Identifying Company Selection Criteria applied by Maritime Transportation Engineering Students for Career Planning

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Increasing global trade volumes require more and more seafarers to be employed on ships. The reports by international organizations and institutions frequently indicate a shortage of onboard officers, as well as that this deficit will keep increasing gradually. Given all these international reports, businesses need to adopt strategies that will make seafaring more attractive to avoid future issues with the employment of competent seafarers. Such strategies would give them competitive advantage by attracting qualified officers to their ranks. This study aims to determine which criteria officers consider when choosing their future employers and the weight they attribute to individual criteria in making such decisions. The criteria were identified by brainstorming of study subjects (n=8) using the focus group method. The weight ratio of the criteria obtained through focus group and Delphi study results was calculated using the fuzzy AHP (FAHP) method (n=32), and the relevance of individual criteria for the selection decision determined. As a result of the research, 18 sub-criteria have been identified under the main criteria of "Operational factors", "Living conditions onboard", "Personal benefits" and "Personnel management policies" and their weight on the selection decision determined. The study contributed to the literature on identifying company selection criteria for officers. These criteria give businesses and international organizations a scientific perspective that will assist them in identifying new policies that will ensure the sustainability of the maritime profession and the employment of seafarers.

KEY WORDS

~ Career path
~ Maritime
~ Human resource management
~ Selection
~ Focus group
~ FAHP

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1. INTRODUCTION

The majority of global trade is carried out by commercial ships. In this context, the world's commercial ship fleet is growing daily and is facing serious workforce shortages. The ICS (2021) report clearly shows there is an ever-increasing need for officers, which will have a negative impact on maritime trade in the near future. To arrest this negative development, career at sea must be promoted as a favorable option for new graduates. International institutions and organizations have been taking some steps to address this issue, such as establishing commissions on various issues like ensuring the return of existing seafarers to active sea life, improving the image of the maritime profession, creating a new group of young seafarers who plan to pursue a career at sea, and preventing officers from abandoning life at sea (Barnett. et al., 2006:127-128; Arsenie et al., 2014: 328-329).

Given the environmental and economic impact of maritime accidents, maritime companies need to employ qualified seafarers to maintain their effective sea operations. Due to the shortage of officers in the current labor market, companies should encourage their employees to stay through micro-strategies. Officers, on the other hand, aim to further their career plans by choosing the company most suitable for their chosen career path.

Changing environmental conditions have altered the way people think, causing their expectations to vary almost on a daily basis. Employees and companies best adapted to this process will survive and continue their business operations. This new order requires only a few administrative improvements to ensure the supply of qualified officers. The necessary improvements can be identified by determining what officers expect from their prospective employers. The study will now pinpoint such expectations through scientific methods.

2. CONCEPTUAL FRAMEWORK

In the current rapidly changing conditions, companies need to evaluate both their internal and external conditions to identify competitive strategies that will ensure their survival. Human resources and employee selection criteria are crucial for the development of these strategies (Dündar, 2008:305). Career path attractiveness should be created to impress employees who are compatible with the variables in terms of human resources.

Career path is a strategic planning process consisting of short and long-term plans. (Al-Abri and Kooli 2018: 105). Encouraging an employee is not just about incentives, but also about recognizing their individual needs (Hölzle, 2010:780-781). Employers grant their employees, as essential elements of their company, certain benefits. Such benefits usually include social protection, salary, leaves of absence, retirement plans, and personal development contributions, helping the relevant HR unit in matters such as recruiting and retaining competent personnel (Pääkkö, 2013: 169), keeping motivation at high levels, and preventing internal conflicts (Itika, 2011:116; Anthony and Omotayo, 2012:12). This indirectly increases the competitive advantage of companies (Mathis and Jackson, 2008: 418-419) which should strive to meet the expectations of their employees and adopt policies that will contribute to their career paths.

The concept of career path refers to the overall work sequence created by the employees throughout their careers to realize their own career goals (Bingöl, 2013:331). HR departments are indirectly or directly responsible for the creation and planning of employee career paths. (Pääkkö, 2013:177). Due to the changes brought about by technology, economic surroundings, demographic differentiation, and migration, the concept of career planning has evolved from the traditional career approach based on salary, job security, and vertical promotion to innovative career approaches based on psychological satisfaction, flexibility, differentiation, and relationships (Çetin and Karalar, 2016:166) (Lent, 2013:2). In this context, HR creates the environment for new career approaches and employees apply to positions that will further their career goals.

The maritime industry is an international sector in all aspects. Ship accidents cause economic and environmental disasters. An examination of these accidents has shown that almost all have been caused by the human factor (Galieriková, 2019: 1319-1320). The human factor has been minimized through the introduction of technological changes, and technological development and integration have reduced the size of crews onboard ships. However, the key role of decision-making officers onboard ships has not changed and they are expected to be more competent. Given that accidents at sea are detrimental to the reputation and economic structure of companies, ship crews are expected to be more competent than in the past in terms of creating competitive advantage (Blagovest: 2010:14-15). This change in the maritime industry, coupled with the increasing autonomy of ships, also increases the need for highly competent seafarers capable of adapting to change (Shahbakhsh, 2022: 10). Research shows that young sailors attribute more importance to technology than traditional sailors and are looking for opportunities that will allow them to improve their skills necessary to specialize in autonomous ships (Bogusławski, 2022, 328-329). Making themselves attractive to seafarers with these characteristics will give companies competitive advantage in the future.

There is a noticeable shortage of officers in the international seafaring market and the need for recruits keeps increasing. In 2021, there was a shortage of 26,240 officers in the world maritime fleet, and this figure is expected to grow to 89,510 by 2026 (ICS, 2021). Externally sourced officers are preferred both in Turkey and in the international market, causing seafarers from different nations to work side by side onboard ships. This deficit in the supply-demand of seafarers created the status quo where companies are pursuing competent seafarers, instead of seafarers applying for job vacancies.

The above mentioned report, published in 2021, is published every 5 years, and ICS-BIMCO (2010) and ICS-BIMCO (2015) reports anticipated future deficit in the number of officers. In this context, the IMO declared 2010 the “Year of the Seafarer” and organized campaigns to encourage young people to pursue careers at sea. In addition, regulations and conventions have been adopted to ensure a decent working environment and prevent the abuse of seafarers.

Businesses need to adopt strategies that motivate officers both in terms of new career planning approaches and encouraging them to seek employment onboard ships in the maritime industry. This study sought to improve the understanding of what officers in the maritime sector expect from a company when devising their career plan.

3. METHODOLOGY

This part of the study was carried out in two stages. In the first stage, a focus group study, one of qualitative research methods, was conducted to identify the company selection criteria of new watch-keeping officers. In the second stage, the Fuzzy AHP method, one of the multi-criteria decision-making methods, was used to determine the level of importance of these criteria for company selection.

The focus group method was chosen due to the need to make inferences about the reasons behind the behavior of the subjects. The focus group method is a method where a researcher brings together a preselected group of subjects to discuss a specific topic under appropriate conditions and learns their ideas through interaction (Nyumba et al., 2018:21). For focus group studies to be productive, groups should have 4-12 participants (Gülcan, 2021: 96-97). The focus group method is frequently used to determine the criteria affecting the decision-making process (Morgan, 1996: 130). Since focus group study is qualitative research, attention was paid to obtaining the opinions of the subjects in comfortable surroundings, with no pressure. The conditions that should be considered when applying qualitative research methods, such as temperature, noise level, and lighting, were provided (Coşkun et al., 2015: 96-101). Subjects were never directed by the moderator, who only asked them to clarify their position to get in-depth information, drilling questions were asked (Yin, 2011: 135-138). The place and time of the focus group study were determined so as to be convenient for all subjects (Trust

2006: 171). The author of the study also acted as a moderator in the focus group study. The author is a researcher who frequently uses qualitative research methods in other studies, including his masters and doctoral thesis, and has experience with this method.

The first stage of the research was carried out as a focus group study with 8 subjects and a moderator at Dokuz Eylül University, Maritime Faculty, Foreign Relations Centre Meeting Room. The focus group meeting lasted 78 minutes. Necessary permissions for the research were obtained from the relevant institutions.

3.1. Sampling

The judgmental sampling method, a non-probability sampling method, was the preferred sampling method. 14 maritime transportation management engineering students who had just graduated from the Maritime Faculty of the Dokuz Eylul University were invited into the focus group. In addition, the subjects had passed the maritime administration exam after internship and had the right to use the title “Watch-keeping Officer”. Eight of the 14 students agreed to participate in the focus group study.

Following the focus group study, a sample group of 41 students who would participate in the Fuzzy AHP study was selected. The researcher organized a 4-hour informative training to help the sample group understand the Fuzzy AHP method. This selected sample group consisted of final-year students from the Maritime Transportation Engineering Department who had completed their marine internship and were entitled to receive the title of watch-keeping officer. After the FAHP study, the answers given by 32 out of 41 participants were found to be consistent.

3.2. Data collection tools

In qualitative research, the extent to which questions asked by the moderator measure the desired phenomenon is an important factor. The questions for the focus group study were carefully selected and a focus group data collection guide was created with these questions. The data collection guide was created based on the expert opinions of 2 professors and 1 associate professor from the Dokuz Eylül University whose areas of expertise are “management and strategy” and “maritime”. In the second stage of the study, the company selection criteria obtained in the first stage were classified and appropriate codes were determined. In this context, the coding and classification content was prepared taking into account the opinions and suggestions of 2 professors, 2 associate professors, and 1 assistant professor.

3.3. Focus group study

3.3.1. Rigor of the study

In addition to the issue of validity and reliability of qualitative research, there is also evaluation based on 5 elements, namely "credibility, transferability, dependability, confirmability and integrity" of the research, jointly referred to as research rigor (Wallendorf & Belk, 1989: 71-72, Sağlam & Çetin, 2018:370). In that respect, the processes indicated in Table 1 were carried out. With respect to the reliability of the research, opinions were obtained from academicians who are experts in this field about whether the data collection guide measures the phenomenon intended to be measured. With respect to validity, 3 subjects were excluded based on their replies to the questions in the data collection guide. Taking into account qualitative research method principles, they were asked the same questions again after 1 week. There was no difference between the answers given.

Criteria	Actions
Credibility	- Expert opinions were obtained while preparing the interview guide. - The moderated explained any questions that were not understood by the subjects. - The researcher who listened to the audio recording and evaluated the notes taken coded the interviews. Opinions and suggestions from 5 faculty members were obtained while determining and classifying the codes.
Transferability	- Subjects were selected using judgmental sampling. - Subjects capable of answering the questions and possessing appropriate qualifications were selected.
Dependability	- When the answers to the questions asked during the meeting reached saturation, the study was terminated.
Confirmability	- The findings section consists of the subjects' statements concerning codes. - After the codes and code classification were determined, the consent of the subjects was obtained.
Integrity	- The identity and contact information of the subjects were kept confidential. - The names and private information in the examples given by the subjects were kept confidential. - The statements requested by the subjects not to be recorded or to be excluded from the study were not evaluated within the scope of the study.

Table 1. Rigor of qualitative research

Source: Created by Sağlam (2019) using the statements by Wallendorf and Belk (1989); Lincoln and Guba (1985)

3.3.2. Findings

In the scope of the research, the statements made by the subjects were recorded both as audio recordings and as written notes by the moderator during the interview. Eight participants attended the focus group meeting. The first 8 subjects (P1-P8) shown in Table 2 participated in both the focus group and the FAHP study. The other 24 subjects (P9-P32) only participated in the FAHP study.

Demographic information on the study subjects is given in Table 2 which shows that all 32 subjects have served for more than 11 months. In addition, the types of ship on which all the subjects worked include the 4 ship types dominant in the sector.

Within the scope of the study, subjects were asked the main question "What are the criteria that affect your company selection decision? Could you explain these criteria in detail?". To draw the subjects into the discussion, drilling questions such as the following were also asked:

"Why did you choose the maritime profession?", "Do you plan to work full-time in the company where you are an intern?", "Which features of the company were you satisfied with?", and *"What features of the company bothered you?"*

Subject number	Age	Sea service experience (months)	Ship type
P1	27	12	Dry bulk cargo, ro-ro
P2	27	13	Crude oil tanker, chemical tanker
P3	24	14.5	Ro-ro, crude oil tanker
P4	23	16	Crude oil tanker
P5	24	13	Dry bulk cargo
P6	24	13	Ro-ro, container
P7	22	16	Oil-chemical tanker
P8	23	14	Container, dry bulk cargo
P9	23	12	Oil-chemical tanker
P10	26	11	Container
P11	25	13	Oil-chemical tanker
P12	21	12	Chemical tanker
P13	24	11	Container
P14	22	11	Crude oil tanker
P15	22	11	Chemical tanker
P16	28	13	Chemical tanker
P17	24	12	Dry bulk cargo
P18	24	13	Dry bulk cargo
P19	29	12	Chemical tanker
P20	24	12	Container
P21	25	11	Ro-ro
P22	22	11	Container
P23	23	11	Oil-chemical tanker
P24	28	13	Container
P25	24	12	Dry bulk cargo
P26	24	12	Container
P27	24	12	Dry bulk cargo
P28	23	12	Container
P29	23	12	Crude oil tanker
P30	25	11	Crude oil tanker
P31	26	12	Ro-ro
P32	25	12	Oil-chemical tanker

Table 2. Demographic information of focus group subjects

When the answers of the subjects were analysed, the answers with high frequency and number of repetitions were identified and coded. According to the statements of the subjects, 18 criteria were determined, namely "s*hip registry, ship size, fleet age, type of ship, navigation area, communication and internet, recreational facilities, accommodation facilities, food and catering, duration of contract, wages, re-joining period, social security, qualified personnel employment, multicultural seafarer employment, training development policies, meritocracy, and workload intensity"*. The coding and explanation of the criteria are shown in Table 3.

In Table 3, company selection criteria determined based on the statements of the subjects are classified under 4 main headings. Expert opinions of 2 professors, 2 associate professors, and 1 assistant professor were consulted using the Delphi method for this classification. The classification developed based on expert opinions is shown in Figure 1.

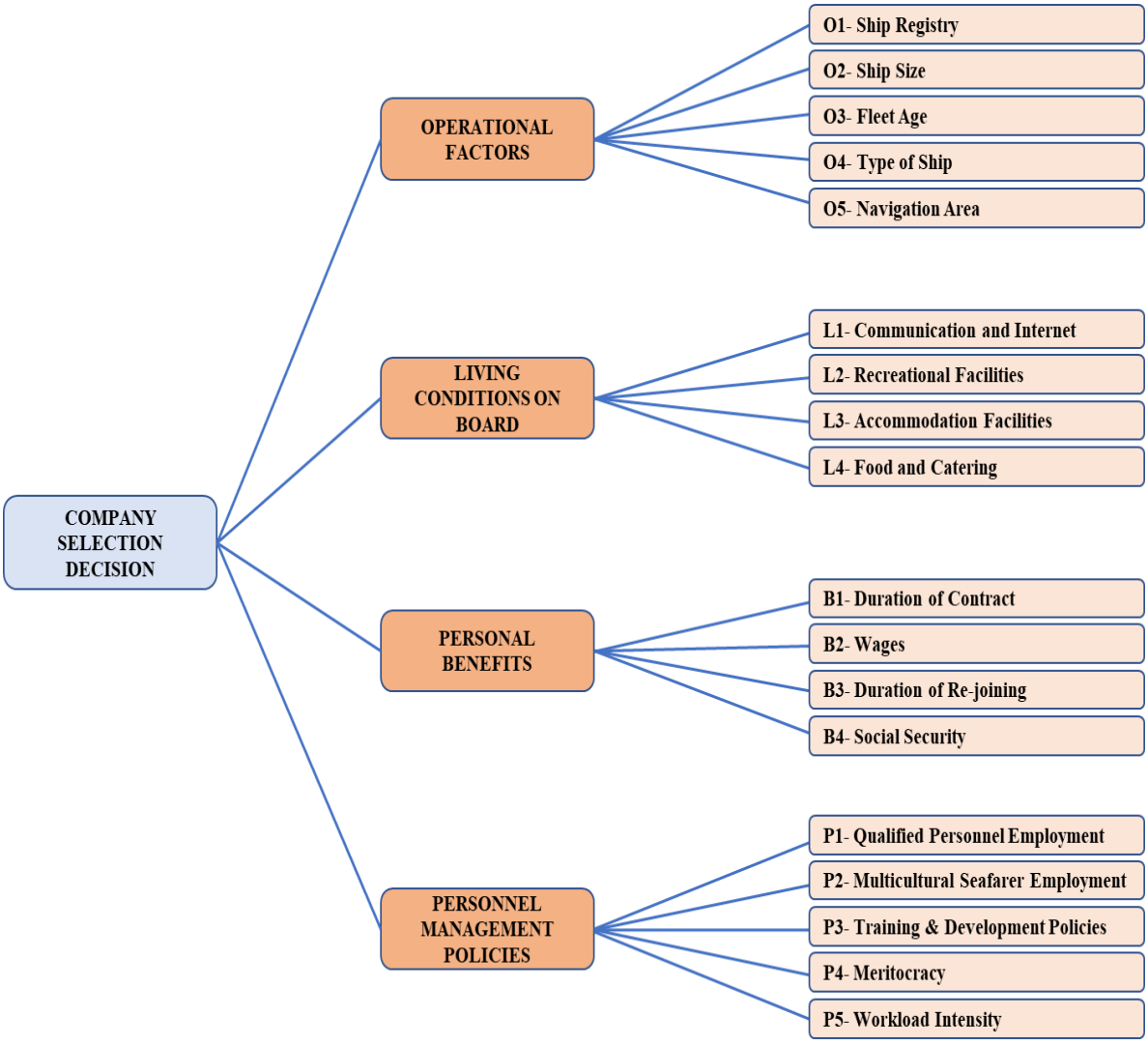

Figure 1. Decision tree model

A fuzzy AHP form was used for the decision tree model, which has 4 main criteria and 18 sub-criteria, determined based on expert opinions. A new meeting was arranged with the subjects to establish the importance they place on each sub-criterion and the main company selection criteria of distance watch-keeping officers.

Criterion	Explanation
Ship registry:	Indicates the country of registration of the ship. It is the flag state of the ship.
Ship size:	It refers to the size and tonnage of the ship.
Fleet age:	It refers to the average age of the ships in the company's fleet.
Type of ship:	It refers to the type of cargo the ship is designed for.
Navigation area:	It states in which regions the ship operates, whether it serves in national or international waters, and whether it navigates to regions with threats such as piracy.
Communication and Internet	It refers to the availability of cheap and accessible communication services and the Internet, allowing the personnel onboard to communicate with their family and their social surroundings.

Recreational facilities:	Indicates whether there are recreational and hobby areas defined within the scope of the MLC, such as a gym, library, game room, television, and movie support onboard.
Accommodation facilities:	It refers to issues such as the size and usability of the cabins, individual showers and toilets, and furniture comfort.
Food and catering:	It means the quality, freshness, healthiness, and deliciousness of food and water.
Duration of contract:	It refers to contract duration, including the duration of work on ships of the employer.
Wages:	It refers to the total amount of the fees received in return for the service.
Re-joining period:	It refers to the duration of the period after contract completion and disembarkation after which seafarers are permitted to re-join the ship's crew.
Social security:	It refers to personal rights such as healthcare, insurance, pension scheme, and medical care.
Qualified personnel employment:	Indicates whether other personnel working on the ship is competent or not.
Multicultural seafarer employment:	Indicates whether seafarers working on the ship belong to different cultures and nationalities.
Training & development policies:	Indicates whether additional training is provided by the company in terms of the development of the seafarer.
Meritocracy:	It means not having an egalitarian system in the promotion of seafarers with education, knowledge, experience, and competence. A structure without performance-based promotion and nepotism is described.
Workload intensity:	It expresses whether policies developed by bad management cause unnecessary workload. It also covers issues such as whether periods of rest and work are observed.

Table 3. Company selection criteria based on the statements of the subjects

3.4. Fuzzy AHP method

The analytical hierarchy process method is a multi-criteria decision-making method that is frequently used to determine the mutual relationships between criteria and measure their effect on the selection decision if there is more than one criterion affecting the decision (Önder and Önder, 2015: 21-22). In this process, the decision tree is created by transposing the criteria that affect the decision into a hierarchical scheme, from the top to the bottom. The weight of each criterion in this decision tree is determined (Aktaş et al., 2015: 218).

The fuzzy AHP (FAHP) model was created with the use of systematic numbers belonging to the fuzzy set theory of the AHP method (Kusumawardani and Agintiara, 2015: 640). Fuzzy AHP consists of a process in which verbal and numerical concepts are evaluated in a fuzzy set where there is no absolute clarity, and there is no definite limit to the expressions (Kuo et al., 2006: 269-270).

In this study, the fuzzy AHP technique based on the Extended Analysis Method developed by Chang (1996), which is the most preferred method in literature (Büyüközkan et al., 2004), was used. The analyses in the study were carried out in 4 stages.

In the first stage, the “Fuzzy Synthetic Extent” was calculated. This process was analyzed using the following formulas:

$$S_1 = \sum_{J=1}^{m} M_{gi}^{j} \times \left[\sum_{i=1}^{n} \sum_{j=1}^{m} M_{gi}^{j}\right]^{-1}$$

$$\sum_{J=1}^{m} M_{gi}^{j} = \left[\sum_{j=1}^{m} l_j \ , \sum_{j=1}^{m} m_j \ , \sum_{j=1}^{m} u_j\right]$$

$$\sum_{i=1}^{n} \sum_{j=1}^{m} M_{gi}^{j} = \left[\sum_{i=1}^{n} l_i \ , \sum_{i=1}^{n} m_i \ , \sum_{i=1}^{n} u_i\right]$$

In the second stage, “Degree of Possibility” of M2= (l2, m2, u2) ≥ M1= (l1, m1, u1) was analyzed using the following formulas:

$$V\,(M_2 \geq M_1) = sup_{y \geq x}\,[min\,\mu_{M1}(x), \mu_{M2}(y)]$$

$$V\,(M_2 \geq M_1) = hgt\,(M_2 \cap M_1) = \mu_{M2}(d) = \begin{cases} m_2 \geq m_1\ ise, 1 \\ l_1 \geq u_2\ ise, 0 \\ other, \frac{l_1 - u_2}{(m_2 - u_2) - (m_1 - u_1)} \end{cases}$$

In the third step, the probability of convex fuzzy numbers being higher than “k” was calculated using the following analysis formula:

$$V\,(M \geq M_1, M_2, \ldots, M_k) = V\,[(M \geq M_1)\ ve\ (M \geq M_2)\ and\ (M \geq M_k]$$

$$= min\ V\,(M \geq M_1) \quad i=1,2,3,\ldots,k$$

$$d'(A_i) = minV\,(S_i \geq S_k)$$

In case k=1,2,3,……,n;k≠1, the weight vector expressed as Ai(i=1,2,…,n) is shown below.

$$W' = [d'(A_1), d'(A_2), \ldots\ d'(A_n)]^T$$

In the fourth step, the normalized weight vector with the normalization process was calculated. The W value represents the weight and is expressed as a non-fuzzy number.

$$W = [d(A_1), d(A_2), \ldots\ d(A_n)]^T$$

In the scope of the study, linguistic and numerical expressions used by Gumus, 2009: 4071 and Sun, 2010: 7746 were used to perform the analysis and create the scale. Verbal, numerical, and triangular fuzzy number equivalents of these expressions are shown in Table 4. The statements of the subjects were rated using these numerical values.

Linguistic expressions	Numerical expressions	Scale of fuzzy numbers
Equal	1	(1,1,1)
Small advantage	2	(1,2,3)
Not bad	3	(2,3,4)
Preferable	4	(3,4,5)
Good	5	(4,5,6)
Fairly good	6	(5,6,7)
Very good	7	(6,7,8)
Absolute	8	(7,8,9)
Perfect	9	(8,9,10)

Table 4 Fuzzy number representation of linguistic and numerical expressions
Source: Gumus, 2009: 4071; Sun, 2010: 7746

In the fuzzy AHP method, there is no consistency calculation in Chang's theory. In addition to this theory, the consistency ratio analysis created by Gogus and Bouncher (1998) was performed. Consistency ratio analysis was conducted using the following calculations, and the study was found to be consistent.

$$\lambda_{max}^{m} = \frac{1}{n}\sum_{i=1}^{n}\sum_{j=1}^{n} a_{ijm}\,(w_j^m / w_i^m)\,,$$

$$\lambda_{max}^{g} = \frac{1}{n}\sum_{i=1}^{n}\sum_{j=1}^{n} \sqrt{a_{iju}a_{ijl}}\,(w_j^g / w_i^g)$$

$$CI^m = \frac{(\lambda_{max}^m - n)}{(n-1)} \; ve \; CI^g = \frac{(\lambda_{max}^g - n)}{(n-1)}$$

$$CR^m = \frac{CI^m}{RI^m}$$

$$CR^g = \frac{CI^g}{RI^g}$$

The Gogus and Bouncher (1998:137) table was used to determine 〖RI〗^m and 〖RI〗^g values. Consistency Ratio calculation was carried out in the scope of this analysis.

3.4.1. Fuzzy AHP study

In this study, the answers given by the subjects were evaluated within the scope of the consistency ratio analysis created by Gogus and Bouncher (1998). The individual consistency ratio of the subjects and the consistency ratio of the whole study were calculated separately. In both cases, Consistency Ratio (CRm) and Consistency Ratio (CRg) values were less than 0.1. Table 5 shows the consistency ratios of the study.

Participant number	Consistency type	Consistency Ratio				
		Operational factors	Living conditions onboard	Personal benefits	Personnel management policies	Company selection decision
P1	CR^m	0.0167	0.0193	0.0256	0.0289	0.0044
	CR^g	0.0385	0.0436	0.0483	0.0830	0.0006
P2	CR^m	0.0137	0.0255	0.0255	0.0365	0.0510
	CR^g	0.0306	0.0482	0.0482	0.0796	0.0964
P3	CR^m	0.0092	0.0192	0.0301	0.0374	0.0044
	CR^g	0.0221	0.0435	0.0489	0.0689	0.0006
P4	CR^m	0.0183	0.0256	0.0000	0.0175	0.0087
	CR^g	0.0325	0.0483	0.0000	0.0323	0.0384
P5	CR^m	0.0161	0.0087	0.0192	0.0229	0.0254
	CR^g	0.258	0.0384	0.0435	0.0543	0.0481
P6	CR^m	0.0174	0.0255	0.0192	0.0023	0.0256
	CR^g	0.0388	0.0482	0.0435	0.0003	0.0482
P7	CR^m	0.0031	0.0256	0.0254	0.0122	0.0301
	CR^g	0.0004	0.0483	0.0481	0.0238	0.0489
P8	CR^m	0.0329	0.0193	0.0299	0.0099	0.0301
	CR^g	0.0717	0.0436	0.0487	0.0222	0.0489
P9	CR^m	0.0255	0.0044	0.0044	0.0327	0.0192
	CR^g	0.0681	0.0006	0.0006	0.0925	0.0435
P10	CR^m	0.0365	0.0342	0.0301	0.0291	0.0254
	CR^g	0.0866	0.0866	0.0489	0.0771	0.0481
P11	CR^m	0.0320	0.0510	0.0341	0.0228	0.0254
	CR^g	0.0811	0.0964	0.0867	0.0475	0.0481
P12	CR^m	0.0373	0.0255	0.0256	0.0236	0.0344
	CR^g	0.0863	0.0482	0.0482	0.0543	0.0868
P13	CR^m	0.0415	0.0044	0.0301	0.0401	0.0192
	CR^g	0.0922	0.0006	0.0489	0.0884	0.0435
P14	CR^m	0.0459	0.0510	0.0044	0.0287	0.0192
	CR^g	0.0978	0.0964	0.0006	0.0637	0.0435
P15	CR^m	0.0298	0.0301	0.0256	0.0458	0.0301
	CR^g	0.0764	0.0489	0.0482	0.0850	0.0489
P16	CR^m	0.0273	0.0301	0.0299	0.0344	0.0044
	CR^g	0.0508	0.0489	0.0487	0.0599	0.0006
P17	CR^m	0.0181	0.0044	0.0254	0.0161	0.0254
	CR^g	0.0338	0.0006	0.0481	0.0258	0.0481
P18	CR^m	0.0182	0.0044	0.0130	0.0259	0.0511
	CR^g	0.0455	0.0006	0.0093	0.0493	0.0965
P19	CR^m	0.0180	0.0193	0.0301	0.0167	0.0044
	CR^g	0.0337	0.0436	0.0489	0.0257	0.0006
P20	CR^m	0.0100	0.0044	0.0044	0.0136	0.0086
	CR^g	0.0223	0.0006	0.0006	0.0254	0.0383
P21	CR^m	0.0239	0.0044	0.0254	0.0244	0.0192
	CR^g	0.0681	0.0006	0.0481	0.0543	0.0435
P22	CR^m	0.0205	0.0256	0.0044	0.0137	0.0192
	CR^g	0.0341	0.0482	0.0006	0.0255	0.0435

Table 5 Consistency analysis results

Participant number	Consistency type	Consistency ratio				
		Operational factors	Living conditions onboard	Personal benefits	Personnel management policies	Company selection decision
P23	CR^m	0.0228	0.0192	0.0193	0.0268	0.0513
	CR^g	0.0475	0.0435	0.0436	0.0561	0.0967
P24	CR^m	0.0136	0.0299	0.0510	0.0335	0.0255
	CR^g	0.0254	0.0487	0.0964	0.0850	0.0482
P25	CR^m	0.0212	0.0256	0.0301	0.0182	0.0044
	CR^g	0.0406	0.0483	0.0489	0.0324	0.0006
P26	CR^m	0.0137	0.0044	0.0192	0.0031	0.0193
	CR^g	0.0255	0.0006	0.0435	0.0004	0.0436
P27	CR^m	0.0046	0.0301	0.0301	0.0136	0.0299
	CR^g	0.0202	0.0489	0.0489	0.0254	0.0487
P28	CR^m	0.0031	0.0301	0.0301	0.0228	0.0192
	CR^g	0.0004	0.0489	0.0489	0.0475	0.0435
P29	CR^m	0.0204	0.0301	0.0342	0.0168	0.0193
	CR^g	0.0340	0.0489	0.0866	0.0258	0.0436
P30	CR^m	0.0250	0.0256	0.0130	0.0120	0.0044
	CR^g	0.0581	0.0483	0.0093	0.0155	0.0006
P31	CR^m	0.0207	0.0087	0.0087	0.0023	0.0193
	CR^g	0.0377	0.0384	0.0385	0.0003	0.0436
P32	CR^m	0.0046	0.0044	0.0256	0.0061	0.0350
	CR^g	0.0046	0.0006	0.0483	0.0268	0.0843
All Participants	$\boldsymbol{CR^m}$	**0.0051**	**0.0009**	**0.0056**	**0.0028**	**0.0039**
	$\boldsymbol{CR^g}$	**0.0101**	**0.0007**	**0.0078**	**0.0037**	**0.0042**

Table 5. Consistency analysis results (cont.)

When the consistency ratio of the study in Table 5 was examined, the study was found to be consistent (<0.1). In the study, the sub-criteria and main criteria under each heading were analyzed for consistency within their group.

In the scope of the study, a matrix of the main criteria and sub-criteria affecting the selection decision was created based on the statements of all subjects. While creating these matrices, the fuzzy numbers corresponding to the statements of the subjects were determined by calculating the arithmetic average. Table 6 shows the main criteria by using and grouping fuzzy numbers.

Criteria	M1			M2			M3			M4		
	l	*m*	*u*	*l*	*m*	*u*	*l*	*m*	*u*	*l*	*m*	*u*
M1- Operational factors	1	1	1	0.346	0.490	0.767	0.362	0.539	0.973	0.709	0.878	1.147
M2- Living conditions onboard	1.304	2.041	2.890	1	1	1	0.842	1.432	2.120	1.135	1.828	2.590
M3- Personal benefits	1.027	1.854	2.760	0.472	0.698	1.187	1	1	1	0.987	1.688	2.372
M4-Personnel management policies	0.872	1.139	1.410	0.386	0.547	0.881	0.422	0.592	1.013	1	1	1

Table 6. Integrated fuzzy comparison matrix for the main criteria

Table 7 shows the sub-criteria under one of the main criteria, “Operational factors” through the use of fuzzy numbers and grouping.

Criteria	O1			O2			O3			O4			O5		
	l	*m*	*u*	*l*	*m*	*u*	*l*	*m*	*u*	*l*	*m*	*u*	*l*	*m*	*u*
O1	1	1	1	0.379	0.548	0.970	0.804	1.231	1.748	0.289	0.390	0.620	0.934	1.215	1.459
O2	1.031	1.824	2.638	1	1	1	1.124	1.961	2.830	0.419	0.583	0.961	1.104	1.888	2.628
O3	0.572	0.813	1.244	0.353	0.510	0.889	1	1	1	0.305	0.419	0.689	0.779	0.886	1.048
O4	1.614	2.562	3.458	1.040	1.716	2.384	1.451	2.388	3.280	1	1	1	1.246	2.233	3.187
O5	0.685	0.823	1.071	0.381	0.530	0.905	0.954	1.129	1.283	0.314	0.448	0.802	1	1	1

Table 7. Integrated fuzzy comparison matrix for “Operational factors”

Table 8 shows the sub-criteria under one of the main criteria, “Living conditions onboard“ through the use of fuzzy numbers and grouping.

Criteria	L1			L2			L3			L4		
	l	*m*	*u*	*l*	*m*	*u*	*l*	*m*	*u*	*l*	*m*	*u*
L1	1	1	1	0.864	1.226	1.582	1.309	2.008	2.676	0.915	1.480	2.190
L2	0.632	0.816	1.158	1	1	1	1.040	1.871	2.735	0.770	1.242	1.832
L3	0.374	0.498	0.764	0.366	0.534	0.961	1	1	1	0.463	0.652	1.061
L4	0.457	0.676	1.093	0.546	0.805	1.300	0.942	1.534	2.159	1	1	1

Table 8. Integrated fuzzy comparison matrix for “Living conditions onboard”

Table 9 shows the sub-criteria under one of the main criteria, “Personal benefits”, through the use of fuzzy numbers and grouping.

Criteria	B1			B2			B3			B4		
	l	*m*	*u*	*l*	*m*	*u*	*l*	*m*	*u*	*l*	*m*	*u*
B1	1	1	1	0.461	0.660	1.099	0.358	0.502	0.801	0.802	1.145	1.496
B2	0.910	1.515	2.167	1	1	1	0.418	0.624	1.099	0.829	1.359	1.972
B3	1.248	1.990	2.794	0.910	1.602	2.393	1	1	1	1.185	1.757	2.378
B4	0.668	0.873	1.246	0.507	0.736	1.206	0.420	0.569	0.844	1	1	1

Table 9. Integrated fuzzy comparison matrix for “Personal benefits”

Table 10 shows the sub-criteria under one of the main criteria, “Personnel management policies”, through the use of fuzzy numbers and grouping.

Criteria	P1			P2			P3			P4			P5		
	l	*m*	*u*	*l*	*m*	*u*	*l*	*m*	*u*	*l*	*m*	*u*	*l*	*m*	*u*
P1	1	1	1	0.779	1.200	1.695	0.728	0.848	1.048	0.343	0.477	0.764	0.436	0.601	0.961
P2	0.590	0.833	1.283	1	1	1	0.565	0.805	1.256	0.369	0.493	0.707	0.405	0.550	0.841
P3	0.954	1.179	1.374	0.796	1.242	1.770	1	1	1	0.382	0.551	0.941	0.457	0.666	1.113
P4	1.309	2.097	2.912	1.414	2.030	2.708	1.063	1.815	2.618	1	1	1	0.975	1.548	2.094
P5	1.040	1.664	2.295	1.189	1.818	2.471	0.899	1.501	2.186	0.478	0.646	1.026	1	1	1

Table 10. Integrated fuzzy comparison matrix for “Personnel management policies”

Based on the results obtained, the process of calculating fuzzy synthetic values with first-stage formulas commenced. In this stage, the fuzzy total values of the rows were calculated. Table 11 shows fuzzy total values.

Fuzzy sum for each row			
Criteria	***l***	***m***	***u***
Operational factors	2.4177	2.9073	3.8876
Living Conditions onboard	4.2806	6.3016	8.6004
Personal benefits	3.4864	5.2406	7.3189
Personnel management policies	2.6795	3.2782	4.3037
Main criteria total value	**12.8642**	**17.7277**	**24.1107**
Ship registry	3.4056	4.3845	5.7960
Ship size	4.6794	7.2563	10.0565
Fleet age	3.0098	3.6272	4.8713
Type of ship	6.3512	9.8995	13.3088
Navigation area	3.3338	3.9289	5.0620
Operational factors total value	**20.7798**	**29.0963**	**39.0945**
Communication and Internet	4.0876	5.7143	7.4480
Recreational facilities	3.4419	4.9285	6.7246
Accommodation facilities	2.2025	2.6843	3.7868
Food and catering	2.9446	4.0150	5.5511
Living conditions onboard total value	**12.6766**	**17.3421**	**23.5106**
Duration of contract	2.6217	3.3075	4.3958
Wages	3.1571	4.4982	6.2379
Re-joining period	4.3436	6.3492	8.5656
Social security	2.5957	3.1783	4.2968
Personal benefits total value	**12.7181**	**17.3332**	**23.4961**
Qualified personnel employment	3.2860	4.1262	5.4684
Multicultural seafarer employment	2.9291	3.6814	5.0868
Training & development policies	3.5898	4.6376	6.1974
Meritocracy	5.7610	8.4894	11.3314
Workload intensity	4.6061	6.6289	8.9781
Personnel management policies total value	**20.9858**	**28.8632**	**38.1909**

Table 11. Fuzzy sum for each row

After calculating fuzzy total values, fuzzy synthetic extent values were calculated by performing the fuzzy inverse operation from the first step. The fuzzy synthetic extent values obtained through calculations are shown in Table 12.

Criteria	***l***	***m***	***u***
Operational factors	0.1003	0.1640	0.3022
Living Conditions onboard	0.1775	0.3555	0.6686
Personal benefits	0.1446	0.2956	0.5689
Personnel management policies	0.1111	0.1849	0.3346
Operational factors			
Ship registry	0.0871	0.1507	0.2789
Ship size	0.1197	0.2494	0.4840
Fleet age	0.0770	0.1247	0.2344
Type of ship	0.1625	0.3402	0.6405
Navigation area	0.0853	0.1350	0.2436

Living conditions onboard			
Communication and Internet	0.1739	0.3295	0.5875
Recreational facilities	0.1464	0.2842	0.5305
Accommodation facilities	0.0937	0.1548	0.2987
Food and catering	0.1252	0.2315	0.4379
Personal benefits			
Duration of contract	0.1116	0.1908	0.3456
Wages	0.1344	0.2595	0.4905
Re-joining period	0.1849	0.3663	0.6735
Social security	0.1105	0.1834	0.3379
Personnel management policies			
Qualified personnel employment	0.0887	0.1497	0.2711
Multicultural seafarer employment	0.0790	0.1336	0.2522
Training & development policies	0.0969	0.1683	0.3072
Meritocracy	0.1554	0.3080	0.5617
Workload intensity	0.1243	0.2405	0.4451

Table 12. Fuzzy synthetic extent values

After the fuzzy synthetic extent values were calculated, the degree of probability matrix was created using the formulas shown in the next step. Table 13 shows the degree of probability matrices for the main selection criteria.

Main criteria	**M1**	**M2**	**M3**	**M4**	**DoP**
M1 - Operational factors		0.394	0.545	0.901	0.394
M2 - Living conditions onboard	1.000		1.000	1.000	1.000
M3 - Personal benefits	1.000	0.867		1.000	0.867
M4 - Personnel management policies	1.000	0.479	0.632		0.479

Table 13. Probability degree matrices for the selection decision

Table 14 shows the degree of probability matrices for the sub-criteria constituting “Operational factors”, which is one of the main selection criteria.

Operational factors	**O1**	**O2**	**O3**	**O4**	**O5**	**DoP**
O1- Ship registry		0.617	1.000	0.381	1.000	0.381
O2- Ship size	1.000		1.000	0.780	1.000	0.780
O3- Fleet age	0.850	0.479		0.250	0.935	0.250
O4- Type of ship	1.000	1.000	1.000		1.000	1.000
O5- Navigation area	0.909	0.520	1.000	0.283		0.283

Table 14. Probability degree matrices for Operational factors

Table 15 shows the degree of probability matrices for the sub-criteria constituting “Living conditions onboard”, which is one of the main selection criteria.

Living conditions onboard	**L1**	**L2**	**L3**	**L4**	**DoP**
L1- Communication and Internet		1.000	1.000	1.000	1.000
L2- Recreational facilities	0.887		1.000	1.000	0.887
L3- Accommodation facilities	0.417	0.541		0.693	0.417
L4- Food and catering	0.729	0.847	1.000		0.729

Table 15. Probability degree matrices for living conditions onboard

Table 16 shows the degree of probability matrices for the sub-criteria constituting “Personal benefits”, which is one of the main selection criteria.

Personal benefits	B1	B2	B3	B4	DoP
B1- Duration of contract		0.755	0.478	1.000	0.478
B2- Wages	1.000		0.741	1.000	0.741
B3- Re-joining period	1.000	1.000		1.000	1.000
B4- Social security	0.968	0.728	0.455		0.455

Table 16. Probability degree matrices for personal benefits

Table 17 shows the degree of probability matrices for the sub-criteria constituting “Personnel management policies”, which is one of the main selection criteria.

Personnel management policies	P1	P2	P3	P4	P5	DoP
P1- Qualified personnel employment		1.000	0.904	0.422	0.618	0.422
P2- Multicultural seafarer employment	0.910		0.817	0.357	0.545	0.357
P3- Training & development policies	1.000	1.000		0.521	0.717	0.521
P4- Meritocracy	1.000	1.000	1.000		1.000	1.000
P5- Workload intensity	1.000	1.000	1.000	0.811		0.811

Table 17. Probability degree matrices for personnel management policies

In the last stage, the normalization calculation was made, and weight scores determined. Table 18 shows the weight of the main selection decision criteria.

Criteria	Weight
M1- Operational factors	0.1439
M2- Living conditions onboard	0.3648
M3- Personal benefits	0.3164
M4- Personnel management policies	0.1749

Table 18. Weight of the main company selection decision criteria

Table 19 shows the weight of both the sub-criteria and the main criteria. Whereas the first column shows the effect of the sub-criteria on the main criteria, the second column shows the impact of the identified sub-criteria on the company selection decision. The weight of the sub-criteria on the company selection decision was obtained by multiplying the weight scores in the first column with the weight scores given in Table 18.

Criterion	Weight within the relevant main criterion	Weight on company selection decision
Operational factors		
O1- Ship registry	0.1413	0.0203
O2- Ship size	0.2894	0.0416
O3- Fleet age	0.0929	0.0134
O4- Type of ship	0.3712	0.0534
O5- Navigation area	0.1052	0.0151
Living conditions onboard		
L1- Communication and Internet	0.3297	0.1203
L2- Recreational facilities	0.2925	0.1067
L3- Accommodation facilities	0.1374	0.0501
L4- Food and catering	0.2404	0.0877
Personal benefits		
B1- Duration of contract	0.1788	0.0566
B2- Wages	0.2771	0.0877
B3- Re-joining period	0.3739	0.1183
B4- Social security	0.1703	0.0539
Personnel management policies		
P1- Qualified personnel employment	0.1357	0.0237
P2- Multicultural seafarer employment	0.1147	0.0201

P3- Training & development policies	0.1674	0.0293
P4- Meritocracy	0.3215	0.0562
P5- Workload intensity	0.2607	0.0456

Table 19. Weight of relevant main criteria

Table 20 gives the weight of the 18 criteria determined based on the focus group study on the company selection decision in percentages.

No	Criterion	Weight score (%)
1	L1- Communication and Internet	12.03
2	B3- Re-joining period	11.83
3	L2- Recreational facilities	10.67
4	L4- Food and catering	8.77
5	B2- Wages	8.77
6	B1- Duration of contract	5.66
7	P4- Meritocracy	5.62
8	B4- Social security	5.39
9	O4- Type of ship	5.34
10	L3- Accommodation facilities	5.01
11	P5- Workload intensity	4.56
12	O2- Ship size	4.16
13	P3- Training & development policies	2.93
14	P1- Qualified personnel employment	2.37
15	O1- Ship registry	2.03
16	P2- Multicultural seafarer employment	2.01
17	O5- Navigation area	1.51
18	O3- Fleet age	1.34

Table 20. Weight of company selection decision criteria

4. DISCUSSION AND CONCLUSION

The criteria having an impact on the company selection decision of watch-keeping officers, and the weights of such criteria have been determined based on research findings. The communication and Internet criterion was found to have the highest weight score, showing the importance the new generation of officers places on social life, which is potentially a very valuable infrastructural investment information for companies wishing to expand their labor pool. The Prawitasari 2018 study proves that technology and communication are extremely important concepts when it comes to career path planning of Generation Z, as well as for every aspect of their lives. In addition, officers have been shown to tend to work for companies that have a ship rejoining duration policy. According to the statements of focus group study subjects, waiting times on land have significantly increased. This period should be reduced through effective human resources planning. The fact that the subjects emphasized criteria such as recreational facilities, food and catering, accommodation facilities, and social security is an indication of the need for better implementation of MLC requirements. Reviewing their human resources policies on “wages, duration of contract, meritocracy, training & development, qualified personnel employment” could help companies find new employees more easily. Type of ship, ship size, ship registry, navigation area, and fleet age criteria have been found to have the lowest impact on the company selection decision. The operational factor criterion, which is one of the main selection criteria and refers to company’s commercial policies that depend on a variety of factors, was found to have a very low effect on the

company selection decision. The Kaya etc. 2017 study reveals that company selection criteria and weights attributed to them by officers have changed in the last 5 years. The expectations of the officers from the company are also changing due to the changing global norms.

The Fodor and Jaeckel 2018 study shows that employers need to create an employer brand to recruit qualified personnel. It is important that the strategies of this brand have a dynamic structure capable of adapting to rapidly changing conditions. Considering the shortage of officers in the international seafarer labor market, international reports (ICS, 2021; BIMCO 2015) indicate that companies will have difficulty hiring competent officers in the near future. Given this situation, companies need to adopt policies and strategies that will attract competent officers. The findings of the study show that the living conditions onboard and personal benefits criteria have a significant weight in the company selection decision. The difficulty of hiring workforce in the future will also be an important factor that may potentially give certain companies competitive advantage. To avoid this issue, targets and strategies need to be determined, especially in the field of HR, in coordination with other departments. Future studies should evaluate the expectations of officers in more detail to determine the relevance of each sub-criterion and allow companies to tailor their policies.

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