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EVALUATION OF THE REST CONDITIONS OF THE ACCOMMODATION AREAS ON-BOARD SHIPS

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ABSTRACT

Ergonomics studies have widely been addressed to the job-specific fields. This situation is also observed in the maritime industry due to the fact that focus point of the studies is bridge ergonomics. Statistics have shown that the main reason for maritime accidents is fatigue as a reflection of human factor, thereby rest and rest conditions on board have become a vital issue. However, in the literature, accommodation areas used for rest on board and their rest conditions including ergonomic criteria have been overlooked. The purpose of this study is to determine the extent to which seafarers find the conditions of the rest areas satisfying. To do this, a survey study has been applied. Through the survey, the perceptions of seafarers of the conditions of the rest areas within the accommodation on board ships have been analyzed. The findings indicate that comfort perception of seafarers varies. Moreover, seafarers' marital status and education level have been found to be the basic determinants of their comfort perception.

Keywords: *Maritime accidents, fatigue, ergonomics, accommodation areas on board, rest conditions.*

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GEMİLERDE YAŞAM MAHALLERİNİN DİNLENME KOŞULLARININ DEĞERLENDİRİLMESİ

ÖZ

Ergonomi çalışmaları, işe özel alanlar için yaygın olarak ele alınmıştır. Bu durum, denizcilik sektöründe de çalışmaların odak noktasının köprü üstü ergonomisi olması nedeniyle gözlemlenmektedir. İstatistikler, deniz kazalarının temel nedeninin insan faktörünün bir yansıması olan yorgunluk olduğunu göstermiş, böylece gemideki dinlenme ve dinlenme koşulları hayati bir konu haline gelmiştir. Ancak, literatürde, gemide dinlenme amacıyla kullanılan yaşam mahalleri ve ergonomik koşulları da içeren dinlenme koşulları göz ardı edilmiştir. Bu çalışmanın amacı gemi adamlarının gemideki dinlenme koşullarını ne ölçüde tatmin edici bulduklarını saptamaktır. Bu kapsamda, bir anket çalışması gerçekleştirilmiştir. Bu çalışmanın örneklemini 74 gemi adamından oluşmaktadır. Bulgular, gemi adamlarının konfor algısının değişiklik gösterdiğini işaret etmektedir. Ayrıca, gemi adamlarının medeni durumu ve eğitim düzeylerinin konfor algısı üzerinde belirleyici unsurlar olduğu bulunmuştur.

***Anahtar Kelimeler:** Deniz kazaları, yorgunluk, ergonomi, gemideki yaşam mahalleri, dinlenme koşulları.*

1. INTRODUCTION

The fundamental element in the maritime sector, as in many other sectors, is human. General perspective to seafarers has been on their job-specific needs. Therefore, ergonomic criteria for seafarers' job environment, bridge in general, have widely been addressed. The nature of shipping necessitates a decent condition for working and living on board. Indecent conditions are most likely to make vessels risky places with their potential accident impacts. The major reason for the maritime accidents is fatigue affecting human element. Therefore, seafarers and their needs, especially rest-related conditions, should be taken into consideration.

Seafarers spend their free times in cabins, hobby rooms and messes. Noise, lighting, thermal comfort, vibration and ventilation are the major ergonomic criteria for the needs of the occupants for comfort. Cabins are used to satisfy the needs of seafarers for decent rest. Therein, beds and furniture have also an impact on seafarers' comfort perceptions.

2. HUMAN ELEMENT AND ERGONOMICS

The term “human element” includes a large variety of subjects. The meaning of the term differs depending upon who uses it. There are many academic disciplines, particularly organizational behavior, ergonomics and occupational psychology, addressing human element as a field of study (Barnett and Pekcan, 2017: 1). Human factor in the shipping industry is undeniably critical. Well-educated and highly motivated crew is needed for safe and efficient navigation. In terms of maritime safety, human element and cultural dimensions which human behavior constitutes are needed to be taken seriously (Oluseye and Ogunseye, 2016: 62). Crew members are expected to do their daily duties properly. This is an obvious prerequisite in elimination of threats which can be faced in emergent situations. However, mostly, human factor sharpens the threat and becomes an additional threat when an emergent situation occurs. Lisco Gloria ship fire is one of the most typical examples of this type of incidents. Commencing factor of the fire was technical deficiency. Despite that, poor management of crew members, by spreading fire, induced dozens of injuries (Lozowicka and Kaup, 2015: 72-73). Work process in ship has been a goal for comprehensive automation like the various technical-based work systems. In today’s modern ships, human is mostly employed for planning, controlling and supervising activities. On the other hand, at the time when serious and unfamiliar conditions arise, they are expected to be in active position and have some certain characteristics such as intuitional approach and flexibly dealing with problems (Hanzu-Pazara et al., 2008: 4).

The origin of the word “*ergonomics*” is based on the two Greek words; “*ergon*” and “*nomos*” meaning “*work*” and “*law*” respectively. The term “human factors” is preferred to be used instead of ergonomics by some countries (Dul and Weerdmeester, 2008: 1). Since interaction of machines and their users is the area of investigation for ergonomics, it aims to enhance the performance level of systems as well as the interaction of machine and their users (Bridger, 2003: 1). Under the concept of ergonomics, the focus point is to do tasks appropriately through removing and mitigating ergonomics-based problems. Accordingly, ergonomics contemplates to boost the level-of-harmony between the doer and the environment where work is done (Fernandez, 1995: 20). Ergonomics has a guiding characteristic on human expectations in relation to workplaces, services given and products. From this aspect, ergonomics aims at forming a road map in the fields of management and engineering design (MacLeod, 2000: 4). Human body needs sufficient level of rest to get rid of fatigue. To fully take advantage

of rest, ambient factors such as noise and temperature must be suitable. For sleep, dirty ambient, improper temperature, noise and vibration are some of the barriers. Those factors are also contributors to nervous stress which interrupts sleep. This difficulty is further severe for seafarers who perform their tasks at night (Hafez, 1999: 6). It has been found that the inadequate ergonomic design of the ships affects seafarers' productivity and creates safety vulnerabilities. Therefore, the importance of the application of ergonomic principles in bridge and accommodation areas design have emerged dramatically (Kan and Kişi, 2016:132).

3. RULES AND CONVENTIONS RELATED WITH CREW HABITABILITY

The related ILO (International Labour Organization) conventions are as follows: C133-Accommodation of Crews (Supplementary Provisions) Convention, 1970 (No. 133), C147- Merchant Shipping (Minimum Standards) Convention, 1976 (No. 147), Maritime Labour Convention 2006. Besides, regarding the specific topic studied in this research, there is another institution worthwhile of mentioning: a guide called ABS (American Bureau of Shipping)–The Guide for Crew Habitability on Ships 2016.

3.1. C133 - Accommodation of Crews (Supplementary Provisions) Convention, 1970 (No. 133)

The convention was adopted by the General Conference of the International Labour Organization on the ground that improvements regarding the crew accommodation in the face of rapidly changing specifications of vessel construction and operation on 14 October 1970. The convention consists of four parts which are general provisions, crew accommodation requirements, application of the convention to existing ships and final provisions respectively. In the general provisions part, the features of the vessels to which the convention can be applied and the provisions that every member of the convention is committed to comply with have been specified. In the crew accommodation requirements part, provisions such as the specified floor areas by the number of occupants in the rooms, specified number of occupants in the rooms and furnishing requirements have been stated. In the third part of the convention, how the application of the convention to existing ships is carried out has been clarified. In the last part, final provisions have been explained (ILO, 1970).

3.2. C147 - Merchant Shipping (Minimum Standards) Convention, 1976 (No. 147)

The convention consists of 12 articles. In the first article, the types of the vessels to which the convention can be applied are listed. Members that ratify the convention are responsible to have laws and regulations in relation to safety standards consisting of competency, hours of work and manning with the purpose of establishing safety of life on board ship, proper social security rules and shipboard conditions of employment and shipboard living arrangements. The convention forces the members to realize effective jurisdiction and control over ships regarding safety standards including standards of competency, hours of work and manning, social security rules and shipboard conditions of employment and shipboard living arrangements (ILO, 1976).

3.3. Maritime Labour Convention 2006

The convention has been established with the aim of creating a single and coherent instrument covering almost all current standards of existing international maritime labour conventions and the major principles found in the other international labour conventions (ILO, 2006).

The convention covers necessities about appropriate working and living conditions on board the ship, seafarers wage, special conditions of accommodation and recreational facilities covering room sizes, heating, ventilation, lighting and hospital accommodation and social security protection for seafarers (www.egemenoglu.av.tr, 13.05.2018).

3.4. ABS – The Guide for Crew Habitability on Ships 2016

The ABS Guide for Crew Habitability on Ships has been generated with the aim of developing the quality of crew member performance and comfort with the way of enhancing working and living environments. The habitability criteria have been selected to create a tool for mitigation of crew fatigue, developing performance and safety. The guide presents criteria, limits and measurement methodologies for whole-body vibration, noise, indoor climate and lighting (ABS, 2016: 1).

A vessel's compliance with minimum criteria for accommodation areas and the ambient environment such as noise and lighting, is expressed with HAB notation. If a vessel complies with more rigid

criteria in relation to accommodation, whole-body vibration, noise and indoor climate along with HAB notation criteria, the vessel may be recorded by the notation HAB+. If a vessel complies with the whole criteria determined in the guide it may be recorded by the notation HAB++ (ABS, 2016:3).

4. RESEARCH METHOD

Seafarers must work and rest on board-ships. From this aspect, comfort of rest areas and the quality of rest on board becomes vital points which should be taken into consideration in terms of their potential impacts over possible accidents and casualties. Although Marine Labour Convention (2006) is put into force, the rest conditions and quality of the resting places on-board ships have not been improved by the shipowners/managers. In this study it is aimed to determine the extent to which seafarers are satisfied with their cabins, the messroom and hobby room, which are used for resting.

4.1. Population and Sample of the Research

The sample is chosen from the populations of the, (i) Turkish seafarers working on board vessels calling İzmir Alsancak Port, (ii) the Turkish seafarers on board scientific research vessel (R/V K. Piri Reis) and (iii) Dokuz Eylül University Maritime Faculty cadets on board ships calling Alsancak port. The research is limited with the data obtained from the 74 seafarers as respondents and convenience sampling method has been used for this study.

4.2. Data Collection Tool

For the purpose of establishing research model, a large scale of literature review has been realized as a first step. Through the literature survey six subgroups related with the human factors are obtained (ABS, 2016; Health and Safety Executive UK, 2018; ILO, 2006). These 6 subgroups are “noise”, “thermal comfort”, “lightning”, “vibration”, “ventilation” and “bed and furniture”. “The work environment on ships may impact on a person’s performance in a number of different ways from effects that damage health (heat stress, musculoskeletal disorders); effects that reduce the individual’s ability to perform a task (poor lighting, distraction); to effects that cause dissatisfaction, resistance to change and uncooperative attitudes” (Health and Safety Executive UK, 2018).

The second step involves face to face interviews conducted during March-April 2018 with 3 experts of this area. These experts are Dr. Altan KOLTAN from KOLTANA Ergonomics Research and Development Center, İbrahim YAMAN from Ulusoy İş Sağlığı ve Güvenliği Tic. Ltd. Şti. and Deniz KORKMAZ from Egetest Çevre Ölçüm Kalibrasyon Bilişim Hizmetleri San.Tic. Ltd. Şti. As a result of these interviews, information has been obtained about ergonomics, environmental and human factors.

The third step has been on the measurement of noise, vibration, thermal comfort and lighting. Accordingly, measurements of noise, vibration, thermal comfort and lighting have been carried out on a ship berthing at Port of Alsancak İzmir in company with İbrahim YAMAN from Ulusoy company with calibrated devices. For the measurements carried out in the port, necessary approvals have been obtained from relevant institutions and organizations. At the time the measurements have been carried out, the weather was clear, and the sea was still. The results of measurements have been evaluated by the criteria set in The Guide for Crew Habitability on Ships 2016-HAB (ABS,2016). According to the results of measurements, noise levels of deck office and hobby room has been found more than levels of the 36 HAB notation criteria. The noise level of cabin has been found at the threshold value of HAB notation criteria. HAB notation criteria is met in terms of noise level of galley, messroom and bridge. In terms of thermal comfort, the relative humidity value of cabin has been found more than the criteria determined. The other areas' thermal comfort values have showed conformity with the criteria specified. In terms of lighting levels, the lighting level of deck office, galley and cabin have been found lower than the criteria determined. The lighting level of messroom, hobby room and bridge have showed conformity with the criteria specified. The whole-body vibration values of deck office, messroom and hobby room have been found more than the criteria determined. However, the measurement values of galley, cabin and bridge comply with the criteria specified (Kolcubaşı, 2018).

Finally, a questionnaire survey has been constituted with the aim of understanding the degree to which seafarers are happy with their rest area conditions. This questionnaire form has been prepared aiming to collect data regarding different perspectives of those involved in the topic of the study. The questionnaire consists of three parts. Part A consists of demographic questions related with the seafarers, Part B is related with the technical properties of the ship and Part C consists of the questions derived from the literature review regarding the six subgroups related

with the human factors. These 6 subscales are also divided as cabins, hobby rooms and messes. The questionnaire consists of a total of 38 statements.

For all those statements, 5 likert type scales have been used (as: 5 strongly agree, 4: agree, 3: neither agree nor disagree, 2: disagree, 1: strongly disagree). The agreement level of respondent to the given statement increases by approaching to 5, decreases by approaching to 1. 1 and 5 are the lower and upper values for their agreement level. In the survey form, the names of subscales have been stated.

4.3. Data Collection

The survey is conducted during May-June 2018 and a total of 74 responses have been received.

4.4. Reliability Analysis

The value of the Cronbach's Alpha for the survey has been calculated as 0.952 which indicates a high level of reliability for the survey.

4.5. Organization and Analysis of Research Data

Data obtained at the end of the research have been analyzed through SPSS 20.0 package program. In the given analysis ANOVA analysis have been carried out.

4.6. Hypotheses of Research

These hypotheses of the research are as follows.

1. H₀: There is not a meaningful difference between seafarers' ages and their thermal comfort perceptions.

H₁: There is a meaningful difference between seafarers' ages and their thermal comfort perceptions.

2. H₀: There is not a meaningful difference between seafarers' marital status and their lighting perceptions.

H₁: There is a meaningful difference between seafarers' marital status and their lighting perceptions.

3. H₀: There is not a meaningful difference between seafarers' marital status and their beds and furniture comfort perceptions.

H₁: There is a meaningful difference between seafarers' marital status and their beds and furniture comfort perceptions.

4. H₀: There is not a meaningful difference between seafarers' educational status and their noise perceptions.

H₁: There is a meaningful difference between seafarers' educational status and their noise perceptions.

5. H₀: There is not a meaningful difference between type of vessel and seafarers' lighting perceptions.

H₁: There is a meaningful difference between type of vessel and seafarers' lighting perceptions.

6. H₀: There is not a meaningful difference between work experience for the current vessel and seafarers' bed and furniture perceptions.

H₁: There is a meaningful difference between work experience for the current vessel and seafarers' bed and furniture perceptions.

4.7. Demographic Findings

Demographic characteristics of respondents of the survey are summarized below.

Majority of respondents are "male" with 73 % of total. Percentage of "female" respondents is 27% of total. The highest participation rate has been seen in "18-25 age range" with 62.2 % of total. The group is followed by "26-40 age range" with 28.4%. The lowest participation rate has been seen in "41 and over age range" with 9.5% of total. Majority of respondents are single with 78.4% of total. Percentage of married respondents is 21.6% of total.

The highest participation rate has been seen in "undergraduate degree" with 68.9% of total. The group is followed by "high school-graduation" with 13.5 % and "associate degree" with 8.1% of total respectively. The participation rate of "PhD-degree" is 4.1% of total. The lowest participation rates have been seen in "master-degree" and "secondary school graduation" with 2.7% of total same rates. According to places where seafarers work on board, the highest participation rate has been seen in the group of "engine room personnel" with 58.1% of total, The group is followed by "deck office personnel" with 39.2% of total. The lowest participation rate has been seen in the group of "personnel working at other than those places like galley" with 2.7 % of total.

According to total work experiences as seafarer, the highest participation rate has been seen in the group of "less than one year" with

53.4 % of total. The group is followed by “between 1-10 years” with 28.8 % of total and between “11-20 years of experience” with 11 % of total respectively. The lowest participation rate has been seen in the group of “20 year and over experience” with 6.8 % of total. According to work experiences for the vessels respondents have currently been working on, the highest participation rate has been seen in the group of “between 4-6 months” with 40.3 % of total. The group is followed by “between 7-12 months” with 23.9 % and “between 0-3 months” with 25.4 % of total respectively. The lowest participation rate has been seen in the group of “more than one year” with 10.4 % of total.

Table 1: Demographic Characteristics

		n	%
Gender	Female	20	27
	Male	54	73
	Total	74	100
Age	18-25	46	62.2
	26-40	21	28.4
	41-50	6	8.1
	51 +	1	1.4
	Total	74	100
Marital Status	Single	58	78.4
	Married	16	21.6
	Total	74	100
Educational Status	Secondary School	2	2.7
	Highschool	10	13.5
	Associate Degree	6	8.1
	Undergraduate Degree	51	68.9
	Master Degree	2	2.7
	PhD	3	4.1
Total	74	100	
Places where seafarers work on board	Deck	29	39.2
	Engine	43	58.1
	Other	2	2.7
	Total	74	100
Total Work Experience as Seafarer	Less than 1 year	39	53.4
	1-10 years	21	28.8
	11-20 years	8	11.0
	20 + years	4	6.8
	Total (missing 1)	73	100
Work Experience for the Current Vessel	0-3 months	17	25.4
	4-6 months	27	40.3
	7-12 months	16	23.9
	More than one year	7	10.4
	Total (missing 7)	67	100

4.8. Ship-Specific Findings

Characteristics of ships that participants of the survey have currently been working on are summarized below.

According to year of built, the highest representing rate has been seen in the group of “between 2001-2010 years” with 46.3 % of total. The group is followed by “2010 and over years” with 32.8 % of total. The representing rate of “between 1975-1980 years” and “between 1991-2000 years” has been the same with 9.0% of total. The lowest representing rate has been seen in the group of “between 1981-1990 years” with 3.0 % of total. According to place of built (country of shipyard), the highest representing rate has been seen in the group of “Turkey” with 45.6 % of total. The group is followed by “Germany” with 21.1 % of total and “South Korea” with 14.0 % of total. The representing rate of “China” and “Japan” has been the same with 7.0% of total. The representing rate of “Poland” has been 3.5% of total. The lowest representing rate has been seen in the group of “the Netherlands” with 1.8 % of total. According to type of vessel, the highest representing rate has been seen in the group of “Container vessel” with 53.5 % of total. The group is followed by “Liquid Bulk Carriers” with 28.2 % of total and “Other types of vessel like scientific research vessels” with 9.9 % of total. The lowest representing rate has been seen in the group of “Dry-Bulk Carriers” with 8.5 % of total. According to flag of vessel, the highest representing rate has been seen in the group of “Turkish-flagged vessels” with 63.4 % of total. The group is followed by “Marshall Island flagged-vessels” with 23.9 % of total and “Malta-flagged vessels” with 8.5 % of total. The lowest representing rate has been seen in the group of “Panama-flagged vessels” with 4.2 % of total. In terms of presence of comfort class, 55.6 % of respondents have stated that the vessels that they have currently been working on have been classed by a classification society. The rate of respondents who don’t know whether the vessels have been classed or not is 43.1% of total. 1.4 % of respondents have stated that the vessels that they have currently been working on have not been classed by a classification society.

Table 2: Ship-Specific Characteristics

		n	%
Year of Built	1975-1980	6	9.0
	1981-1990	2	3.0
	1991-2000	6	9.0
	2001-2010	31	46.3
	2010 +	22	32.8
	Total (Missing 7)	67	100
Place of Built (Country of Shipyard)	Turkey	26	45.6
	Germany	12	21.1
	South Korea	8	14.0
	China	4	7.0
	Japan	4	7.0
	Poland	2	3.5
	The Netherlands	1	1.8
	Total (Missing 17)	57	100
Type of Vessel	Container	38	53.5
	Dry-Bulk Carrier	6	8.5
	Liquid-Bulk Carrier	20	28.2
	Other	7	9.9
	Total (Missing 3)	71	100
Flag of Vessel	Turkey	45	63.4
	Marshall Island	17	23.9
	Malta	6	8.5
	Panama	3	4.2
	Total (Missing 3)	71	100
Classification for Comfort	Yes	40	55.6
	No	1	1.4
	No idea	31	43.1
	Total (Missing 2)	72	100

4.9. Descriptive Statistics on Rest Areas' Comfort Perceptions Survey

Numbers, values of mean and standard deviation values related with sub-scales in the survey can be seen in the following table.

Table 3: Descriptive Statistics on Rest Areas' Comfort Perception Survey

	N	Mean	St. Dev.
Noise	74	2.52	0.882
Thermal Comfort	74	2.53	0.831
Lighting	74	2.60	0.819
Vibration	73	3.18	1.163
Ventilation	72	3.13	1.086
Bed and Furniture	72	2.88	0.768

4.10. Statistical Analyses

In this part, statistical analyses have been stated. Only statistically significant hypothesis depending on ANOVA analysis and Tukey Multiple Comparisons Tests are discussed as follows.

4.10.1. Variability of Rest Areas' Thermal Comfort Perceptions by Age

There is a meaningful difference between seafarers' ages and their thermal comfort perceptions. ($p=0.006 < 0.05$). Seafarers at the age group of 26-40 find thermal comfort more satisfying compared to the other age groups.

Table 4: ANOVA Analysis in Relation to Thermal Comfort Perception by Age

	Mean	Standard Dev.	F	p
18-25	2.70	0.685	4.502	0.006
26-40	2.06	0.178		
41-50	2.86	1.243		
51+	4.00	0.00		
Total	2.53	0.831		

4.10.2. Variability of Rest Areas’ Lighting Perception by Marital Status

There is a meaningful difference between seafarers’ marital status and lighting-related comfort perceptions. ($p=0.000 < 0.05$). Married seafarers find lighting more satisfying compared to single seafarers.

Table 5: ANOVA Analysis in Relation to Lighting Perception by Marital Status

	Mean	Standard Dev.	F	p
Single	2.77	0.784	13.854	0.000
Married	1.97	0.634		
Total	2.60	0.819		

4.10.3. Variability of Rest Areas’ Bed-Furniture Comfort Perception by Marital Status

There is a meaningful difference between seafarers’ marital status and bed-furniture comfort perception. ($p=0.020 < 0.05$). Married seafarers find bed-furniture comfort more satisfying compared to single seafarers.

Table 6: ANOVA Analysis in Relation to Bed-Furniture Perception by Marital Status

	Mean	Standard Dev.	F	p
Single	2.99	0.71	5.647	0.020
Married	2.46	0.858		
Total	2.88	0.768		

4.10.4. Variability of Rest Areas' Noise Perception by Education Level

There is a meaningful difference between seafarers' education level and noise-related comfort perception. ($p=0.025 < 0.05$).

Table 7: ANOVA Analysis in Relation to Noise Perception by Education Level

	Mean	Standard Dev.	F	p
Secondary School	1.94	0.235	2.759	0.025
Highschool	2.42	0.973		
Associate Degree	1.51	0.453		
Undergraduate Degree	2.68	0.844		
Master Degree	1.94	0.864		
PhD	3.03	0.788		
Total	2.52	0.882		

Tukey Multiple Comparisons Test has been applied to understand which two variables demonstrate the meaningful difference. As a result of the test, a meaningful difference has been found between the variables of associate degree and undergraduate degree because the P value is 0.022 and it is less than 0.05.

4.10.5 Variability of Lightning Perception by Type of Vessel

There is a meaningful difference between seafarers' type of vessel and their lightning perception. ($p=0.026 < 0.05$).

Table 8: ANOVA Analysis in Relation to Lighting Perception by Type of Vessel

	Mean	Standard Dev.	F	p
Container	2.3743	.79891	3.271	0.026
Dry-Bulk Carrier	2.6111	1.27802		
Liquid-Bulk Carrier	3.0500	.57620		
Other	2.4524	.79636		
Total	2.5923	.82834		

Tukey Multiple Comparisons Test has been applied to understand which two variables demonstrate the meaningful difference. As a result of the test, a meaningful difference has been found between the variables of container and liquid bulk carrier because the P value is 0.015 and it is less than 0.05.

4.10.6 Variability of Bed and Furniture Perception by Work Experience

There is a meaningful difference between seafarers' work experience and their bed and furniture perception. ($p=0.007 < 0.05$).

Table 9: ANOVA Analysis in Relation to Bed and Furniture Perception by Work Experience

	Mean	Standard Dev.	F	p
0-3 Months	2.4400	.85590	4.459	0.007
4-6 Months	3.1556	.62100		
7-12 Months	2.5875	.72468		
More than a year	3.1429	.65792		

Tukey Multiple Comparisons Test has been applied to understand which two variables demonstrate the meaningful difference. As a result of the test, a meaningful difference has been found the seafarer's working for 0-3 months less satisfying because the P value is 0.014 and it is less than 0.05.

5. DISCUSSION ON THE FINDINGS

73% of 74 respondents are male. Most of the respondents by age groups belongs to 18-25 age group with 62.2 %. 78.4% of respondents are single. Most of the respondent's education level is seen at undergraduate degree and over with 75.7%. 58.1% of respondents work as engine-room personnel. According to total work experience, 53.4% of respondents have been working as seafarers for less than one year. 40.3% of respondents have been working on their current vessel for 4-6 months. 46.3% of vessels that respondents have currently been working on were built between the years of 2001 – 2010. According to place of built, the majority of the vessel's respondents have currently been working on belongs to Turkey with 45.6%. 53.5% of vessels which respondents have currently been working on are container vessels. According to flags of vessels, Turkish flagged vessels have the majority with 63.4%. 55.6% of the vessels that respondents have currently been working on have been classed in terms of comfort criteria.

In the research, the mean values of ergonomic criteria have respectively been 2.52 for noise, 2.53 for thermal comfort, 2.60 for lighting, 3.18 for vibration, 3.13 for ventilation and 2.88 for bed and furniture. In general, while the values do not show obvious results, respondents' vibration and ventilation comfort perceptions are more negative than noise, thermal comfort, lighting and bed and furniture. A relationship has been detected between thermal comfort perception and seafarers' age. Age group of 26-40 stated that their thermal comfort perceptions are more positive compared to the other age groups. Marital status has been found a clear determinant for two-comfort criteria. In this respect, married seafarers find lighting and bed-furniture comfort more satisfying compared to single seafarers.

In this research, education level has been found a determinant for noise perception. In this respect, approaches of respondents with associate degree to noise is more positive compared to respondents with undergraduate degree. Although engine-room personnel are expected to be more dissatisfied with lighting compared to deck-office personnel from the point of darkness-brightness condition in their workplace environment, in this research, a finding in this direction has not been reached according to the survey.

Even though noise and vibration perceptions are expected to be lower in the old vessels from the point of possible insulation and wearing problems, in this research, a finding in this direction has not been

reached. Although noise and vibration perceptions are expected to be different by type of vessel from the point of changing cargo-related conditions and necessities, in this research, a finding in this direction has not been reached according to the survey.

6. CONCLUSION

The fundamental reason of maritime accidents is fatigue as an element of human factor. Fatigue occurs as a result of lack of rest as well as job-specific issues. However, focus point in literature is predominantly over job-specific issues and environments like bridge. Accommodation areas used for rest on board and their rest conditions seem to have been dramatically overlooked. A study like this topic could not be found in the literature.

In the research, it is understood that ergonomic comfort perceptions on accommodation areas used for rest of seafarers differ with their personal conditions and priorities. For some of the ergonomic rest conditions, the degree of satisfaction is higher for married seafarers compared to single seafarers. Married seafarers' economical responsibility to their wife/husband or children is thought to be the main reason for this situation. Thermal comfort is found more satisfying by seafarers at the age group of 26-40. Another result of this research is changing comfort perceptions by education level (between associate degree and undergraduate degree).

It is determined that some of the seafarers do not have any idea about comfort criteria constituted by classification societies. Hence, those seafarers experience difficulties in determining the comfort suitability degree of the vessel they work on. Shipowners or ship owning companies should inform seafarers about those criteria.

7. LIMITATIONS AND RECOMMENDATIONS FOR FURTHER STUDIES

This study is a pioneer study for measuring the human factor derivatives that are related with the seafarer's conceptions of the quality of ship's accommodation resting spaces. With the lack of the literature on this topic, a real and approved measurements are held at a conventional working ship and the survey questions are prepared according to these studies, expert opinions and face to face interviews that are held with the

seafarers. But during these stages the seafarers abstain was observed and this made a limit to 74 seafarers as the sample.

We may see at table 1 that 53.4% of seafarer's total work experience is less than a year. But this is not significant because the ergonomic variables that we tried to measure is based on general ergonomic principals (human factors) and do not have any correlation with experience.

A study supported by quantitative analyses with more respondents may provide more clear view about the topic. In addition, ergonomic measurements addressing and affecting seafarers may also be supported and advanced into further details by future researches.

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