IBN HALDUN UNIVERSITY
SCHOOL OF GRADUATE STUDIES
DEPARTMENT OF AIR TRANSPORT MANAGEMENT

MASTER THESIS

CABIN CREW SELECTION WITH THE MULTIMOORA METHOD: AN APPLICATION IN AN AIRLINE COMPANY

MERVE DAĞ

THESIS SUPERVISOR
PROF. ALİ OSMAN KUŞAKCI

İSTANBUL, 2024

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by
MERVE DAĞ

A thesis submitted to the School of Graduate Studies in partial fulfillment of the requirements for the degree of Master of Science in Air Transport Management

THESIS SUPERVISOR
PROF. ALİ OSMAN KUŞAKCI

İSTANBUL, 2024

THESIS APPROVAL PAGE

This is to certify that we have read this thesis and that it is fully adequate, in scope and quality, as a thesis for the Master of Science in Air Transport Management degree.

Thesis Jury Members

Title-Name Surname	Opinion	Signature
_____	_____	_____
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_____	_____	_____

This is to confirm that this thesis complies with all the standards set by the School of Graduate Studies of Ibn Haldun University:

Date of Submission Seal/Signature

ACADEMIC HONESTY ATTESTATION PAGE

I hereby declare that all information in this document has been obtained and presented by academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

Name-Surname:

Signuture:

ÖZ

MULTİMOORA YÖNTEMİ İLE KABİN EKİBİ SEÇİMİ: BİR HAVA YOLU ŞİRKETİNDE UYGULAMA

Dağ, Merve
Hava Taşımacılığı Yönetimi Yüksek Lisans
Öğrenci Numarası: 224038013
Open Researcher and Contributor ID (ORC-ID): 0000-0002-5888-6014
Ulusal Tez Merkezi Referans Numarası: 10657772

Tez Danışmanı: Prof. Dr. Ali Osman Kuşakcı
Ağustos 2024, 69 Sayfa

Gelişen dünyada işletmelerin rakiplerine karşı güçlü olmak ve devamlılıklarını sağlamlaştırmak için yenilikleri yakından takip etmeleri gerekir. Bunu başarmak için işletmelerinin imajını geliştirecek çeşitli faaliyetlerde bulunmaları gerekir. Hedeflenen kalite, başarı ve kazancı elde etmek için en iyi özelliklerle donatılmış çalışanların seçilmesi gerekir. Rekabetçi piyasada işletmeye artı değer katacak insan kaynaklarının üst düzey özellikler taşıması, iyi bir eğitim sürecinden geçmiş olması ve işletmeye bağlılıklarının devam etmesi önemlidir. Bütün bu nedenler, insan kaynakları yönetiminin önemini her geçen gün arttırmaktadır.

Etkin insan kaynakları yönetimi, özellikle değişen yaşam koşullarından etkilenen havacılık sektöründe kritik bir rol oynamaktadır. Özellikle kabin hizmetleri, havayolu şirketlerinin görünen yüzünü temsil eden, yolcularla direkt iletişim kuran, olumlu veya olumsuz imajın belirleyicisi olacak faaliyetleri kapsayan bir alan olduğundan müşterilerin beklentilerine karşılayacak personel temini sürecini titizlikle sürdürmek durumundadır. Bu nedenle rekabet sürecini olumlu yönetecek, havayolu şirketlerinin değerlerini temsil edecek, üstün özellikleri ile müşteri ve kalite beklentilerini karşılayacak kabin görevlilerinin istihdam edilmesi için bazı kriterler belirlenir. Bu çalışmada bir hava yolu firmasının kabin memurlarında aradığı yetkinlikler ve kriterler göz önünde bulundurularak personel seçimi çalışması yapılmıştır. Personel seçimi

sürecinde değişkenlik ve sübjektiflik ilkeleri nedeniyle çok kriterli karar verme yöntemlerinden bulanık MULTIMOORA metodu önerilmiştir.

İlk aşamaları geçen üç aday, bir hava yolu şirketinde personel alımında görevli uzmanlar tarafından ilgili pozisyon için gerçekleştirilen görüşmede değerlendirilmiştir. İnsan kaynakları uzmanları ile gerçekleştirilen bu görüşmeler sonucunda ortaya çıkan veriler kullanılarak MULTIMOORA yöntemiyle en iyi aday belirlenmeye çalışılmıştır. Bulguların geçerliliğinin test edilmesi amacıyla bütünleşik bir AHP-TOPSIS uygulamasının sonuçlarından da yararlanılmıştır.

Anahtar Kelimeler: Bulanık MOORA Yöntemi, Çok Kriterli Karar Verme, Havacılık Sektörü, İşe Alım, Kabin Memuru.

ABSTRACT

CABIN CREW SELECTION WITH THE MULTIMOORA METHOD: AN APPLICATION IN AN AIRLINE COMPANY

Dağ, Merve
MSc in Air Transport Management
Student ID: 224038013
Open Researcher and Contributor ID (ORC-ID): 0000-0002-5888-6014
National Thesis Center Reference Number: 10657772

Thesis/Project Supervisor: Prof. Ali Osman Kuşakcı
August 2024, 69 Pages

In the developing world, businesses must follow innovations closely to be robust against their rivals and to maintain their continuity. To achieve this, they need to carry out various activities that will improve the image of their businesses. Workers with the best characteristics must be chosen to accomplish the targeted quality, success, and profit. In the competitive market, it is essential that the human resources that will add value to the business have high-level qualifications, have undergone a good training process, and remain committed to the company. All these causalities increase the significance of human resources management every day.

Influential human resources management is critical in the aviation industry, significantly affected by changing living conditions. Especially since cabin services are an area that represents the visible face of airline companies, communicates directly with passengers, and includes activities that will determine the positive or negative image, it is necessary to meticulously continue the process of recruiting personnel to meet customers' expectations. For that reason, some measures are determined for the employment of cabin crew who will manage the competitive process positively, represent the values of the airline companies, and meet customer and quality expectations with their most significant characteristics. A personnel selection study was conducted in that study, considering the competencies and criteria that an airline company seeks in cabin crew. Due to the principles of variability and subjectivity in

the personnel selection process, the FUZZY MULTIMOORA approach, one of the multi-criteria decision-making methods, was suggested.

Three candidates who passed the first steps were evaluated in an interview by an airline company's personnel recruitment experts for the relevant position. The data obtained from these interviews with human resources experts was used to determine the best candidate with the MULTIMOORA method. The results of an integrated AHP-TOPSIS application were also utilized to test the validity of the findings.

Keywords: Aviation Industry, Cabin Crew, Fuzzy MOORA Method, Multi-Criteria Decision, Recruitment.

DEDICATION

“I dedicate all of my success to my sister, who makes me feel like spring and encourages me to bloom like a vibrant flower whenever I start to fade.”

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Merve Dağ

ISTANBUL, 2024

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LIST OF SYMBOLS AND ABBREVIATIONS

AHP	Analytical Hierarchy Process
ANP	Analytical Network Process
DEMATEL	Decision-Making Trial and Evaluation Laboratory
ELECTRE	Elimination and Choice Expressing Reality
MCDM	Multi-Criteria Decision Making
MOORA	Multiple Objective Optimization based on Ratio Analysis
MULTIMOORA	Multi-Objective Optimization by Ratio Analysis
TOPSIS	Technique for Order Preference by Similarity to Ideal Solution
VIKOR	Vise Kriterijumska Optimizacija I Kompromisno Resen

CHAPTER I

INTRODUCTION

Global aviation developments have increased the workforce and competition. Airline companies use a variety of strategies to differentiate themselves in the competitive climate, go over customer demands, and be the preferred company on their flights. Experts, managers, and system developers keep up with corporate strategy and operations advancements in a continually changing and developing environment. The use of technological innovations and the need for qualified labor have compelled a reconsideration of the concept of human resource management. That is why, in recent years, human resource management has been structured as a planned and methodical process. Personnel evaluation techniques and criteria are set, and the recruitment process moves on appropriately. However, established processes and criteria in human selection do not always yield solid results due to the subjective attitudes of the evaluators. Different strategies in human resource management are being developed to avoid undesirable scenarios that may happen due to this situation. The competencies and qualities of cabin crew, who comprise the most critical human resources branch in the civil aviation sector, are essential for resolving potential challenges.

1.1. The Aim of the Study

This study aims to contribute to the field by analyzing the successful criteria and personnel selection process for cabin crew recruitment in an aviation company. The study analyzes the requirements previously established by specialists in recruiting cabin crew, which are fundamental components of the aviation business.

This study aims to determine the critical considerations for airlines when selecting new cabin crew members and to evaluate three potential candidates based on these

considerations. In the conducted research, the criteria for cabin crew selection were determined. The evaluation and ranking of three cabin crew candidates was carried out by applying the Fuzzy MULTIMOORA method. The criteria weights were determined using the Multi-Criteria Decision Making (MCDM) AHP-TOPSIS method. The results were evaluated using the AHP-TOPSIS method. The results were similar to MULTIMOORA. No existing literature study applies MCDM methods to evaluate cabin crew. Therefore, this study is expected to significantly contribute to the literature. The research study received approval from the Presidency of the Social and Human Sciences Scientific Research and Publication Ethics Committee of Ibn Haldun University on 24.06.2024 (Meeting Number: E-71395021-050.04-42911, Decision Number: 2024/06-05).

1.2. Content

The research focuses on cabin crew members in the passenger transportation industry and the specialists who assess them. The issue of the selection process for cabin crew has been investigated.

1.3. Method

In the study, information about the subject was gathered through interviews, which is a qualitative research method, following the thesis's scope and purpose. By accessing essential resources, guides, and standards used by experts, we conducted a thorough literature review of the subject. This enabled us to gather valuable insight into candidate selection criteria. One evaluation expert and ten cabin crew candidates were chosen in this regard. There are factors to be considered when selecting candidates. The requirements were developed by the company's human resources department following an assessment of the necessary skills for the positions. After interviewing an expert, the suitability of ten candidates for cabin crew recruitment was assessed according to the criteria. In this study, Balezantis et al. (2012), the multi-criteria decision-making (MCDM) method known as MULTIMOORA, which takes into

account verbal and numerical criteria and is frequently used in personnel selection, was used. The documents were analyzed, and the interview data were evaluated.

Using the scientific decision-making technique with the subjective outcomes collected during the cabin crew selection problem resulted in a more objective evaluation outcome. Due to its features, which include having very little numerical data and imprecise information, such an approach is used in the study chosen for analyzing and resolving the personnel selection problem. The candidates were also assessed using the integrated AHP-TOPSIS technique, and it was seen that the two models produced the same result, proving the validity of the findings and comparing the usefulness of the suggested method.

CHAPTER II

LITERATURE REVIEW

2.1. Multi-Criteria Decision Approaches in the Airline Industry

Businesses use raw resources to make items and provide their consumers and employees with good service to fulfill their corporate goals. Successful human resource management is essential for the organization to use its resources efficiently. It takes time and money to define what constitutes human resources, assess the hiring environment and train and develop staff. Personnel selection and recruitment are two of the most crucial human resources processes that must be done carefully. The approaches are used in these processes to make the most significant contribution. It is now easier to determine the best people for the employment position because the approaches used give more effective results. This thesis section discusses studies employing MCDM (Multi-Criteria Decision Making) approaches for human resource selection.

Analytical Hierarchy Process (AHP), TOPSIS (Technique for Order Preference by Similarity to Ideal Solution), DEMATEL (The Decision Making Trial and Evaluation Laboratory), ELECTRE, ORESTE (Organization, Rangement Et Synthese De Donnees Relationnelles), VIKOR (ViseKriterijumska Optimizacija I Kompromisno Resenje), etc. are commonly used in personnel selection. In addition to these approaches, integrated applications and their versions, such as AHP-TOPSIS, AHP-MOORA, AHP-VIKOR, AHP-BVZA, and AHP-ELECTRE.

One of the multi-criteria decision-making methods, the Analytical Hierarchy Process (AHP), was created in 1977 by Thomas L. Saaty. Together, qualitative and quantitative characteristics are evaluated since the team leading the AHP process places a high value on these priorities. "In AHP, the first stage is to identify the elements and sub-

factors relevant to the decision maker's goal. In AHP, the objective is chosen first and then the factors influencing the goal are attempted to be determined. To identify all aspects affecting the decision-making process, a survey research or expert opinions might be consulted (Dağdeviren et al., 2004).

The TOPSIS (Technique for Order Preference by Similarity) Method is a multi-criteria decision-making approach created in 1980 and used in various fields. The first step is to identify the evaluation criteria for the options. The raw data in the Decision matrix is then converted to normalized form. Criteria are weighted based on their importance in the decision-making process. The relative relevance of each criterion is reflected in the weights. Solutions that are both ideal and anti-ideal are identified. The proximity to the perfect solution is calculated. It is calculated by comparing each alternative's proximity to the ideal solution and distance from perfect and non-ideal solutions. Alternatives are evaluated based on how close they are. The alternative with the most excellent proximity is regarded as the ideal option. The TOPSIS approach considers both the advantages and disadvantages of each option, making it a valuable technique for making decisions when multiple criteria are at play.

"Criteria determined in personnel selection; appearance, age, general knowledge, general ability, decision making, time management, tendency to teamwork, willingness, analytical thinking, graduation status, foreign language knowledge, work experience." (Kuşakçı et al., 2019). Doğan & Önder (2014). They used the AHP and TOPSIS methodologies to pick sales representatives for work in the IT sector, with the primary factors being experience/job experience, education, professional needs, individual qualities, and appearance.

DEMATEL is a decision analysis methodology that evaluates and models cause-and-effect correlations between various aspects or criteria utilized in the decision-making process. It enables decision-makers to see how different factors are interdependent and helps make better selections. If the essential steps in the DEMATEL technique are described, the factors, variables, or criteria connected to the decision problem must first be established and listed. The cause-and-effect links between the determined

factors are represented by a matrix that is made. To make the elements of a similar scale, it normalizes the matrix, converting the raw values into measurements of relative importance. The total impacts for each component are computed by adding the rows and columns of the normalized matrix. This process aids in the identification of factors that significantly impact the system as a whole. A factor can be categorized as either a push factor (having a substantial effect on others) or a dependency factor (being influenced by others). A directed graph or cause-effect diagram can visualize cause-and-effect interactions between variables.

Aksakal & Dağdeviren (2015) evaluated each personnel using DEMATEL and AHP methodologies, considering the interdependence of criteria. As a result, this strategy can often be applied in decision-making procedures, including complicated interactions and dependencies between criteria. It offers a structured way to understand factor interactions and assists in prioritizing them based on their impact on the overall decision problem.

ELECTRE, which stands for Turning Elimination and Selection into Reality, is a collection of multi-criteria decision analysis approaches used to handle decision-making situations with numerous competing criteria. It has undergone multiple expansions and adaptations since its creation in the late 1960s by French operations research specialist Bernard Roy. ELECTRE methods are intended to address choice issues in which options are evaluated using more than one criterion, each of which may be of varying value. The purpose is to rank or select alternatives based on their positive and negative characteristics.

When employing the ELECTRE technique to choose candidates for employment, a structured process is used to evaluate and rank job applicants based on a variety of factors. Qualifications, abilities, experience, personality features and other pertinent variables are examples of criteria. The main job-related criteria are determined. This could include schooling, suitable professional experience, specific abilities, communication skills, teamwork, etc. Every criterion is given a weight according to its importance to the company. For instance, the candidate's age may not carry as much

weight as their educational background. Every applicant is assessed using predetermined standards. Compatibility indices determine how well a candidate meets or surpass the criteria. Incompatibility indices can aid in identifying conflicts or areas in which the candidate falls short. It is decided which candidates are dominant over others or whether some candidates are not. Both compatibility and incompatibility indexes can be used to rate candidates. Candidates that satisfy the minimally acceptable standards are identified by setting a decision threshold. Applicants who meet this criterion might be considered for advancement in the hiring process. It is crucial to highlight that while the ELECTRE methodology gives a systematic approach to decision-making, it is only one of many accessible methods, and its effectiveness is determined by the correctness of the criteria, the weights allocated, and the quality of the candidate information supplied. In addition, human judgment and knowledge should always be considered in the final hiring choice.

The VIKOR approach is very beneficial when discovering a compromise solution that balances competing criteria. It provides a systematic and quantitative method for decision-making while dealing with various and frequently contradictory aims. This ranking and selection system has been used in multiple sectors, including engineering, finance, and environmental management.

El-Santawy's research (2012), "Using VIKOR for Ranking Personnel Problem," suggests that the best candidates be chosen using the VIKOR method to organize personnel training for an international company. This recommendation is based on factors like age, work experience, company experience, and the results of the human resources exam. (Kuşakçı et al., 2019)

In addition to the methods used in the field of human resources, Akduman & Karahan (2020) Competency and Qualities A Cabin Attendant Should Have: A Field Survey with Cabin Attendants Who Are Graduates of Civil Aviation Cabin Services obtained data from a demographic information form consisting of two questions about gender and status as a cabin crew member, as well as a form containing questions created from 11 scales. Furthermore, a survey form called the "Five Factor Personality Scale" was

designed and verified. The data was analyzed using the SPSS 21.0 program. Tables showing frequency and percentages correspond to the people's demographic data.

Akduman & Karahan (2021) provide a recruitment model proposal in their study, A Model Suggestion for Civil Aviation Cabin Services Cabin Crew Recruitment, that can be used to find qualified cabin crew members for employment in civil aviation cabin services.

In their study Cabin Crew Selection in Civil Aviation with Fuzzy SWARA and Fuzzy MARCOS Methods, Aşkın Özdağoğlu, Murat Kemal Keleş, and Barış Işıldak (2021) employed a variety of techniques to assess the significance of the factors airline companies should take into account when employing cabin crew and to select the most appropriate option among the available cabin crew options. Candidates are ranked using the Fuzzy MARCOS approach and one of the criterion decision-making techniques, fuzzy SWARA. In the analysis, "education and success level," "foreign language knowledge," and "physical characteristics" were identified as the top three evaluation criteria, respectively.

Ulufer Kansoy & Koçali (2023) conducted an "Anthropometric Analysis Of Cabin Crew Selection Criteria Based On A380 Aircraft Model" study. The study focuses on the criteria set by airline companies to ensure that they meet the specific requirements for selecting cabin crew members. Ulufer Kansoy & Koçali (2023) recommend that airline companies use standardized anthropometric measurement parameters to select cabin crew in their study.

We will apply the MULTIMOORA method, created in 2006 by Brauers and Zavadskas, to that thesis. "One of the multi-criteria decision-making techniques, the MOORA method, has been increasingly popular in recent years for use in staff selection." (Tepe & Görener, 2014) When making a decision, it's crucial to start by clearly defining the Decision Problem. This means outlining the objectives and criteria that need to be taken into consideration, as well as identifying available alternatives. Relevant criteria are then identified and given weight based on their significance. They

are normalized to ensure that all requirements are on the same scale. Reference points for each criterion are established using the intended performance levels. An overall performance score for each alternative is calculated by multiplying the weighted ratios by the weights assigned to each criterion. Alternatives are then ranked based on their total points, with the option receiving the lowest score typically being deemed the best one. Although this strategy is relatively new, it has already been implemented in various industries for personnel selection.

Özbek (2015) utilized the AHP and MULTIMOORA methods to determine the most suitable manager for the position of principal at Kırıkkale Vocational School. Similarly, Akar and Çakır (2016) employed these same techniques to select logistics operations personnel and achieve the best outcomes.

Academic studies in aviation are increasing daily. Studies that approach different topics with new methods enrich the field. Table 2.1 includes a literature review that provides information on personnel selection in aviation, various studies on cabin crews, and the techniques used in these studies.

Table 2.1. Approaches Used for Human Resource and Cabin Crew Selection

Çalışmanın yazarı/yazarları	**Çalışmanın konusu**	**Kullanılan yöntemler**
Akduman & Karahan (2020)	Field research among employed civil aviation cabin services program graduates	Survey, Statistical analysis
Yelgin & Ergün (2020)	Job demands perceived by cabin crew in airline companies operating in Turkey.	Survey, Statistical analysis
Erdağ & Yaşlıoğlu (2020)	Qualitative research on cabin crew in an airline company	Deliberate sample selection
Tsaur et al. (2020)	Evaluation of cabin crew problems in the sector	Content analysis

Table 2.1. (cont.)

Yıldırım et al. (2019)	Personnel selection in airline companies	ARAS
Kuşakcı et al. (2019)	Personnel selection in the field of aviation	Fuzzy MULTIMOORA
Korkmaz & Özcan (2018)	Performance evaluation of cabin crew in an airline company	Data mining
Yılmaz & Flouris (2017)	Manager selection at airports	AHP
Yazgan & Erol (2016)	Investigation of selection criteria of civil aviation pilot candidates	Regression analysis
Korkmaz et al. (2013)	Leadership and job satisfaction perceived by cabin crew in the civil aviation industry	Survey, Statistical analysis

Source: Özdağoğlu et al. (2021)

This thesis aims to provide an in-depth analysis of cabin staff selection criteria and choose the most suitable candidate for the role out of ten cabin crew. To achieve this goal, the MULTIMOORA method was utilized, which is a prominent decision-making tool that considers multiple criteria and multiple options. Furthermore, the validity of the results obtained from the MULTIMOORA method was tested using an integrated AHP-TOPSIS application. Overall, the study's findings provide valuable insights into the selection criteria for cabin crew and help identify the best candidate for the position. The research highlights the importance of utilizing practical decision-making tools, such as the MULTIMOORA and AHP-TOPSIS methods, to ensure the selection of the most qualified and competent candidate for the role.

2.2. Cabin Services Concept

The civil aviation sector provides significant benefits for sustainable development and encompasses economic, social, political and environmental aspects. Due to these advantages, numerous airline companies compete to establish their presence in the sector. Changing competitive conditions and the emergence of employment

opportunities in the industry, along with other related areas, have prompted airline companies to implement new measures for more effective and efficient use of their marketing initiatives. “Company managements have financial goals and objectives. The measure of achieving these goals is expressed as activity. In this context, effectiveness is a performance measurement tool” (Güngör, 2022). To gain recognition and preference, airline companies have prioritized the development of various strategies, with a particular emphasis on enhancing cabin services. To effectively reach a substantial customer base, meet service expectations and ensure seamless flight operations, engaging skilled and experienced personnel with versatile qualifications is imperative."It is crucial for the cabin crew members responsible for cabin services to be experienced and positively impact passengers. Cabin services encompass all the services the cabin crew provides to ensure passengers' comfort and satisfaction throughout a flight's entire duration" (İşbitir, 2018). "Throughout a flight, passengers consistently interact with cabin crew members, from boarding to disembarkation. Given this extensive contact, the role of these employees is paramount in shaping the favorable perception of airline carriers." Following the Commercial Air Transport Operations Regulation (2022) established by the General Directorate of Civil Aviation (DGCA), the flight crew encompasses pilots and flight engineers, who bear responsibility for the operation and oversight of the aircraft, as well as cabin crew, who are tasked with delivering in-flight services. In civil aviation, there are specific characteristics that flight crews must possess and certain obligations they must fulfill.

2.2.1. Cockpit Crew

In the DGCA Flight Crew Flight Duty and Rest Periods and Application Principles Instruction (2014), cockpit personnel are defined as follows.

"The captain pilot is responsible for all aircraft operations during a flight. They are appointed by the company, hold the status of captain pilot, and have a specific license authorized by the DGCA for this purpose" (DGCA, 2014).

Captain Pilot in Charge: The captain pilot, determined by the Aviation Operators, is responsible for directing and managing the flight. If the captain pilot cannot perform their duty in an emergency, another pilot will temporarily take over this responsibility.

As designated by the DGCA, the co-pilot is responsible for the command and management of the aircraft alongside the pilot in charge and the pilot in command. The co-pilot is a pilot appointed by the company, with a specific license assigned for this purpose by the General Directorate of Civil Aviation, and is a cockpit crew member (DGCA, 2014).

2.2.2. Cabin Crew

The Civil Aviation Flight Crew Flight Duty and Rest Periods and Application Principles Instruction (DGCA, 2014) states that "the cabin crew, whose primary duty place is the aircraft's cabin and who have received the necessary basic and refresher training and are certified by the operator to meet passenger safety and requirements, also serve in the performance of flight duties in addition to the cockpit crew.". "The attendants who are responsible for ensuring that any required safety and security measures are implemented on board any aircraft performing passenger transportation and for passengers' comfort, are defined as "cabin crew members" or "cabin attendants." (DGCA, 2024)

Cabin Crew Members, serving in the cabin compartment of the aircraft to ensure that flights are operated safely, securely, and comfortably, refer to the persons who satisfy the requirements prescribed under the relevant regulations promulgated by the Directorate General of Civil Aviation and who have completed their pieces of training successfully and who, thereby, become entitled to obtain a "Cabin Crew Member Certificate" (DGCA, 2024). Cabin crew members are divided into three groups of workers. These include the chief, cabin crew members and cabin attendants.

Cabin chiefs are chosen from cabin crew members who meet professional standards, have at least five years of experience, and have completed cabin crew training and exams. “The cabin chief ensures and monitors that the catering/product service is carried out by the standards throughout the flight following the policies and objectives of the airline company and reports any detected deficiencies by ensuring that the service is provided within the framework of flight duties and responsibilities for service quality and passenger satisfaction.” (Karaarslan, 2014)

"Cabin crew members have been assigned professional experts to increase the quality of service in recent years. An example of these experts is the flying chefs assigned to long-haul flights." (DGCA, 2019).

“They are professional experts assigned to increase the service quality as a cabin crew member, apart from the cabin chief and cabin attendant (DGCA, 2012). In recent years, flying chefs, who have been assigned especially to wide-body and long-range flights, do not have the status of cabin attendant but are included in the cabin crew.”

“Cabin crew members are the cabin crew members responsible for the safety of the flight under normal and emergency circumstances by national and international provisions, are responsible to the cabin chief and the captain pilot and have the appropriate certification levels” (DGCA, 2019).

2.3. Cabin Crew Members’ Competencies and Characteristics

The importance of employing qualified personnel in the aviation sector is very significant, especially since cabin crew members “play a critical role in terms of passenger comfort and the behavior of cabin crew members towards passengers directly impacts the service quality and customer satisfaction of the airline company.” (Kızılcan, 2023).

“Airlines or placement agencies hiring cabin crew will have varying requirements depending on the airline and the country. While there may be some variation, most airlines will look for some minimum requirements for the job.” (IATA, 2006). Depending on the airline, it may be necessary to possess specific skills, physical attributes and personal characteristics. While advertisements often specify only the minimum requirements, it is essential to note that skills, psychological traits and characteristic features are also evaluated at subsequent stages following the initial screening process.

Listed below are the minimum requirements that airlines take into consideration when making hiring decisions:

- “Minimum age requirements vary worldwide between 18 and 21 years.”
- “Height requirements are generally between 1.57m and 1.85m.”
- “Weight should be proportionate to height and you should be in excellent physical and medical condition. Many airlines will conduct a medical check, including vision and hearing screening, and ask you to take a drug test. Contact lenses and eyeglasses are allowed. Most airlines will also require that you can swim.”
- “Background check (work history and criminal record) varying from 5-10 years depending on the requirements of the country or airline that you are applying to.”
- “Some airlines may have specific language requirements of fluency in one or more languages. Multiple language skills are a hiring advantage at most airlines. If an airline flies internationally, you must be able to speak English, which is aviation’s international language.”
- “You must be a holder of a valid passport without restrictions. (You may be asked to bring it to your interview).”
- “High school diploma or certificate of completion is required by most airlines, but university education is not required for all airlines” (IATA, 2006)

Some of the major airlines worldwide have set minimum requirements. For example, Qatar Airways conducts the recruitment process based on the following criteria:

- “Minimum age of 21
- Minimum arm reach of 212 cm

- High School Certificate
- Fluent in English (written and spoken)
- Exceptional interpersonal skills
- Passion for service and an ability to work as part of a multicultural team
- Excellent health and fitness
- A willingness to relocate to Doha, Qatar" (Qatarair, 2024)

Singapore Airlines is the second largest airline in the world. The criteria for cabin crew recruitment are as follows:

- "Minimum age of 18 years old due to legislative requirements
- Pleasant personality and service-oriented
- Fluent in English with good communication skills for servicing international customers
- Minimum height requirement of at least 1.58m for females and 1.65m for males to carry out safety and emergency procedures onboard

Minimum qualification of 5 GCE 'O' Level credits (including English) or Higher Nitec and above" (SingapurAir, 2024).

Emirates Airlines cabin crew recruitment criteria are listed below:

- "Fluent in written and spoken English (additional languages are an advantage)
- A natural team player with a personality that shines.
- At least 160cm tall and able to reach 212 cm high.
- Able to meet the UAE's employment visa requirements.
- At least 21 years old.
- A minimum of high school graduate (grade 12) education
- No visible tattoos while in Emirates cabin crew uniform" (Emirates group, 2024)

Airlines base their hiring decisions on the skills they possess and the experiences they have under their belt. Listed below are experiences and qualities that airlines generally look for in candidates for cabin crew.

Table 2.2. Qualities That Airlines Generally Look for in Candidates for Cabin Crew

Customer service experience
Strong communication skills
Experience in dealing with the general public
First aid or medical training
Ability to work well in a team
Good judgment
Ability to handle pressure in stressful situations
Outgoing
Flexible
Positive self-image with excellent grooming and appearance
Outstanding attendance and dependability
Willingness to work on an unpredictable schedule, holidays,nights and weekends

Source: IATA (2006)

In Turkey, the Directorate General of Civil Aviation (DGCA), Ministry of National Education (MoNE), aviation training institutions and airline companies have established specific criteria for recruiting cabin crew members. Airline companies meticulously select cabin crew members, emphasizing their versatility and qualifications. "The main purpose of personnel selection is determining the most suitable candidate. To make this determination, relevant information must first be collected from the candidate. If necessary, a knowledge and skill test must be conducted, followed by an interview" (Küçükkönal & Korul, 2002). At each stage, specific characteristics are desired for cabin crew members.

The Ministry of National Education states in the “Food and Beverage Services, Stewardess Related Institutions and Legislation” (MoNE, 2012) that flight attendants must have the following characteristics:

- To be a citizen of the Republic of Turkey,
- Reside in the cities requested by the airline company,

- At least a high school graduate or equivalent approved by the Ministry of National Education,
- At least 18 years old.
- Document that you can speak at least one foreign language well. (Second language is preferred).” (MoNE, 2012)
- At least 160 - 175 cm tall for women,
- At least 170 - 185 cm tall for men.

Apart from the specified conditions, this situation must be documented with "no physical defects, a suitable health condition for flight, and a fully equipped hospital report" (MoNE, 2012).

Cabin crew applicants must meet requirements such as "not having a criminal record, not having previously left a flight duty in other aviation organizations due to indiscipline, insufficient record, or health reasons" (MoNE, 2012).

The requirements listed below are outlined in Turkish civil aviation regulations to become a member of the cabin crew:

- “Being 18 years of age or older,
- Attaining a health report from an approved health institution attesting to the individual's ability to perform their duties fully,
- meeting the physical (height, weight compliance, etc.) and psychological requirements requested by the company,
- Possessing a high school diploma that has been approved in Turkey or abroad,
- Having adequate knowledge of English."(DGCA, 2024)

Some of the airline companies operating in Turkey have the following criteria for cabin crew recruitment:

Turkish Airlines has the following criteria for cabin crew recruitment;

- Cabin crew members must accept and commit to carrying out their duties following the regulations outlined in the Uniform Use and Representation Manual.

- Considering the flight destinations and our connecting flights, candidates must have a good command of English. Proficiency in a second foreign language is also desirable.
- In job advertisements, the required educational qualifications are usually stated as a college degree, but sometimes high school graduates are eligible to apply. Candidates who completed their high school or university education abroad must have their credentials evaluated and provide the necessary documents.
- Female candidates applying for cabin crew positions must meet height requirements of 160-180 cm, while male candidates must be 170-190 cm tall. Weight assessment is based on the height-weight index.
- As depicted in the image outlining our tattoo guidelines, visible body parts (as indicated by the white areas) should be free of tattoos, piercings, wounds, burns, stains, birthmarks, or any other permanent marks.
- Applicants must not have a criminal record or any archived criminal records. (Turkish Airlines, 2024).

Candidates who want to join Ajet Airlines cabin crew must have the following qualifications.

- Having Turkish citizenship,
- Born between 01/01/1989 and 31/12/2003,
- Residing/able to reside on the Anatolian side of Istanbul or in Ankara,
- Having at least a high school diploma,
- Knowing English fluently (A second foreign language is preferred),
- Not having a criminal record or criminal archive record,
- Not having previously left THY Inc. or THY Inc.'s subsidiary companies through termination,
- Not having previously been a member of THY Inc. or who have not left their positions in different organizations due to behaviors against moral and good faith rules such as absenteeism, indiscipline,
- No obstacle to domestic and international travel,
- Can start training as of May 2024 if the process progresses positively,
- Have a height between 160-180 cm and an appropriate height-weight ratio,

- Candidates who do not have permanent marks such as tattoos, piercings, and wounds/burns/blemishes on visible parts of their body when wearing the AJet Cabin Crew uniform can apply (Ajet, 2024).

Cabin crew members applying to Pegasus Airlines must have the qualifications listed below.

- Being a citizen of the Turkish Republic,
- Born on January 1, 1988, or after,
- Minimum degree from high school,
- Possessing a solid command of English,
- height of between 160 and 180 cm for female candidates and 170 and 190 cm for male candidates,
- The ability to travel abroad for extended periods,
- No physical or mental health problems that would prevent airworthiness,
- The completion of military service or its aftermath for at least a year,
- The ability to live on the Anatolian side of Istanbul. (Pegasus, 2024)

To become a cabin crew member on Sunexpress Airlines, the following criteria must be met.

- Possession of a valid passport and citizenship in the Republic of Turkey are essential requirements,
- Being born before January 1, 2003, is also required.
- Individuals who completed their education domestically need to show proof of graduation, while those who studied overseas need to show proof of high school equivalence,
- Possessing strong proficiency in both Turkish and English (a second language is ideal),
- The ideal height-weight ratio for female applicants is between 1.55 and 1.80 meters, while the perfect height-weight ratio for male candidates is between 1.60 and 1.85 meters. Cabin crew members must have no visible tattoos, piercings, or scars. They must have a clean appearance and be proficient swimmers(Sunexpress, 2024).

When analyzing advertisements, specific age, education, physical appearance and health criteria were established. However, qualifications about competency were left to the airlines' discretion for consideration in subsequent stages. According to Akduman & Karahan (2020), the role of a cabin crew necessitates a high level of discipline and meticulous attention to detail due to the inherent responsibilities. Additionally, possessing advanced communication and empathy skills is essential as the role is people-oriented. When examining the job postings for cabin crew positions in Turkey and other countries, it becomes apparent that cabin crew members are expected to project a professional image by adhering to the uniform requirements and maintaining a well-groomed appearance while displaying a consistently positive and friendly attitude. The recruitment process for cabin crew members involves a thorough evaluation of the candidate's personality traits and ability to embody the values and standards of the airline. In the selection of cabin crew, human resources experts take into consideration a range of essential qualities. These include aptitude for work, experience, knowledge, and skills, all of which play a crucial role in creating a professional working environment for cabin crew.

“In addition, considering that the airline sector is a service sector, the importance of cabin crew's personalities, emotional intelligence, proactivity, harmony with their teammates and communication with passengers is well analyzed by human resources” (Ulufer Kansoy &Koçali, 2023).

Businesses in the aviation sector aim to acquire high-quality personnel to achieve their goals and ensure their sustainability. To achieve this, they conduct various tests, exams, and competency assessments to evaluate candidates' emotional and personality traits. Aviation personnel must possess a compatible personality and meet professional requirements to collaborate effectively in a team. Furthermore, a pleasant and safe trip is greatly influenced by the communication between the cabin crew and the crew. As a result, duties and training must be completed before beginning work and even during the hiring process. The candidates' physical, psychological and emotional structures must be strong enough to handle these levels. For all the reasons mentioned above, airline companies prioritize evaluating candidates' human qualities and skills during

board meetings, interviews and other stages to identify and recruit the desired workforce profile. “Although the competencies that cabin crew members should have are known experientially by experts working in this field, there is no scientific study on this subject” (Akduman & Karahan, 2020). The following characteristics, which experts learn from experience, generally fall under the following headings: extroversion, adaptability, responsibility, openness to change, self-love, self-efficacy, communication skills, empathy, social skills, social awareness, psychological resilience, human values, and moral maturity (Akduman & Karahan, 2020). Experts in the field consider all these characteristics when comparing candidates applying for a cabin crew position.

2.3.1. Cabin Crew Selection Process

All firms have specific decision-making policies to define their objectives and unite individuals to work toward them. Decision-making is a crucial process for resolving challenges encountered at all stages of life, both individually and institutionally. “Decision-making is selecting the most appropriate or alternatives among the available options to achieve the determined purpose, taking into account the determined criteria” (Özbek, 2017). People are a factor that influences many situations in business. Therefore, to get efficient results from individuals, great care should be taken when selecting personnel to be included in the institutions. Placing the most qualified person in the job and assigning them to the correct position are crucial considerations. At the same time, it should embrace the company's culture and reflect the institution in alignment with its business objectives. “Recruitment involves a long and costly process. Some things need to be done carefully during this process. The process starts with determining the need, continues with candidate research and finding, and ends with selection and placement.” (Aslan, 2012).

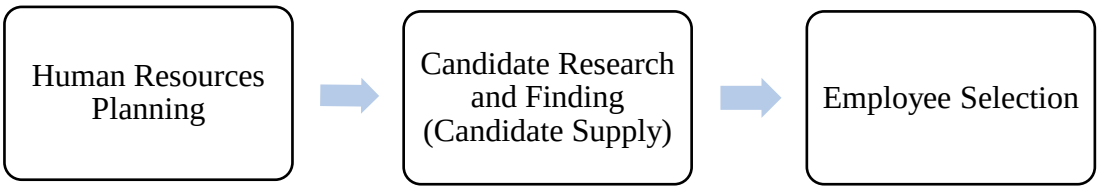

Figure 2.1. Human Resources/Employee Recruitment and Selection Process
Source: Acar (2008)

If the candidate being considered for the position lacks the necessary skills, it indicates a flawed selection process."Selecting the wrong personnel can create significant problems for the business and the staff. Inadequately chosen personnel bring an additional training burden to the company, decrease efficiency, increase work accidents, add to the workload of colleagues and raise the personnel turnover rate" (Atalay, 2007). The company must search for and choose personnel again if the selected personnel do not meet the job requirements. That situation causes the company to incur losses in both cost and time. When addressing their personnel needs, companies carefully formulate an effective personnel policy. “There are many reasons why a company can succeed; however, unless managers can hire the right people for the right jobs, a company might not be able to fully satisfy its mission, vision and overarching long-term objectives” (Mathis & Jackson, 2008).

Because of that, companies carefully select their employees and hire the best candidates available to them to maintain their success and keep up with the advancements of the times. Personnel with adaptable abilities and the ability to function in demanding, competitive environments are in greater demand. In light of this, organizations employ a method of subjecting job applicants to a series of tests when selecting candidates for a position. Airlines use several stages in the hiring process, just like many other industries. Candidates who apply for the cabin crew position, which entails a high level of responsibility, must go through many steps. Businesses use a different technique when making selection judgments. “Generally, each company implements a method that it changes specifically for itself. There is a possibility that a candidate whose qualifications are not suitable will be rejected at every stage” (Atalay, 2007). The steps of the personnel selection process may differ

from institution to institution. The key factors that differentiate the staff selection process are the institution's aims, structure and vacancy in the desired job. Regardless, in general, the decision-making and personnel selection procedure consists of the following steps: "receiving applications, interviewing the applicants, administering tests to applicants, conducting background investigations, arranging for physical examinations, placing and as-signing new employees, coordinating follow-up of these employees, conducting exit interviews with departing employees and maintaining appropriate records and reports" (Mathis & Jackson, 2008). Depending on the institution's employer, some stages may be sidestepped or the order modified. Nevertheless, the following are the stages of the selection process that are typically observed:

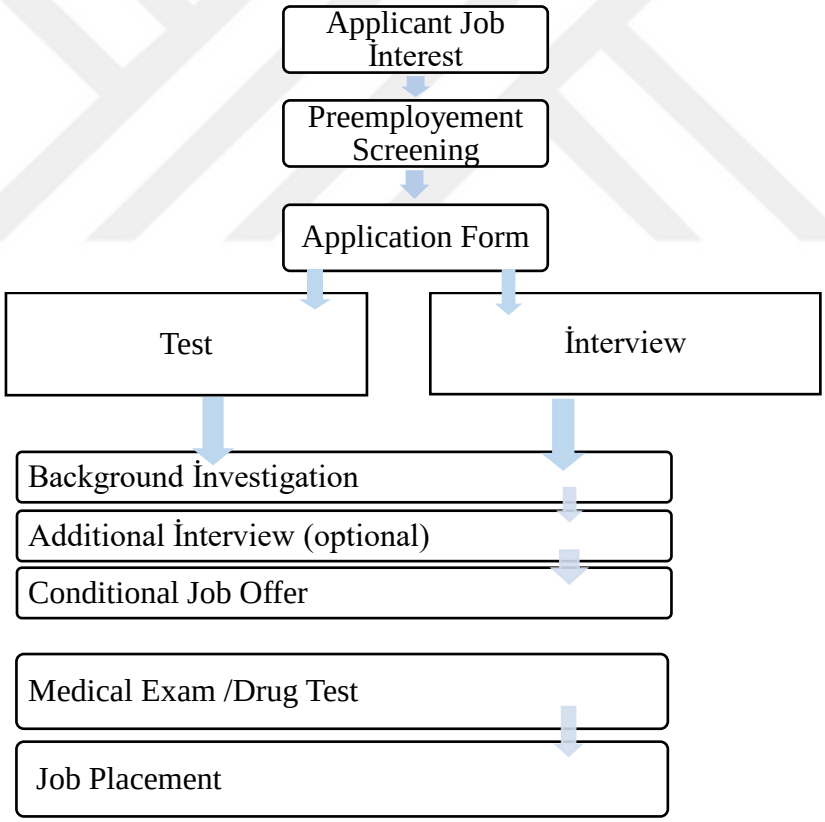

Figure 2.2. Selection Process Flowchart
Source: Mathis & Jackson (2008)

The following procedures are generally followed to implement the method.

2.3.1.1. Pre-Selection

The most crucial stage of decision-making management is the hiring of the necessary personnel. Initially, the job description is created, the requirements define the role, and the required credentials are ascertained. Suitable employees apply, the best candidate is chosen for the post, and the position is closed" (Aslan, 2012). Many candidates apply to the internet advertisement during the pre-selection phase. Human Resources reviews the information of the applicants who best fulfill the criteria in the ad, and if the candidates have the qualities required for the job, they are allowed to take the company's exam.

2.3.1.2. Test Application

Candidates receive an invitation link for the online English language exam. “General ability or intelligence tests required by the job position are applied for the unit needed” (Ulufer Kansoy & Koçali, 2023). Those who pass the English language exam are invited to the Human Resources Assessment Center for interviews.

2.3.1.3. Interview

The institution conducts height and weight measurements of candidates who pass the English written exam, which the airline companies then determine. Applicants who pass the height and weight tests, the document control, and the tattoo-scar control phase move on to the interview procedure's English and board interview stages. These are the interviews with the candidates to see whether they are suitable for the position and to analyze them. Airline operations usually have one-on-one, group, and English interview stages.” (Ulufer Kansoy & Koçali, 2023) Speaking the English language or multiple languages is vital in the developing world. Employees' CV information containing a second language has a beneficial influence. It is a fact that the English language issue is essential when taken into account in the aviation sector because the language of aviation is English, and many sources and organizations approve of this. The cabin crew, who have the most interaction with passengers, is responsible for satisfying their requirements using their communication language and the range of

languages spoken. As a result, language examinations are regularly given for job applications, both online and in person. Cabin crew members are subject to language tests during the hiring process and every two or four years. In other words, cabin crews stay up-to-date, and their professional development in English language processes continues throughout their careers. In addition, cabin crews with proficiency in languages other than English are submitted to exams unique to the language they know, and remarkable attention is given to planning flight schedules based on the language they use in the country. Cabin crew personnel frequently contact customers in various ways, including assisting with seat allocations, providing flight information, and helping with special requests. Good language abilities help them give excellent customer service, resulting in a good passenger experience. Furthermore, language proficiency allows cabin crew to be sensitive to cultural variations, thereby making passengers feel more comfortable and valued. Given that disagreements might emerge between passengers or crew of different nationalities, cabin crew who communicate well to minimize tension and resolve them significantly reduce passengers' anger. While we always discuss passenger pleasure, the most crucial concerns are language convenience in terms of safety and security and the ability to communicate with passengers during the flight. For instance, cabin staff members can inform travelers about safety precautions, including wearing seat belts, emergency exits, and evacuation protocols. Clear and precise communication in many languages guarantees that every passenger comprehends and can adhere to safety procedures. In any emergency, cabin crew members must effectively communicate with passengers, other crew members, and the ground control team. That includes giving instructions, preparing for the evacuation, and giving passengers cool-headed confidence. Language and good communication are vital in many concerns, from the security and safety conditions discussed earlier to passenger satisfaction. Due to this, airline companies that operate worldwide and serve a different passenger demographic from other airlines have guarded their attention to the foreign language requirement when choosing cabin crew.

2.3.1.4. Reference Check

During the recruitment process, candidates are evaluated based on their job appropriateness, previous successes, and references, who will be contacted as needed. References and job experiences are important factors considered by airlines throughout the recruiting choice phase. Candidates receiving positive ratings from human resources professionals must pass another stage: the health assessment stage.

2.3.1.5. Health Checks

Airline businesses establish specific health criteria to assess which candidates will meet the job's performance requirements. Candidates who pass the interview procedure are notified of the health report and document preparation process. Candidates must receive a report from health institutions certified by the General Directorate of Civil Aviation stating that their health is fit for flight and workplace physicians must approve their reports before beginning work. Even if the authorized hospital provides a favorable report, DGCA reserves the right to decide whether the applicant will be initiated by its internal procedures. Candidates are invited to the training procedures if they complete the health examination at creditable hospitals chosen by the airline industry and whose documentation and health report processes are favorable.

2.3.2. Criteria for Evaluating Cabin Crew Selection

The necessities for becoming a cabin attendant and information about cabin services in the civil aviation industry are discussed. As the literature analysis has revealed, many aspects are taken into account throughout the pre-and post-recruitment phases of the recruitment process for cabin attendants. That study took shape according to the criteria established due to the investigation.

The selection criteria used in this study are shown in Figure 2.3.

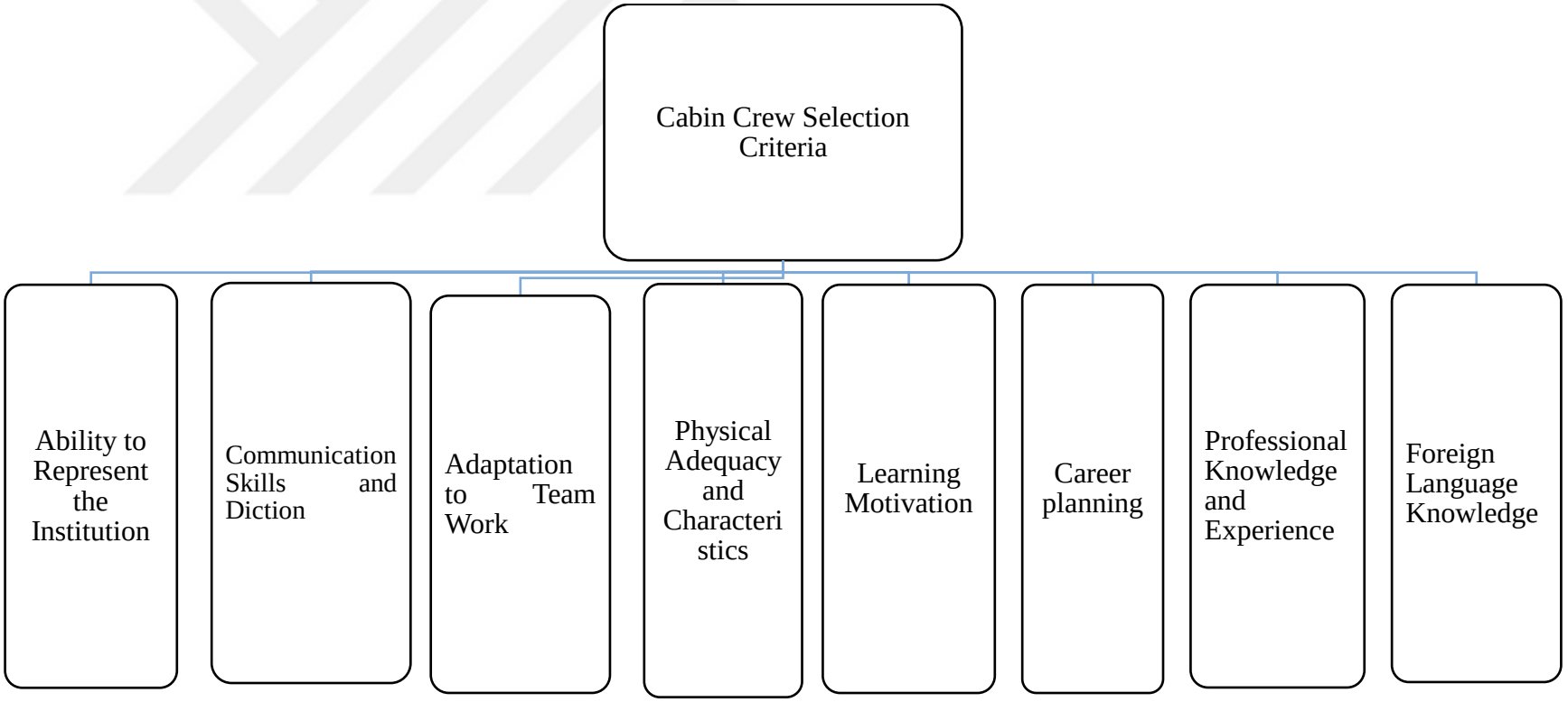

Figure 2.3. Criteria Used for Cabin Crew Selection
Source: Own Creation

The selected eight criteria are described as follows;

C1, Ability to Represent the Institution: This criterion requires mastering the corporate culture and the ability to represent the institution.

C2, Communication Skills and Diction: These include skills such as effectively expressing oneself, making good use of diction and voice, and correct management of body language.

C3, Adaptation to Team Work: Willingness to participate in group work, tendency to cooperate and problem-solve, respect for different opinions, solidarity with team members.

C4, Physical Adequacy and Characteristics: Meeting weight and height standards, no tattoos, sight, hearing, etc., no health problems

C5, Learning Motivation: Being willing to increase personal knowledge and skills or business knowledge, being open to innovations and learning, being open to criticism and feedback from team members.

C6, Career planning: Job/study motivation, career goal, consistency of work/internship experience, whether the position meets the candidate's expectations.

C7, Professional Knowledge and Experience: Improving professional knowledge and experience, having a work-related internship, education and work history.

C8, Foreign Language Knowledge: Ability to speak a foreign language fluently, understand what is communicated clearly, and master more than one foreign language.

CHAPTER III

METHODOLOGY & APPLICATION

This section explains the concept of decision-making, the decision-making process, decision-making components, and MCDM. The management or implementer's desired outcome determines the decision-making scenario from which a decision is made (Moskowitz & Wright, 1979). Decision-making is selecting one of multiple options for achieving goals and objectives. "Decision-making has always been a problem that human beings have faced, which needs to be solved. While experience, intuition and reason are significant in decision-making, using scientific methods has also become equally important" (Özbek, 2017). The decision-making process involves five primary variables. The decision maker (or decision makers), the decision environment (constraints), the objectives (criteria, targets), the alternatives and the resources are these factors. "(Dinçer, 2019). To clarify the main aspects of the decision-making action, "decision-maker" refers to the individual or group who has the ability and capability to choose from the available possibilities. (Dinçer, 2019). Apart from these variables, other aspects, including the decision-maker's prior knowledge, anticipated future events, surroundings, and time, are also incorporated into the decision-making procedure. Some characteristics must be present to make a good decision. These characteristics (Dinçer, 2019) can be listed as follows:

- Decision-making carries psychological and material difficulties.
- Decision-making is based on efficiency and rationality.
- The cost of decision-making is high.
- Decision-making is a problem-solving process.
- Decision-making is based on will and authority.
- Decision-making is a process focused on the future and based on prediction.
- Making and implementing the decision requires a time gap.
- Decision-making creates alternative costs.
- Decision-making is a planning process.

The decision-maker examines the options and other elements that present themselves to him to solve the problem during the decision-making process. The decision-making process commonly follows the steps depicted in Figure 3.1:

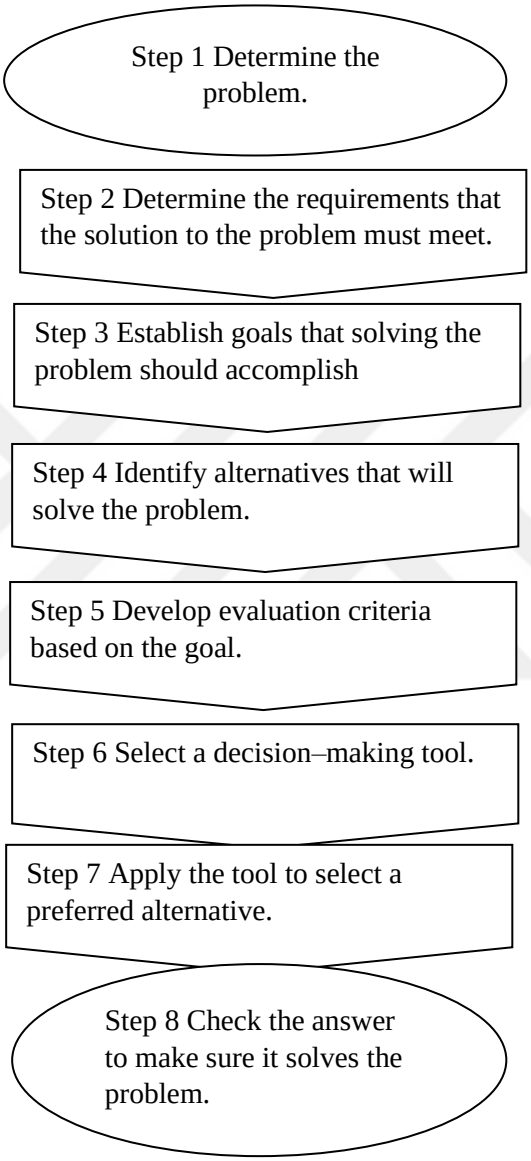

Figure 3.1. General Decision–Making Process
Source: Baker et al. (2019)

3.1. MCDM and MCDM Methods

“Multiple Criteria Decision Making (MCDM) can be defined as the decision-making process by using at least two criteria within a set of countably finite or uncountable choices” (Ada & Çakır, 2022). MCDM is a set of methods that help you select the best option in various life situations. Mainly, it will be convenient for strategic-level managers to use multi-criteria decision-making processes to make the most appropriate decisions in complex decision problems (Ada & Çakır, 2022). "One of the challenges for managers in decision-making is selecting the most suitable option from a set of alternatives. Traditional selection procedures may not offer a realistic solution due to conflicting and excessive criteria." (Soner & Önüt, 2006) In this case, Multi-Criteria Decision-Making (MCDM) methods are utilized. Therefore, many studies today make use of multi-criteria decision-making techniques. The steps followed in the MCDM method can be listed as follows (Arslankaya & Göraltay, 2019):

- The criteria and alternatives related to the subject have been identified.
- The relative importance levels of the criteria are being determined.
- Every option is assessed using all criteria, and then the options are put in order of preference.

“In multiple attribute decision making, a small number of alternatives are to be evaluated against a set of attributes which are often hard to quantify. The best alternative is usually selected by comparing alternatives concerning each attribute” (Pohekar & Ramachandran, 2004).

The multicriteria decision process is shown in Figure 3.2.

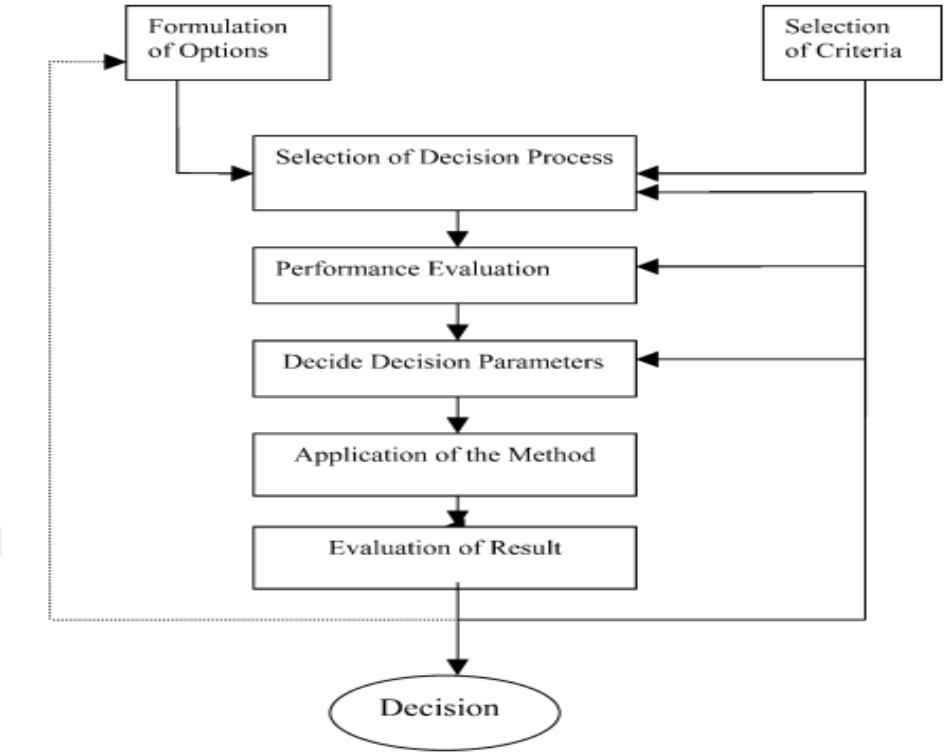

Figure 3.2. Multicriteria Decision Process
Source: Pohekar & Ramachandran (2004)

A general classification of decision-making methods is presented in Figure 3.3.

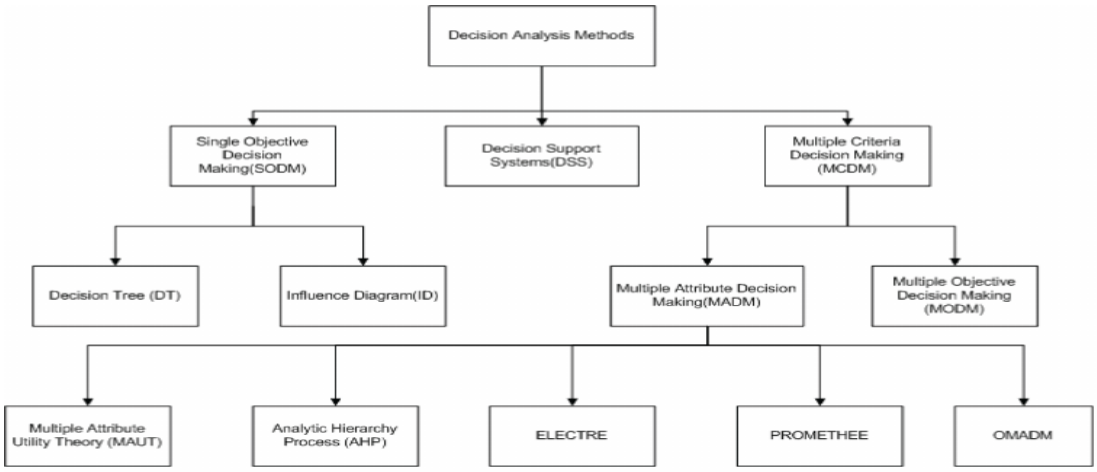

Figure 3.3. Decision Analysis Methods Classification
Source: Zhou et al. (2006)

AHP, TOPSIS, and MOORA methods, widely used among MCDM methods and utilized in this study, will be explained.

3.1.1. Analytical Hierarchy Process (AHP)

Analytical Hierarchy Process (AHP) is a decision-making method developed by Thomas L. Saaty in 1977 to solve multi-criteria and complex decision problems, and it is used in economic, social, and technical fields. “The AHP is about breaking a problem down and then aggregating the solutions of all the sub-problems into a conclusion. It facilitates decision-making by organizing perceptions, feelings, judgments, and memories into a framework that exhibits the forces influencing a decision” (Saaty & Vargas, 2012). The most crucial feature of AHP is that it divides the decision problem of the decision maker into elements that have a hierarchical relationship with each other. At the top of this hierarchy is the ultimate goal of the decision maker" (Dinçer, 2019).

“The Analytical Hierarchy Process involves three main levels: goals, criteria and alternatives” (Özdemir, 2019). The general hierarchical structure of the AHP is shown in Figure 3.4.

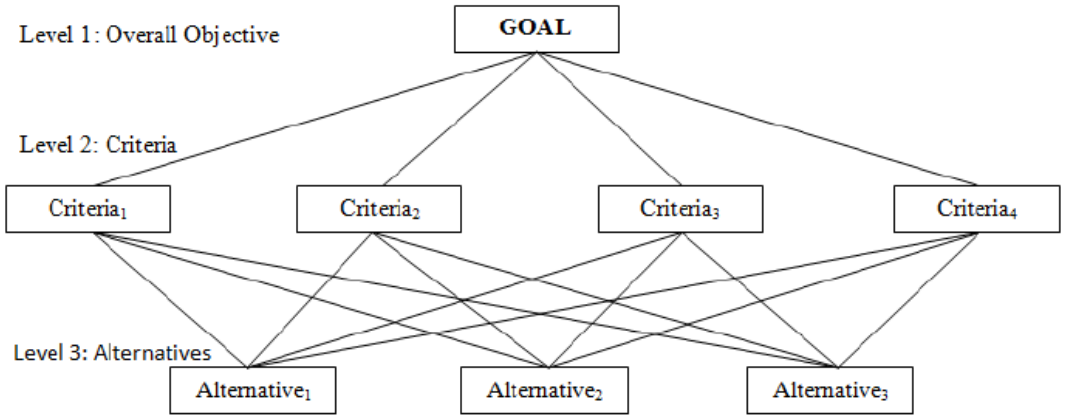

Figure 3.4. General Hierarchical Structure of AHP
Source: Agarwal et al., (2014)

“If sub-criteria are defined for the criteria in a hierarchical structure, the number of levels will vary based on the number of sub-criteria levels used.” (Özdemir, 2019)
AHP application involves following these steps:

1. Creating the hierarchical structure.
2. Making pairwise comparisons.
3. Determining the importance levels.
4. Performing consistency analysis.
5. Determining the best option.

The steps for application of the AHP can be formulated as follows.

Step 1: The decision-making problem has been defined, and a hierarchical structure has been created.

The problem to be decided is defined. In AHP, the decision maker determines the criteria and sub-criteria according to their goals and creates a hierarchical structure. Then, alternatives are determined for each criterion. “In the application of AHP, all qualitative and quantitative variables affecting the decision process must first be determined in line with the literature, surveys or expert views.” (Kiracı & Bakır, 2018)

"The first step in solving problems using all other decision-making methods involves creating a hierarchical structure. Sufficient details about the subject should be determined when creating the hierarchies to represent the problem as accurately as possible" (Dinçer, 2019).

“Following the creation of the hierarchical structure, the degrees of relative importance of the governing criteria are calculated. At this point, a pairwise comparison matrix is obtained by comparing the decision criteria and the alternatives under the criteria.” (Kiracı & Bakır, 2018)

Step 2: A matrix of pairwise comparisons is created.

A matrix of comparative judgments and pairwise comparisons is created. Pairwise comparisons are designed to establish decision criteria and priority distributions of alternatives. Criteria in the hierarchy are compared in pairs to determine their importance relative to the criterion at the upper level.

The inter-factor comparison matrix is an nxn square matrix. The matrix components on the diagonal of this matrix have a value of 1 (Dinçer, 2019).

$$A = \begin{bmatrix} a_{11} & a_{12} & \dots & a_{1n} \\ a_{21} & a_{22} & \dots & a_{2n} \\ \dots & \dots & \dots & \dots \\ a_{n1} & a_{n2} & \dots & a_{nn} \end{bmatrix}_{nxn} \quad (3.1)$$

The matrix components that the factors are compared with take the value 1 when i = j. Comparisons between factors are made mutually for each factor (Yaralıoğlu, 2001). The importance scale values in Table 3.1. are used for the comparison operations in the matrix. "The terms in the matrix are the result of pairwise comparison of the criteria with each other using the 1-9 scale suggested by T.L Saaty, and then the relative importance degree of the criteria is calculated" (Kiracı & Bakır, 2018). As a result of comparing different criteria, Table 3.2 presents the matrix formed. In pairwise comparison, the terms indicate the relative importance level of the requirements to each other.

Table 3.1. Comparison Scale

Degree of Importance	Definition	Description
1	Equal	The two choices are equally important.
3	Moderate	One choice is comparatively slightly more important
5	Strong	One choice is comparatively more important.
7	Very Strong	One choice is comparatively much more important.
9	Absolute	One choice is absolutely more important.
2, 4, 6, 8	Intermediate Values	Represents intermediate values.

Source: Saaty (2008)

Table 3.2. Pairwise Comparison Matrix for Criteria

	J		
i	Criteria-1	Criteria -2	Criteria -n
Criteria-1	w1/w1	w1/w2	w1/wn
Criteria -2	w2/w1	w2/w2	w2/wn
...	…	…	…
Criteria -n	wn/w1	wn/w2	wn/wn

Source: Saaty (1990)

Comparisons are made for values above the main diagonal of the matrix, and the following formula is used for values below the diagonal.

$$a_{ji} = \frac{1}{a_{ij}} \tag{3.2}$$

Step 3: The importance of the allocation of the factors is determined.

The comparison matrix demonstrates the relative importance of factors within a specific framework. The column vectors in the comparison matrix are utilized to determine the overall percentage importance of these factors. The formula used to calculate the column vector B, which has n components, is provided below:

$$B_i = \begin{bmatrix} b_{11} \\ b_{21} \\ \cdots \\ b_{n1} \end{bmatrix}_{nx1} \tag{3.3}$$

The following formula is used to calculate B-column vectors:

$$b_{ij} = \frac{a_{ij}}{\sum_{i=1}^{n} a_{ij}} \tag{3.4}$$

When the mentioned steps are repeated for "other evaluation factors, B-column vectors will be obtained as many as the number of factors. When n B column vectors are brought together in a matrix format, the C matrix shown will be created" (Yaralıoğlu 2001).

$$C = \begin{bmatrix} b_{11} & b_{12} & \dots & b_{1n} \\ b_{21} & b_{22} & \dots & b_{2n} \\ \dots & \dots & \dots & \dots \\ b_{n1} & b_{n2} & \dots & b_{nn} \end{bmatrix}_{nxn} \quad (3.5)$$

"Using the C matrix, percentage importance distributions showing the importance values of the factors relative to each other can be obtained. For this, the arithmetic average of the row components forming the C matrix is taken, and the column vector W, the Priority Vector, is obtained." (Yaralıoğlu, 2001).

$$w_i = \frac{\sum_{j=1}^{n} c_{ij}}{n} \quad (3.6)$$

Step 4. Consistency in factor comparisons is measured.

The consistency ratio is calculated to determine if there is consistency in comparisons between the factors (Dağdeviren et al., 2004). The basis of the Consistency Ratio (CR) calculation is the number of factors and the fundamental value (λ) (Yaralıoğlu, 2010). When calculating, the A and W matrices are multiplied to create the D column vector.

$$D = \begin{bmatrix} a_{11} & a_{12} & \dots & a_{1n} \\ a_{21} & a_{22} & \dots & a_{2n} \\ \dots & \dots & \dots & \dots \\ a_{n1} & a_{n2} & \dots & a_{nn} \end{bmatrix} x \begin{bmatrix} w_1 \\ w_2 \\ \dots \\ w_n \end{bmatrix}$$

The evaluation factors' fundamental value (E) is obtained by dividing the column vectors D and W. The arithmetic average of these values gives the fundamental value (λmax) for comparison.

$$E_i = \frac{d_i}{w_i} \qquad (i = 1,2, \dots, n) \quad (3.7)$$

$$\lambda max = \frac{\sum_{i=1}^{n} E_i}{n} \quad (3.8)$$

Once λ is calculated, the Consistency Indicator (CI) can be determined using the following formula:

$$CI = \frac{\lambda - n}{n-1} \tag{3.9}$$

In the final stage, the Consistency Ratio (CR) is calculated by dividing the Consistency Index (CI) by the standard correction value known as the Random Index (RI). If the CR value is less than 0.10, the comparisons are considered consistent. However, if the CR value is more significant than 0.10, it suggests that the decisions should be re-evaluated (Yılmaz, 2022).

$$CR = \frac{CI}{RI} \tag{3.10}$$

The values , including the random index values expressing the random consistency index, are given in Table 3.3.

Table 3.3. Random Indicators (RI)

N	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
RI	0	0	0,58	0,9	1,12	1,24	1,32	1,41	1,45	1,49	1,51	1,48	1,56	1,57	1,59

Source: Er et al. (2023)

Step 5. The alternative and best choice is determined.

In the last step of the Analytic Hierarchy Process (AHP), a mixed priority matrix of size n x m is created, where n represents the number of alternatives and m represents the number of criteria. This matrix is multiplied by a column vector, which contains the importance levels of the requirements. In this scenario, when you multiply an n x m matrix by an m x 1 matrix, the result will be an n x 1 matrix. This means that each option will be assigned a percentage and the sum of all the percentages for the possibilities will equal 1. The option with the highest rate will be considered the best choice according to the Analytical Hierarchy Process method.

3.1.2. TOPSIS

Yoon (1980) and Hwang and Yoon (1981) created the TOPSIS technique to solve multi-criteria decision-making problems. “TOPSIS is an influential and user-friendly method that rates potential solutions based on how far away they are from the ideal, positive solution. Researchers Cheng and Hwang (1992) and Lai, Liu and Hwang (1994) conducted studies on the creation of the TOPSIS method” (Doğan &Önder, 2014).

Step 1. The decision matrix is created.

After the decision matrix, alternatives and criteria are determined, an n x m dimensional matrix is created by the decision maker. Here, n represents the alternatives and m represents the criteria.

$$D = \begin{bmatrix} d_{11} & d_{12} & \dots & d_{1m} \\ d_{21} & d_{22} & \dots & d_{2m} \\ . & . & . & . \\ . & . & . & . \\ . & . & . & . \\ d_{n1} & d_{n2} & \dots & d_{nm} \end{bmatrix} \quad (3.11)$$

The rows of the decision matrix (3.11) above represent the alternatives and the columns represent the criteria. d_iji shows the current performance of the alternative concerning the j criterion i=1,2, …, n , j=1,2,…,m.

Step 2. The standard decision matrix (normalized) is created.

It is obtained by taking the square root of the sum of the squares of the values of each criterion in the decision matrix and dividing the value expressed by the appropriate criterion in the column by this obtained value. The value of a criterion with a value of zero is also accepted as zero in the normalized decision matrix. The normalized decision matrix is placed as seen in matrix (3.12).

$$R = \begin{bmatrix} r_{11} & r_{12} & \dots & r_{1m} \\ r_{21} & r_{22} & \dots & r_{2m} \\ . & . & . & . \\ . & . & . & . \\ . & . & . & . \\ r_{n1} & r_{n2} & \dots & r_{nm} \end{bmatrix} \quad (3.12)$$

The elements of the R standard decision matrix are calculated as shown in equation (3.13).

$$r_{ij} = \begin{cases} \frac{d_{ij}}{\sqrt{\sum_{k=1}^{n} d_{kj}}} & i = 1,2,\dots,n \ , j = 1,2,\dots,m \\ 0, \ d.y. \end{cases} \quad (3.13)$$

Step 3. A weighted standard decision matrix is created.

First, the criteria weights (w_i, i=1,2, …, m) are determined.

$$V = \begin{bmatrix} w_1 r_{11} & w_2 r_{12} & \dots & w_m r_{1m} \\ w_1 r_{21} & w_2 r_{22} & \dots & w_m r_{2m} \\ . & . & . & . \\ . & . & . & . \\ . & . & . & . \\ w_1 r_{n1} & w_2 r_{n2} & \dots & w_m r_{nm} \end{bmatrix} = \begin{bmatrix} V_{11} & V_{12} & \dots & V_{1m} \\ V_{21} & V_{22} & \dots & V_{2m} \\ . & . & . & . \\ . & . & . & . \\ . & . & . & . \\ V_{n1} & V_{n2} & \dots & V_{nm} \end{bmatrix} \quad (3.14)$$

Step 4. Positive and negative ideal solution values are calculated.

Using the V matrix, positive ideal and negative solution sets are obtained for each criterion according to the purpose of the relevant criterion. If the requirements are benefit-oriented, the positive ideal solution is the most significant value of the columns of the V matrix and the negative perfect solution is the smallest value of the columns of the V matrix. If the criteria are cost-oriented, the positive ideal solution is the smallest value of the columns in the V matrix, and the negative ideal solution represents the most significant values in the columns. Here, the positive ideal solution set is defined as $V^* = V_1^*, V_2^*, \dots, V_m^*$, and the negative perfect solution set is defined as $V^- = V_1^-, V_2^-, \dots, V_m^-$.

Step 5. Distance values to the positive ideal and negative ideal solution values are obtained.

The Euclidean approach is used to find the deviations from the harmful and harmful ideal solution values of the evaluation criteria for each alternative. The distance values are calculated as shown in Equations (3.15) and (3.16).

$$S_i^* = \sqrt{\sum_{j=1}^{m}(V_{ij} - V_j^*)^2} \text{ , i=1, 2, …, n} \quad (3.15)$$

$$S_i^- = \sqrt{\sum_{j=1}^{m}(V_{ij} - V_j^-)^2} \text{ , i=1, 2, …, n} \quad (3.16)$$

Step 6. The relative proximity coefficients to the ideal solution are calculated.

Distances from the positive ideal and negative ideal solution values are used to calculate the relative proximity coefficients of each alternative to the perfect solution.

$$C_i^* = \frac{S_i^-}{S_i^* - S_i^-} \ , i = 1,2, \dots, n \quad (3.17)$$

The relative closeness value for each alternative is calculated with Equation (3.17). Here, 0≤C_i^*≤1 ,i=1,2,…,n. Equation (3.17) is the share of the distance to the negative ideal solution in the total distance. Accordingly, the alternative C_i^*, i=1,2,…,n close to 1 is accepted as the alternative with the highest performance.

3.1.3. MOORA

“The MOORA method developed by Brauers and Zavadskas in 2006 is based on the process of simultaneous optimization in cases of two or more conflicting attributes subject to certain constraints” (Kiracı & Bakır, 2018). "The MOORA method developed by Brauers and Zavadskas in 2006 is based on the process of simultaneous optimization in cases of two or more conflicting attributes subject to certain constraints" (Kiracı & Bakır, 2018)."In the MOORA method, all interactions between

decision options and criteria are taken into account holistically and weighted normalization is performed with objective weighted values." It was chosen over AHP and TOPSIS because it is easier to implement, requires less calculation time, has fewer mathematical operations, and is reliable."

By differentiating the process steps of MOORA, which is an MCDM method based on proportional analysis,

- MOORA-Ratio Method
- MOORA-Reference Point Approach
- MOORA-Importance Coefficient Approach
- MOORA-Full Multiplication Form
- Multi-MOORA The method has been developed under the titles.

3.1.3.1. MOORA-Ratio Method

MOORA- The steps for the ratio method are explained below. (Brauers & Zavadskas, 2006).

Step 1. Creating the Decision Matrix

The MOORA method starts with a decision matrix X that shows the performance of different alternatives for various qualities or purposes. The decision matrix in the first step is represented as follows 3.18:

$$X = \begin{bmatrix} x_{11} & x_{12} & \dots & x_{1n} \\ x_{21} & x_{22} & \dots & x_{2n} \\ \dots & \dots & \dots & \dots \\ x_{m1} & x_{n2} & \dots & x_{mn} \end{bmatrix} \quad (3.18)$$

where

i= alternative

j= quality or measure

m= total number of alternatives

n= total number of quality or measures

xij= i alternative shows the measured value according to j measurement (Kiracı & Bakır, 2018)

Step 2. Obtaining the Normalized Decision Matrix

The square root of the sum of the squares of the performance values is used to normalize the matrix by dividing the performance value of each alternative according to each purpose by Equation 3.19.

$$X_{ij} = \left\{ \frac{x_{ij}}{\sqrt{\sum_{j=1}^{m} x^2{}_{ij}}} \right. \quad (3.19)$$

$xij*$ shows the normalized performance value of the i. alternative according to the j. objective. This value can be in the range of [0-1], but in some cases it can also be in the range of [-1,1]. (Kuşakçı et al., 2019)

Step 3: Obtaining the yi* Values for the Alternatives

The sum of the minimization performance values is subtracted from the sum of the normalized maximization performance values.

$$yi^* = \sum_{j=1}^{g} xij^* - n \sum_{j=g+1}^{n} xij^* \quad (3.20)$$

The yi*'s are ranked from most significant to most minor. The alternative at the top of the yi* ranking will be the most appropriate for the problem.

3.1.3.2. MOORA-Reference Point Approach

"The reference point approach is based on normalized values obtained with the MOORA-Ratio method. In the case of maximization for each criterion, the best value is selected as the reference point (ri) and in the case of depreciation, the lowest value is selected as the reference point. Then, the distances of the alternatives to the reference points for each criterion are found" (Arslankaya & Göraltay, 2019).

$$d_{ij} = \lfloor r_{ji} - xij * \rfloor \quad (3.21)$$

The ranking of alternatives is done using equation 3.21. The highest value of each alternative is found (Pi). The other options are organized from smallest to largest. The first alternative is considered the best option.

$$Pi = \min(maxdij) \quad (3.22)$$

3.1.3.3. MOORA-Importance Co-efficient Approach

The normalized data found with the MOORA-Ratio Method is used as a basis. Nevertheless, in some cases, the importance value of a criterion may differ from the importance value of another. In these cases, the requirements are multiplied with proper weights using the MOORA Importance Coefficient Method. Equality (1.14) can be used for this.

$$yij * = \sum_{j=1}^{g} \text{ wjxij*- n } \sum_{j=g+1}^{n} wjxi\text{j*} \quad (3.23)$$

wi shows the importance weights of the criteria. $yj*$ values are ranked from smallest to largest. The alternative should be selected as the finest option. The importance weights of the criteria are also used in the reference point approach. In this case, the

ranking is created by using the equation (3.24), in which the importance weights are also taken into account.

$$d_{ij} = wi\left|r_{ij} - xij*\right| \quad (3.24)$$

3.1.3.4. MOORA-Full Multiplication Form

In this approach, the creation of the maximization data of each alternative is divided by the product of the minimization data. This method is expressed by the equation (3.25) (Özbek, 2019).

$$Ui = \frac{Ai}{Bi} \quad (3.25)$$

Here;

$$Ai = \prod_{g=1}^{j} x_{gj} \quad (3.26)$$

m represents the number of alternatives and j represents the number of maximization (usefulness) criteria.

$$Bi = \prod_{k=j+1}^{n} x_{kj} \quad (3.27)$$

n-j defines the number of minimization (cost) criteria. Ui defines the scores of the alternatives. Ui values are ranked from most significant to most minor, and the first-ranked alternative is considered the most proper option.

3.1.3.5. Multi-MOORA

Multi-Objective Optimization by Ratio Analysis (MOORA) was introduced by Brauers and Zavadskas (2006) based on previous research by Brauers (2004). Brauers and Zavadskas (2010a) extended the method, and in this way, it became more robust, such as MULTIMOORA (MOORA plus the complete multiplicative form). These methods have been applied in numerous studies (Brauers et al., 2007; Brauers and

Ginevicius, 2009, 2010b; Brauers and Zavadskas, 2009) focused on regional studies, international comparisons and investment management. The decision matrix of the Multi-MOORA method, the ratio method, the reference point approach, the exact product form relationship and the flow are shown in Figure 3.5:

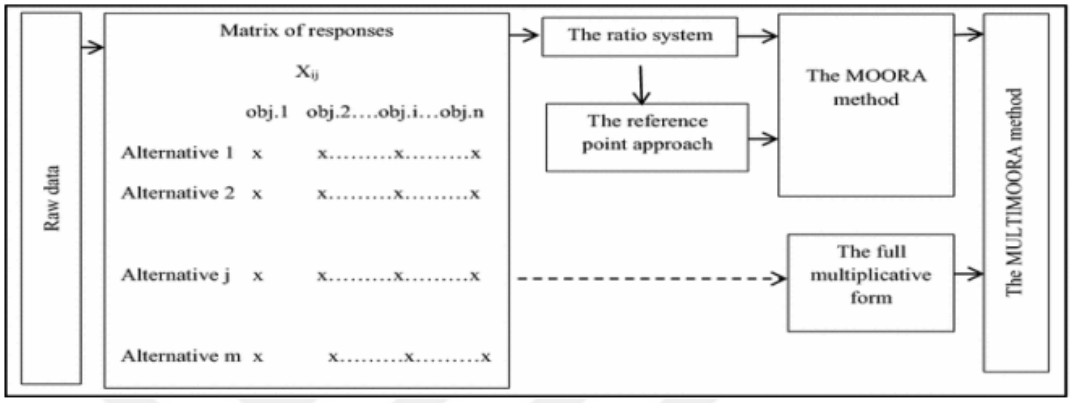

Figure 3.5. Diagram of MULTIMOORA
Source: Abdulvahitoğlu et al. (2022)

3.2. Fuzzy Set and Fuzzy Numbers

"The idea of a fuzzy set was first put forward by Zadeh in 1965. According to him, a fuzzy collection is a class of objectives with a continuous membership degree. It is a set characterized by membership functions, where each objective is assigned a membership degree between 0 and 1" (Zadeh, 1965). Fuzzy sets are suggested to describe the membership degrees of elements to specific sets. Instead of using characteristic functions such as matching functions, a fuzzy subset Ã in the universal set X can be defined by its membership function $\mu_{\tilde{A}}(x)$.

$$\tilde{A} = \left\{\left(x, \mu_{\tilde{A}}(x)\right) \middle| x \in X\right\}, \quad (3.28)$$

Here $x \in X$ indicates that the elements belong to the universal set;

$\mu_{\tilde{A}}(x): X \rightarrow [0,1]$ (Tzeng ve Huang, 2011) (3.29)

3.2.1. Fuzzy MULTIMOORA

The steps of the fuzzy MOORA approach used in the study to assess the alternatives and determine their rankings are as follows:

Step 1. Fuzzy decision using triangular fuzzy numbers create the matrix

$$\begin{bmatrix} [x_{11}^1 \quad x_{11}^m \quad x_{11}^n] & [x_{12}^1 \quad x_{12}^m \quad x_{12}^n] & \dots & [x_{1n}^1 \quad x_{1n}^m \quad x_{1n}^n] \\ & \vdots & & \\ [x_{m1}^1 \quad x_{m1}^m \quad x_{1m}^n] & [x_{11}^1 \quad x_{m2}^m \quad x_{m2}^n] & \dots & [x_{11}^1 \quad x_{mn}^m \quad x_{mn}^n] \end{bmatrix} \tag{3.30}$$

The xl ij, xmij and x n ij values in the matrix represent the fuzzy numbers with small, medium and large values, respectively, in the triangular membership function for the i. alternative in terms of the j criterion.

Step 2. A normalized fuzzy decision matrix with vector normalization is created.

$$r_{ij}^l = \frac{x_{ij}^l}{\sqrt{\sum_{j=1}^m \left[\left(x_{ij}^l\right)^2 + \left(x_{ij}^m\right)^2 + \left(x_{ij}^n\right)^2\right]}} \tag{3.31}$$

$$\boldsymbol{r_{ij}^m = \frac{x_{ij}^m}{\sqrt{\sum_{j=1}^m \left[\left(x_{ij}^l\right)^2 + \left(x_{ij}^m\right)^2 + \left(x_{ij}^n\right)^2\right]}}} \tag{3.32}$$

$$\boldsymbol{r_{ij}^n = \frac{x_{ij}^n}{\sqrt{\sum_{j=1}^m \left[\left(x_{ij}^l\right)^2 + \left(x_{ij}^m\right)^2 + \left(x_{ij}^n\right)^2\right]}}} \tag{3.33}$$

Step 3. A weighted normalized fuzzy decision matrix is created.

$$v_{ij=}^l w_{jr_{ij}^l} \tag{3.34}$$

$$v_{ij=}^m w_{jr_{ij}^m} \tag{3.35}$$

$$v_{ij=}^n w_{jr_{ij}^n} \tag{3.36}$$

Step 4. Each alternative in terms of benefit and cost criteria rankings is calculated. For the benefit criterion,

$$S_i^{+1} = \sum_{j=1}^{n} \boldsymbol{v_{ij}^{l}} | \boldsymbol{j \epsilon j^{max}} \quad (3.37)$$

$$S_i^{+m} = \sum_{j=1}^{n} \boldsymbol{v_{ij}^{m}} | \boldsymbol{j \epsilon j^{max}} \quad (3.38)$$

$$S_i^{+n} = \sum_{j=1}^{n} \boldsymbol{v_{ij}^{n}} | \boldsymbol{j \epsilon j^{max}} \quad (3.39)$$

The following equations are used for cost criteria.

$$S_i^{-1} = \sum_{j=1}^{n} \boldsymbol{v_{ij}^{l}} | \boldsymbol{j \epsilon j^{min}} \quad (3.40)$$

$$S_i^{-m} = \sum_{j=1}^{n} \boldsymbol{v_{ij}^{m}} | \boldsymbol{j \epsilon j^{min}} \quad (3.41)$$

$$S_i^{-n} = \sum_{j=1}^{n} \boldsymbol{v_{ij}^{n}} | \boldsymbol{j \epsilon j^{min}} \quad (3.42)$$

Step 5. Performance values of each alternative are created. This clarifies vertex benefit and cost criterion values for other options using the method.

$$S_i(S_i^{+}, S_i^{-}) = \sqrt{\frac{1}{3}}[(S_i^{+1} - S_i^{-1})^2 (S_i^{+m} - S_i^{-m})^2 (S_i^{+n} - S_i^{-n})^2] \quad (3.43)$$

Step 6. Alternatives are ranked according to performance index figures. The option with the highest performance index score should be preferred.

CHAPTER IV

RESULTS & DISCUSSION

4.1. Fuzzy MULTIMOORA Method

In the first stage of the evaluation studies, interviews were conducted by three faculty members working in the transportation services department's civil aviation cabin services program and with aviation industry experience. These academics are the ones whose opinions were considered authoritative in this research. The experts prioritized the evaluation criteria in order of significance after establishing them. The requirements and codes to be taken into consideration in the selection of cabin crew are given in order of priority in Table 4.1.

Table 4.1. Obtained Selection Criteria Table

Criteria	Definition
Ability to Represent the Institution (C1)	To know the history, vision, mission, and cultural values of the institution, to adapt to the institution, to exhibit a professional stance, and to have the ability to deliver the institution successfully.
Communication Skills and Diction (C2)	Having skills such as expressing oneself effectively, good use of diction and voice and correct management of body language
Adaptation to Team Work (C3)	Willingness to take part in group work, tendency to cooperate and problem-solving, respect for different opinions, solidarity with team members
Physical Adequacy and Characteristics (C4)	Meeting weight and height standards, no tattoos, sight, hearing, etc., no health problems

Table 4.1. (cont.)

Learning Motivation (C5)	It is being willing to increase personal skills or business knowledge, being open to innovations and learning, and being open to criticism and feedback from team members.
Career planning (C6)	Job/study motivation, career goal, consistency of work/internship experience, whether the position meets the candidate's expectations
Professional Knowledge and Experience (C7)	Improving professional knowledge and experience, having a work-related internship, education and work history
Foreign Language Knowledge (C8)	Ability to speak a foreign language fluently, understand what is communicated clearly, and master more than one foreign language

Source: Own Creation

Table 4.2. displays the evaluation scale for the interview process used by the company's human resources department.

Table 4.2. Interview Process Evaluation Scale

Assessment Scale	**Degree of Importance**
Very high (VH)	5
High (H)	4
Moderate (M)	3
Low (L)	2
Very low (VL)	1

Source: Own Creation

After the interview, each candidate was evaluated based on the criteria determined by the evaluators using the scale in Table 4.2. The results of this evaluation are given in Table 4.3.

Table 4.3. Candidate Scores After the Interview

	C1	C2	C3	C4	C5	C6	C7	C8
Candidate 1	2	3	2	3	2	2	2	5
Candidate 2	4	4	5	5	4	4	5	5
Candidate 3	4	5	5	5	4	5	5	5

Table 4.4. Linguistic Term Set for Qualitative Evaluation

Linguistic term	**Fuzzy Number**		
Very low (VL)	0	0	0,16
Low (L)	0	0,16	0,34
Medium-low (ML)	0,16	0,34	0,5
Moderate (M)	0,34	0,5	0,66
Medium-high (MH)	0,5	0,66	0,84
High (H)	0,66	0,84	1
Very high (VH)	0,84	1	1
Ideal (UORH)	1	1	1

Source: Balezentis et. al.,2012

Table 4.5 shows the initial decision matrix, which includes the linguistic representation of the evaluation results determined by the evaluators for each candidate.

Here, DM1: indicates the first evaluator, DM2: is the second evaluator, DM3: the third evaluator, A1: the candidate number one, A2: the candidate number two, A3: the candidate number three.

Table 4.5. Representation of the Initial Decision Matrix with Linguistic Expressions

		C1	C2	C3	C4	C5	C6	C7	C8
DM1	**A1**	L	ML	ML	M	ML	ML	ML	VH
	A2	H	H	VH	VH	H	H	VH	VH
	A3	H	VH	VH	VH	H	VH	VH	VH
DM2	**A1**	ML	M	L	MH	L	ML	ML	H
	A2	H	VH	H	VH	H	VH	H	VH
	A3	H	H	VH	VH	H	H	H	VH
DM3	**A1**	ML	ML	L	M	L	L	ML	VH
	A2	H	H	H	VH	H	H	VH	VH
	A3	VH	VH	VH	VH	H	H	VH	H

Source: Own Creation

Table 4.6. Ranking Results and Best Non-Blurring Performance Values

	Ratio Method		**Full Multiplication Form**		**Reference Point Approach**	
	Best performance value	Ranking	Best performance value	Ranking	Best performance value	Ranking
Candidate 1	1,2945	3	0,0023	3	0,9048	3
Candidate 2	3,0385	2	0,6001	2	0,6597	1
Candidate 3	3,0917	1	0,6452	1	0,6736	2

Source: Own Creation

In a study conducted using the MULTIMOORA method in a fuzzy environment to solve the cabin crew selection problem, candidate three was the most suitable for the enterprise.

Table 4.7. Fuzzy MULTIMOORA Ranking Results

	Fuzzy MULTIMOORA
Candidate 1	3
Candidate 2	2
Candidate 3	1

4.2. Integrated AHP-TOPSIS Method

If there are essential criteria, a severity scale containing values between 1 and 9 symmetrically is used to calculate sub-criteria. Finally, matrices are calculated, and decisional options are compared according to criteria in which all requirements are considered. The binary comparison table of the criteria determined by AHP for the analysis is Table 4.8.

Table 4.8. Pairwise Comparison Table of Criteria

	C1	C2	C3	C4	C5	C6	C7	C8
C1	1,000	7,000	3,000	2,000	0,125	6,000	0,167	0,111
C2	0,143	1,000	5,000	0,200	0,167	8,000	0,143	0,125
C3	0,333	0,200	1,000	0,143	0,143	8,000	0,143	0,125
C4	0,500	5,000	7,000	1,000	8,000	7,000	0,125	0,125
C5	8,000	6,000	7,000	0,125	1,000	8,000	0,143	0,125
C6	0,167	0,125	0,125	0,143	0,125	1,000	0,125	0,125
C7	6,000	7,000	7,000	8,000	7,000	8,000	1,000	0,125
C8	9,000	8,000	8,000	8,000	8,000	8,000	8,000	1,000

Source: Own Creation

Table 4.9. Criterion Weights D Matrix and Other Information

	C1	C2	C3	C4	C5	C6	C7	C8
Weights	0,0743	0,0342	0,0256	0,0806	0,2374	0,0072	0,2274	0,3133

Source: Own Creation

Table 4.3. the criteria weights are given in. When the criterion weights calculated by AHP are examined, it is seen that the criterion with the highest level of importance is the C8 criterion. Criteria C5 and C7 have significance values close to each other and the highest level of importance criterion. Different criteria have a low level of importance.

The normalized decision matrix obtained from the Topsis application result is given in Table 4.10.

Table 4.10. Normalized Decision Matrix

	C1	C2	C3	C4	C5	C6	C7	C8
CANDIDATE 1	0,3333	0,4243	0,2722	0,3906	0,3333	0,2981	0,2722	0,5774
CANDIDATE 2	0,6667	0,5657	0,6804	0,6509	0,6667	0,5963	0,6804	0,5774
CANDIDATE 3	0,6667	0,7071	0,6804	0,6509	0,6667	0,7454	0,6804	0,5774

Source: Own Creation

After the anomalies between the data are corrected by normalization, a weighted normalized Decision matrix is created by adding the criteria weights calculated by the AHP method to the calculation. The weighted normalized decision matrix is calculated by multiplying each value in the normalized decision matrix by the weight of the relevant criterion. It allows the criterion weights to participate in the analysis. The weighted normalized decision matrix is given in Table 4.11.

Table 4.11. Weighted Normalized Decision Matrix

	C1	C2	C3	C4	C5	C6	C7	C8
CANDIDATE 1	0,0248	0,0145	0,0070	0,0315	0,0791	0,0021	0,0619	0,1809
CANDIDATE 2	0,0495	0,0193	0,0174	0,0525	0,1583	0,0043	0,1547	0,1809
CANDIDATE 3	0,0495	0,0242	0,0174	0,0525	0,1583	0,0054	0,1547	0,1809

Source: Own Creation

TOPSIS is a method that determines an ideal set of solutions and calculates the distance and proximity of alternatives to this set of solutions. Therefore, ideal and negative ideal solution sets are computed at this analysis stage. Table 4.5 shows the ideal and negative ideal solution sets. To create a perfect solution set, the largest of the weighted evaluation factors in the V matrix, the column values (the smallest if the relevant evaluation factor is minimization-oriented), are selected. When we apply the formula to our application, the ideal solution is set in Table 4.12. The perfect solution is given in Table 4.12.

Table 4.12. Ideal and Negative Ideal Solution Sets

	C1	C2	C3	C4	C5	C6	C7	C8
S*	0,0495	0,0242	0,0174	0,0525	0,1583	0,0053	0,1547	0,1809
S-	0,0248	0,0145	0,0070	0,0315	0,0791	0,0021	0,0619	0,1809

Source: Own Creation

At the next stage, after the ideal and negative ideal solution sets are calculated, the distances of the alternatives to the ideal and negative ideal solution points are calculated. The criterion that shows the highest performance or should be preferred at the highest level is determined. Table 4.7. the distances of the alternatives to the ideal and negative ideal solution points are given. When these values are examined, it is seen that the CANDIDATE 1 alternative is the closest alternative to the perfect solution.

Table 4.13. Ideal and Negative Ideal Distance Values of Alternatives

Negative Ideal Distance Values	
	Si*
CANDIDATE 1	0,127080692
CANDIDATE 2	0,0049599
CANDIDATE 3	0
Negative Ideal Distance Values	Si-
CANDIDATE 1	0
CANDIDATE 2	0,126780993
CANDIDATE 3	0,127080692

Source: Own Creation

At the next stage, after the ideal and negative ideal solution sets are calculated, the distances of the alternatives to the ideal and negative ideal solution points are calculated, and the criterion that shows the highest performance or should be preferred at the highest level is determined. Table 4.13. the distances of the alternatives to the ideal and negative ideal solution points are given. When these values are examined, it can be seen that the CANDIDATE 3 alternative is the closest alternative to the perfect solution. Still, there is no profound difference between it and CANDIDATE 2. In other words, additional criteria may be needed to choose between these alternatives.

Table 4.14. Topsis Result Table

	Si*	Sİ-	Ci*
CANDIDATE 3	0	0,127080692	1
CANDIDATE 2	0,0049599	0,126780993	0,962351098
CANDIDATE 1	0,127080692	0	0

Source: Own Creation

When the TOPSIS results Are examined, alternatives 2 and 3 perform better than alternative 1. Alternative 3 is significantly inferior to alternative 2. Additional information can be used to choose between these two alternatives so that the decision maker does not make a wrong decision.

CHAPTER V

CONCLUSIONS

The increasing competition among businesses globally reveals the necessity of closely following change and innovations. Enterprises have to apply modern management techniques to maintain competition. One trendy management technique that is necessary is choosing a strong staff. Enterprises with an equipped and solid human resource staff can make a difference to their competitors by adapting quickly to changing conditions and technological developments.

Other jobs and positions in airline companies require that the personnel hired have different qualifications, abilities, and personality traits. This situation has made it mandatory for enterprises to carry out a careful process to employ suitable and qualified people, especially in selecting cabin crew members responsible for passengers' safety and satisfaction. Companies make evaluations based on general and special criteria to find and choose cabin personnel who will represent themselves in the best way, actively and efficiently. Although the importance and value of each criterion from the business point of view are different, there are some characteristics that each candidate should carry.

In this case, new methods will reveal the importance of the candidates' characteristics for the business and ensure that the best candidate is determined accurately and quickly. Multi-criteria decision-making methods, which serve to minimize the difficulties of the decision-making process, help quantitative and qualitative evaluation. However, the fact that some of these methods have many transaction steps and involve mathematically complicated operations can sometimes make the decision-maker's job easier. According to research, AHS, TOPSIS, DEMATEL, ELECTRE, ORESTE, and VIKOR are among the most commonly used methods in personnel selection decision-making.

This study used the MULTIMOORA method, which stands out as a new decision-making approach to solving the cabin crew selection problem. The MULTIMOORA method has been preferred more recently since there are fewer mathematical operations and calculation time; simultaneously, goals, criteria, and options can be linked in decision-making. The fact that the steps of the method are not complicated and can be used to analyze qualitative and quantitative data has ensured its applicability in decision-making processes by creating criteria. The study tried to identify the cabin crew selection problem using the fuzzy MULTIMOORA method and determine the most accurate alternative. Verbal data was obtained from an interview with decision-makers on duty at an airline, and criterion weights were determined. Since all criteria are taken with equal weight in the fuzzy MULTIMOORA method, criteria are taken equally in the thesis. By converting the obtained data into fuzzy numbers, data tables for the candidates to be selected were created and realistic results were found by including them in the model. To test the validity of the result found by the MULTIMOORA method, a comparison was made with the results of the integrated AHS-TOPSIS method evaluation. The weights of the criteria were determined by the AHS method, and the most suitable candidate was determined using the TOPSIS method. It has been seen that the results of the AHS and TOPSIS methods are similar to those of MULTIMOORA. CANDIDATE 3 is in the first place in all solutions. CANDIDATE 2, 2 in all solutions. Although it is seen that it is ranked in the order, there is no profound difference between CANDIDATE 3 and CANDIDATE 2. Dec. When the TOPSIS results are examined, it is seen that alternatives 2 and 3 have higher performance compared to alternative 1. It is possible to state that Alternative 3 has a meager amount of superiority over Alternative 2. Oct Decider can be used to choose between these two alternatives to prevent the decision maker from making a wrong decision. October Decrees that additional criteria may be needed to choose between these alternatives. In the MOORA-Ratio method, CANDIDATE 3 is the first choice, CANDIDATE 2 is the second choice, and CANDIDATE 1 is the 3. is ranked.

The MULTIMOORA method has been proposed because it is thought to provide decision support to senior managers working in the enterprise and the chief of cabin crew representation and ease in terms of economic and time savings. Due to the

limitations of the information provided by the company in the study, no more alternative candidates could be evaluated. To develop the findings obtained and spread them over a wider area, subsequent studies can focus on the decision problem through more criteria and alternatives. Findings regarding the performance of the candidate selected in the cabin crew group in the airline company where the study was conducted after recruitment during the recruitment process could not be obtained. In other studies, the relationship between research findings and performance can be tested by comparing the data. In the following studies, different examinations can be made using multiple decision-making methods, such as Fuzzy SWARA, Fuzzy MARCOS, Fuzzy DEMATEL, Fuzzy ELECTRE, and VIKOR. Experts can compare the data acquired. In the new studies, an evaluation can be made using multiple decision-making methods for a different occupational group within the aviation sector.

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APPENDIXES

APPENDIX A

The Ethics Committee Permission Certificate obtained by the student regarding the questionnaire for the thesis is attached.

Evrak Tarih ve Sayısı: 28.06.2024-42911

İBN HALDUN ÜNİVERSİTESİ

T.C.
İBN HALDUN ÜNİVERSİTESİ
Sosyal ve Beşeri Bilimler Bilimsel Araştırma ve Yayın Etiği
Kurulu Başkanlığı

Sayı : E-71395021-050.04-42911 28.06.2024
Konu : Etik Kurul Kararı - Merve DAĞ

İLGİLİ MAKAMA

Kurulumuza başvuran Merve DAĞ'ın, "Cabin Crew Selection with the Multimoora Method: An Application in an Airline Company" isimli projesi; amaç, araştırma türü, veri toplama araçları, süreç ve işlemler, veri analizleri dikkate alınmak suretiyle 24.06.2024 tarihinde değerlendirilerek 2024/06-05 karar numarası ile etik açıdan uygun bulunmaktadır.
Bilgilerini ve gereğini arz/rica ederim.

Prof. Dr. Alev ERKİLET
Başkan

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Telefon:0212 692 0212 Faks:0212 551 6464
Kep:ibu@hs01.kep.tr e-Posta:info@ibu.edu.tr Elektronik Ağ:www.ibu.edu.tr
Bilgi için: Ümran HASANOĞLU
Unvanı: Kıdemli Uzman
Tel No: 1178

Bu belge,güvenli elektronik imza ile imzalanmıştır.

APPENDIX B

SEMI-STRUCTURED INTERVIEW

Dear Participant,

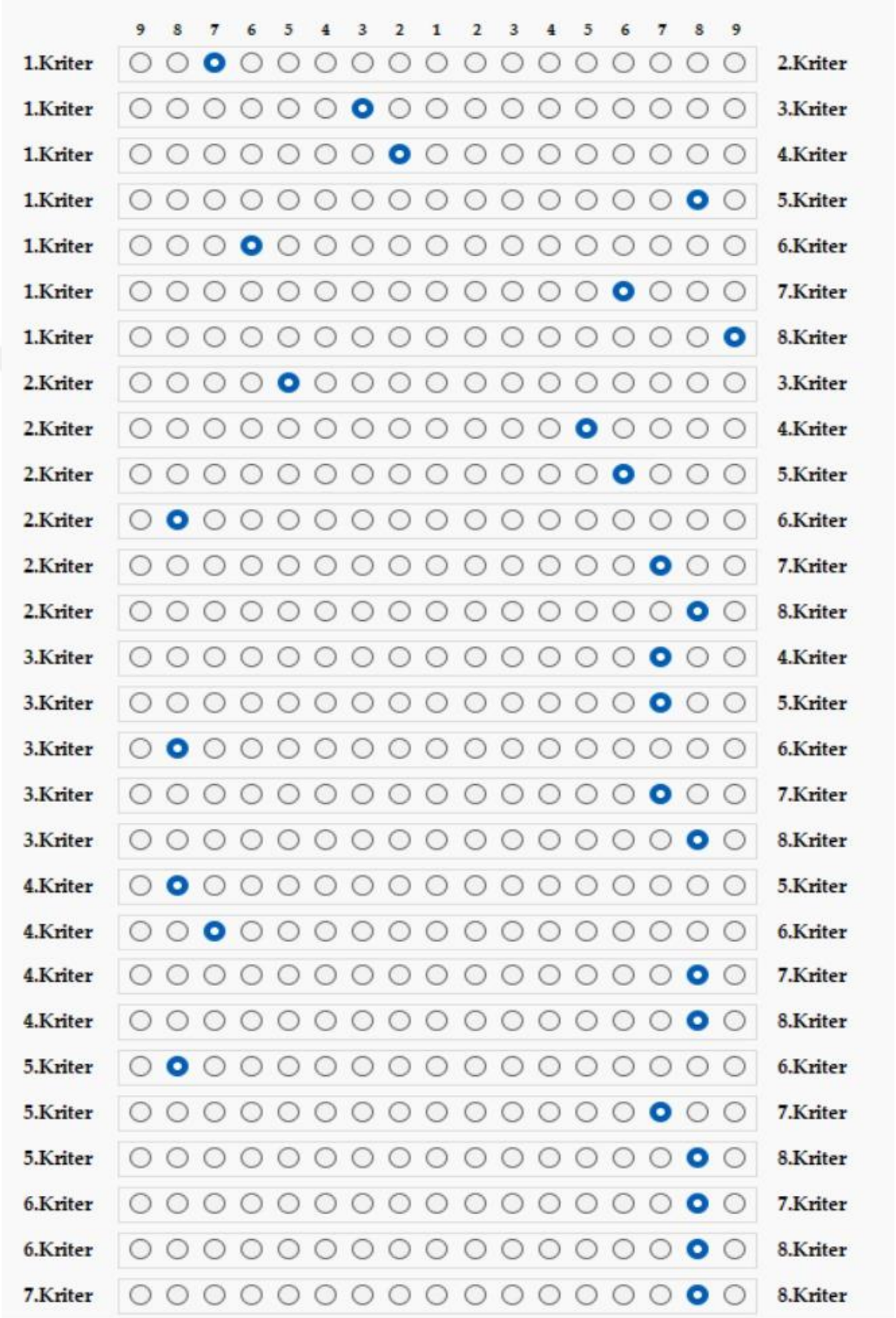
This survey is based on the master's thesis of Ibn Haldun University Graduate School of Education Air Transport Management program. It was edited by Merve Dag, who is preparing it under the supervision of Prof. Ali Osman Kuşakcı. The realistic answers you will give to the questions will significantly contribute to the research and remain confidential. Thank you for your interest.

Date: :

What is the Profession/Title of the Evaluator?

1. What criteria are considered when selecting candidates during the cabin crew recruitment process?
2. Could you share with us your opinions about the compliance of the candidates you evaluated during the cabin crew recruitment process with the corporate culture and the ability to represent the institution?
3. Could you share with us your opinions about the compliance of the candidates you evaluated during the cabin crew recruitment process with the corporate culture and the ability to represent the institution?
4. What are your opinions about the positive and negative characteristics of the candidates that will affect the teamwork?
5. What would you like to say about the physical and characteristic characteristics of the candidates you are evaluating?
6. To what extent are the physical competence and characteristic characteristics of the candidates effective in the cabin crew recruitment process?
7. How do the candidates' learning motivation, knowledge and experiences affect the process during the cabin crew recruitment process?
8. How does foreign language knowledge affect the number of candidates in the cabin crew recruitment process?
9. If there are any comments or different situations that you would like to specify, please add them.

APPENDIX C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CURRICULUM VITAE

Personal Information:

Merve Dağ

Education:

2017 – 2021 BA in English Literature and Language, Mardin Artuklu University, Turkey.

2010 – 2012 MA in Air Transport and Management, İbn Haldun University, Turkey.

Experience:

2022– 2023 Turkish Airline- Cabin Crew

Publications:

Kuşakcı A. O. & Dağ, M. (2024, August). *Cabin Crew Selection with Fuzzy Multimoora: Application in An Airline Company*. 12th International Mardin Artuklu Scientific Researches Conference, August 17-19, 2024/Mardin, Turkey.