, Government Roles, Consequences of Implementation, Cost and Fees and Lack of Training Center were 2.57, 2.81, 2.18, 4.14 and 3.31 respectively. The results shown that there are significantly different was seen between Cost and Fees factor and all other factors. Therefore, the Cost and Fees for attending STCW-F course are the biggest challenges in implementing STCW-F for fishing vessels from fisherman point of view.

5 Conclusion

The factors that has been extract with statistical analyses shows the issues faced by fishermen on the implementation of STCW-F 1995. The finding major fishermen significantly agree all factors are related to each other if government want to implement the convention for example, fishermen awareness, and government roles, consequences of implementation, cost and fees and lack of training center. The biggest challenges for fishermen on this implementation is cost and fees. The significant agree of every variables are key factor to

implement the new law that has been produce by IMO in Malaysia. All the data presented and been analysed are drawn from the total of 44 fishermen respondents from north Malaysia. This research conclude major fishermen significantly agree all factors are related to each other and biggest challenges for fishermen on this implementation is cost and fees if Government and Authorities bodies of Malaysia implement this convention.

Perception of east Malaysia fishermen on the 5 factors are the same variables in questionnaires can be used to upgrade the safety of fisherman around east Malaysia. STCW-F is the way to upgrading fisherman safety precaution in term of whole vessels, start from the skipper until the crew members. STCW-F covered all safety aspects, to apply this convention to fisherman these 5 factors need to be consider by government.

Implementation of STCW-F is the vital so that government can control and prevent accident/casualties at sea among fishermen, because course that has been offered by STCW-F convention is a complete for all fishing vessel personnel. Sabah fishing industry is the second largest contribution to Malaysia fishing industry in term of fish catch [10], so to preserve and maintain the prosperity of Malaysia fishery industry, safety of fishermen need to be concern. All 5 factors in this research is key point to government implement this convention to Malaysian fishermen. These all life-saving skills are designed for anyone who work on the vessel at sea. Proper implementation of STCW-F among fishermen could save their life and prevent accident due to the safety skills and knowledge that are thought in that courses provided with a framework for safe working practice, emergency procedures and teamwork within the maritime environment.

Acknowledgements

Special thanks to the Ministry of Education for giving a grant to carry out this research.

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