# Marine Science and Technology Bulletin

## RESEARCH ARTICLE

# Investigation of the relationships between personality traits of leaders and accidents in the maritime sector with adaptation of the five-factor personality inventory into Turkish

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**ABSTRACT**

Despite the many developments in the maritime sector in recent years, the number of accidents is still at a significantly high level. Beyond the accident analysis, which is defined as the reactive process, it is clear that more studies are needed in this sector, taking into account the personal traits of the employees and with the foresight that these traits may cause accidents. Statistically significant relationships were determined in this analysis, as a result of the five-factor personality inventory adapted into Turkish and the questionnaire covering the accidents (Occupational accident and marine casualty) on the ships of 156 leaders (Masters, chief engineers and chief officers). Participants who don't have an 'occupational accident' history have higher conscientiousness and agreeableness personality traits than those who have occupational accident history; when considered as facets, it was understood that they had a higher sense of duty, self-discipline, and ideas. In addition, relationships were determined between 'marine casualty' and personality traits only in the context of facets. It is seen that participants who don't have marine casualty history have higher gregariousness and lower values compared to those who have marine casualty history. Evaluations were made and some conclusions were reached with the understanding that the relationships identified in this study are similar to the results of the research conducted in this field of different sectors.

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## Introduction

Besides the fact that seafarers at ships have a different subculture from others (Maurizio, 2013) and are exposed to social isolation (Sampson & Thomas, 2003), the maritime sector which we can call a human system, shaped by the effects of some factors (technology, environment and organizational) on the performance of employees (Rothblum et al., 2002) is a sector which the human factor is largely (about 80%) effective in accidents (Bea et al., 1997).

There are many studies showings that there is a relationship between accidents that result from a combination of errors or chains of errors, including a human error by making the wrong decision, taking inappropriate action, or inaction (Rothblum et al., 2002) and personality traits that are relatively consistent and permanent, although each individual's unique mental, emotional, social and physical characteristics vary over time (Ewen, 2010).

In the literature review, it is seen that there are many studies that determine the relationship between personality traits and occupational accident (Thoms & Venkataraman, 2002; Cellar et al., 2001; Clarke & Robertson, 2005; Pourmazaherian et al., 2017), accident propensity (Koç et al., 2014), safety behaviors (Beus et al., 2015; Pourmazaherian et al., 2017) medical error and problem solving tendency (Babaei et al., 2018), job engagement (Öngöre, 2014), leadership (Özbağ, 2016), cultural intelligence and intercultural communication competence (Yeke & Semerciöz, 2016), etc.

This study is important because there are very few studies investigating the relationships between the personality traits of the leaders in the maritime sector and the accidents (e.g., Makarowski et al., 2020), and also it is the first study in this sector in Turkey.

Using the adaptation of the 'Five-Factor Personality Inventory', this study aims to examine whether there is a significant relationship or not between the personalities of leaders who are actively working at sea and occupational accidents or serious/very serious maritime accidents on their ships.

The 'International Personality Item Pool' which was developed by Goldberg (1999) was used to create the item pool of the questionnaire of this study (IPIP, 2019). The 'Five Factor Personality Inventory' questionnaire which was created by selecting the relevant items from the aforementioned pool with the support of linguists, professional experts and psychologists, was conducted with a group of 156 Turkish oceangoing masters, chief officers and chief engineers.

## Materials and Methods

The survey method was adopted as the data collection method in this research. In the questionnaire created for the purposes of the research, there are 5 main factors and 3 facets for each main factor with 60 questions (reduced to 40 questions in the analysis phase). In this part of the study, validity and reliability findings for the mentioned inventory are included.

### *Demographic, Occupational and Descriptive Findings*

The respondents are a very experienced sample group considering that 52.6% of them are over 40 years old, or in other words, 77.5% of them are over 35 years old. It can be seen that 53.8% of the participants are oceangoing masters, 25.6% of them are chief engineers and 20.5% of them are chief officers in terms of their ranks at the ship (Table 1).

**Table 1.** Demographic statistics

| Item | Category | Frequency (n) | Percentage |
|------|----------|---------------|------------|
| Age | Between 24-29 | 4 | 2.6% |
| | Between 30-35 | 31 | 19.9% |
| | Between 36-39 | 39 | 25.0% |
| | Between 40-45 | 25 | 16.0% |
| | Between 46-50 | 21 | 13.5% |
| | Age 51 and over | 36 | 23.1% |
| | Total | 156 | 100.0% |
| Rank | Master | 84 | 53.8% |
| | Chief Officer | 32 | 20.5% |
| | Chief Engineer | 40 | 25.6% |
| | Total | 156 | 100.0% |

When the occupational accidents and marine casualties that took place at ships of the participants are examined (Table 2), it is seen that 80.8% of them have an occupational accident history and 48.7% of them have a marine casualty history.

### *Personality Measurement Tool*

First of all, some maritime companies were interviewed, with their written approval, the survey link was sent to the leaders working on their ships and these seafarers answered the questionnaire electronically of their own free will. All the information covering their answers has not been shared with anyone, including these mentioned companies. The respondents are still actively working at ships, and they are all Turkish citizens. The five-factor personality inventory which was adapted into Turkish was used only in this study, and the details about its validity and reliability are explained below.

**Table 2.** Occupational statistics

| Item | Category | Frequency (n) | Percentage |
|---|---|---|---|
| How many "Occupational Accidents" occurred in your department during your leadership at ship (while you were Captain and/or Chief Officer or Chief Engineer)? | Never | 30 | 19.2% |
| | 1-2 times | 80 | 51.3% |
| | 3-5 times | 32 | 20.5% |
| | 6-10 times | 8 | 5.1% |
| | 11-15 times | 4 | 2.6% |
| | More than 15 | 2 | 1.3% |
| | Total | 156 | 100.0% |
| How many "Marine Casualty" occurred during your time leading at ship (while you were Captain and/or Chief Officer or Chief Engineer)? | Never | 80 | 51.3% |
| | 1-2 times | 63 | 40.4% |
| | 3-5 times | 11 | 7.0% |
| | 6-10 times | 2 | 1.3% |
| | Total | 156 | 100.0% |

**Table 3.** Bartlett test of sphericity of each main factor, Cronbach's alpha value ranges of facets and ranges of items' factor scores

| | Ranges of Items' Factor Scores | Bartlett Test of Sphericity | Cronbach's Alpha Value Ranges of Facets |
|---|---|---|---|
| Neuroticism | 0.540-0.867 | $\chi^2(15)=83.278$ Sig.=0.000 | 0.534-0.636 |
| Extraversion | 0.479-0.861 | $\chi^2(36)=179.517$ Sig.=0.000 | 0.597-0.766 |
| Agreeableness | 0.431-0.874 | $\chi^2(45)=257.333$ Sig.=0.000 | 0.563-0.707 |
| Conscientiousness | 0.512-0.888 | $\chi^2(28)=152.600$ Sig.=0.000 | 0.582-0.709 |
| Openness to experience | 0.507-0.768 | $\chi^2(28)=84.175$ Sig.=0.000 | 0.583-0.659 |

*Explanatory Factor Analysis* and *Cronbach's Alpha reliability* analyzes were applied separately for each main factor within the scope of validity and reliability analyzes of 5 different main factors belonging to the five-factor personality inventory. Before the explanatory factor analysis, *Kaiser Meyer Olkin* (KMO) *sampling adequacy value* and *Bartlett's Test of Sphericity* statistics were checked. Cronbach's Alpha reliability analyzes were applied to control reliability levels of the scale and facets.

The Bartlett test of sphericity values of each main factor, the Cronbach's alpha value ranges of the facets of each main factor and the factor score ranges of the items of the questionnaire are listed for this scale in Table 3.

As a result of the reliability analysis covering all the questionnaire questions, the Cronbach's alpha value of the developed scale was determined as 0.761. When Table 3 is examined, it can be seen that the Cronbach's alpha value ranges of the facets of main factors are between 0.534-0.766 and the factor score ranges of the items are between 0.431-0.888. As a result, it is understood that the validity and reliability levels of the scale which was developed are sufficient (Özdamar, 2016).

### Findings Covering the Effects of Personality Traits on Accidents

The results of the independent sample t-test in terms of personality traits, which was applied to compare the five factors and their facets between ship leaders who have occupational accident history (126 people) and ship leaders who don't have an occupational accident (30 people) are provided in Table 4. When Table 4 is examined, agreeableness ($t(154)=2.262$, Sig.<0.05) and responsibility ($t(154)=2.607$, Sig.<0.05) as main factors; self-discipline ($t(154)=2.353$, Sig.<0.05), sense of duty ($t(154)=2.658$, Sig.<0.05) and ideas ($t(154)=3.017$, Sig.<0.05) as facets of factors draw attention. It can be seen for those traits that averages of ship leaders who don't have occupational accident history are higher than ship leaders who have occupational accident history; and there is a statistically significant difference between them at the 5% significance level.

The results of the independent sample t-test in terms of personality traits, which was applied to compare the five factors and their facets between ship leaders who have marine casualty history (76 people) and ship leaders who don't have marine casualty history (80 people) are given in Table 5.

Although no significant difference is found as the main factors between the personality traits of the leaders on board and marine casualty; gregariousness (t(154)=1.983, Sig.<0.05) and values (t(154)=-2.201, Sig.<0.05) as facets of factors (Table 5) are noticed. It can be seen for gregariousness that averages of ship leaders who don't have marine casualty history are higher than ship leaders who have marine casualty history; there is an opposite relationship for the facet of values, and there is a statistically significant difference between them at the 5% significance level.

**Table 4.** Independent sample t-test findings examining differences in main factors and their facets by occupational accident history

| Trait | Occupational Accident History | N | $\overline{X}$ | S.D. | t(154) | Sig. |
|---|---|---|---|---|---|---|
| Anger | Not have | 30 | 4.383 | 0.838 | 1.927 | 0.056 |
| | Have | 126 | 4.028 | 0.924 | | |
| Anxiety | Not have | 30 | 3.217 | 0.806 | 0.302 | 0.763 |
| | Have | 126 | 3.167 | 0.817 | | |
| Immoderation | Not have | 30 | 3.867 | 0.694 | 0.988 | 0.324 |
| | Have | 126 | 3.714 | 0.773 | | |
| Neuroticism | Not have | 30 | 3.822 | 0.529 | 1.666 | 0.098 |
| | Have | 126 | 3.636 | 0.554 | | |
| Gregariousness | Not have | 30 | 3.544 | 0.652 | 1.260 | 0.209 |
| | Have | 126 | 3.331 | 0.872 | | |
| Assertiveness | Not have | 30 | 4.544 | 0.406 | 1.900 | 0.059 |
| | Have | 126 | 4.349 | 0.526 | | |
| Excitement-Seeking | Not have | 30 | 2.178 | 0.654 | -0.856 | 0.393 |
| | Have | 126 | 2.315 | 0.816 | | |
| Extraversion | Not have | 30 | 3.422 | 0.399 | 1.029 | 0.305 |
| | Have | 126 | 3.332 | 0.441 | | |
| Trust | Not have | 30 | 4.050 | 0.708 | 1.921 | 0.057 |
| | Have | 126 | 3.776 | 0.701 | | |
| Modesty | Not have | 30 | 3.133 | 0.805 | 0.917 | 0.360 |
| | Have | 126 | 2.979 | 0.835 | | |
| Altruism | Not have | 30 | 4.450 | 0.578 | 1.689 | 0.093 |
| | Have | 126 | 4.242 | 0.612 | | |
| **Agreeableness** | **Not have** | **30** | **3.878** | **0.436** | **2.262\*** | **0.025** |
| | **Have** | **126** | **3.666** | **0.468** | | |
| **Self-Discipline** | **Not have** | **30** | **4.517** | **0.676** | **2.353\*** | **0.020** |
| | **Have** | **126** | **4.143** | **0.805** | | |
| **Sense of Duty** | **Not have** | **30** | **4.850** | **0.214** | **2.658\*** | **0.009** |
| | **Have** | **126** | **4.651** | **0.396** | | |
| Competence | Not have | 30 | 4.517 | 0.464 | 0.581 | 0.562 |
| | Have | 126 | 4.456 | 0.522 | | |
| **Conscientiousness** | **Not have** | **30** | **4.628** | **0.359** | **2.607\*** | **0.010** |
| | **Have** | **126** | **4.417** | **0.407** | | |
| **Ideas** | **Not have** | **30** | **4.400** | **0.563** | **3.017\*** | **0.003** |
| | **Have** | **126** | **4.016** | **0.641** | | |
| Emotionality | Not have | 30 | 2.333 | 0.913 | -1.326 | 0.187 |
| | Have | 126 | 2.552 | 0.784 | | |
| Values | Not have | 30 | 3.356 | 0.955 | 0.886 | 0.377 |
| | Have | 126 | 3.190 | 0.909 | | |
| Openness to experience | Not have | 30 | 3.363 | 0.427 | 1.184 | 0.238 |
| | Have | 126 | 3.253 | 0.466 | | |

*Note:* * Indicates statistical significance at 5% significance level, $\overline{X}$: Mean, S.D.: Standard Deviation, t: T-test statistic, (Includes test degrees of freedom in parentheses), Sig.: Significance value.

**Table 5.** Independent sample t-test findings examining differences in main factors and their facets by marine casualty history

| Trait | Marine Casualty History | N | $\overline{X}$ | S.D. | t(154) | Sig. |
|---|---|---|---|---|---|---|
| Anger | Not have | 80 | 4.206 | 0.920 | 1.547 | 0.124 |
| | Have | 76 | 3.980 | 0.903 | | |
| Anxiety | Not have | 80 | 3.219 | 0.822 | 0.668 | 0.505 |
| | Have | 76 | 3.132 | 0.806 | | |
| Immoderation | Not have | 80 | 3.838 | 0.783 | 1.594 | 0.113 |
| | Have | 76 | 3.645 | 0.725 | | |
| Neuroticism | Not have | 80 | 3.754 | 0.518 | 1.921 | 0.057 |
| | Have | 76 | 3.586 | 0.578 | | |
| Gregariousness | **Not have** | **80** | **3.500** | **0.794** | **1.983\*** | **0.049** |
| | **Have** | **76** | **3.237** | **0.864** | | |
| Assertiveness | Not have | 80 | 4.383 | 0.517 | -0.086 | 0.932 |
| | Have | 76 | 4.390 | 0.506 | | |
| Excitement-Seeking | Not have | 80 | 2.271 | 0.796 | -0.286 | 0.775 |
| | Have | 76 | 2.307 | 0.783 | | |
| Extraversion | Not have | 80 | 3.385 | 0.476 | 1.056 | 0.293 |
| | Have | 76 | 3.311 | 0.384 | | |
| Trust | Not have | 80 | 3.841 | 0.704 | 0.218 | 0.828 |
| | Have | 76 | 3.816 | 0.718 | | |
| Modesty | Not have | 80 | 3.021 | 0.919 | 0.189 | 0.850 |
| | Have | 76 | 2.996 | 0.727 | | |
| Altruism | Not have | 80 | 4.250 | 0.595 | -0.673 | 0.502 |
| | Have | 76 | 4.316 | 0.626 | | |
| Agreeableness | Not have | 80 | 3.704 | 0.459 | -0.070 | 0.944 |
| | Have | 76 | 3.709 | 0.480 | | |
| Self-Discipline | Not have | 80 | 4.213 | 0.787 | -0.036 | 0.971 |
| | Have | 76 | 4.217 | 0.806 | | |
| Sense of Duty | Not have | 80 | 4.722 | 0.360 | 1.118 | 0.265 |
| | Have | 76 | 4.655 | 0.392 | | |
| Competence | Not have | 80 | 4.431 | 0.583 | -0.921 | 0.358 |
| | Have | 76 | 4.507 | 0.420 | | |
| Conscientiousness | Not have | 80 | 4.455 | 0.419 | -0.065 | 0.948 |
| | Have | 76 | 4.459 | 0.394 | | |
| Ideas | Not have | 80 | 4.158 | 0.639 | 1.371 | 0.172 |
| | Have | 76 | 4.018 | 0.644 | | |
| Emotionality | Not have | 80 | 2.481 | 0.813 | -0.446 | 0.656 |
| | Have | 76 | 2.539 | 0.816 | | |
| Values | **Not have** | **80** | **3.067** | **0.934** | **-2.201\*** | **0.029** |
| | **Have** | **76** | **3.386** | **0.874** | | |
| Openness to experience | Not have | 80 | 3.235 | 0.461 | -1.073 | 0.285 |
| | Have | 76 | 3.314 | 0.457 | | |

*Note:* * Indicates statistical significance at 5% significance level, $\overline{X}$: Mean, S.D.: Standard Deviation, t: T-test statistic, (Includes test degrees of freedom in parentheses), Sig.: Significance value.

Although a significant relationship could not be determined between age groups and occupational accidents, a significant relationship could be determined between age groups and maritime casualty. The Chi-Square test findings that test the differences in terms of marine casualty history according to age groups are presented in Table 6. When Table 6 is examined, it can be seen that the majority of the leaders in the age group over 46 have a history of marine casualty, while the majority of the leaders in the lower age groups do not have a history of marine casualty.

Serious marine casualties occur in very small numbers in the professional life of seafarers. It is understandable that these numbers increase with advancing age. For this reason, it is quite natural that ship leaders (especially aged 46 and over) who are definitely masters or chief engineers have more marine casualty backgrounds than chief officers.

### Results and Discussion

It is understood that there is a negative relationship between the occupational accident histories of the leaders at ship and conscientiousness and agreeableness among the main factors. When considered in the context of facets of main factors, there is also a negative relationship between the occupational accident histories of the leaders and sense of duty, self-discipline, and ideas (Table 4).

No significant relationship could be found between the marine casualty and the five main personality traits of the leaders at the ship. However, some important relationships could be determined in the context of facets of some main factors. It can be seen that, while marine casualties are in a negative relationship with gregariousness, it is in a positive relationship with the values facet (Table 5).

Beus et al. (2015) examined the relationships between personality and unsafe behaviors, they found a negative relationship with conscientiousness and agreeableness, and a positive relationship with neuroticism and extraversion. According to this study, sensation seeking, altruism, anger and impulsiveness are also personality traits as facets that affect safety behaviors (Beus et al., 2015).

Cellar et al. (2001) investigated the relationships between workplace accidents and personality traits by self-reports of the participants, as in this study. They found an inverse relationship between only conscientiousness and agreeableness, and the accidents as main factors that are parallel to the relationships found in our study.

Clarke & Robertson (2005) discussed the relationship between personality traits and occupational/non-occupational accidents. According to this study, low conscientiousness and low agreeableness are effective personality effects in occupational accidents, while extroversion is only related to non-occupational accidents (such as traffic accidents).

Pourmazaherian et al. (2017) carried out a study in the construction sector, which is one of the risky sectors, and the authors indicated that neuroticism, conscientiousness and agreeableness are effective in both occupational and non-occupational accidents while conscientiousness and agreeableness personality traits are much more significant in improving safety performance.

**Table 6.** Chi-square test findings that test the differences in terms of marine casualty history by age groups

| Age Group | Statistics | Marine Casualty History | | Total |
| | | *Not Have* | *Have* | |
| --- | --- | --- | --- | --- |
| Between 24-35 | Frequency (n) | 25 | 10 | 35 |
| | Percentage (%) | 31.3% | 13.2% | 22.4% |
| Between 36-45 | Frequency (n) | 37 | 27 | 64 |
| | Percentage (%) | 46.3% | 35.5% | 41.0% |
| 46+ | Frequency (n) | 18 | 39 | 57 |
| | Percentage (%) | 22.5% | 51.3% | 36.5% |
| Total | Frequency (n) | 80 | 76 | 156 |
| | Percentage (%) | 100.0% | 100.0% | 100.0% |
| **Chi-Square Test Statistics** | | | | |
| $\chi^2(02)=15.636^*$ | | | Sig.=0.000 | |

*Note:* * Indicates statistical significance at 5% significance level, $\chi^2$: Chi-square test statistic, (Includes the degree of freedom of the chi-square test in parentheses.), Sig.: Significance value.

Many of the studies investigating the relationship between personality traits and accidents show that the conscientiousness factor is the most effective personality trait (Arthur & Graziano, 1996; Cellar et al., 2001; Clarke & Robertson, 2005). Christian et al. (2009) especially emphasized the conscientiousness personality trait as the determinant of safety performance in their meta-analytical path model.

A person who is deficient in planning and systematic decision making in unexpected situations has low conscientiousness and may be exposed to accidents. In addition, the reason for the low sense of duty under the conscientiousness personality trait may be related to the fact that a person is disrespectful to authority, socially incompatible and experiencing social deviation (West et al., 1993).

Like the conscientiousness personality trait, it is understood that people with low agreeableness also have more accidents history (Cellar et al., 2001; Clarke & Robertson, 2005). People with low agreeableness may be weaker in cooperating with others and may react more aggressively to situations. However, if individuals had high levels of agreeableness; they would both comply more with safety-related corporate policies and care more about the safety of their colleagues (Drew, 2014).

## Conclusion

Taking into account the many risks in the maritime industry, it is understandable that people working at ships have much higher rates of injury and death compared to those working on the land (Borch et al., 2012; Roberts et al., 2014). Beyond the mere reactive process of incident investigations, this sector needs behavior-based approaches that are proactive and examine the situation before accidents occur (Rothblum et al., 2002). There is also a need for human-based safety approaches based on understanding and even accepting internal feelings, needs and perceptions among employees (Geller, 2006).

Much more research is needed on the impact of personality traits for accidents in the maritime industry. If the selection of personnel in the leadership position for maritime companies becomes widespread by conducting personality tests and maritime schools choose students based on their personality traits, it may allow a reduction in the number of accidents or deaths in the long run.

In addition, it may be useful to conduct an international survey with more ship leaders to determine the personality-accident relationship, including near misses which are the precursors of an accident.

As a final recommendation, it should be ensured that the system used to detect non-technical skills in aviation is also applied in maritime sector especially during promotions.

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## Compliance With Ethical Standards

### *Authors' Contributions*

HSÇ: Validation, investigation, data curation, writing original draft, methodology, visualization and conceptualization.

LT: Writing-review-editing and supervision.

### *Conflict of Interest*

The authors declare that there is no conflict of interest.

### *Ethical Approval*

The study has been approved by Istanbul Technical University Social and Human Sciences Human Research Ethics Committee on 25 February 2021. Project number: 156.

## References

Arthur, W. Jr., & Graziano, W. (1996). The five-factor model, conscientiousness, and driving accident involvement. *Journal of Personality, 64*(3), 593-618. https://doi.org/10.1111/j.1467-6494.1996.tb00523.x

Babaei, M., Mohammadian, M., Abdollahi, M., & Hatami, A. (2018). Relationship between big five personality factors, problem solving and medical errors. Heliyon, 4*(9)*, e00789. https://doi.org/10.1016/j.heliyon.2018.e00789

Bea, R. G., Holdsworth, R. D., & Smith, C. (1997). Human and organizational factors in the safety of offshore platforms. In R. G. Bea, R. D. Holdsworth, & C. Smith (Eds.), *1996 International Workshop on Human Factors in Offshore Operations* (pp. 71-84). American Bureau of Shipping.

Beus, J. M., Dhanani, L. Y., & McCord, M. A. (2015). A meta-analysis of personality and workplace safety: Addressing unanswered questions. *Journal of Applied Psychology, 100*(2), 481–498. https://doi.org/10.1037/a0037916

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Borch, D. F., Hansen, H. L., Burr, H., & Jepsen, J. R. (2012). Surveillance of maritime deaths on board Danish merchant ships, 1986-2009. *International Maritime Health, 63*(1), 7-16.

Cellar, D. F., Nelson, Z. C., Yorke, C. M., & Bauer, C. (2001). The five-factor model and safety in the workplace: Investigating the relationships between personality and accident involvement. *Journal of Prevention & Intervention in the Community, 22*(1), 43-52. https://doi.org/10.1080/10852350109511210

Christian, M., Bradley, J., Wallace, J., & Burke, M. (2009). Workplace safety: A meta-analysis of the roles of person and situation factors. *Journal of Applied Psychology*, *94*(5), 1103-1127. https://doi.org/10.1037/a0016172

Clarke, S., & Robertson, I. (2005). A meta-analytic review of the Big Five personality factors and accident involvement in occupational and non-occupational settings. *Journal of Occupational and Organizational Psychology*, *78*(3), 355-376. https://doi.org/10.1348/096317905X26183

Drew, E. N. (2014). Personnel selection, safety performance, and job performance: Are safe workers better workers? [Ph.D. Thesis. Florida International University].

Ewen, R. B. (2010). *An Introduction to Theories of Personality* (7th ed.). Psychology Press.

Geller, E. S. (2006). People-based safety, an evolution of behavior-based safety for greater effectiveness. *Proceedings of the ASSE Professional Development Conference and Exposition*. Washington, pp. 12-13.

Goldberg, L. R. (1999). A broad-bandwidth, public-domain, personality inventory measuring the lower-level facets of several five-factor models. In Mervielde, I., Deary, I., De Fruyt, F., & Ostendorf, F. (Eds.), *Personality Psychology in Europe* (pp. 7-28). Tilburg University Press.

IPIP. (2019, September 23). *International Personality Item Pool*. Retrieved on January 15, 2020, from https://ipip.ori.org

Koç, M., Ayancı, M., Çolak, T. S., & Düşünceli, B. (2014). Kaza sayılarına göre kişilik profili: Kazaya yatkınlık. *5. Karayolu Trafik Güvenliği Sempozyumu ve Sergisi.* Turkey. pp. 318-328.

Makarowski, R., Plopa, M., Piotrowski, A., & Plopa, W. (2020). The human factor in maritime transport: personality and aggression levels of master mariners and navigation students. *Advances in Cognitive Psychology, 16*(4), 363-369. https://doi.org/10.5709%2Facp-0310-5

Maurizio, E. (2013). The social world of seafarers, A sociological research in central Italy. *Advances in Applied Sociology, 3*(4), 199-205. https://doi.org/10.4236/aasoci.2013.34027

Öngöre, Ö. (2014). A study of relationship between personality traits and job engagement. *Procedia - Social and Behavioral Sciences, 141*, 1315–1319. https://doi.org/10.1016/j.sbspro.2014.05.226

Özbağ, G. K. (2016). The role of personality in leadership: Five factor personality traits and ethical leadership. *Procedia - Social and Behavioral Sciences, 235,* 235-242. https://doi.org/10.1016/j.sbspro.2016.11.019

Özdamar, K. (2016). *Ölçek ve Test Geliştirme Yapısal Eşitlik Modeli.* Nisan Yayın Evi.

Pourmazaherian, M., Mohammed, S. Baqutayan, S., & Idrus, D. (2017). The role of the big five personality factors on accident: A case of accidents in construction industries. *Journal of Science, Technology and Innovation Policy, 7*(1), 34-43. https://doi.org/10.11113/jostip.v7n1.65

Roberts, S. E., Nielsen, D., Kotłowski, A., & Jaremin, B. (2014). Fatal accidents and injuries among Merchant seafarers worldwide. *Occupational Medicine, 64*(4), 259–266. https://doi.org/10.1093/occmed/kqu017

Rothblum, A., Wheal, D., Withington, S., Shappell, S. A., Wiegmann, D. A., Boehm, W., & Chaderjian, M. (2002). Improving incident investigation through inclusion of human factors. *2nd International Workshop on Human Factors in Offshore Operations.* United States Department of Transportation - Publications & Papers. 32.

Sampson, H., & Thomas, M. (2003). The social isolation of seafarers: causes, effects, and remedies. *International Maritime Health, 54*(1-4), 58-67.

Thoms, P., & Venkataraman, R. (2002). Relation of Managers Personality to Accident and Injury Rates. *Psychological Reports*, *91*(3 Pt 2), 1107-1115.

West, R., Elander, J., & French, D. (1993). Mild social deviance, Type-A behaviour pattern and decision-making style as predictors of self-reported driving style and traffic accident risk. *British Journal of Psychology, 84*(Pt 2), 207-219. https://doi.org/10.1111/j.2044-8295.1993.tb02474.x

Yeke, S., & Semerciöz, F. (2016). Relationships between personality traits, cultural intelligence and intercultural communication competence. *Procedia - Social and Behavioral Sciences, 235,* 313-319. https://doi.org/10.1016/j.sbspro.2016.11.036