

A New Tool for Evaluating and Training Of Chemical Tanker Crew: Seafarer Evaluation And Training Software: DEPEDES (SETS)

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ABSTRACT: Shipping industry is growing regularly and regulative bodies of the industry put more emphasis on safety and environmental management of ships and ship management companies. With regard to the shortage of human resource officers, which will be continued by following years according to latest surveys, shipping industry has hard times to employ qualified officers in their fleets. Especially for chemical tanker ships, it is needed more qualified seafarers regarding to the environmental and safety concern of public and industry. Therefore, training of seafarers has become more important then ever before. Training of seafarers in office environment before sea period is as important as training at training institutions and on-the-job training. Therefore, measuring of seafarers' performance and planning of individual training programs for each seafarer has become more important than ever.

In order to develop the quality of seafarer training and consequently maintaining safe and profitable shipping, the factors which are important for evaluating the chemical tanker crew are determined and clustered in hierarchical manner; the weighting of factors for each rank are observed by utilizing Analytic Hierarchy Process (AHP) Method; the trainings which should be given to seafarers related to scores of evaluation factors are determined then the Seafarer Evaluation and Training Software DEPEDES (SETS) is created by utilizing Visual Basic Software. In this study, the content of SETS software is evaluated with details. Consequently, the main aim of this study is to maintain safe chemical tanker shipping by utilizing SETS software.

1 INTRODUCTION

According to the latest surveys, officer shortage will be continued increasingly (BIMCO, 2005). Chemical tankers are complex ships that they are designed to carry many different type and dangerous chemical substances; so this type of ships requires well educated and trained seafarers (Arslan & Er 2008). Especially for chemical tanker ships, it is needed more qualified seafarers regarding to the environmental and safety concern of public and industry. Therefore, training of seafarers has become more important than ever before (Arslan & Turker 2008). Training of seafarers in office environment before sea period is as important as training at training institutions and on-the-job training. Therefore, measuring of seafarers' performance and planning of individual training programs for each seafarer has become more important than ever. In order to develop the quality of seafarer training and consequently maintaining safe and profitable shipping, the factors which are im-

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2 METHODS USED IN THIS STUDY

After the observing of evaluation factors, the evaluation factors are clustered in hierarchical structure and the weighting of factors are calculated by utilizing Analytic Hierarchy Process (AHP) Method.

AHP is a mathematical tool that is developed by Saaty (Saaty, 1980). It is used for analyzing complex decision problems with multiple criteria (Vaidya & Kumar, 2006). Generally it is widely used in several areas such as solving decision problems and strategic planning etc. AHP is based on pair-wise comparisons that enables decision makers to assign a relative priority to each factor. In this study, the pair-wise comparisons among evaluation factors has done by crewing managers and operation managers of a chemical tanker company. Seafarer Evaluation and Training Software (SETS) is created by using Visual Basic Programming Software.

3 SEAFARER EVALUATION

3.1 *Seafarer Groups*

Four different seafarer groups are observed for different criteria or weight of criteria. These groups are Senior officer group (Master, Chief Officer, Chief Engineer and Second Engineer); Junior officer group (2nd, 3rd and other deck officers, 3rd, 4th and other engine officers; electrician and other officers), Rating Group (Boatswain, A/B, O/S, deck boy, donkeyman, oiler, wiper, fitter, pump man and other deck and engine department ratings) and Service group (Cook and Steward). 34 evaluation criteria for Senior officer evaluation and 31 criteria for junior officer group, rating group and cook & steward group evaluation observed and the evaluation criteria grouped in four main clusters:

- Professional Knowledge & Skill and Adaptation to Safety Rules
- Professional Behavior
- Leadership and Social Behavior
- Adaptation to Sea and Ship Life

3.2 *Senior Officer Evaluation Criteria*

The Following Evaluation factors are observed for senior officer evaluation:

Professional Knowledge & Skill and Adaptation to Safety Rules group criteria:

- Profession knowledge (General)
- Profession experience
- English level
- Understanding talent
- Work planning
- Working carefulness
- Knowledge of equipment
- Evaluation and timing of requisitions
- ISM knowledge and adaptation
- Operational knowledge and adaptation (cargo, bunkering)
- ISPS knowledge and adaptation

- MARPOL / Environmental knowledge and adaptation
- Reporting
- Knowledge and adaptation on safety rules (General)
- Carefulness (General)
- Implementation the Company instructions / timing
- Team culture

Professional Behavior evaluation criteria:

- Cooperation and sharing knowledge
- Behavior, relationships with inferiors / superiors
- Adaptation of marine usage and customs
- Taking lessons from mistakes
- Loyalty to the Job & Company
- Computer knowledge & skill

Leadership and Social Behavior evaluation criteria:

- Adaptation to Sea and Ship Life
- Reliability
- Motivation ability and follow events, peoples and judgment
- Sharing Responsibility
- To share his/her knowledge and instructiveness
- Could he/she shortly explain his/her request. Speech ability
- Individual improvement / Has effort to improve the System
- Personnel cleanness
- Apparel / presentable and keeps clean his/her cabin/associate

Adaptation to sea/ship life group criteria:

- Suitability to job basis health/physics
- Adaptation on Drug and Alcohol policy
- Adaptation on sea life

The priorities of evaluation groups for senior officers are shown in figure 1.

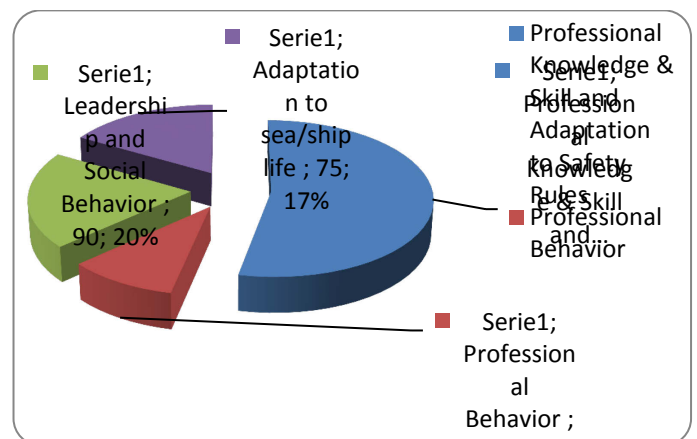


Figure 1: Priority of criteria groups for senior officers

3.3 Officer and Other Crew Evaluation Criteria

The Following Evaluation factors are observed for junior officer group; rating group and cook & steward groups evaluation:

Professional Knowledge & Skill and Adaptation to Safety Rules group criteria:

- Profession knowledge (General)
- Profession experience
- English level
- Hand skill and use of equipment
- Understanding talent and application
- Work planning & timing
- Knowledge of equipments and maintenance
- ISM knowledge and adaptation
- Operational knowledge and adaptation
- ISPS knowledge and adaptation
- MARPOL / Environmental knowledge and adaptation
- Knowledge and Adaptation on safety rules (General)
- Carefulness
- Participation to drills and achievement
- Safety & Team culture
- Computer knowledge & skill

Professional Behavior evaluation criteria:

- Cooperation and sharing his/her knowledge
- Behavior, relations to his/her inferiors
- Adaptation to sea & ship tradition
- Taking lessons from mistakes
- Loyalty to the Company

Leadership and social behavior evaluation criteria:

- Reliability
- Individual relationships
- Capability of explain his/her request. Speech ability
- Motivation ability and follow events
- Sharing Responsibility
- Personnel cleanness
- Apparel / presentable and keeps clean his/her cabin/associate areas

Adaptation to sea/ship life group criteria:

- Suitability to job basis health/physics
- Adaptation on Drug and Alcohol policy
- Adaptation on sea life

The weighting of evaluation groups is different for all seafarer groups. The priorities of evaluation groups for junior officer group, rating group and cook&steward group are shown in figure 2.



Figure 2: Priorities of Criteria Groups

3.4 Trainings

26 different trainings that can be given in a chemical tanker management company observed. These trainings and training codes are:

- 1 Environmental Officer Training Course
- 2 Incident Investigation
- 3 Safety Officer Training
- 4 Shipboard Familiarization
- 5 Rescue Techniques from Confined Spaces
- 6 Lifeboats
- 7 Keeping Up Standards
- 8 Ship Vetting Inspection
- 9 Chemical Tanker Operation
- 10 Safety and Pollution Prevention
- 11 MARPOL and Environmental Protection
- 12 Chemical Tank Cleaning & Inspection
- 13 Search Techniques
- 14 Crisis Management
- 15 Marine Risk Assessment
- 16 Permit to Work Systems
- 17 Recognizing Suspicious Behavior
- 18 Identifying Explosives and Weapons
- 19 Watch keeping
- 20 Maintenance
- 21 Nitrogen Generator and Inerting
- 22 Bunkering
- 23 Drug and Alcohol Policy
- 24 Requisition
- 25 Hygiene on Board
- 26 Company Policies and Procedures

4 MAIN CHARECTERISTICS OF DEPEDES (SETS) SOFTWARE

The main idea of Seafarer Evaluation and Training Software (SETS) is firstly to measure the performance of seafarers quantitatively then to give necessary trainings according to their scores. The program recommends different trainings for each rank and scores. The weighting of factors which are computed by utilizing AHP is enlarged to meaningful marks. Likert scale was used for marking. The scores of cri-

teria and trainings to be given according to evaluation is shown in Table-1.

Table-1: Scores and Trainings to be given

CRITERIA	VG	G	M	P	VP	Training No
Knowledge of equipments	5	4	3	2	1	07-24
Evaluation and Timing of requisitions	5	4	3	2	1	07-24-26
ISM knowledge and adaptation	25	20	15	10	5	03-04-20
Operational knowledge and adaptation	15	12	9	6	3	9-12-20-21-22
ISPS knowledge and adaptation	5	4	3	2	1	2-13-14-17-18

According to the columns, marks are shown in VG ‘Very Good’; G ‘Good’; M ‘Moderate’; P ‘Poor’ and VP ‘Very Poor’ columns. The numbers shown in mark columns are the weightings of each score. The yellow marks shows training needs and the red one’s show dismissal suggestion that should be discussed by the management. The column ‘Training No’ shows the training numbers which are described section 3.4 of this paper. SETS software is developed by utilizing Visual Basic programming language. The program is using ‘if-then-else’ rule codes such as:

'k 13 Knowledge

If q61.Value Then

Knowledge.Fields("k13") = 15

ElseIf q62.Value Then Knowledge.Fields("k13") = 12

ElseIf q63.Value Then Knowledge.Fields("k13") = 9

ElseIf q64.Value Then Knowledge.Fields("k13") = 6

ElseIf q65.Value Then Knowledge.Fields("k13") = 3

End If

NECESSARY TRAININGS

EVALUATION AND TRAINING

SEAFARER

NAME: **Özcan** SURNAME: **ARSLAN** ID NO: **123456**

RANK: **Kaptan** SHIP: **ITU MARITIME** EVALUATOR: **Crewing Department**

GENERAL RESULTS: **BAS**

04.01.2009

EVALUATION RESULTS

Knowledge_Skill Score	138	Professional Behavior	115	Leadership Score	74
Knowledge-Skill	% 81,17	Professional Behavior	85,18	Leadership	% 74
				115	
TOTAL POINT	522	% SCORE :	% 87		

1.Environmental Officer Training Course CD
2.Incident Investigation CD
3.Safety Officer Training CD
4.Shipboard Familiarization CD, GP-8.03
5.Rescue Techniques from Confined Spaces CD
6.An Introduction to Freefall Lifeboats CD
7.Keeping Up Standards CD
8.Ship Vetting Inspection CD
9.Safety and Pollution Prevention CD
10.Marpol Annex VI CD, GP-4.03
11.Chemical Tank Cleaning/Inspection CD
12.Search Techniques CD, Geni Guv. Plan Plan
13.Crisis Management CD
14.Marine Risk Assessment CD - SP-7.02
15.Permitted to Work Systems CD, GP-4.04
16.Recognising Suspicious Behaviour CD

Figure 3: SETS Software

The Seafarer Evaluation and Training Software (SETS) can also lists and graphically shows seafarers’ scores according to their rank groups and scores, working dates and etc. Evaluation and Training Module of SETS is shown in figure 3.

5 CONCLUSION

The main aim of this study is to improve the seafarer evaluation during sea period and consequently enhancement of safety and ship management performance to prevent accidents and casualties in maritime transportation by utilizing SETS software. It should be considered that the evaluation criteria; priority of criteria; trainings that can be given by the company and training needs can vary among different ship management companies. This software is prepared considering the capacity and needs of chemical tanker Management Company

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