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# Evaluation of port workers' general awareness of dangerous cargo transport: a Turkish port example

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ABSTRACT

The International Maritime Dangerous Goods (IMDG) Code training is mandatory for all shoreside personnel involved in the handling and transport of dangerous cargoes by sea. This study aims to measure and evaluate the port workers' dangerous cargo transport general awareness level. For this purpose, the "Dangerous Cargo Transport General Awareness Questionnaire" was developed and applied to trained 100 port workers face-to-face. The questionnaire was proven to be valid and reliable by content validity, construct validity, internal consistency reliability, and test-retest reliability analyses. Four factors were determined as a result of Explanatory Factor Analysis. Discriminant analyses were performed using the Student's t-test and One Way ANOVA test. Pearson correlation analysis was carried out to determine the relationship between factors. Simple linear regression analysis was used for modeling the relationship between factors. SPSS 24.0 was utilized to conduct the analyses. According to analysis results, port workers' dangerous cargo transport general awareness does not differ depending on age, position, and education. There is a weak positive or a moderate positive correlation between factors. Port workers have an average and above-average level of general awareness. It is highlighted that increasing this level is possible by increasing the frequency of dangerous cargo transport training. Suggestions are offered for more effective training.

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## 1 Introduction

Maritime transport offers a lower-cost solution for transporting large quantities over longer distances than other transport modes [1]. Due to the advantages it provides, maritime transport constitutes at least 80% of the world's transport [2]. Approximately 2000 dangerous goods are carried by maritime transport in packaged or bulk form [3]. The United States Department of Transportation (USDOT) defines dangerous goods as any subject or material that may be harmful to humans, property, and the environment. Dangerous goods are classified according to their physical and chemical properties. The United Nations (UN) divides dangerous goods into nine classes: explosives, gases, flammable liquids, flammable solids, oxidizing substances and organic peroxides, toxic and infectious substances, radioactive substances, corrosive substances, and miscellaneous dangerous substances, respectively [4].

As in other transport modes, accidents may occur during maritime dangerous cargo transport. These accidents may result in death, serious injury, evacuation, loss of property, deterioration in the marine environment, and disruption to marine traffic [4]. Ports provide a range of services for dangerous cargoes [5]. Considering the proximity of ports to settlements, dangerous cargo accidents in ports have much more devastating consequences [6,7].

Human error is the primary contributing cause of dangerous cargo-induced maritime accidents [8-11]. It is the most common cause of numerous dangerous cargo accidents in ports [12]. Preventing these accidents that occur in ports or overcoming them with the least damage can be possible by increasing the dangerous cargo awareness of port workers [13]. Many studies conducted a risk assessment for dangerous cargo handling ports [14-20]. In some studies, dangerous cargo accidents in ports were analyzed, and factors contributing to these accidents were deter-

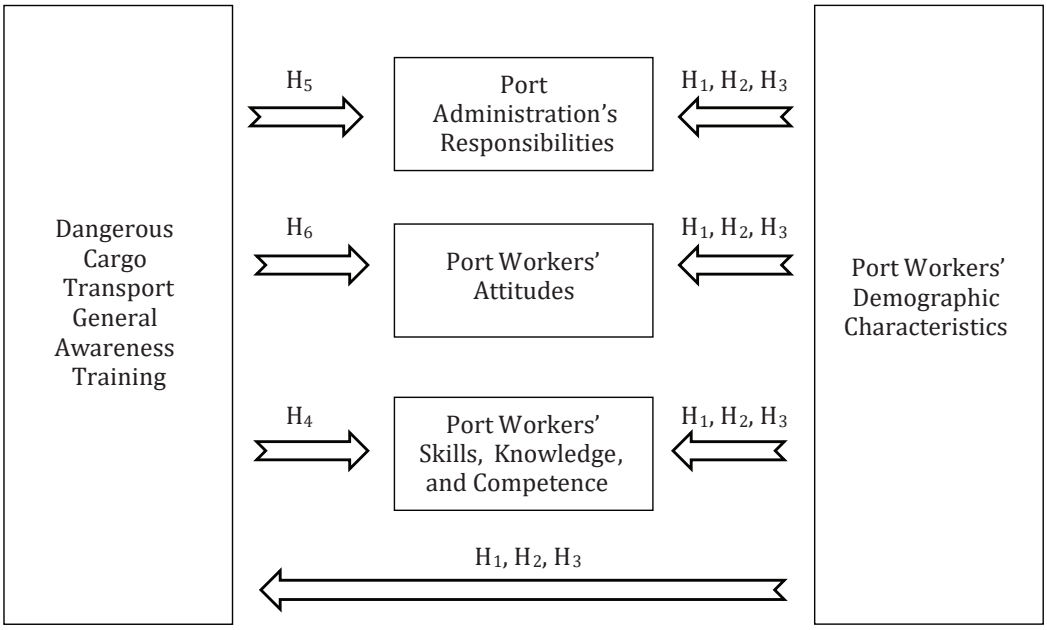


**Figure 1** Theoretical framework model of the research

Source: Authors

mined [3,8,21,22]. There is no previous study on dangerous cargo awareness of port workers.

The International Maritime Organization (IMO) is the main rule maker on maritime issues and aims to provide standardization in international maritime transport with conventions, codes, resolutions, circulars, and guidelines. Maritime dangerous cargo transport is one of the issues that the IMO gives utmost importance. The IMO developed the International Maritime Dangerous Goods (IMDG) Code to increase maritime safety by setting standards for the packaged dangerous cargo transport [23,24]. Employees working in maritime packaged dangerous cargo transport must comply with the IMDG Code rules. For this reason, employees need to be trained [25]. From 1 January 2010, IMDG Code training became compulsory. In accordance with IMDG Code Chapter 1.3, workers in ports where dangerous cargoes covered by the IMDG Code are handled should also be subject to this training and certified [26].

There are three types of training given to port workers involved in operations related to dangerous cargoes covered by the IMDG Code. Dangerous cargo transport general awareness training, as stated in Section 1.3.1.2.1 of the IMDG Code, includes classification, packaging, marking, labeling, placarding, handling, stowage, carriage, storage, segregation, survey or inspection, legal requirements, and general damages of dangerous cargoes. Function-specific training, as stated in Section 1.3.1.2.2 of the IMDG Code, is detailed training on the safe handling of dangerous cargoes, taking into account the function of port workers. Safety training, as stated in Section 1.3.1.2.3 of the IMDG Code, is training on accident avoidance methods, preventing exposure to dangers, and emergency response procedures [26].

This study aims to measure and evaluate the dangerous cargo transport general awareness of port workers. For this purpose, a dangerous cargo transport general awareness questionnaire was developed and applied to the port workers.

This paper was divided into four sections. In the introduction section, the aim and necessity of the study are explained. In the materials and methods section, the theoretical framework model of the study is given, and the data collection process and the statistical method are explained. In the third section, results are introduced. In the last section, the results are discussed, and suggestions are offered for more effective training.

## 2 Materials and methods

### 2.1 Theoretical framework

The relational screening model, one of the quantitative research methods, has been used to design the study. It is used to determine the existence and degree of the relationship between more than one variable through statistical analysis such as t-test, analysis of variance, correlation, and regression analysis [27].

The theoretical framework reveals the relationship between factors assumed to be associated with the research question [28]. It has been used to determine the factors that affect port workers' general awareness of

dangerous cargo transport and the relationship between these factors. Figure 1 shows the theoretical framework model developed for this study. Four factors have been identified that are assumed to affect port workers' general awareness of dangerous cargo transport [29-31]. These are dangerous cargo transport general awareness training, port administration's responsibilities, port workers' attitudes, and port workers' skills, knowledge, and competence. The impact of demographics on factors and the relationship between factors have been examined with hypotheses.

**Table 1** Option limits

| Answer Codes | Limits | Options |
|---|---|---|
| 1 | 1.00-1.80 | Unawareness |
| 2 | 1.81-2.60 | Low level of awareness |
| 3 | 2.61-3.40 | The average level of awareness |
| 4 | 3.41-4.20 | Good level of awareness |
| 5 | 4.21-5.00 | High level of awareness |

Source: [32]

### 2.2 Data collection and sample

The participants of the study were port workers consisting of laborers, operators, and foremen. They were carrying on their duties in the same port in Istanbul province. This port provided dangerous cargo handling services. Dangerous cargo transport general awareness training was given to 107 port workers. Considering the number of port workers who received training, the sample size was calculated as 84 with a 95% confidence level and 5% error using the Raosoft online calculator. A questionnaire was designed to collect data. The designed questionnaire was conducted face to face among 100 port workers selected using simple random sampling. The final form of the questionnaire consisted of two parts. The first part included demographic questions. The second part included dangerous cargo transport general awareness level measuring items. While the number of demographic questions was 5, the number of items measuring general awareness was 33. These 33 items were on a 5-point Likert scale type. The choices ranged from 1: Strongly Disagree to 5: Strongly Agree. Table 1 shows the option limits determined by assuming that the items were at equal intervals (N-1/N = 4/5 = 0.80) [32].

### 2.3 Statistical analysis

SPSS-V.24 (Statistical Package for the Social Sciences) was used to carry out the data analysis. Descriptive statistics were calculated for categorical variables (N, %). The validity of the questionnaire is related to the power to get answers appropriate to the research subject [33]. For validity analysis, content and construct validity were tested. Content validity is the degree to which the whole questionnaire and each item of it serve the research purpose [34]. The opinions of 11 experts were asked to ensure content validity using the Davis technique. Experts scored items based on A: The item represents the feature, B: The item needs some correction, C: The item needs quite a correction, and D: The item does not represent the feature. Item-level content validity index (I-CVI) was calculated for each item by proportioning the number of experts ticking A and B to the total number of experts. Items were sufficient in terms of content validity (I-CVI> 0.80). The content validity index of the overall questionnaire (S-CVI) was obtained by calculating the average of all items' I-CVIs [35]. Construct validity determines which concepts or features the questionnaire measures. Exploratory factor analysis (EFA) with Varimax rotation was conducted for construct validity. Factors were explored based on the relationships between observed variables [36]. Primarily, Kaiser Meyer Olkin's measure of sampling adequacy and Barlett's sphericity test were used as pre-tests to confirm the adequacy of the sample size for EFA. The Kaiser-Meyer-Olkin (KMO) value was 0.881 and Barlett's sphericity test was significant with a p-value of <0.001. So, data was found appropriate for conducting EFA [37]. Bartlett's sphericity test also showed the suitability of the data for multiple normal distributions [38]. Eigenvalues-greater-than-1 rule and explanatory percentage of total variance were used to decide the number of factors.

The reliability of the questionnaire is related to the power of the survey application to give similar results if it is repeated in the same ways. The questionnaire was applied again three weeks after the first application to determine the reliability [39].

For reliability analysis, the internal consistency coefficient, test-retest coefficient, and item-total correlations were calculated. Cronbach's alpha coefficient was used to evaluate internal reliability. Test-retest reliability was measured using the Pearson correlation coefficient. Item-total correlations for the 33 items were calculated with item analysis.

Discriminant analyses were performed. The effect of education level on port workers' general awareness of dangerous cargo transport was evaluated using the Student's t-test. One Way ANOVA test was used for the comparison of more than two independent and normally distributed variables. The effect of position and age level on port workers' general awareness of dangerous cargo transport was evaluated using the One Way ANOVA test.

In the context of the theoretical framework model of the research, correlation and regression analyses were applied. Pearson correlation analysis was carried out to determine the relationship between factors. Simple linear regression analysis was used for modeling the relationship between factors.

**Table 2** Demographic characteristics of the port workers (N=100)

| | | N | % |
|---|---|---|---|
| **Gender** | Male | 100 | 100.0 |
| **Age (years)** | 31-40 | 6 | 6.0 |
| | 41-50 | 61 | 61.0 |
| | 51 and older | 33 | 33.0 |
| **Education** | Primary school | 72 | 72.0 |
| | High school | 28 | 28.0 |
| **Position** | Laborer | 67 | 67.0 |
| | Operator | 28 | 28.0 |
| | Foreman | 5 | 5.0 |
| **Experience in this port (years)** | 1-4 | 2 | 2.0 |
| | 13-16 | 1 | 1.0 |
| | 16 and over | 97 | 97.0 |

Source: Authors

**Table 3** Rotation sums of squared factor loadings

| | Eigenvalue | Percent Variance | Cumulative % |
|---|---|---|---|
| Factor 1 | 7.911 | 23.973 | 23.973 |
| Factor 2 | 5.642 | 17.096 | 41.069 |
| Factor 3 | 5.015 | 15.198 | 56.267 |
| Factor 4 | 4.598 | 14.099 | 70.366 |

Source: Authors

## 3 Results

Table 2 shows the demographic characteristics of 100 port workers. All of them are male, and the majority of them are between the ages of 41 and 50 years old (N=61, 61.0%), graduate from primary school (N=72, 72.0%), serve as laborers (N=67, 67.0%), and have experience of 16 years and more in this port (N=97, 97%).

The content validity of the questionnaire was confirmed by S-CVI= 0.97. It shows that the questionnaire has an appropriate sample of items for measuring port workers' general awareness of dangerous cargo transport. The results of the KMO measure of sampling adequacy (KMO= 0.881) and Barlett's sphericity test ($p< 0.001$) indicated that the sample size was suitable for EFA. Moreover, applying 33 items to a sample of 100 people (100:33; 3:1 ratio) is suitable for EFA. It was determined as a result of EFA that the eigenvalues of the 4 factors were greater than 1. The contribution of these 4 factors to the total variance was 70.4% (>50%). Table 3 shows the explanatory total variance.

According to EFA, the questionnaire consisted of 4 subscales. Table 4 shows the factor pattern and the factor load values of the items. The first factor includes 15$^{th}$-25$^{th}$ items. The second factor includes 26$^{th}$-33$^{rd}$ items. The third factor includes 1$^{st}$-8$^{th}$ items. The fourth factor includes 9$^{th}$-14$^{th}$ items.

The factors were named as follows:

Factor 1: Worker's Skills, Knowledge, and Competence (11 items)

Factor 2: Dangerous Cargo Training (8 items)

Factor 3: Administration's Responsibility (8 items)

Factor 4: Worker's Attitudes (6 items)

The internal consistency of sub-dimensions was between 0.91 and 0.96, while the test-retest reliability was between 0.78 and 0.80. Item-total correlations ranged from 0.377 (q11) to 0.736 (q25). Items were well discriminating. For the whole questionnaire, Cronbach's alpha coefficient is 0.948, and the test-retest Pearson correlation coefficient is 0.810, so the reliability of the questionnaire was acceptable. "Dangerous Cargo Transport General Awareness Questionnaire" was proven to be valid and reliable by analyses. The original language of the questionnaire is Turkish.

The average of a factor is equal to the average of all items in that factor. Awareness levels are evaluated according to option limits in Table 1. Table 5 shows the factor averages and the port workers' awareness level. Skills, knowledge, and competence awareness of port workers is at an average level. Dangerous cargo training awareness of port workers is at a good level. Port workers have an average level of awareness of the administration's responsibility. The attitudes awareness of port workers is at a high level.

The effects of demographic variables on factors were examined. Discriminant analyses were carried out to discuss three hypotheses.

Hypothesis 1 ($H_1$): There is a statistically significant difference between educational status and general awareness factors.

**Table 4** Rotational component matrix

| Items | Components | | | |
|---|---|---|---|---|
| | **Factor 1** | **Factor 2** | **Factor 3** | **Factor 4** |
| q21. I know about the cargo marking application. | 0.875 | | | |
| q16. I can subclass the dangerous cargo classes. | 0.856 | | | |
| q20. I know about the dangerous cargo placarding system. | 0.855 | | | |
| q19. I know about the dangerous cargo labeling system. | 0.852 | | | |
| q22. I know about the stowing and segregation of dangerous cargoes. | 0.815 | | | |
| q24. I know about the packaging of dangerous cargoes. | 0.790 | | | |
| q23. I know about the dangerous cargo transport documents. | 0.789 | | | |
| q17. I know the characteristics of dangerous cargoes handled in the port. | 0.771 | | | |
| q18. I recognize the danger signs related to dangerous cargoes. | 0.744 | | | |
| q15. I can classify dangerous cargoes. | 0.733 | | | |
| q25. I know about the general damages of dangerous cargoes. | 0.544 | | | |
| q31. Written materials are used for the training provided. | | 0.852 | | |
| q32. Visual materials are used for the training provided. | | 0.817 | | |
| q30. There has been a change in my behavior after the training provided. | | 0.813 | | |
| q33. Audio materials are used for the training provided. | | 0.809 | | |
| q29. The outcomes of the training provided are measured. | | 0.772 | | |
| q27. The duration of the training provided is sufficient. | | 0.727 | | |
| q26. The training provided is suitable for the worker's job description and field of work. | | 0.712 | | |
| q28. The frequency of the training provided is sufficient. | | 0.627 | | |
| q2. Port workers working with dangerous cargoes in the port are inspected. | | | 0.861 | |
| q1. Job descriptions of the workers working with dangerous cargoes in the port are made. | | | 0.848 | |
| q3. The decisions taken and the rules set by the port administration on dangerous cargoes are notified. | | | 0.802 | |
| q5. The placards on the cargo transport units containing dangerous cargoes are checked. | | | 0.744 | |
| q4. The list of dangerous cargoes in the port area is kept and shared. | | | 0.722 | |
| q7. Dangerous cargo emergency arrangements are made. | | | 0.683 | |
| q6. The dangerous cargo operation area is safe. | | | 0.601 | |
| q8. Port workers are encouraged to comply with the rules regarding dangerous cargoes. | | | 0.562 | |
| q10. I comply with the health and safety signs in the dangerous cargo operation area. | | | | 0.882 |
| q13. I follow the personal protective equipment usage instructions. | | | | 0.818 |
| q14. I think that dangerous cargo accidents are preventable. | | | | 0.815 |
| q11. I report dangerous cargo accidents to my superiors. | | | | 0.800 |
| q12. I wear protective clothing according to the physical and chemical properties of the dangerous cargoes. | | | | 0.790 |
| q9. I act according to the dangerous cargo rules. | | | | 0.753 |
| Rotation method: Varimax with Kaiser Normalization | | | | |

Source: Authors

**Table 5** Factor averages and awareness levels

| Factors | Average Values | Awareness Levels |
|---|---|---|
| Factor 1 | 3.30 | The average level of awareness |
| Factor 2 | 3.45 | Good level of awareness |
| Factor 3 | 3.16 | The average level of awareness |
| Factor 4 | 4.26 | High level of awareness |

Source: Authors

Hypothesis 2 ($H_2$): There is a statistically significant difference between age and general awareness factors.

Hypothesis 3 ($H_3$): There is a statistically significant difference between position and general awareness factors.

Table 6 shows the findings on the relationship between demographic variables and general awareness factors. There is no statistically significant difference between demographic variables and general awareness factors with a 95% confidence level. Hypotheses are rejected.

**Table 6** Findings in discriminant analyses

| Educational Status | | | | |
|---|---|---|---|---|
| **Factors** | **Test Type** | **t** | **p** | **Result** |
| Factor 1 | the Student's t-test | 1.957 | 0.303 | Rejection of hypothesis 1 |
| Factor 2 | | 0.453 | 0.489 | |
| Factor 3 | | 0.022 | 0.164 | |
| Factor 4 | | 0.338 | 0.411 | |
| **Age** | | | | |
| **Factors** | **Test Type** | **F** | **p** | **Result** |
| Factor 1 | One Way ANOVA test | 0.436 | 0.648 | Rejection of hypothesis 2 |
| Factor 2 | | 0.970 | 0.383 | |
| Factor 3 | | 3.177 | 0.056 | |
| Factor 4 | | 0.429 | 0.652 | |
| **Position** | | | | |
| **Factors** | **Test Type** | **F** | **p** | **Result** |
| Factor 1 | One Way ANOVA test | 0.995 | 0.373 | Rejection of hypothesis 3 |
| Factor 2 | | 0.583 | 0.560 | |
| Factor 3 | | 1.374 | 0.258 | |
| Factor 4 | | 0.482 | 0.619 | |

Source: Authors

**Table 7** Correlation between factors

| Factors | Factor 1 | Factor 2 | Factor 3 | Factor 4 |
|---|---|---|---|---|
| Factor 1 | 1.000 | | | |
| Factor 2 | 0.623** | 1.000 | | |
| Factor 3 | 0.317** | 0.417** | 1.000 | |
| Factor 4 | 0.248* | 0.249* | 0.470** | 1.000 |
| *p<0.05, **p<0.01 | | | | |

Source: Authors

Pearson correlation analysis was utilized to determine the relationship between factors. Table 7 shows the correlation analysis results. There is a weak positive statistical correlation between worker's skills, knowledge, and competence and worker's attitudes. So, while the worker's skills, knowledge, and competence increasing, the worker's attitudes will be getting better. There is a weak positive statistical correlation between dangerous cargo training and worker's attitudes. As the worker receives dangerous cargo training, the worker's attitude will be getting better.

There is a moderate positive statistical correlation between dangerous cargo training and worker's skills, knowledge, and competence. As the worker receives dangerous cargo training, the worker's skills, knowledge, and competence will be getting better.

There is a moderate positive statistical correlation between dangerous cargo training and the administration's responsibility. As the worker receives dangerous cargo training, the worker's awareness of the administration's responsibility will be getting better. There is a moderate positive statistical correlation between worker's skills, knowledge, and competence and the administration's responsibility. So, while the worker's skills, knowledge, and competence increasing, the worker's awareness of the administration's responsibility will be getting better. There is a moderate positive statistical correlation between the administration's responsibility and worker's attitudes. So, while the awareness of the administration's responsibility increase, the worker's attitudes will be getting better.

Simple linear regression was performed to model the relationship between the independent variable (dangerous cargo training) and dependent variables (worker's skills, knowledge, and competence, administration's responsibility, worker's attitudes). Hypotheses were discussed.

Hypothesis 4 ($H_4$): Dangerous cargo training has a statistically significant effect on the worker's skills, knowledge, and competence.

Hypothesis 5 ($H_5$): Dangerous cargo training has a statistically significant effect on the worker's awareness of the administration's responsibility.

Hypothesis 6 ($H_6$): Dangerous cargo training has a statistically significant effect on the worker's attitudes.

Table 8 shows the simple linear regression analysis results. There is a statistically significant positive linear relationship between dangerous cargo training on the one hand and worker's skills, knowledge and competence, the administration's responsibility, and worker's attitudes ($p<0.05$) on the other.

**Table 8** Regression analysis

| Model | Unstandardized β | Standard Deviation | Standardized Beta | t | p |
|---|---|---|---|---|---|
| 1 Constant | 1.031 | 0.298 | | 3.459 | 0.001 |
| Dangerous Cargo Training | 0.658 | 0.083 | 0.623 | 7.886 | <0.001 |
| 2 Constant | 1.657 | 0.343 | | 4.837 | <0.001 |
| Dangerous Cargo Training | 0.436 | 0.096 | 0.417 | 4.548 | <0.001 |
| 3 Constant | 3.419 | 0.340 | | 10.058 | <0.001 |
| Dangerous Cargo Training | 0.242 | 0.095 | 0.249 | 2.548 | 0.012 |

Source: Authors

Simple linear regression formula was expressed for each relationship:

$$\text{Worker's skills, knowledge and competence} = 1.031 + 0.658 * \text{Dangerous cargo training} \quad (1)$$

$$\text{Administration's responsibility} = 1.657 + 0.436 * \text{Dangerous cargo training} \quad (2)$$

$$\text{Worker's attitudes} = 3.419 + 0.242 * \text{Dangerous cargo training} \quad (3)$$

When the effect of dangerous cargo training increases by a unit, the worker's skills, knowledge, and competence increase by 0.658 units. 38.8% ($R^2$=0.388) of the worker's skills, knowledge, and competence change is explained by dangerous cargo training. When the effect of dangerous cargo training increases by a unit, the worker's awareness of the administration's responsibility increases by 0.436 units. The change of 17.4% ($R^2$=0.174) in the worker's awareness of the administration's responsibility is explained by dangerous cargo training. When the effect of dangerous cargo training increases by a unit, worker's attitudes increase by 0.242 units. Worker's attitudes change of 6.2% ($R^2$=0.062) is explained by dangerous cargo training. Low $R^2$ indicates the variability of data and deviations from the fitted line. This does not mean that the predictors and model will not be significant. As can be seen from Table 8, the predictors are statistically significant at the 5% significance level. So, hypotheses are accepted.

## 4 Discussion and conclusions

Ports serve dangerous cargoes with different hazard characteristics and degrees of danger. Preventing dangerous cargo accidents occurred in ports or overcoming them with minimal damage is critical. At this point, port workers' awareness of dangerous cargo transport comes to the fore. This awareness is created by dangerous cargo training. IMDG Code training is compulsory and consists of three types of training. Dangerous cargo transport general awareness training is one of them and includes general issues related to dangerous cargo transport. This study seeks to measure and evaluate the dangerous cargo transport general awareness of trained workers working in a port where dangerous cargoes are handled.

The findings of this study reveal that the port workers' dangerous cargo transport general awareness does not differ depending on age, position, and education. The result is not surprising when considering their work does not require creativity. Due to the demographic characteristics of the port workers participating in the study, it could not be determined whether port workers' general awareness differs depending on gender and experience. The maritime sector is male-dominated. In addition, port workers have been working at the same port for many years. In this study, port workers have an average and above-average level of general awareness. Increasing this level is possible by increasing the frequency of dangerous cargo training. Training provided should be appropriate to the position and educational status of port workers. It would be appropriate to support training with on-the-job training to make it more efficient. Training outcomes should be measured and evaluated precisely. Port administration should take the necessary precautions for dangerous cargo, prepare port workers for dangerous cargo emergencies and provide refresher training at regular intervals.

The findings of this study indicate that there is a weak positive or a moderate positive correlation between factors. Especially, dangerous cargo training will enable the port workers to develop their skills, knowledge, and competence and hence naturally help to increase their job safety. Besides this training will also mold their attitudes and help them to achieve better cooperation within the port [30,31]. It should be emphasized that a statistically significant effect does not mean a significant dependency in the linear regression method. So, dangerous cargo training has a relatively significant effect on the worker's skills, knowledge, and competence, the worker's awareness of the administration's responsibility, and the worker's attitudes.

Dangerous cargo transport general awareness training is an issue that both port administrations and workers should take seriously. After the training received by the

port workers participating in this study, the port administration has observed that dangerous cargo accidents in the port have tended to decrease. It is not surprising when considering there is a direct connection between worker training and accident rates. Worker training is effective in reducing accidents [40-44].

Port workers' dangerous cargo transport general awareness is handled in this study for the first time. Furthermore, this study is valuable for bringing the "Dangerous Cargo Transport General Awareness Questionnaire" to the literature. This questionnaire appears to have good reliability and validity and is a good instrument for assessing port workers' general awareness of dangerous cargo transport.

It is a definite limitation that this study lacks revealing the correlation between port workers' general awareness and frequency of accidents. It is considered that this study will serve as a base for future research.

The short form of the "Dangerous Cargo Transport General Awareness Questionnaire" is shown in the Appendix.

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## Appendix: Dangerous Cargo Transport General Awareness Questionnaire – Short Form

Please respond to each statement by indicating how much you agree or disagree (**1: Strongly disagree, 2: Disagree, 3: Neither agree nor disagree, 4: Agree, 5: Strongly agree**).

| | | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| **Administration's Responsibility** | | | | | | |
| 1 | Job descriptions of the workers working with dangerous cargoes in the port are made. | | | | | |
| 2 | Port workers working with dangerous cargoes in the port are inspected. | | | | | |
| 3 | The decisions taken and the rules set by the port administration on dangerous cargoes are notified. | | | | | |
| 4 | The list of dangerous cargoes in the port area is kept and shared. | | | | | |
| 5 | The placards on the cargo transport units containing dangerous cargoes are checked. | | | | | |
| 6 | The dangerous cargo operation area is safe. | | | | | |
| 7 | Dangerous cargo emergency arrangements are made. | | | | | |
| 8 | Port workers are encouraged to comply with the rules regarding dangerous cargoes. | | | | | |
| **Worker's Attitudes** | | | | | | |
| 9 | I act according to the dangerous cargo rules. | | | | | |
| 10 | I comply with the health and safety signs in the dangerous cargo operation area. | | | | | |
| 11 | I report dangerous cargo accidents to my superiors. | | | | | |
| 12 | I wear protective clothing according to the physical and chemical properties of the dangerous cargoes. | | | | | |
| 13 | I follow the personal protective equipment usage instructions. | | | | | |
| 14 | I think that dangerous cargo accidents are preventable. | | | | | |
| **Worker's Skills, Knowledge, and Competence** | | | | | | |
| 15 | I can classify dangerous cargoes. | | | | | |
| 16 | I can subclass the dangerous cargo classes. | | | | | |
| 17 | I know the characteristics of dangerous cargoes handled in the port. | | | | | |
| 18 | I recognize the danger signs related to dangerous cargoes. | | | | | |
| 19 | I know about the dangerous cargo labeling system. | | | | | |
| 20 | I know about the dangerous cargo placarding system. | | | | | |
| 21 | I know about the cargo marking application. | | | | | |
| 22 | I know about the stowing and segregation of dangerous cargoes. | | | | | |
| 23 | I know about the dangerous cargo transport documents. | | | | | |
| 24 | I know about the packaging of dangerous cargoes. | | | | | |
| 25 | I know about the general damages of dangerous cargoes. | | | | | |
| **Dangerous Cargo Training** | | | | | | |
| 26 | The training provided is suitable for the worker's job description and field of work. | | | | | |
| 27 | The duration of the training provided is sufficient. | | | | | |
| 28 | The frequency of the training provided is sufficient. | | | | | |
| 29 | The outcomes of the training provided are measured. | | | | | |
| 30 | There has been a change in my behavior after the training provided. | | | | | |
| 31 | Written materials are used for the training provided. | | | | | |
| 32 | Visual materials are used for the training provided. | | | | | |
| 33 | Audio materials are used for the training provided. | | | | | |