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**GRADUATE EMPLOYMENT AND EARNINGS OUTCOMES IN LOGISTICS AND
TRANSPORT PROGRAMS IN TÜRKİYE: A DESCRIPTIVE PROGRAM-LEVEL
ANALYSIS**

Emine ÖZTÜRK KOÇALI¹

ABSTRACT

The present study evaluates the widely expected high employment opportunities available for graduates of Turkish transport and logistics programs based on the official statistics. The twelve programs differ in registered employment rate, time to first job placement and earning group. Applying the official information provided by TÜİK-TURKSTAT about five bachelor's (Logistics Management; Maritime Business Administration, Aviation Management, International Trade and Logistics, Marine Transportation Engineering) and seven associate-degree (Rail Systems Operations, Transportation and Traffic Services, Civil Air Transportation Operations, Logistics, Maritime and Port Management, Marine Transportation and Operations, Postal Services) programs for the period of 2022-2025, the study examines the contrast between the expectations and reality in the context of the employment and earnings of the graduates. The study is exploratory and descriptive, not causal. It uses the techniques of panel descriptive statistics, rank-stability statistics and single-term reference trend deviation measure (similarly to shift-share approach, but without industry mix and competition effects component). The deviations are further related to the sectoral indices such as foreign trade, cargo movement at ports and air traffic. Most of the programs generally follow their general trend with a few exceptions among aviation-related and maritime programs. While aviation-related programs demonstrate faster-than-trend performance along with 29.5% growth in number of aircraft movements, many of maritime programs reveal a decrease despite the stability or growth in port cargo movement. The results are descriptive associations and do not indicate any causalities. Job Matching Theory and Signaling Theory are applied only as theoretical frameworks and are not empirically tested. Noteworthy, Marine Transportation Engineering program demonstrates the paradox of the highest earning group combined with the lowest and decreasing employment rate.

Keywords: Graduate Employment, Logistics Education, Transport Education, Job Matching Theory, Türkiye.

JEL Classification Codes: I23, J21, J24, L91.

**TÜRKİYE'DE LOJİSTİK VE ULAŞTIRMA PROGRAMLARINDA MEZUN İSTİHDAMI VE
KAZANÇ SONUÇLARI: PROGRAM DÜZEYİNDE BETİMSSEL BİR ANALİZ**

ÖZ

Bu araştırmada, Türkiye'de ulaştırma ve lojistik programlarından mezun olan bireylerin güçlü istihdam olanaklarına sahip olacağı yönündeki yaygın beklenti, resmî veriler temelinde incelenmektedir. Bu alanda yer alan on iki program arasında istihdam oranı, ilk işe girişi süresi ve gelir düzeyi bakımından belirgin farklılıklar bulunmaktadır. Çalışmada, TÜİK tarafından 2022-2025 dönemi için yayımlanan beş lisans programına (Lojistik Yönetimi, Denizcilik İşletmeleri Yönetimi, Havacılık Yönetimi, Uluslararası Ticaret ve Lojistik, Deniz Ulaştırma İşletme Mühendisliği) ve yedi ön lisans programına (Raylı Sistemler İşletmeciliği, Ulaştırma ve Trafik Hizmetleri, Sivil Hava Ulaştırma İşletmeciliği, Lojistik, Deniz ve Liman İşletmeciliği, Deniz Ulaştırma ve İşletme, Posta Hizmetleri) ilişkin resmi veriler kullanılmıştır. Analiz, söz konusu programlara yönelik istihdam beklentilerinin mezunların fiili işgücü piyasası sonuçlarıyla ne ölçüde örtüştüğünü ortaya koymayı amaçlamaktadır. Çalışma betimleyici ve keşfedici niteliktedir; nedensellik iddiası taşımaz. Yöntemsel olarak panel betimsel analizleri, sıra istikrarı istatistikleri ve shift-share mantığından esinlenen tek terimli bir referans eğilimden sapma ölçüsü (klasik

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shift-share analizindeki sanayi karması ve rekabet etkisi bileşenlerini içermemektedir) kullanılmış; sapmalar dış ticaret hacmi, liman yük hareketleri ve hava trafiği gibi sektörel göstergelerle birlikte değerlendirilmiştir. Bulgular, programların büyük bölümünün kendi düzeylerindeki genel eğilimi izlediğini; ayrışmaların havacılık ve denizcilikle ilişkili programlarda yoğunlaştığını göstermektedir. Havacılıkla ilişkili programlar, hava trafiğindeki %29,5’lik artışla birlikte eğilimin üzerinde bir iyileşme gösterirken, denizcilik programlarının çoğu liman yük hareketlerindeki istikrar veya artışa rağmen geri kalmaktadır; bu ilişkiler betimleyicidir ve nedensel etki olarak yorumlanmamalıdır. İş Eşleştirme Teorisi ve Sinyal Teorisi yalnızca yorum çerçevesi olarak kullanılmış, test edilmemiştir. Deniz Ulaştırma İşletme Mühendisliği ise en güçlü ücret sinyalini vermesine karşın, en düşük ve gerileme eğilimindeki istihdam oranına sahip program olarak öne çıkmaktadır.

Anahtar Kelimeler: Mezun İstihdamı, Lojistik Eğitimi, Ulaştırma Eğitimi, İş Eşleştirme Teorisi, Türkiye.

JEL Sınıflandırma Kodları: I23, J21, J24, L91.



1. INTRODUCTION

Every summer, hundreds of thousands of Turkish high-school graduates rank university programs on centralized preference forms, and transport and logistics fields are consistently promoted, by universities, career-guidance sites, and popular forums alike, as fields where “everyone finds a job.” This is not merely informal chatter: Rothwell, Herbert, and Rothwell (2008) show that students’ self-perceived employability is shaped by the perceived status and labor-market demand of their specific field of study, independent of individual skill or university reputation, so a field-level reputation for being “in demand” can shape enrollment before any graduate outcome is observed. The mismatch of perception and reality is not exclusive to this cohort. As explained by Uz (2022), Turkish youth who are enrolling into tertiary education envisage highly paid and prestigious jobs but find themselves facing an ever harder process of getting to the labor market. For example, according to Salas-Velasco (2007), whose paper looks into transition experiences of graduates from nine European countries, field of study and academic level independently affect duration of transitions regardless of personal characteristics of individuals or socio-economic background. This means that time-to-first-job will be regarded as an outcome in itself. The perception of easy job opportunities in the transport and logistics is hardly ever evaluated using one consistent data source regardless of years and programs and such perception cannot be self-evident in case of diverse groups of students.

Türkiye offers an unusually good setting to test this claim empirically. Since 2022, TÜİK has published annual Higher Education Employment Indicators (Yükseköğretim İstihdam Göstergeleri) which links graduation records to Social Security Institution (SGK) employment registries for every higher-education program in the country, reporting registered employment rate, average time-to-first-job, and an ordinal earnings-group classification. The dataset is composed of four successive years (2022-2025), based on the same methodology, and includes students of the 2015-2024 cohorts residing in Türkiye for the reference year (TÜİK, 2026).

In this paper, we use this series to study twelve transport and logistics programs that include five bachelor programs (Logistics Management, Maritime Business Administration, Aviation Management, International Trade and Logistics, Marine Transportation Engineering), and seven associate-degree programs (Rail Systems Operations, Transportation and Traffic Services, Civil Air Transportation Operations, Logistics, Maritime and Port Management, Marine Transportation and Operations, Postal Services). This analysis will help answer five questions:

- Which programs have more registered employment, and how stable this ranking is?
- Which programs provide graduates with jobs faster, and is there any correlation between this ranking and the ranking by the employment rate?
- Which programs have more stable earnings class, and is there any correlation between earnings strength and placement strength or trade-off between them?
- To what extent year-to-year changes of programs can be accounted for by level-wide trends (either bachelor's degree or associate) rather than program-specific residual, and whether this residual moves in the same direction as the matched sector indicator?
- Underlying motive of the entire study: Comparing the results of the logistics program with that of other transportation programs and not with the average of all university programs.

They are both descriptive and exploratory in nature. The research does not posit or test causal hypotheses; it only describes how outcomes vary across and covary among the programs. Job Matching Theory and Signaling Theory are used in interpreting the observed patterns rather than testing them, and any relationships observed between indicators and outcomes are described as covariations rather than causal effects.

Contributions of the study are threefold. Empirically, previous research on graduate outcomes in Turkey is based on labor-force surveys or small sample sizes and uses graduates of broad educational categories and vocational education as the units of analysis (Özer & Suna, 2020; Orbay et al., 2021; Akgül, 2025). However, transport and logistics education have been studied using surveys of students or graduates (Kıracı & Bayrak, 2014; Akar, 2026; Arslan et al., 2026). As far as we know, this study is the first one to aggregate program-level outcomes from the administrative data of TÜİK in the transport and logistics cluster over all four available years and to study the outcomes in the cluster rather than just quoting some isolated numbers. Methodologically, it applies the reference-trend component of shift-share analysis (Dunn, 1960) to the rate-based graduate-outcome data, interpreting its



output as deviation statistics rather than as weight-based analysis of the original technique. Theoretically, it suggests that Job Matching Theory (Jovanovic, 1979) and Signaling Theory (Spence, 1973) are two complementary perspectives that can help us interpret the outcomes. Matching quality is determined by the employment rate and the time to first job. Signaling quality is determined by earnings classification. The data cannot test any of the two theories.

2. LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1. Job Matching Theory

The job-matching model of Jovanovic (1979) considers employment as an experience good, where neither the employee nor the company can understand the quality of the match until after hire. Information on the quality of the match will be gathered from the employment experience. The increased level of initial information gained from either the stronger occupational identity of the program, licensing, or connections made by the employer should result in quicker completion of the search and discovery process leading to the reduction in time to first employment. Programs that offer degrees leading to licensed occupations (with clear identity) are anticipated to have lower search costs compared to the programs offering more generalized degrees. Two hypotheses from the theory of Job Matching are generated for the current case scenario: the programs that offer higher occupational identity should show faster placements as well as higher employment rate in the long run.

The fundamental model proposed by Jovanovic applies to general labor markets, while subsequent research develops it along two lines of inquiry especially relevant to this study. At the macro level, Pissarides (2000) formulates an equilibrium search and matching model which shows how vacancy-to-seeker frictions produce an equilibrium distribution of matching delays by occupation. A special program aimed at a small licensed occupation faces an entirely different matching function from general programs competing in a large labor market regardless of aggregate demand conditions. At the school-to-work level, Blokker et al. (2023), having synthesized a body of literature from 365 articles over 28 years, systematizes it according to antecedents of transition quality from the personal, contextual, and temporal perspectives. Their results indicate that better school-employer coordination leads to better match quality and greater earnings from the first job, while more stringent labor protection legislation increases transition time, especially for more educated workers. The contextual perspective is equivalent to the main mechanism considered in this study: occupational licensing systems, like STCW in seagoing maritime occupations, serve as coordination institutions in the manner proposed by Jovanovic, and their strictness relative to graduates' supply is to show up in employment rates and transition times provided in the analysis below.

2.2. Signaling Theory

An alternative approach is provided through Spence's (1973) signaling model. In Spence's signaling model, education does not have to improve productivity in order for it to lead to an increase in wages, but can act as a costly signal that is positively correlated with the ability of an individual and is used by firms to distinguish between candidates when they are uncertain about the type of candidate applying to work for them. According to this perspective, a wage differential associated with an educational qualification shows how well it signals higher-ability candidates from lower-ability candidates from the viewpoint of the firm, and does not necessarily imply the speed or rate at which these individuals become employed.

Whether earnings differentials represent signaling or human capital, the impact on productivity through education captured by Becker (1964) and measured via the earnings function approach pioneered by Mincer (1974) has remained unresolved for half a century. The primary competing theory in signaling is screening, which Arrow (1973) modeled as a filtering process sorting workers based on existing abilities, Stiglitz (1975) formalized the equilibrium under the conditions of imperfect information, while Layard and Psacharopoulos (1974) showed that returns to completed credentials exceed the returns to equivalent incomplete education, proving the signaling value of the credential per se. Weiss (1995) likewise argues that productivity effect of schooling is in many cases due to the inference of preexisting traits like persistence by employers, thus being closer to screening than Becker's human capital theory. Huntington-Klein (2021) explains the difficulty in resolving this controversy: since the identification conditions necessary to distinguish the channels in question are seldom met for observational data like TÜİK bulletin used in this paper, any assertion that a wage gap is "mostly signaling" goes beyond the power of these data. In this paper, no such decomposition is made; the classification of individuals into earnings groups is simply used as a measure of signaling strength in the Spence (1973) framework, meaning that the credential



results in a split of a subgroup into premium earnings regardless of the underlying channel, precisely matching Marine Transportation Engineering case (section 4). Finally, Collins (2011) brings yet another variable into play: credential inflation the signaling value of the credential may decline with increased credential prevalence even in absence of skills change, constituting the slow-moving background for interpretation of the 2022-2025 period examined in this paper.

The signaling theory is not applicable in the same way for bachelor's degrees as for vocational credentials, the latter comprising one half of this panel. Grubb (1993), separating the screening explanation into two categories, screened and unscreened occupations in the U.S., has found that vocational associate degrees serve as screening signals different from bachelor's degrees, centered in areas where employers can easily correlate them with a limited set of skills. The idea is expanded by Hanushek et al. (2017) on a career track: while vocational education promotes youth employment compared to the general education, there is a cost of reduced adaptability, a trade-off characteristic of countries where there is a strong link between vocational education and employers through the apprenticeship-type connection, exactly the structural factor upon which the vocational programs in this panel are based. A big positive residual of a vocational degree program, for instance Rail Systems Operations (Section 4.4), may therefore not have the same cause as a similar bachelor's degree program: a narrow vocational credential correlated with a limited and growing set of employers can be considered a cleaner signal according to Grubb, precisely due to its narrowness. This point will be discussed further with regards to Rail Systems Operations' residual in Section 5.4.

2.3. Applied Literature on Logistics and Transport Graduate Outcomes

Skill and employability research in logistics and supply chain management has grown far beyond Turkey. In a survey among logistics and supply chain managers in Oman, Harrasi et al. (2023) revealed that there is always a mismatch between the skills of graduates and the requirements of entry-level jobs. According to Cantoni et al. (2024), soft skills have become more and more important in hiring in the larger field of logistics, which has happened much faster than the curriculum adaptation. In a study of Malaysian logistics, Ong and Dwivedi (2026) attributed good communication, problem-solving, teamwork, and adaptability to success at entry-level positions. Muja et al. (2019), studying Dutch vocational graduates, revealed that self-assessed skills were better predictors of integration than general skills and that only certain signals of education mattered to employers, which is consistent with the hypothesis that vocational and academic degrees may send different signals put forward in Section 2.2 of this paper. Notably, none of these four studies use an equivalent of an administrative register, such as Turkish Statistical Institute (TÜİK-TURKSTAT). All of them conduct surveys that are useful to explain the matching mismatch but cannot quantify it due to their methodology.

Maritime education in Turkey offers a unique literature base, although it is relatively small. Akar (2026) identified high sector preference instability among maritime vocational students at İskenderun Technical University where 41.3% had no sector preference and their salary expectations were low (30,001–50,000 TL). Arslan et al. (2026) studying 1,760 senior maritime students countrywide concluded that motivation, gender, family status, and institution type predict future sea tenure and that course completion is just a poor substitute for sector preference. Yıldız et al. (2016) examining 618 deck cadets noted occupational fatigue and difficult working conditions on board sufficient to compromise future careers. Together, these papers provide empirical support for the behavioral mechanism described in Section 5.2 through which maritime employment may be reduced even in case of rising port activity without any reduction in labor demand.

The field of Turkish aviation education, on the other hand, is marked by a more limited survey literature than an administrative literature. Kiracı and Bayrak (2014) find considerable variability among graduates of civil aviation bachelor's programs in terms of how much early employment relates to aviation education with a substantial share moving on to other management jobs. This result is similar to, although does not represent a test of, the strong positive residual from the aviation-related education in Section 4.4 that suggests that higher placement demand does not mean that people will go into aviation occupations. It is important to note that no work has yet used a national administrative record of aviation management results as a benchmark for comparison; this gap is partly filled by the current study (Section 5.3).

2.4. The Broader Turkish Graduate-Labor-Market Mismatch Literature

The cluster being studied exists in the context of a wider trend within Turkey of mismatch of qualifications of university graduates. Qualification mismatch is a recognized feature of the graduate labor market in Türkiye: many



degree holders work in jobs that require either lower or higher qualifications than their degrees certify. Çakır and Kellevezir (2020) suggest that such a trend needs to be researched at the field and program levels instead of using aggregate statistics for the whole economy. Uz (2022), analyzing the data provided by the TÜİK over 11 years for graduates aged 15–24, reaches similar conclusions from a sociological point of view. It was discovered that the transition into employment became more difficult with graduates often occupying insecure, poorly paid jobs or working in unrelated fields. Özsoy (2015), focusing on the vocational segment that makes up half this panel, argues Türkiye’s weak vocational-employment link stems from policy prioritizing program-expansion quantity over employer-alignment quality, a supply-side account complementing the demand-side, sector-exposure account in Sections 3.2 and 4.4. These studies’ shared point, that national statistics conceal enormous field-level heterogeneity, is this paper’s starting premise: the twelve-program range in Table 1 (36.6% to 81.3% registered employment among bachelor’s programs sharing one “transport and logistics” label) illustrates exactly the pattern they describe for Turkish higher education as a whole.

Recent Turkish literature offers evidence at the field-level and vocational level. Using data from household labor force surveys from 2009–2023, Akgül (2025) finds large differences in employment chances and wages by field of higher education, with graduates in science, technology, health, and law fields faring better than graduates in humanities and arts. Orbay, Aydede, and Erkol (2021) show that a considerable share of Turkish university graduates is overeducated for their jobs and that within their dataset there is no wage penalty associated with the field-of-study-occupation mismatch, which is taken as a sign that suitable graduate employment may not require specialization in a particular field. At the vocational education level, Özer and Suna (2020) find high employment chances among graduates from vocational and technical Anatolian high schools, though most of them are working in occupations not related to their field of education, and Suna et al. (2020) examine the reasons behind such out-of-field employment. While both studies focus on upper secondary vocational education and not associate-degree programs, the same issue of horizontal mismatch related to the vocational dimension of this paper comes into question. Two more studies focus on the experience of graduates from different angles: İslamoğlu and Alp (2019) show that there is a lack of research about the school-to-work transition in Türkiye, and that there are not many surveys by TÜİK about such transitions (2009 and 2016); Görmüş et al. (2023), based on interviews of twelve graduates from engineering, social science, language, and health education programs, find that graduates blame unemployment mainly on a lack of experience and universities failing to provide necessary qualifications. When considered together, these studies suggest that field mismatches are important for Turkey, although they rely on surveys and broad categories of fields. None follows transport and logistics education programs across several years using administrative data; this is what the current study fills the void in.

2.5 Synthesizing the Two Theories for This Study

Read together, the two theories imply that a single-number ranking of “which transport program is best” is the wrong object of analysis. A program can be a strong match (fast, high-probability placement) without being a strong signal (high pay), and vice versa, and because the human-capital-versus-signaling decomposition of any given earnings gap is not identifiable from data of this kind (Huntington-Klein, 2021), the more productive analytical move is not to adjudicate between the theories but to let each govern the outcome variable it was built to explain. We therefore treat employment rate and time-to-first-job as the primary matching-quality indicators, tracing directly to Jovanovic (1979) and to the context and time dimensions identified by Blokker et al. (2023), and the earnings classification as the primary signaling-strength indicator, tracing to Spence (1973). We look for cases where the two diverge as the most theoretically informative findings, rather than averaging them into a composite score that would obscure exactly the tension the theories predict.

3. DATA AND METHODS

3.1 Data Source and Scope

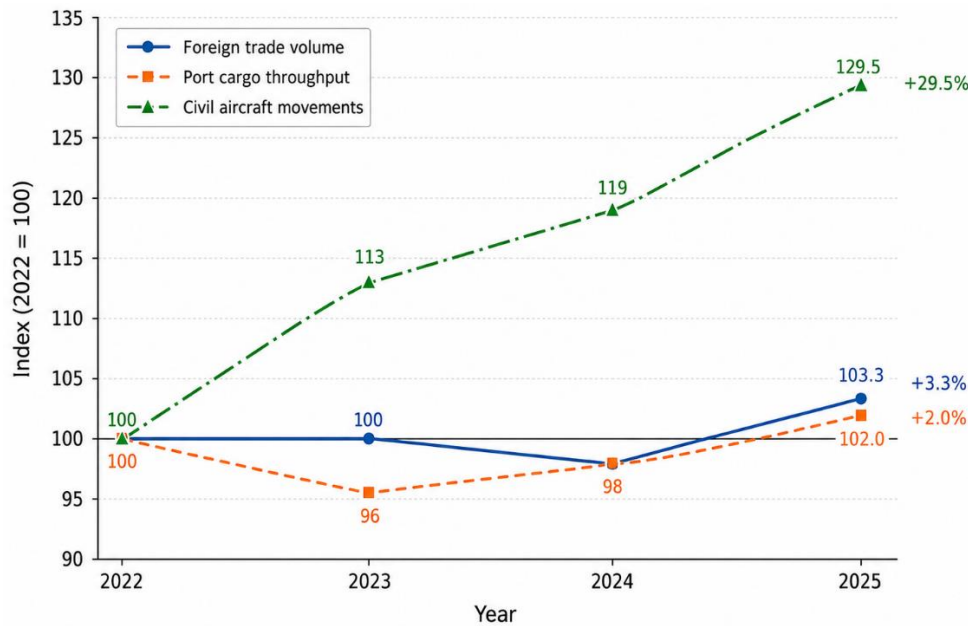
The primary data source is TÜİK’s Higher Education Employment Indicators bulletin, in its 2025 release, which reports 2022–2025 figures for registered employment rate, average time-to-first-job (in months), and a five-category ordinal earnings-group classification (very low to very high), separately for bachelor’s and associate-degree graduates, by program. The underlying population is graduates of the 2015–2024 cohorts who were resident in Türkiye and matched to SGK employment records in the reference year; TÜİK is explicit that non-registration does not equal unemployment, since it also captures continued study, informal employment, non-search, and emigration (TÜİK, 2026).

We restrict the panel to the transport and logistics programs TÜİK reports with a complete four-year run across all three indicators: five bachelor's programs (Logistics Management; Maritime Business Administration; Aviation Management; International Trade and Logistics; Marine Transportation Engineering) and seven associate-degree programs (Rail Systems Operations; Transportation and Traffic Services; Civil Air Transportation Operations; Logistics; Maritime and Port Management; Marine Transportation and Operations; Postal Services). These twelve programs are the full list of eligible programs, covering the whole period from 2022 to 2025 in all three criteria; no exemptions have been made. There are two additional programs that can be found only in the earnings criteria table but not in the employment rate or duration tables: Pilotage (bachelor's degree) and Aircraft Technology (associate degree).

3.2 Sector-Exposure Series

In the operationalization of the shift-share based component, each program group was paired with an independently derived sectoral activity time-series for the period 2022-2025: the total volume of foreign trade of Turkey (exports and imports under General Trade System) for logistics and international trade related programs (Ministry of Trade, 2026); the total volume of cargo tons handled at Turkish ports for maritime related programs (T.C. Ministry of Transport and Infrastructure, General Directorate of Maritime Affairs, 2026); and total aircraft movements (arrivals and departures) for aviation related programs, calculated from data obtained from State Airports Authority (DHMI). No such pair for rail or postal sectors activities has been found for this period and that is considered to be a limitation of substance (Section 5.2). Figure 1 indexes all three series to 2022 = 100; civil aircraft movements grew far faster than the other two over the period, a pattern that becomes central to the residual analysis in Section 4.4.

Figure 1. Matched Sector-Exposure Series



Note. Foreign trade volume (exports + imports, General Trade System), port cargo throughput, and civil aircraft movements (landings + take-offs), 2022–2025. Sources: T.C. Ministry of Trade (2026); T.C. Ministry of Transport and Infrastructure, General Directorate of Maritime Affairs (2026); reporting DHMI figures.

3.3 Analytical Strategy

We deliberately do not estimate a fixed-effects panel regression. With five and seven cross-sectional units observed over four years respectively, a two-way fixed-effects model would consume nearly all available degrees of freedom, standard-error correction methods that require large T asymptotics (Driscoll–Kraay, panel-corrected standard errors) are mechanically inapplicable, and the three outcome indicators are jointly determined by the same underlying matching process rather than causally sequenced, which would make any regression of one on another

a description dressed as a causal claim. Instead we use three complementary descriptive tools appropriate to a small, non-causal panel.

- We compute the coefficient of variation of employment rate across programs, within each degree level and year, to track whether the cluster is converging toward or diverging from a common outcome (Section 4.1).
- We compute Spearman rank correlations between each program's 2022 and 2025 employment-rate rank, and Kendall's coefficient of concordance (W) across all four years, to assess how stable the within-cluster ranking is (Section 4.1).
- Central to answering Research Question 4, we compute a reference-trend deviation analysis, informed by the logic of shift-share decomposition (Dunn, 1960) but adapted to rate rather than level data. Classical shift-share decomposes a level variable, typically regional employment counts, into a reference-area growth component, an industry-mix component, and a local competitive residual (Dunn, 1960; Esteban-Marquillas, 1972); TÜİK publishes registered employment as a rate, not a graduate headcount, so that multi-term, weight-based decomposition is not available to us, and what follows should be read as a single-term deviation statistic in that tradition rather than a full re-implementation of it. We compute, for each program i , the total change in employment rate over 2022–2025, $\Delta\text{Rate}_i = \text{Rate}_{i,2025} - \text{Rate}_{i,2022}$, and decompose it into a level-wide reference component, $\Delta\text{Rate}_L = \text{Rate}_{L,2025} - \text{Rate}_{L,2022}$ (the bachelor's-wide or associate-wide total change), and a program-specific residual, $\text{Residual}_i = \Delta\text{Rate}_i - \Delta\text{Rate}_L$. We then examine, qualitatively rather than through formal inferential correlation given $n = 5$ and $n = 7$, whether each residual's sign and magnitude align with the direction of its matched sector-exposure series. We use the term "shift-share-inspired" only to signal this lineage, not to claim the industry-mix and competitive-effect terms that a genuine Dunn-style decomposition would require; a headcount-weighted, multi-term version is not attempted here and is flagged as a direction for future work in Section 6. In practice, the residual is calculated as the difference between the change in employment rates of a particular program and the change in the aggregate employment rates of the degree category. No industry-mix effect and no competitive effect are included in this calculation of the residual, which thus serves only to measure the descriptive departure from the trend in the degree category in the way that was defined by Dunn (1960). The presentation of the residual alongside the indicator of the industry will show if they move together. Worked example (Aviation Management): $\Delta\text{Rate} = 75.7 - 74.5 = +1.2$ pp; reference trend $= 73.9 - 75.1 = -1.2$ pp; Residual $= +1.2 - (-1.2) = +2.4$ pp.

With twelve programs and several descriptive statistics computed across the same underlying panel (coefficient of variation, Spearman rho, Kendall's W, twelve residuals, and correlations between residuals and duration change), the cases discussed at greatest length in Sections 4 and 5 are, by construction, disproportionately the most extreme ones. This is appropriate for a hypothesis-generating descriptive study of a small, complete population of programs, not a hypothesis-testing exercise on a sample, but it means the narrative emphasis on Marine Transportation Engineering and Rail Systems Operations in particular should be read as flagging the clearest cases for follow-up, not as a claim that these cases are representative of the panel as a whole; Section 4.4 and Section 5.4 return to this point explicitly.

All computations were done in Python using the NumPy library (version 1.26) and SciPy library (version 1.11). Each chart in section 4 is generated using the TÜİK values that have been presented in Appendix A along with the sector exposures discussed in Section 3.2.

4. FINDINGS

4.1 RQ1 – Registered Employment Rate: Level, Ranking, and Stability

Table 1 shows the four-year employment-rate series. Within bachelor's degrees, Maritime Business Administration had the edge in 2022 (83.3%), followed by its falling behind Logistics Management in 2025 (81.3% compared to 80.2%). Marine Transportation Engineering is an outlier, falling from 40.6% to 36.6%, or roughly half of that of other bachelor's degrees and considerably lower than the average for all bachelor's degrees of 73.9% in 2025. In terms of associate-degree programs, Rail Systems Operations had the advantage in 2022, increasing the gap to 81.2% in 2025, while Postal Services stayed the lowest in all periods, at around 61%. Despite these changes, the within-cluster rankings are very stable. The Spearman's rho correlation coefficient between the

rankings in 2022 and 2025 is 0.90 for bachelor's and 0.89 for associate programs (significant at the given low number of programs), and Kendall's W over four years is 0.95 and 0.96, respectively, implying perfect rank correlation. The programs that were ranked in the upper or lower quintile of the cluster in 2022 retained their position in 2025, except for Civil Air Transportation Operations that fell from the fifth to the third place among associate programs. Thus, answering directly RQ1, ranking of transport programs with higher registered employment is immune to yearly fluctuations; however, it is a ranking within a cluster of programs whose level diverges in time. The coefficient of variation for bachelor's degrees increased from 24.7% in 2022 to 26.9% in 2025, and for associate degrees – from 6.9% to 9.3%.

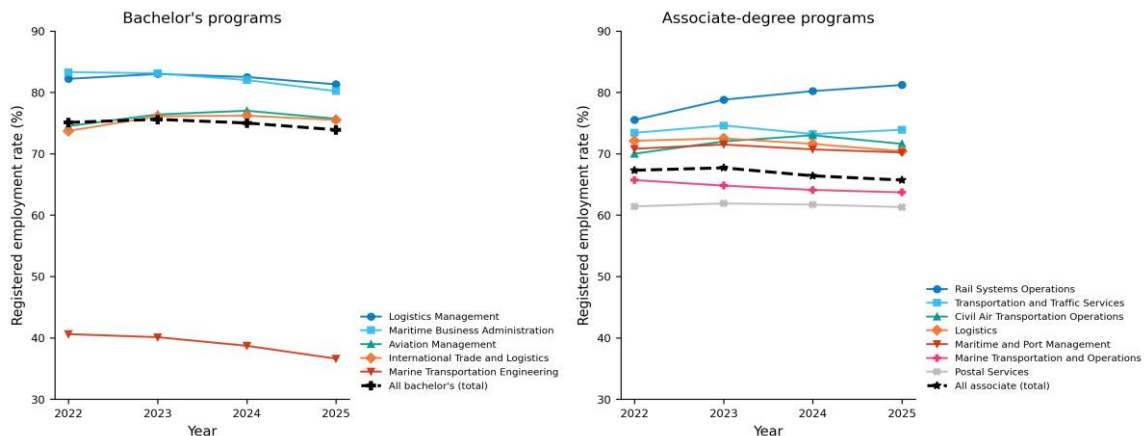
Table 1. Registered Employment Rate by Program and Year (%)

Program (Bachelor's)	2022	2023	2024	2025	Δ 2022–25
Logistics Management	82.2	83.0	82.5	81.3	−0.9
Maritime Business Administration	83.3	83.1	82.0	80.2	−3.1
Aviation Management	74.5	76.4	77.0	75.7	+1.2
International Trade and Logistics	73.7	76.1	76.2	75.5	+1.8
Marine Transportation Engineering	40.6	40.1	38.7	36.6	−4.0
All bachelor's programs (total)	75.1	75.6	75.0	73.9	−1.2
Program (Associate)	2022	2023	2024	2025	Δ 2022–25
Rail Systems Operations	75.5	78.8	80.2	81.2	+5.7
Transportation and Traffic Services	73.4	74.6	73.2	73.9	+0.5
Civil Air Transportation Operations	70.0	72.0	73.0	71.6	+1.6
Logistics	72.1	72.5	71.6	70.4	−1.7
Maritime and Port Management	70.8	71.5	70.7	70.2	−0.6
Marine Transportation and Operations	65.7	64.8	64.1	63.7	−2.0
Postal Services	61.4	61.9	61.7	61.3	−0.1
All associate programs (total)	67.3	67.7	66.4	65.7	−1.6

Source: TÜİK (2026).

Figure 2 shows the four-year trends of all programs in the panels. The Marine Transportation Engineering program of the bachelor's panel gradually differentiates itself from other programs, while Rail Systems Operations in the associate-degree panel, which was already leading in 2022, continues to widen the gap between 2022 and 2025.

Figure 2. Registered Employment Rate by Program,



Note. Left panel: bachelor's programs. Right panel: associate-degree programs. Dashed black line marks the level-wide total in each panel. Source: TÜİK (2026).

4.2 RQ2 — Time-to-First-Job

Table 2 shows an improvement in the average time to first job placement for the majority of the programs, mirroring the level-wide trend as a whole (bachelor's total: 15.0 to 14.2 months; associate total: 16.8 to 15.8 months). Marine Transportation Engineering is still the odd man out, being the only bachelor's program that sees an increase in duration of time to first job (19.3 to 20.6 months), and having the highest time to first job of all the programs even back in 2022. On the associate side, Postal Services increases from 17.0 to 17.7 months, and



Logistics stays the same. In terms of programs, the residuals from the reference trend analysis in Section 4.4 and change in duration are negatively correlated in both bachelor's ($r = -0.54$) and associate levels ($r = -0.56$): programs with an employment rate improvement above the level-wide trend experienced greater decrease in time to first job than those below it. Neither correlation reaches statistical significance with five and seven programs, respectively; therefore, they are presented here just as an indication of the direction of the correlation which matches the prediction by Job Matching Theory that good matching is positively related to quicker and full employment.

Table 2. Average Time-to-First-Job by Program and Year (Months)

Program	2022	2025	Δ
Bachelor's			
Maritime Business Administration	12.0	10.0	-2.0
Logistics Management	12.4	11.7	-0.7
International Trade and Logistics	13.7	12.5	-1.2
Aviation Management	15.4	13.4	-2.0
Marine Transportation Engineering	19.3	20.6	+1.3
All bachelor's programs (total)	15.0	14.2	-0.8
Associate			
Rail Systems Operations	15.1	13.8	-1.3
Civil Air Transportation Operations	14.3	13.9	-0.4
Maritime and Port Management	15.0	14.1	-0.9
Logistics	14.6	14.6	0.0
Transportation and Traffic Services	16.0	14.9	-1.1
Marine Transportation and Operations	16.4	16.2	-0.2
Postal Services	17.0	17.7	+0.7
All associate programs (total)	16.8	15.8	-1.0

Source: TÜİK (2026).

4.3 RQ3 — Earnings Classification

The earnings group ordinal ranking produced by TÜİK shows partial overlap with the core panel: it includes two programs, which were not part of either the employment rate or the duration rankings [Pilotage (bachelor's) and Aircraft Technology (associate)] that are both ranked consistently “very high” over the four-year span. Marine Transportation Engineering is ranked “very high” every year as well, as the only “very high” member of the core panel. The earnings groups of Logistics Management and Aviation Management stay at the “medium” level, experiencing no changes throughout the whole period; International Trade and Logistics is the worst-performing program in the bachelor's cluster, moving from “very low” to “low.” At the associate level, the earnings groups become more volatile and weaker: Postal Services and Maritime and Port Management have “low” and lower levels of earnings for the majority of the period, while Civil Air Transportation Operations and Rail Systems Operations are upgraded to “high” in 2025.

One of the key findings for research question 3, discussed above in Sections 4.1 and 4.2, is the disconnection between Marine Transportation Engineering and other programs in the core panel. This program produces the most stable and positive earnings signals within the entire bachelor's cluster, at the same time having the worst and deteriorating employment rates and increasing search periods. It is one possible explanation that cannot be verified through this data but can explain the reason behind the credential in distinguishing a select few of the well-paid graduates (such as those with officer credentials working for shipping companies) from a greater number of graduates who lack this type of employment.

4.4 RQ4 — Level-Wide Trend vs. Program Residual and Sector Exposure

Table 3 below illustrates the reference-trend deviation analysis (shift-share-inspired; see Section 3.3) along with its respective matched exposure growth rate for each program cluster from 2022 to 2025.



Table 3. Employment Rate Change Split into a Level-Wide Reference Trend and a Program-Specific Residual, including Matched Sector Exposure

Program	Δ Rate (pp)	Reference trend (pp)	Residual (pp)	Matched sector exposure, cumulative growth 2022–25
Bachelor's				
Logistics Management	–0.9	–1.2	+0.3	Foreign trade volume: +3.3%
International Trade and Logistics	+1.8	–1.2	+3.0	Foreign trade volume: +3.3%
Maritime Business Administration	–3.1	–1.2	–1.9	Port cargo throughput: +2.0%
Marine Transportation Engineering	–4.0	–1.2	–2.8	Port cargo throughput: +2.0%
Aviation Management	+1.2	–1.2	+2.4	Civil aircraft movements: +29.5%
Associate				
Logistics	–1.7	–1.6	–0.1	Foreign trade volume: +3.3%
Maritime and Port Management	–0.6	–1.6	+1.0	Port cargo throughput: +2.0%
Marine Transportation and Operations	–2.0	–1.6	–0.4	Port cargo throughput: +2.0%
Civil Air Transportation Operations	+1.6	–1.6	+3.2	Civil aircraft movements: +29.5%
Rail Systems Operations	+5.7	–1.6	+7.3	No matched national series available
Transportation and Traffic Services	+0.5	–1.6	+2.1	No matched national series available
Postal Services	–0.1	–1.6	+1.5	No matched national series available

Sources: TÜİK (2026); Ministry of Trade (2026); T.C. Ministry of Transport and Infrastructure, General Directorate of Maritime Affairs (2026); reporting DHMİ figures.

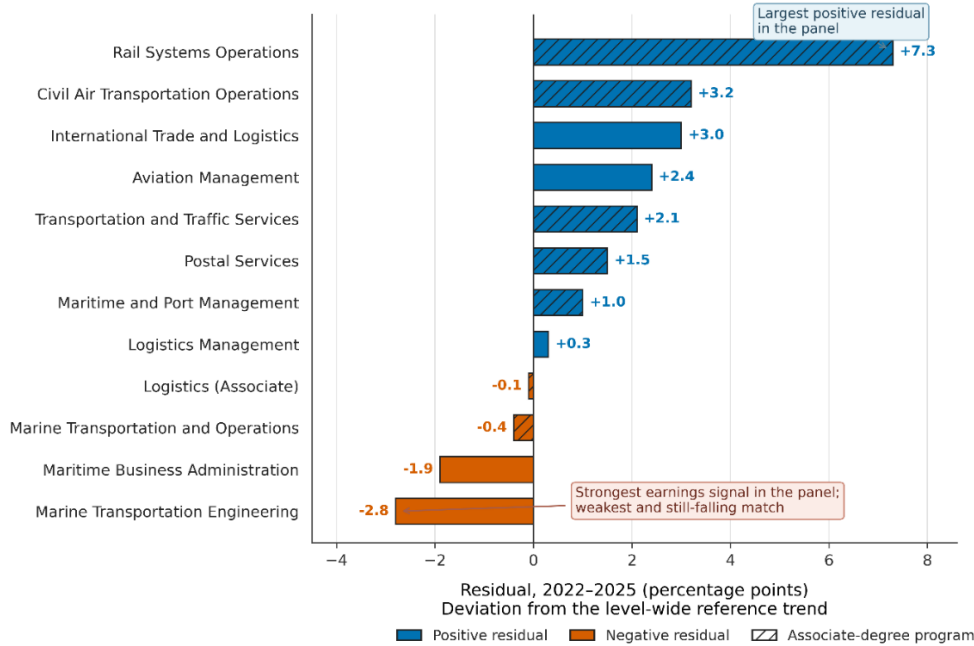
Note. Residual = Δ Rate of the program – reference trend, where the reference trend is the 2022–2025 change in the total rate for the program's degree level (bachelor's: –1.2 pp; associate: –1.6 pp). Example: Aviation Management rose from 74.5% to 75.7% (Δ Rate = +1.2); the bachelor's total fell from 75.1% to 73.9% (reference trend = –1.2); Residual = +1.2 – (–1.2) = +2.4 pp. A positive residual means the program improved more (or fell less) than the total for its degree level; the sector column is shown for comparison only.

Two tendencies can be found. First, there is co-movement between programs related to aviation and their sector indicator, since aircraft operations have increased by 29.5% (the highest increase rate among three sector indicators), and the residuals of Aviation Management and Civil Air Transportation Operations are equal to +2.4 and +3.2 points, correspondingly. It seems like this co-movement is typical not only for aviation since the program of International Trade and Logistics has positive residual of +3.0 despite foreign trade growth of 3.3%. Thus, the growth of sector does not define this kind of residuals in these programs. Second, for programs related to maritime, residuals tend to move in the opposite direction from ports' activities, as ports' cargo throughput has grown by 2.0%, while three out of four programs related to maritime had negative residuals (–2.8 for Marine Transportation Engineering, –1.9 for Maritime Business Administration, –0.4 for Marine Transportation and Operations), and Maritime and Port Management (+1.0) is the only exception. Therefore, sector activity and placement of graduates were not related for most of the maritime programs.

Logistics programs, at both degree levels, are the cluster's least dramatic movers: their residuals (+0.3 and –0.1) are close to zero, meaning their employment-rate trajectory essentially tracks the level-wide bachelor's or associate trend rather than diverging from it in either direction. Rail Systems Operations posts by far the largest residual in the entire panel (+7.3), but we could not locate a matched national rail-activity series to test whether this tracks sector growth or reflects a program-specific dynamic (a plausible candidate is the recent expansion of urban rail systems across Turkish metropolitan municipalities, though this is a demand-side conjecture we flag rather than test; an equally plausible alternative, which our data cannot distinguish from it, is a cohort-composition artifact, if Rail Systems Operations has grown rapidly in recent admission cycles, a larger share of its graduate pool is young and not yet old enough to have drifted into the non-employment categories, informal work, continued study, that accumulate with cohort age, which would inflate its registered-employment rate mechanically rather than reflect

improved matching). Figure 3 orders all twelve residuals from most negative to most positive, distinguishing bachelors from associate-degree programs.

Figure 3. Reference-Trend Deviation Residuals by Program



Note. Hatched bars are associate-degree programs. Positive values indicate a program improved faster than its level-wide trend; negative values indicate it fell behind. Source: Authors' calculations based on TÜİK (2026), see Appendix A and the accompanying workbook for complete computations.

An aside from program-level specifics shows that, according to Table 3, out of twelve residuals, eleven are close to zero ± 3 percentage points; Rail Systems Operations (+7.3) is the sole outlier for this indicator. The Marine Transportation Engineering program residual (-2.8) is not large; however, this particular program is unusual from other perspectives, as well, since it has the lowest employment rate (36.6%), the only case of an extended search period among bachelor's programs, and the largest earnings group in the panel, too. As such, the following sections will be devoted to these two programs in more detail, as they represent outliers in the context of this study the most theoretically relevant way, compared to other programs. For the majority of programs, employment rate behavior follows the general trend characteristic for the level as a whole.

4.5 RQ5 — Is the Logistics Advantage Real, and is it “Logistics” Specifically?

Pooling the four previous results, there is only partial evidence in support of the hypothesis of logistics being a particularly safe choice for educational purposes. The logistics management program is actually one of the two top-performing bachelor's programs of the cluster throughout 2022-2025, holding almost 7-point advantage over the mean of bachelor's programs each year. However, as demonstrated in Section 4.4, it shows a level effect, but no trend effect, meaning that Logistics Management residual is almost equal to zero, thus implying no additional progress beyond the level of its peers and that simply being named “logistics” does not explain its advantage. The international trade and logistics program also carries the “logistics” title but has some differences in terms of curriculum and a substantially lower initial wage group (“very low” in 2022), having the biggest positive residual among bachelor's programs (+3.0). It does not have an employment rate higher than the rates of Logistics Management and Maritime Business Administration, but it improves much faster relative to the trend compared to other programs. In other words, those programs that demonstrate the biggest relative improvements relative to their trends are not “logistics” programs: those that carry the “logistics” name (Logistics Management as a bachelor's program and Logistics as an associate program) remain close to their respective trends (Table 3).

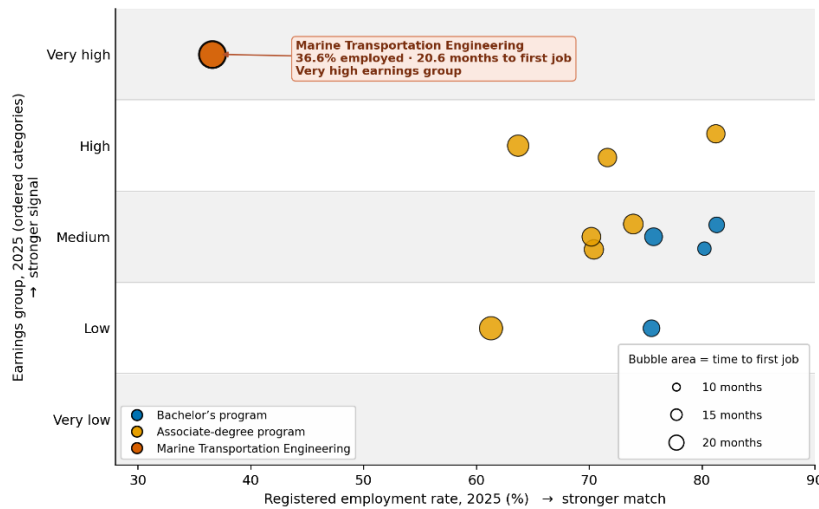
5. DISCUSSION

In this section, the results that were generated in Section 4 are stated as findings. The possible explanations of the findings are regarded as interpretations or hypotheses; these are not empirically examined by the data and hence do not constitute causations.

5.1 Matching and Signaling: Complementary not Competitive Perspectives

Marine Transportation Engineering is a prototypical example of the theoretical claim made in the article. In fact, the same program could be both the strongest signal and the weakest match in its cluster, while combining the two components in one ranking would hide the dilemma students face. From an aggregate perspective, the observed relationship reflects a double-edged sword for graduates, some of whom get licensed, remunerated seafaring jobs, while many do not make it to the list of employed people on an equivalent timeline. As we cannot see the distribution across the program, this explanation stays hypothetical rather than a proven theory. Another way to explain the observed phenomenon is signaling theory (Spence, 1973). Namely, the value of the certificate depends on the selection of a certain subpopulation who successfully obtains the license, while the employment rate shows the size of the subpopulation. In figure 4, each program is placed on the same graph with matching quality (employment rate) on the x-axis and signaling strength (earnings group) on the y-axis; the size of the bubble indicates time-to-first-job. As the earnings group is an ordinal variable, the y-axis represents the ranking, and distances between categories are not interpreted as meaningful intervals. Marine Transportation Engineering has a unique place in the top left corner: it is the only program that combines the highest earnings group and the lowest employment rate, as well as the largest bubble.

Figure 4. Matching Quality Versus Signaling Strength by Program



Note. Horizontal axis shows the percentage of employed population for 2025. Vertical axis is the earnings level in five ranks of TÜİK for 2025, and only the rank itself has any importance, whereas there is no meaning behind the spacing among levels and small variations along the vertical axis among the same levels, which is just done for the sake of better clarity. Bubble sizes show time-to-first job for 2025 with reference bubbles at 10, 15, and 20 months. Source: Authors' calculation using TÜİK (2026).

It is worth being explicit about what this paper does not claim. It does not claim that the earnings premium associated with Marine Transportation Engineering is “really” signaling and not human capital a point that, as Huntington-Klein (2021) shows, cannot be identified from data like TÜİK's. The information which could be identified and would not have been identified through either of the theoretical frameworks alone is the fact that, for this specific program, two different outcome dimensions regulated by the theories move in opposite directions. A pure human capital interpretation of the earnings data (where the degree increases the capability of marine engineers to earn higher salaries) is inconsistent with employment rates, which not only are among the lowest in the panel but even decreasing. On the contrary, a pure matching theory interpretation of the employment rate which means decreased demand or search friction causing it to decrease cannot explain the high earnings level of the small proportion of graduates that find registered employment. Thus, by taking into account both theories, that is, who is matched to certain positions and how these people are paid, we can interpret the data.



5.2 Sector Growth without Matching Gains: The Maritime Puzzle

The dissociation between rising port throughput and falling maritime-program employment rates (Section 4.4) is the paper's second substantive finding and the one most directly relevant to curriculum and workforce planning. If the sector were simply shrinking, falling graduate employment rates would need no further explanation. It is not shrinking; cargo tonnage handled at Turkish ports rose in three of the last four years and set a historical record in 2025 (T.C. Ministry of Transport and Infrastructure, 2026). We cannot test mechanism directly with administrative outcome data of this kind, but a matching-side explanation is, in our reading, a more parsimonious fit to the pattern than a demand-side one: growing automation in cargo handling, a widening gap between officer-track certification requirements (STCW) and program capacity, or graduate oversupply relative to the specific, licensed roles the sector is actually adding are all consistent with rising sector activity coinciding with falling graduate placement, and none of them requires positing that the sector itself is contracting. These remain conjectures the present data can motivate but not adjudicate between; distinguishing them would require the program-level enrollment, certification-completion, and vacancy data discussed below.

The student-level literature reviewed in Section 2.3 offers a complementary, behavioral layer to this institutional story. According to Akar (2026), more than 40% of the maritime vocational students surveyed have no clear sector preference, whereas Arslan et al. (2026) show that the intended time spent at sea is highly dependent on the maritime experience of the family and on the kind of institution, and not on program completion. This implies that there is a pipeline where the completion of the program is a less reliable predictor of occupational commitment than in the case of a license program such as those for doctors and teachers. According to Blokker et al. (2023), this scenario represents the interplay of a person dimension antecedent (unclear career intention during training) and a context dimension antecedent (STCW licensing regime, which does not imply automatic translation of program completion to a seagoing job). Two further points bear on this mechanism without our being able to test either directly. First, both Akar (2026) and Arslan et al. (2026) test gender as a predictor of maritime career intentions and duration, but the present dataset does not report program-level gender composition, so a gender-composition channel behind the employment-rate decline can be flagged as relevant but not ruled in or out. Second, the causal arrow we have emphasized runs from sector and licensing conditions into graduate placement, but it could in principle run partly in the other direction, if a program's employment-rate reputation itself shapes the selectivity or motivation of students it subsequently admits, a feedback loop the present cross-sectional data cannot detect. Distinguishing "capacity has outpaced licensed roles" from gender-composition shifts and reputation-driven selection would require program-level enrollment, certification-completion, and intention data outside this study's scope, and we flag this combined agenda as the clearest priority for follow-up research.

5.3 The Aviation Counter-Case

The aviation programs are an especially apt case for comparison owing to the direct connection between exposure and residuals in this case: there was a 30% increase in the level of aircraft activity, and both aviation programs within the panel had positive residuals (+2.4 and +3.2). It should be noted that International Trade and Logistics (+3.0) had positive residuals too, but much less exposure growth. The occupational trajectory associated with Aviation Management (BA program) and Civil Air Transportation Operations (AA program) is distinctly different: the BA program is geared toward management-type positions in business/marketing and ground operations, whereas the AA program is geared toward operational technician jobs and airside jobs. Therefore, the positive residual observed can be explained as there are actually two different channels at work, which the data does not allow us to separate. A possible guess, which cannot be confirmed by empirical tests within our current paper, is that a quick increase in the number of routes, capacity of airlines, and capacity for maintenance and ground operations will decrease search friction for graduates from both tracks by increasing the number of matches. One possible reason for logistics programs not showing the same result is that the logistics track includes a wide range of companies and tasks that cannot be captured by one foreign trade variable. In contrast, the exposure to aviation and maritime activities is much narrower and more measurable. This is also the point where the lack of peer-reviewed, country-specific literature on the topic of outcomes of graduates from aviation management programs becomes particularly acute (Section 2.3): the administrative pattern is sufficiently clear to suggest a need for a complementary qualitative analysis similar to Akar (2026) or Arslan et al. (2026) for the maritime cluster.



5.4 Cluster Positioning Within the Overall Mismatch in Turkey

According to Çakır and Kellevezir (2020), Turkish mismatch between graduates and labor market is better analyzed at the level of particular academic fields than by using aggregate statistics of unemployment. The cluster under consideration serves as a further empirical test for the hypothesis presented by Çakır and Kellevezir, going beyond their analytical boundaries. Twelve fields, grouped under one sectoral label, have a range of employment rates reaching 44.7 percentage points in 2025 (see Table 1). This range, within the national average framework, exceeds the internal variation for many entire fields. As discussed in Chapter 4.4, the majority of this range can be attributed to static variation at the level-wide level, while not to dynamic widening: most programs follow the level-wide trend, and two stand out for different reasons that carry a policy message. Marine Transportation Engineering demonstrates that there can be a considerable mismatch even when the program carries the maximum signal strength of earnings within the cluster. The fact will be missed if the issue is considered from the point of view of "logistics graduates are in high demand," since, strictly speaking, the program is not a logistics degree. On the other hand, taking into account Rail Systems Operations and looking at the vocational-education-and-training literature about signaling (See Section 2.2; Grubb, 1993), one way to interpret the relatively large positive residual of this course may be that a narrowly defined and easily verifiable vocational credential acts as a signal; yet, such an interpretation has not been empirically verified in the current study. In neither case does the program match the language provided by cluster-level guidance. Thus, from another angle, the observed phenomenon fits into Çakır & Kellevezir's claim about graduate guidance in Turkey being program-specific.

5.5 Implications for Guidance and Curriculum Design

The clear implication for aspiring students and their counselors is that "transport and logistics" is too broad a category for comparison; instead, indicator-based data on a per-program basis provides better insights. The aspiring student who places a higher premium on speedy and certain placement needs to place greater value on employment rate and length rather than earnings classification, and understand Marine Transportation Engineering's earnings figure as one representative of an elite group rather than the average. For those who are program administrators, the findings on maritime studies suggest that they need to watch the difference between admission capacity and licensed positions open to graduates in this cluster with more care, since sector growth has not been accompanied by higher graduate employment rates in most maritime programs.

With respect to national guidance infrastructure like YÖK Atlas, which at present provides only admission cut-offs and quotas but no information about employment rates at the time of program choice, a concrete suggestion based directly on this study is that the three TÜİK figures used here would be provided at the same time as admission cut-offs, rather than in a separate bulletin that aspirants need to seek out themselves. Such a system is in use elsewhere. The United Kingdom's Longitudinal Education Outcomes (LEO) data links higher-education records to HM Revenue and Customs tax data to report graduate earnings and employment by institution and subject, published through the Discover Uni service specifically so applicants can consult it before choosing (Department for Education, 2026). The TÜİK-SGK linkage this paper draws on is methodologically the same design, and the main gap relative to LEO is guidance-system integration and timing, not data availability: TÜİK already collects what an applicant-facing, preference-time display would need. Framed this way, the finding that a single cluster label can conceal a Marine-Transportation-Engineering-sized gap is not a Turkish peculiarity but an illustration of a more general problem, that administrative outcome-linkage data is routinely built for retrospective reporting and rarely for the moment, preference selection, when it would actually change a decision.

6. LIMITATIONS

Several limitations bear directly on how these findings should be read. First, the shift-share-inspired reference-trend deviation analysis in Section 4.4 operates on registered employment rates, not graduate headcounts, because TÜİK's public bulletin does not report program-level graduate volumes in the tables used here; the decomposition should therefore be read as a reference-trend-versus-residual accounting exercise rather than a classical, weight-based shift-share analysis, and the residuals cannot be interpreted as "additional graduates employed." Second, with five and seven programs per degree level, formal inferential statistics (correlation significance tests, in particular) are underpowered, and we have reported effect sizes and directions rather than leaning on p-values as the basis for any claim. Finally, the panel covers four years in a Turkish macroeconomic environment marked by high inflation and currency volatility over the same period; while this affects nominal earnings classifications for all programs and years roughly comparably, it is a contextual factor this study does not model directly. Moreover,



the model is descriptive and non-causal, since sectoral indicators and program residuals are shown side by side, but no evidence of a sectoral effect can be found from the data, and the interpretations made in Section 5 remain hypotheses. Job Matching Theory and Signaling Theory are used to explain the results, but these theories are not tested empirically. The registered employment measure of TÜİK does not differentiate between informal labor, ongoing research, emigration, and non-employment (TÜİK, 2026), and there are no corresponding sector series for the rail and postal programs.

7. CONCLUSION

Four years of administrative data suggest that Turkish transport and logistics programs are not a homogeneous set in terms of their safety: outcome varies across different programs and even across different indicators. The vast majority of programs follow the overall trend of their degree level. Logistics programs have a high amount of registered employment with very little variance over time. Aviation programs have a positive trend that surpasses the level-wide trend during a time period in which aircraft movements rose by 29.5%. On the other hand, most maritime programs perform worse than their level-wide trend although the indicator of port cargo throughput is stable or even growing. Marine Transportation Engineering shows the highest earnings group in the panel along with the lowest and decreasing employment rate, and the only prolongation in search time amongst bachelor programs. Job Matching Theory and Signaling Theory can help us understand this contrast since employment rate and search time are proxies of matching quality whereas earnings group is a proxy of signaling; however, the data does not allow us to conduct any test of those theories. The results obtained are purely descriptive in nature. The analysis uses a non-causal design: correlations between sector indicators and program residuals represent co-movements and not sector effects. Conjectures made in the above section about possible reasons behind the trends (licensing, automation, oversupply, student profile, cohort effect) will need to be verified using program-level data on enrollment, certification and vacancies. With twelve programs observed during four years, our results are mostly exploratory in nature. Practical implication for applicants and people who are going to pursue a graduate degree preparation is that the outcome data should be analyzed in terms of individual programs and individual indicators.

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