

## Vocational Preference Tendency Analysis of Maritime Transportation Management Engineering Undergraduate Students

### Deniz Ulaştırma İşletme Mühendisliği Lisans Öğrencilerinin Meslek Tercih Eğilimlerinin İncelenmesi

Türk Denizcilik ve Deniz Bilimleri Dergisi

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#### ABSTRACT

Maritime is an essential profession for both Turkey and the world. 80-90% of the world trade volume is carried out by the ships and as might be expected seafarers. The most important part of the maritime profession is undoubtedly education. It is known that education at international standards in the field of maritime is provided by the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW), published by the International Maritime Organization (IMO), and the flag state carries out the inspections. In order to receive an undergraduate and an associate degree in the field of maritime in Turkey, it is necessary to take the YKS exam, choose the relevant department of the university, and get enough scores to be placed in this department. The study aims to understand better the education and career paths chosen by maritime transportation management engineering students. In the study, the preference tendencies of the students who prefer this department in the universities that provide education in the maritime transport management engineering department and the professions that the students prefer outside the department were examined. As a result of the evaluations, the most popular preferences among the students who placed maritime transportation management engineering were computer engineering, ship machinery management engineering, electrical-electronic engineering, and nursing departments. The increase in the score in the YKS exam has had a significant and negative effect on the rate of students choosing maritime transportation management engineering. The data in this study were obtained from the YÖK Atlas database.

**Keywords:** Maritime, seafarers, occupational preference tendency, human factor

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## ÖZET

Denizcilik hem ülkemiz hem de dünyamız için önemli bir meslek grubudur. Dünya ticaret hacminin %80-90'luk kısmı denizler ve haliyle denizciler vasıtasıyla gerçekleştirilmektedir. Denizcilik mesleğinin en önemli bölümü ise kuşkusuz eğitimidir. Denizcilik alanında uluslararası standartlarda eğitimin, uluslararası denizcilik örgütü (IMO) tarafından yayınlanan, gemi adamlarının eğitim, belgelendirme ve vardiya tutma standartları sözleşmesi (STCW) ile sağlandığı, denetimlerin ise bayrak devleti tarafından yapıldığı bilinmektedir. Ülkemizde denizcilik alanında lisans ve ön lisans eğitimi alabilmek için YKS sınavına girmek, üniversitenin ilgili bölümünü tercih edip yerleşmeye hak kazanmak gerekmektedir. Çalışmanın amacı, deniz ulaştırma işletme mühendisliği öğrencilerinin seçtikleri eğitim ve kariyer yollarını daha iyi anlamaktır. Yapılan çalışmada, deniz ulaştırma işletme mühendisliği bölümünde eğitim veren üniversitelerde bu bölümü tercih eden öğrencilerin tercih eğilimlerinin belirlenmesi ve öğrencilerin bölüm dışındaki tercihte buldukları mesleklerin incelenmesi hedeflenmiştir. Yapılan değerlendirmeler sonucunda deniz ulaştırma işletme mühendisliği kazanan öğrenciler arasında en popüler tercihler sırasıyla bilgisayar mühendisliği, gemi makineleri işletme mühendisliği, elektrik-elektronik mühendisliği ve hemşirelik bölümleri olmuştur. YKS sınavında alınan puanın artması ile öğrencilerin deniz ulaştırma işletme mühendisliğine tercihte yer verme oranını anlamlı ve olumsuz şekilde etkilemiştir. Bu çalışmadaki veriler YÖK Atlas veri tabanından elde edilmiştir.

**Anahtar sözcükler:** Denizcilik, gemiadamı, mesleki tercih eğilimi, insan faktörü

### 1. INTRODUCTION

Maritime is an indispensable profession for both our country and the world. Commercial maritime education during the Ottoman period started in 1884 with the “Leyli Tüccar Kaptan Mektebi” (Karakaya, 2011). Commercial maritime education, based in Istanbul for many years in Turkey, has spread throughout the country, especially with the start of deck education departments at Dokuz Eylül University (DEU) in 1995 and Karadeniz Technical University (KTU) in 1996. The Department of Maritime Transportation Management Engineering is a program that continues to provide education at the undergraduate level in 8 public universities and 2 foundation universities as of the 2020-2021 academic year (YÖK, 2021).

Since the 1970s, technological advancement, the growth of international trade, and developments in supply chain management have increased the need for qualified employees in the maritime industry (Park *et al.*, 2019). Many developed countries face the problem of a shortage of qualified and skilled shipments for maritime enterprises (Guo *et al.*, 2006). Turkey's need for a skilled workforce in line with its strategic

objectives in the naval sector is constantly increasing (Öztürk *et al.*, 2020). Investment in human capital is a priority for sector stakeholders because the human element has a significant impact (Altınpınar and Başar, 2021) for commercial maritime operations. Today's rapid technological change leads to the emergence of new professions while reducing the economic opportunities of some occupations. Even if the use of autonomous technologies in maritime activities increases, human participation in many of the operations in the marine field will continue, and a qualified workforce will give enterprises an advantage in competition.

Students who cannot work in the maritime profession prefer these departments, which will cause a waste of resources (Fidan and Nas, 2019). Students' motivation, academic performance, and ability to assimilate new knowledge influence their career preference tendencies (Handoyo, 2018). Physical and mental difficulties make it difficult to practice the maritime profession (Yıldız *et al.*, 2016; Erginer *et al.*, 2019; Uğurlu *et al.*, 2022). Maritime is a socially restricted profession compared to other occupations (Demir and

Gürkan, 2020; Uğurlu *et al.*, 2018). A study in Taiwan (Chen, 2001) concluded that university graduates who do not know the maritime profession during the occupational preference have lower intentions to work onboard. The younger generation, who are not motivated to participate in the labor market and do not have the appropriate qualifications to become seafarer, will adversely affect the development of the maritime sector. For the candidate students who will choose the department of transportation management engineering in Turkey, standards such as age, height, weight, and physical fitness have been set universities. Prospective students must be successful in the exam that includes physical education interviews. Additionally, they have been asked to document that they can become seafarers with a health report (YÖK, 2021).

International regulations are considered in the institutions providing maritime education, and curriculum and practices are reshaped according to the frequently changing rules. In the maritime transportation management engineering department, curriculum, instructors, infrastructure, and training equipment are regularly inspected by the Turkey Ministry of Transport and Infrastructure (UAB) according to the requirements of the seafarers' training and examination regulations (Güzel and Bolat, 2020). Moreover, internationally accepted maritime training is provided in this department. With these audits, the aim is to ensure that naval education institutions train talented personnel and well-educated young people who will provide contributions to the maritime sector. With investments in naval education, it is aimed that high value-added seafarers are exported to the world maritime fleet, and shipment contributes to the country's economy. Although there are studies in the literature examining the profession preference trends of undergraduate students with YÖK data, there is no study yet for the marine transportation management engineering department.

### **1.1. Department of Maritime Transportation Management Engineering**

The marine transportation management engineering department focuses on maritime

safety and ship safety, marine and environmental protection, navigation, shipping, stability, shipping processes, cargo handling, maritime law, import/export contracts, warehouse processes, intermodal freight transportation, and port facilities. In higher education institutions, maritime students are asked to develop their professional skills and qualifications and to obtain up-to-date professional knowledge. The curriculum of the departments of transportation management engineering authorized to train seafarers has been approved by the UAB in Turkey and complies with IMO regulations (e.g., STCW). Research in Hong Kong, China, and Greece (Lau and Ng, 2015; Lau *et al.*, 2018; Pallis and Ng, 2011) students perceive the courses learned in maritime education as too theoretical. Balancing academic and pragmatic knowledge is very important in naval education. Students of the marine transportation management engineering department who graduate from a faculty authorized by UAB, who have the necessary conditions, and are successful in the exams organized by the Seafarer's Exam Center (GASM) can have the competence of an oceangoing watchkeeping officer.

Attention has been paid to the existence of ports and maritime agencies, lakes and dams in cities where higher education institutions provide maritime education at associate and undergraduate level. Maritime education institutions are geographically close to the areas where maritime activities are carried out. In this way, the students of these institutions, which can cooperate with other stakeholders, gain advantages in terms of internship, equipment, participation in panels and conferences.

Students of some universities are obliged to wear uniforms in the marine transportation management engineering department. Foreign language knowledge, physical competence, safety, and quality management are at the forefront of maritime education. While high salaries positively influence the students' desire to work onboard, personal interest, experiencing different cultures, and practicing the pieces of training they have received (Fernandez Gonzalez *et al.*, 2014), living away from society and challenging work conditions negatively affect. To graduate from the marine transportation

management engineering department, an offshore internship for one year must be completed. It gives an idea of whether the candidates who study offshore internships can do seafaring as a profession by putting up with the profession's challenges.

## **1.2. Consciousness in Choosing a Profession**

The profession is a general definition that covers the activities that the individual applies for to provide for their livelihood and to survive; Turkish Language Association (TDK) states that production should be based on training and skills when defining the expression of a profession (TDK, 2021). Individuals who need to participate in business life after a certain age must choose their career; the period of profession preference usually takes shape during adolescence. In making choices, individuals need to be directed correctly, and their interests, abilities, and existing backgrounds should be evaluated. The compatibility of the occupation with physical, emotional, and personal characteristics must be taken into account. An environment, different types of anxieties, changes brought about by adolescence, and psychological pressures negatively affect students during periods of profession preference (Özdemir *et al.*, 2021).

The increasing number of students enrolled in maritime transportation management engineering departments shows that interest in naval education in Turkey has increased. The appropriate choice can be ensured by directing the students correctly by considering their interests, abilities, and personality characteristics. In many studies, the preference rankings of university students in Turkey (Ada, 2014; Şimşek *et al.*, 2020; Üzülmez and Arslan, 2019) are primarily shaped by the Higher Education Institutions Examination (YKS) base scores and geographical proximity. Students want to work immediately after graduation. Research (Lau *et al.*, 2021) shows that participants are influential in choosing marine education because students think that they can get good grades by working less and find a job easily after graduation.

The answer to the question of whether the students who choose the maritime transportation

management engineering department make a conscious choice when selecting the maritime profession or whether they prefer it by considering their YKS scores is essential not only for the students but also for the marine sector. The reason of this, the success of the person in the chosen profession contributes to the production and increases the speed of development of that profession.

## **2. MATERIAL AND METHOD**

In this study, documentary analysis was selected as a research model. YÖK Atlas data were examined, and the vocational preference trends of the students who preferred the department of transportation management engineering were interpreted.

YÖK Atlas program prevents students from making mistakes while making their choices and provides guidance to researchers by presenting numerical data. YÖK Atlas is a valuable and reliable reference source with processed data that only YÖK can compile. The application audience will benefit from is prospective students and their families, educators, academics, researchers, and administrators during the transition to higher education (YÖK, 2020).

Higher education input indicators include the number of quotas of universities, preferred statistics, demographic data of the students who make preferences, and base scores as a result of placements. Higher education process and output indicators include the number of faculty members and title distribution, number of registered students, number of students graduating from the field.

## **3. RESULTS**

The study with 6,290 preference data obtained through the YÖK Atlas program aimed to examine the profession preference trends of students entitled to settle in the department of transportation management engineering. Candidates for central placement in higher education programs; YKS scores are placed by the Assessment, Selection, and Placement Center (ÖSYM), considering the additional

scores, if any, and the quotas and special conditions of these programs (YÖK, 2020). In the YKS exam, the weights of the tests are different in each type of score. Students are placed in the marine transportation management engineering department taking into account the kind of score and the success sequence of the dam, which is calculated numerically. In the study, 2020 YÖK Atlas preference data were used. According to the YÖK 2020 higher education institutions exam placement results report, the number of candidates who chose in 2020 is 1,113,640. Out of every 100 candidates who made the preference, 80 were entitled to

universities. Students can preference up to 24 departments in the online candidate transactions system. When the preference tendencies of the students who are allowed to enter the maritime transport management engineering department are examined, 33.24% of the 6,290 choices made are the universities' maritime transport management engineering departments. The 66.76% preference segment consists of different sections. In Table 1, detailed information is given about the 15 departments preferred by the students placed in the maritime transport management engineering department.

**Table 1.** Preference tendencies of students placed in maritime transportation management engineering department

	<b>Program</b>	<b>Number of Preferences</b>	<b>Preference Rate</b>
1	Marine Transportation Management Engineering	2,091	%33.24
2	Computer Engineering	470	%7.47
3	Department of Marine Engineering	408	%6.49
4	Electrical and Electronics Engineering	327	%5.20
5	Nursing	301	%4.79
6	Mechanical Engineering	296	%4.71
7	Civil Engineering	168	%2.67
8	Department of Naval Architecture and Marine Engineering	167	%2.66
9	Industrial Engineering	150	%2.38
10	Software Engineering	141	%2.24
11	Primary Mathematics Teaching	125	%1.99
12	Veterinary	120	%1.91
13	Dentistry	80	%1.27
14	Mechatronics Engineering	74	%1.18
15	Architecture	67	%1.11
16	Other	4,985	%20.75
	Sum	6,290	%100

Quotas and preferred numbers of state and foundation universities where the maritime transportation management engineering

department is located are given in table 2. These rates show the demand for departments of universities in the range of points.

**Table 2.** Preference statistics by universities

University	Number of Preferences	Quota	Preference Per Quota
Dokuz Eylül University (DEU)	812	72	11.3
İstanbul Technical University (ITU)	1,071	182	5.9
Karadeniz Technical University (KTU)	616	84	7.3
Ordu University (ODU)	290	41	7.1
Recep Tayyip Erdoğan University (RTEU)	217	77	2.8
Van Yüzüncü Yıl University (YYU)	25	16	1.6
İskenderun Technical University (ISTE)	265	41	6.5
İstanbul University-Cerrahpaşa (IUC)	614	72	8.5
Piri Reis University (PRU)	383	100	3.8
Girne University	25	30	0.8
Sum	4,318	715	6.0

According to Table 2 data, the three most preferred universities per quota are DEU, IUC, KTU, and ODU (Table 2). Although the maritime transport management engineering department with the highest base score is in ITU, it is seen that the university has more than one campus, and one of these campuses is in Cyprus affects the number of preferences.

Table 3 provides information about the order of succession of the students who have settled in the marine transportation management engineering department. Students who are between 23,397 (ITU) and 299,179 (YYU) dam success sequences have been eligible to settle in according to the 2020 assessment and placement

results, the marine transportation management engineering department. Among the institutions that provide free and public university education, there are only three vacancies left in YYU. The 300 thousand thresholds, a prerequisite for engineering faculties, resulted in 3 quotas remaining at YYU. In foundation universities, vacant quotas are seen only where fully paid students are accepted. All quotas, including partial scholarship quotas at foundation universities, have been filled. At KKTC, Kyrenia University and ITU provide marine transportation management engineering education.

**Table 3.** Ranking of students placed in maritime transport management engineering department

	Min. Achievement Score	Mean Achievement Score	Max. Achievement Score
<b>State</b>	299,176	152,779	23,397
<b>Foundation</b>	295,913	181,059	52,535
<b>KKTC</b>	293,389	243,942	179,775

In Table 4, preference distributions of marine transportation management engineering students who settled in public universities and YKS base scores for 2020 were given. Students' profession tendencies vary according to universities. While the dentistry department is among the preferences of the students who are entitled to study at ITU, it is not among the choices of other university students in the research because of the

base and top YKS scores of the departments of other universities. However, it is noteworthy that the second most popular department among students placed at IUC is ship marine engineering, which is considered a maritime profession. The second most popular department among the students who settled in KTU, ODU, and ISTE is the nursing department.

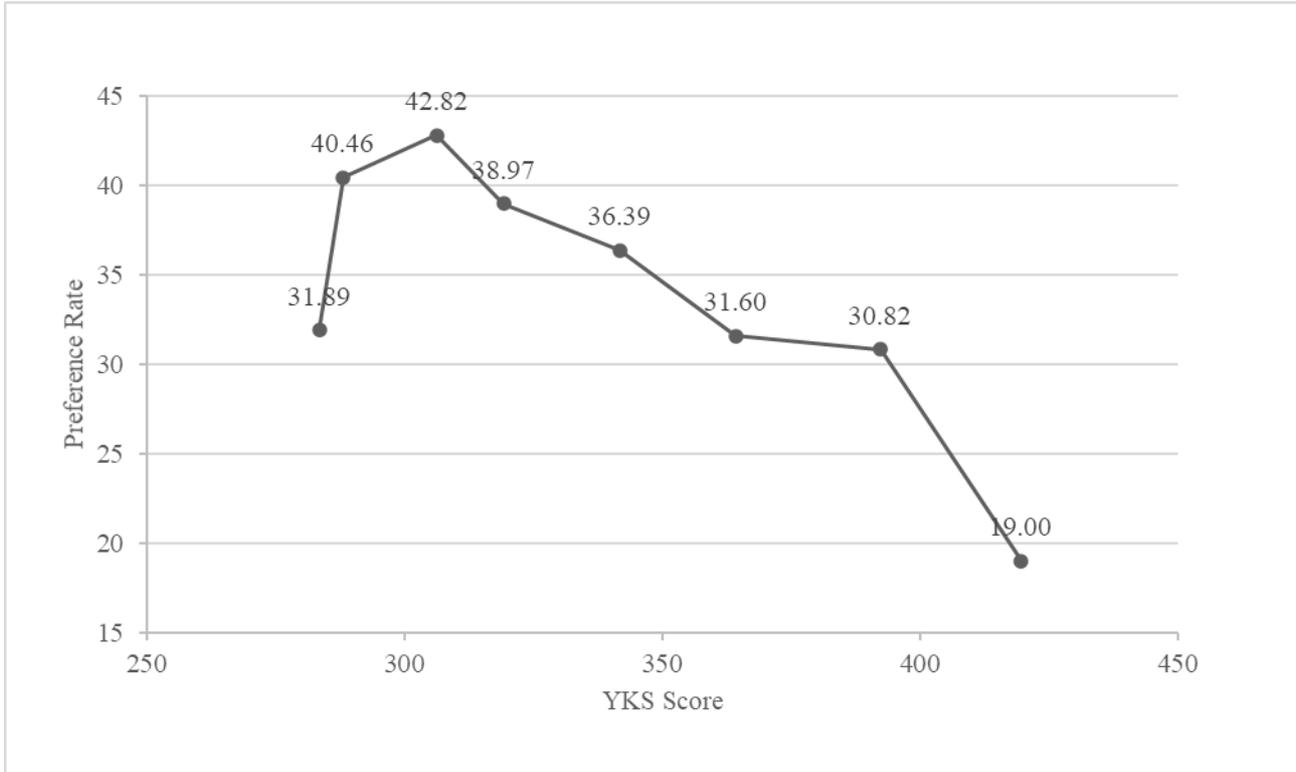
**Table 4.** Preference distribution of maritime transport management engineering students who are entitled to enter state universities

	<b>ITU*</b> <b>(419.67)</b>	<b>DEU</b> <b>(392.33)</b>	<b>IUC</b> <b>(364.26)</b>	<b>KTU</b> <b>(341.69)</b>	<b>ODU</b> <b>(319.20)</b>	<b>ISTE</b> <b>(306.45)</b>	<b>RTU</b> <b>(288.06)</b>	<b>YYU</b> <b>(283.48)</b>
Marine Transportation Management Engineering	%19.0	%30.82	%31.60	%36.39	%38.97	%42.82	%40.46	%31.89
Computer Engineering	%14.33	%6.10	%5.98	%7.28	%5.88	%4.34	%4.98	%7.57
Marine Engineering	%8.49	%6.9	%10.66	%6.93	%4.41	%1.90	%2.19	%1.08
Electrical and Electronics Engineering	%4.46	%6.9	%4.68	%6.57	%5.33	%5.69	%6.44	%4.32
Nursing	%0.53	%2.89	%4.29	%7.98	%7.90	%10.57	%6.56	%4.87
Mechanical Engineering	%4.24	%7.54	%2.21	%3.17	%4.04	%4.07	%7.90	%8.65
Civil Engineering	%1.48	%2.57	%3.12	%3.29	%2.39	%2.44	%4.25	****
Naval Architecture and Marine Engineering	%2.65	%2.09	%2.21	%2.58	%5.51	%1.90	%1.46	%0.54
Industrial Engineering	%3.82	%2.57	%1.69	%3.87	%1.47	%0.54	%0.85	%2.16
Software Engineering	%3.08	%1.28	%1.69	%1.53	%3.13	%1.90	%1.46	%2.16
Primary Mathematics Teaching	%4.35	%3.37	%4.68	%1.64	%2.02	%0.27	%0.12	****
Veterinary	%0.85	%4.33	%3.38	%3.52	%2.21	%0.27	%0.49	%2.70
Dentistry	%8.39	****	****	****	****	****	****	****
Mechatronics Engineering	%1.17	%0.96	%0.39	%0.24	%1.10	%0.81	%2.79	%2.70
Architecture	%0.11	%0.64	%1.04	%1.29	%1.10	%2.44	%0.49	****

\*Information about the department in Istanbul and provided free education.

Based on Table 4, the chart in figure 1 is created. The decrease in the preference of the base score

seen in this graph was remarkable, and the link between these two values was examined.



**Figure 1.** Impact of student scores on marine transportation management engineering in preference distribution

As a result of the analysis, the correlation between student scores and the marine transportation management engineering rate in the preference list is  $-0.78$ , i.e., high. However, the direction of the relationship was negative because the rate of preference decreased with the increase in points.

#### 4. DISCUSSION AND CONCLUSIONS

YÖK Atlas 2020 data were used to analyze the preference trends of the students of the maritime transportation management engineering department, the choice of professions, and the variability of the scores. According to the analysis results of 6,290 preference data, YKS scores are very effective in choosing careers. The most crucial factor in the profession preference of marine transportation business engineering students is the YKS score. Choices of students placed in ITU, whose maritime transport management engineering base score is higher than other universities, include computer engineering, ship mechanical management

engineering, and dentistry. There was no preference for the dentistry department among the students who settled in other universities' marine transportation business engineering department. In order to increase the quality of higher education in 2019, the YÖK decision (YÖK, 2019), which set the order of succession of dentistry department thresholds at a minimum of 80,000 affected the distribution of preferences. YÖK has set the minimum dam success order for the pharmacy department at 100,000.

For this reason, besides the students who placed ITU and DEU, the pharmacy department was not preferred. Nursing departments come to the fore instead of dentistry and pharmacy departments in students who have the right to be placed in the maritime transportation management engineering department in other universities. The fact that the most critical factors affecting the vocational choices of the students are the exam scores shows that the awareness of the intention of profession is not formed in the students (Durmuş and Tokyay, 2021). The fact

that maritime transport management engineering students placed in universities with relatively high base scores prefer departments such as dentistry and pharmacy instead of maritime transport management engineering departments in other universities shows the effect of the exam score on their profession preferences.

In a study examining the factors affecting students' university and career choices (Bardakçı, 2019), it was seen that a significant part of the students had sufficient information about the department they chose before making their choice. Still, they did not have enough information about the departments' academic staff. The most critical factors in the selection of students in the university were found to be geographical proximity to the family and the adequacy of the score obtained. Students' level of knowledge about the profession and university they will choose while making the selection process significantly affects their satisfaction in the department they are placed in (Bardakçı, 2019). Geographically, being preferred in terms of proximity to the family ensures that universities in major cities of Turkey, such as Istanbul Izmir, are in high demand. According to December 2021 data, %18.71 of Turkey's population lives in Istanbul, and %5.23 lives in Izmir. In other provinces with maritime transport management engineering departments, Turkey's population is Hatay (%1.97), Van (%1.35), Trabzon (%0.96), Ordu (%0.90), Rize (%0.41) is disbanded. The high base scores of universities in cities with a high population density are related to geographical proximity. It is thought that KTU, which has a relatively higher base score compared to big cities, is among the well-established universities. The increase in the base scores reduces the density of the maritime transport management engineering department in the preferences. Similar results were observed in the study conducted by Durmuş and Tokyay (2021). The choice of the profession selected in the preference list in more than one university is accepted as an indicator of interest in that profession. It is known that making consciously department choice reduces the degree of anxiety (Aydın and Tiryaki, 2017).

Erkuş *et al.* (2020) emphasized that among the

factors affecting the choice of department, finding a job and exam score were the most critical factors. A study conducted at DEU stated that employment in the maritime sector is high and knowing a foreign language provides an advantage in recruitment (Ayaz *et al.*, 2018). Lusic *et al.* (2019) state a significant excess demand in the employment of watchkeeping officers in the maritime sector. While the maritime profession is expected to be preferred because it has more advantages over the occupational groups in the same YKS score range in terms of employment, the maritime profession does not receive the expected attention due to the social limitations (Uğurlu, 2016) of the job. Career development and income are crucial issues in choosing a profession (Osman, 2016). Training in maritime transport management engineering is carried out under the control of the flag state, within the scope of STCW, at international standards.

Minimum salaries for oceangoing watchkeeping officer qualifications for international seafarers are set by the International Transport Workers' Federation (2021), and as of 2021, for month cannot be less than approximately US\$2,000, including overtime and leave pay. Although this fee varies from time to time with the ship type and voyage region, the minimum values and job opportunities are seen above standards Turkey. The study's influential factors in these preferences could not be detailed because data was not collected by contacting the students directly. Thanks to the data provided by YÖK, general information about the profession preference trends of the students who prefer the maritime transportation business engineering department has been obtained. In future studies, students can be contacted, detailed information about the factors affecting their profession tendencies can be collected, and comparative analysis can be made with the preference data we have. YÖK Atlas data should be examined with longitudinal study methods in the following years.

## CONFLICT OF INTERESTS

The authors declare that for this article, they have no actual, potential, or perceived conflict of interests.

## ETHICS COMMITTEE PERMISSION

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