Sarcouncil Journal of Economics and Business Management

ISSN(Online): 2945-3593

Volume- 05| Issue- 11| 2026

Research Article **Received**: 20-10-2026 | **Accepted**: 15-11-2026 | **Published**: 28-11-2026

Optional Pilotage under the Montreux Convention and Pilot Uptake Patterns in the Turkish Straits (2019–2025)

Emine Öztürk Koçali

Lecturer, Logistics Program, Istanbul Gelişim Vocational School, Istanbul Gelişim University, Istanbul, Türkiye.

Abstract: The Montreux Convention leaves pilotage and towage optional for merchant vessels in peacetime. This study reads that rule alongside navigational safety regulations and descriptively analyses official pilot uptake statistics for the Istanbul and Çanakkale straits in 2019–2025. Aggregate pilot uptake fell from 64.8% to 61.3% in Istanbul and rose from 49.4% to 53.9% in Çanakkale. Uptake in the upper length classes approached 100% in 2025, whereas Çanakkale's 150–200 m class recorded 59.9%. Monthly data show that the rise in Çanakkale's 200–250 m class occurred in August–September 2024, before the Directive amendments examined here. A midpoint decomposition with five common length groups attributes Istanbul's change to −1.99 points from composition and −1.53 from within-group rates; the Çanakkale components are 0.87 and 3.64. Statistics include port calls (41.2% of Istanbul and 46.8% of Çanakkale transits in 2025) and military vessels, so aggregate uptake does not isolate optional merchant-vessel pilotage; for non-call transits the possible 2025 uptake range is 34.1–100% in Istanbul and 13.4–100% in Çanakkale. Findings establish neither causality nor treaty compatibility. The contribution is a two-strait comparison by vessel length and a clarification of the legal scope of measurement.

Keywords: Turkish Straits, Montreux Convention, pilotage, navigational safety, vessel traffic services.

INTRODUCTION

The Montreux Convention was signed on 20 July 1936 and reached its ninetieth year in 2026. Article 2, which regulates the freedom of transit of merchant vessels in peacetime, leaves pilotage and towage optional. This legal choice does not remove the importance of pilotage for navigational safety, but it does set a limit on the nature of the instruments that may be used on safety grounds. In the Istanbul and Çanakkale straits, the right of transit, the traffic regime and operational decisions on board vessels operate simultaneously.

The series of the Ministry of Transport and Infrastructure (MTI) records 40,172 transits in Istanbul and 44,468 in Çanakkale for 2025, of which 24,608 and 23,971, respectively, were transits in which a pilot was taken (MTI, 2026). The totals of the two straits cannot be added together, because the same voyage may be recorded in both straits. Moreover, total transits do not consist solely of non-call transits subject to the merchant-vessel provisions of Montreux; this difference in scope prevents a direct equivalence between the legal provision and the statistic.

The study treats the relationship between the optional status and the safety management that supports pilotage not as a claim of contradiction or tension but as the context that sets the limits of measurement and interpretation. A high pilot uptake rate does not show that the optional rule has ceased to apply, just as a low rate does not by itself measure the size of a safety gap.

Three research questions are addressed. First, how did pilot uptake change in the two straits, in total and by length class, between 2019 and 2025? Second, how much of the movement in the aggregate rate is attributable to length composition and how much to within-class rates? Third, what are the interpretive limits of these rates when read together with the optional rule, domestic-law recommendations and conditional transit provisions? Vessel size and tanker share define the traffic context; they are not used as a substitute for realised accident risk.

LITERATURE AND POSITIONING OF THE STUDY

Historical and political assessments of Montreux and navigational safety research answer different questions. Karlıklı (2017) discusses the historical and political significance of the convention; measuring annual service use, by contrast, requires a separate data design.

Ulusçu *et al*. (2009) examined traffic in the Istanbul Strait with a simulation-based risk model and showed local traffic density and pilotage to be among the important factors; Ece (2016) reported that, in 1982–2014 accident records, vessels that did not take a pilot were involved in most accidents. The share of pilotless vessels among vessels involved in accidents is not the same measure as the accident probability of all pilotless transits; the latter requires exposure denominators consisting of total piloted and pilotless transits.

Copyright © 2022 The Author(s): This work is licensed under a Creative Commons Attribution- NonCommercial-NoDerivatives 4.0 (CC BY-NC-ND 4.0) International License

***Corresponding Author:** Emine Öztürk Koçali

DOI-https://doi.org/10.5281/zenodo.24622886

Bahadır *et al*. (2026) reported a long-run statistical relationship, using an ARDL cointegration approach, between accident counts and piloted-transit counts in the Istanbul Strait for 1996–2023; according to the abstract, a one-unit increase in the number of piloted transits is associated with a change of approximately −0.0036 units in the number of accidents. The present study does not offer a new estimate of the effectiveness implied by that relationship; it differs in comparing the 2019–2025 uptake rates of the two straits, in using the length cross-tabulation, and in decomposing the total change into components. Because only the abstract and bibliographic record of that publication could be examined, no judgment is made about its full text.

Pilot supply and capacity must also be distinguished from the decision to use a pilot: Uçan and Nas (2016) addressed pilot capacity in the Istanbul Strait by simulation; in annual totals it cannot be seen whether not taking a pilot is due to choice, capacity or timing. Kamal and Çakır (2022) examined accident types in relation to vessel and environmental characteristics with a Bayesian network approach; conditions such as size, visibility and current are not available at the transit level in the data of this study.

The literature review is a focused review based on publisher pages, DergiPark and authors' institutional research records; it is not a systematic search of Scopus or Web of Science. The originality claim is therefore limited, and no "first study" claim is made: what is presented is a descriptive calculation, accompanied by a legal-scope distinction, that is comparable across the two straits over the same period and length classes.

LEGAL FRAMEWORK AND SAFETY MANAGEMENT

The Optional Rule of Montreux and Its Express Exception

The examination relies on the League of Nations Treaty Series copy in the United Nations Treaty Collection. Article 2 of Montreux provides for freedom of transit for merchant vessels in peacetime without distinction of flag or cargo; for vessels passing through the straits without calling at a port, no taxes or charges are levied other than those listed in Annex I. The last provision of the same article expressly states the optional status of pilotage and towage (Montreux Convention, 1936, Art. 2).

Paragraph 5 of Annex I provides that services such as pilotage and towage, duly provided at the request of the master or the agent, may be charged for; thus public charges connected with transit are separated from the price of a service provided on request. These provisions cannot be read as a prohibition of services that would prevent regulating or recommending pilotage as a service.

Article 6 regulates a different situation: if Turkey considers herself to be threatened with imminent danger of war, the provisions of Article 2 continue to apply, with conditions that vessels enter by day and follow the designated route. Pilotage may be made compulsory in this case, but no charge may be levied. This express authority specific to the exception must be distinguished from ordinary peacetime safety management; the statistics in this study do not show whether the exception has been used (Montreux Convention, 1936, Arts. 4, 6 and Annex I, para. 5).

Recommendation, Condition and Port Call in Domestic Law

The Turkish Straits Maritime Traffic Regulation was published in the Official Gazette (Resmî Gazete) of 15 August 2019; it lists Montreux among its legal bases and regulates the traffic separation scheme, vessel traffic services and the reporting system. Vessels with an overall length of 150 m or more or a draught of 10 m or more are defined in the category of vessels with difficulty navigating in the traffic separation lane; these thresholds relate to different vessel characteristics, and length-class statistics cannot identify all vessels in the same category (Türk Boğazları Deniz Trafik Düzeni Yönetmeliği, 2019, Arts. 2–7, 26). The amendment of 16 December 2020 to the Regulation (Official Gazette No. 31336; Decision No. 3305) added to the first sentence of the fourth paragraph of Article 26 the wording excluding container and Ro-Ro vessels, and also changed words in two paragraphs of Article 37 and the Çanakkale coordinates and Istanbul southern-entrance anchorage information in the annexes; it did not touch the provisions on pilot uptake and port-call definitions (Türk Boğazları Deniz Trafik Düzeni Yönetmeliğinde Değişiklik Yapılmasına Dair Yönetmelik, 2020). Whether there are other amendments has not been verified from the official text in this study; references rely on the 2019 text and this amendment.

The first paragraph of Article 28 of the Regulation provides that vessels intending to pass without calling at a port are strongly recommended to take

Copyright © 2022 The Author(s): This work is licensed under a Creative Commons Attribution- NonCommercial-NoDerivatives 4.0 (CC BY-NC-ND 4.0) International License

Publisher: SARC Publisher

a pilot; the definitions of non-call and port-call transit are distinguished in Article 3 on the basis of the voyage plan and port call. Articles 38 and 46, concerning Istanbul and Çanakkale, regulate the places and procedure for taking and dropping pilots; these alone should not be regarded as evidence of a general obligation for port-call vessels. Services tied to a port call are a scope that must be separately identified in measuring optional strait transit.

The Implementation Directive published in the Ministry's file of 7 October 2025 contains, in its fifteenth article, recommendations on pilots, tugs and daytime passage according to length and cargo categories. In other articles, taking a pilot appears as a condition in situations such as technical deficiency, special transit conditions, towed transit, LNG/LPG, nuclear or Class 7 cargoes, current conditions and transit priority; the application of the provisions depends on the vessel's situation as defined in the relevant article and must not be generalised (Ministry of Transport and Infrastructure, General Directorate of Maritime Affairs [MTI-GDMA], 2025).

Two distinctions must be maintained in reading these texts together: a recommendation and a provision that makes taking a pilot a condition of the transit arrangement are not the same; and the existence of a condition in domestic law does not by itself prove its conformity with the optional rule in Montreux. The study offers no judicial assessment of conformity. Table 1 shows the norms without converting them into one another.

Table 1: Legal provisions and interpretive limits of the statistics

Provision	Subject matter	Interpretive limit
Montreux Arts. 2 and 4	Pilotage and towage are optional within the relevant merchant-vessel transit regime.	The service uptake rate is not the same as the scope of the norm.
Montreux Annex I, para. 5	Provision of, and charging for, an optional service on request.	Transit charges are distinguished from the fee for a requested service.
Montreux Art. 6	Pilotage may be made compulsory in imminent danger of war; it is free of charge.	An exceptional situation expressly regulated in the treaty.
Regulation Art. 28(1)	Taking a pilot is strongly recommended for non-call transit.	A recommendation is distinct from an obligation.
Regulation Arts. 3, 38, 46, 50	Transit categories, service procedures and vessels treated separately.	Port-call and military categories must be identified separately.
Directive Art. 15	Recommendations tied to length and cargo conditions.	The same recommendation is not assumed for every class.
Directive Arts. 5–7, 9–10, 14, 16	Pilot-uptake condition in specific vessel or transit situations.	A domestic-law condition is not automatically a Montreux exception.

***Source**: Montreux Convention (1936); Türk Boğazları Deniz Trafik Düzeni Yönetmeliği (2019, 2020); MTI-GDMA (2025).*

The interpretations in Table 1 are based on the version of the Directive dated 7 October 2025, whereas the study period is 2019–2025. The Ministerial Approvals (Olur) referred to in the sources are dated 18 April 2022 (30173), 4 December 2023 (1493540; in force from 1 January 2024), 23 December 2024 (2396435; announced 27 December 2024, in force 1 February 2025) and 1 October 2025 (3086827; in force 13 October 2025) (Chamber of Shipping, 2024; MTI-GDMA, 2023, 2024, 2025). The full texts examined are the 2023, late-2024 and 2025 versions; the 2022 version is known only through the reference in the repeal provision of the 2023 version, and the implementing rules between 2019 and April 2022 have not been identified. The interpretations in Table 1 therefore cannot be applied retroactively to 2019–2024.

Two readings of the optional provision of Montreux are possible; they are this study's own analysis and are not attributed to a particular author. Under the first reading, traffic regulations and recommendations may be compatible with the convention so long as they do not restrict freedom of transit; the Regulation lists Montreux among its bases. Under the second, optional status treats transit without a pilot as an element of freedom, and tying transit priority or timing to taking a pilot may create tension with the optional status. Which is stronger is not the subject of this study. Article 35(c) of the United Nations Convention on the Law of the Sea states that the relevant Part does not affect the legal regime in straits in which passage is regulated in whole or in part by long-standing international conventions in force

Copyright © 2022 The Author(s): This work is licensed under a Creative Commons Attribution- NonCommercial-NoDerivatives 4.0 (CC BY-NC-ND 4.0) International License

Publisher: SARC Publisher

specifically relating to such straits (United Nations, 1982).

Vessel Traffic Services and Pilotage

Vessel traffic services and pilotage are separate functions: IMO Resolution A.1158(32) lists pilotage among the "related services" involved in safe passage within a VTS area (International Maritime Organization [IMO], 2021). This study does not propose AIS and traffic monitoring as a direct substitute for a pilot.

That a vessel has taken a pilot does not remove its need for other safety measures; nor does its not having taken one mean that other tools are not working. The aggregate pilot uptake rate therefore cannot be used alone as an indicator of overall safety performance; monitoring service use and measuring accident probability are separate analytical tasks.

DATA AND METHODS

Scope and Indicators

The main data are a series of 14 observations—two straits and seven years—constructed from the annual transit files of the MTI for 2019–2025. According to the metadata, local maritime traffic is outside the scope; totals include civilian and military vessel transits (MTI, 2020). The unit of observation is not a unique vessel but a recorded transit. Because the number of pilot-assisted transits is not presented separately for port-call and non-call transits, the measure is named the "aggregate pilot uptake rate"; it is not "the proportion of merchant vessels choosing optional pilotage". The data are counts covering all recorded transits; sampling uncertainty has not been calculated. The date of the metadata is 13 July 2020; it is assumed that the same definitions apply to the 2021–2025 files.

For each year and strait, with total transits N and pilot-assisted transits P, the rate is $R = 100 \times P/N$; differences are expressed in percentage points and relative changes in percent. The tanker indicator is the ratio to N of the sum of the unspecified tanker, LPG/LNG and chemical tanker classes; it measures vessel-type composition, not the quantity of hazardous cargo carried. Mean GT is annual total GT divided by the number of transits.

The length-by-pilot cross-tabulation consists of six published classes: under 100 m, 100–150 m, 150–200 m, 200–250 m, 250–300 m and over 300 m. The "200 m and above group" is the union of the last three classes, and the "250 m and above group" of the last two. Because the annual summary column carries the heading "larger than 200 m", whether vessels exactly at the threshold value are included cannot be resolved from the aggregated table; the union used matches the summary column numerically.

Midpoint Decomposition

The aggregate rate is the weighted sum of the shares of the length groups and the within-group pilot rates. With w the share of transits in a group in the total and r the pilot rate, $R = \Sigma w_i r_i$. With the start and end years denoted 0 and 1, the change in percentage points is decomposed into the following two components. The r values are used on the percentage scale and the w values as shares summing to one.

$\Delta R = \Sigma[(w_{i1} - w_{i0})(r_{i1} + r_{i0})/2] + \Sigma[(r_{i1} - r_{i0})(w_{i1} + w_{i0})/2]$.

The first term belongs to the change in length composition and the second to the change in the pilot rate within the same length group. The midpoint weights use both years symmetrically instead of choosing one of the two years as the reference; this two-component structure is also described by Oaxaca and Sierminska (2025). The calculation is an identity that fully allocates the total difference; the names of the components are not behavioural causes or policy effects. Within-class change may also include changes in vessel type or port call within the same length range.

Because the Istanbul 2019 table contains no transits in the over-300 m class, the starting rate of this class is undefined; since treating zero transits as a zero rate would introduce an arbitrary allocation among the components, the 250–300 m and over-300 m classes were merged in the decomposition, and five common groups with observations in every compared year were used. The descriptive Table 3 retains the six published classes. The decomposition is computed for 2019–2025 and for 2022–2025, the years in which the aggregate rates of both straits peaked; the second period is a descriptive comparison, not a post-intervention period. For sensitivity, alternative groupings with three and four groups were also tried. The signs of the components remained the same in every grouping; for 2019–2025, the composition component ranged between −1.47 and −1.99 and the within-class component between −1.53 and −2.05 points in Istanbul, and the composition component between 0.60 and 1.30 and the within-class component between 3.21 and 3.91 points in Çanakkale. For 2022–2025, the

Copyright © 2022 The Author(s): This work is licensed under a Creative Commons Attribution- NonCommercial-NoDerivatives 4.0 (CC BY-NC-ND 4.0) International License

Publisher: SARC Publisher

within-class component is larger in absolute value in every grouping.

Checks, Port-Call Bounds and Sensitivity

The checks cover the matching of totals with the length-class and vessel-type totals, that the number of pilot-assisted transits does not exceed the number of transits, that monthly values match annual totals, and recalculation of the rates; source traces are kept at file, sheet and cell level. Between the annual files and the MTI's Year-by-Year Comparison Table, a difference was found only in the 2019 Çanakkale GT, of 2,000 units; the 872,314,222 in the annual file was used, and this difference does not affect the rates.

Measurement is limited with respect to the target group in two ways. The first is military vessels: since the number of pilot-assisted transits is unknown for the Warship (Naval) class, whose number of transits is M, the rate for transits outside this class is bounded between 100(P−M)/(N−M) and 100P/(N−M). The second, and quantitatively more important, is port-call transits. With N total transits, U non-call vessels and P pilot-assisted transits, the lower bound of the pilot rate of non-call vessels is 100·max(0, P−(N−U))/U and the upper bound is 100·min(P, U)/U. The bounds rest on the extreme cases in which all or none of the port-call transits took a pilot; taking the number of port-call transits as N−U is an assumption, and the bounds do not produce an exact rate.

RESULTS

Table 2: Transits, pilot uptake and traffic composition, 2019–2025

Strait	Year	Transits	Pilot-assisted	Pilot %	Tanker %	200 m group %	250 m group %
Istanbul	2019	41,112	26,632	64.8	21.8	10.7	3.2
Istanbul	2020	38,404	24,754	64.5	22.0	12.9	3.4
Istanbul	2021	38,551	25,357	65.8	21.4	13.8	3.7
Istanbul	2022	35,146	23,380	66.5	24.6	11.6	3.7
Istanbul	2023	39,000	25,337	65.0	23.8	12.2	3.9
Istanbul	2024	41,363	25,327	61.2	23.4	11.4	3.5
Istanbul	2025	40,172	24,608	61.3	23.8	10.7	4.9
Çanakkale	2019	43,759	21,616	49.4	22.5	16.0	5.8
Çanakkale	2020	42,036	21,175	50.4	22.3	17.7	6.1
Çanakkale	2021	43,342	23,706	54.7	21.2	18.1	6.1
Çanakkale	2022	42,340	23,969	56.6	23.4	17.1	6.8
Çanakkale	2023	44,892	24,802	55.2	23.0	18.2	7.2
Çanakkale	2024	45,849	23,683	51.7	22.8	17.5	6.6
Çanakkale	2025	44,468	23,971	53.9	23.7	18.1	8.3

***Source**: MTI (2026); calculation by this study. Tanker = TTA + LPG/LNG + TCH. The 200 m group is the top three and the 250 m group the top two published length classes.*

Istanbul Strait

In Istanbul, total transits declined from 41,112 in 2019 to 40,172 in 2025 (−2.3%). While pilot-assisted transits fell from 26,632 to 24,608, the aggregate rate moved from 64.8% to 61.3% (−3.52 points; Table 2). The highest rate is 66.5% in 2022; the 2022–2025 difference is −5.27 points. The tanker share rose from 21.8% to 23.8%, and the number of transits in the top two length classes rose from 1,324 to 1,964; the total share of the 200 m and above group is about 10.7% at both the start and the end. Mean GT decreased by 0.8% over the same period.

In the 200 m and above group, the pilot rate lies between 99.9% and 100.0% throughout the period. In the 150–200 m class, the rate rose from 98.2% to 99.6% (Table 3); in 2025, of 14,814 transits in total in classes of 150 m and above, 38 were without a pilot. The rate for the 100–150 m class fell from 47.9% to 44.4%, and that for under 100 m from 33.6% to 31.2%. The aggregate indicator combines these different movements in a single number.

In the five-group decomposition (Table 4), of the 2019–2025 change, −1.99 points is the length-composition component and −1.53 points the within-class rate component; the corresponding figures for 2022–2025 are −0.86 and −4.41 points. In the latest period the within-class component is larger, but this is not by itself a measure of a change in preference: over the same period transits under 500 GT rose from 333 to 2,531 and the barge category from 9 to 1,187, and since these

Copyright © 2022 The Author(s): This work is licensed under a Creative Commons Attribution- NonCommercial-NoDerivatives 4.0 (CC BY-NC-ND 4.0) International License

Publisher: SARC Publisher

two classifications are not cross-tabulated, they are not assumed to be the same vessels.

Table 3: Pilot uptake rate by published length classes (%)

Length class	Istanbul 2019	Istanbul 2025	Çanakkale 2019	Çanakkale 2025
>300 m	–	100.0	100.0	100.0
250–300 m	100.0	100.0	99.5	99.9
200–250 m	100.0	100.0	81.2	99.9
150–200 m	98.2	99.6	63.0	59.9
100–150 m	47.9	44.4	30.6	36.4
<100 m	33.6	31.2	25.6	30.3

***Source**: MTI (2026), length × pilot tables. "–": no transits in the class; it does not mean a zero pilot rate.*

Çanakkale Strait

In Çanakkale, total transits rose from 43,759 to 44,468 (1.6%). Pilot-assisted transits rose from 21,616 to 23,971, and the aggregate rate from 49.4% to 53.9% (4.51 points; Table 2). Total GT increased by 10.7% and mean GT by 9.0%. The tanker share changed from 22.5% to 23.7%, and the share of the 200 m and above group from 16.0% to 18.1%; the number of transits in the top two length classes rose from 2,526 to 3,671. The series peaked at 56.6% in 2022, and the 2022–2025 difference is −2.70 points.

Unlike Istanbul, the pilot rate of the 200 m and above group rose from 87.8% to 99.9%. The marked movement is in the 200–250 m class: the rate is 81.2% in 2019, 90.0% in 2024 and 99.9% in 2025. Monthly data show the timing of the movement (Fig 2): in this class the rate stood between 82% and 85% in January–July 2024, then rose to 96.7% in August 2024, 99.7% in September 2024 and 99.7–100% in October–December 2024; in every month of 2025 it is 99.7% or above. By contrast, in the 150–200 m class the rate fell from 63.0% to 59.9%; in 2025, 5,492 pilotless transits are recorded in this class. Of 21,728 transits in the 150 m and above classes in total, 5,498 are pilotless (25.3%); in Istanbul the pilotless share in the same scope is 0.3%.

Of the 2019–2025 increase, 0.87 points is the length-composition component and 3.64 points the within-class rate component (Table 4); in the 2022–2025 change, the composition component is upward at 0.66 points and the within-class component is −3.37 points. The net increase relative to 2019 therefore does not imply a continuous rise in recent years. Comparing the Directive texts with the monthly timing, Article 15 of the version that entered into force on 1 January 2024 mentions, as regards strongly recommending that a pilot be taken in Çanakkale, only vessels of 250 m overall length and above carrying hazardous cargo (excluding Ro-Ro and container vessels); a general recommendation for all other vessels of 200 m overall length and above appears in the file bearing the Approval of 23 December 2024, and this Approval entered into force on 1 February 2025. In the 2025 version, the provision on other vessels between 200 and 300 m is numbered 15/6 and was amended by the Approvals of 23 December 2024 and 1 October 2025 (MTI-GDMA, 2023, 2024, 2025; Chamber of Shipping, 2024). The jump in the monthly series, however, occurred in August–September 2024, that is, before these Approvals; the increase therefore cannot be explained by the amendments examined. No amendment that could be placed before August 2024 was identified in the texts examined; determining the cause (another regulation, a change in practice, service access or operator preference) requires transit-level data and a regulatory history.

Table 4: Midpoint decomposition with five common length groups (percentage points)

Strait	Period	Total change	Length composition	Within-class rate
Istanbul	2019–2025	−3.52	−1.99	−1.53
Istanbul	2022–2025	−5.27	−0.86	−4.41
Çanakkale	2019–2025	4.51	0.87	3.64
Çanakkale	2022–2025	−2.70	0.66	−3.37

***Source**: MTI (2026); calculation by this study. The top two length classes are merged. Because of rounding, the sum of the displayed components may differ by 0.01 points.*

Common Pattern and Scope Sensitivity

Fig 1 shows the different movements of the two aggregate rates up to and after 2022. Istanbul's rate is above Çanakkale's in all years, but the gap between start and end has narrowed. In 2025, while the upper length classes have similarly high

Copyright © 2022 The Author(s): This work is licensed under a Creative Commons Attribution- NonCommercial-NoDerivatives 4.0 (CC BY-NC-ND 4.0) International License

Publisher: SARC Publisher

pilot use, differentiation persists in the 150–200 m class. The tanker share and length indicators do not show in which length class or pilot status the tankers are.

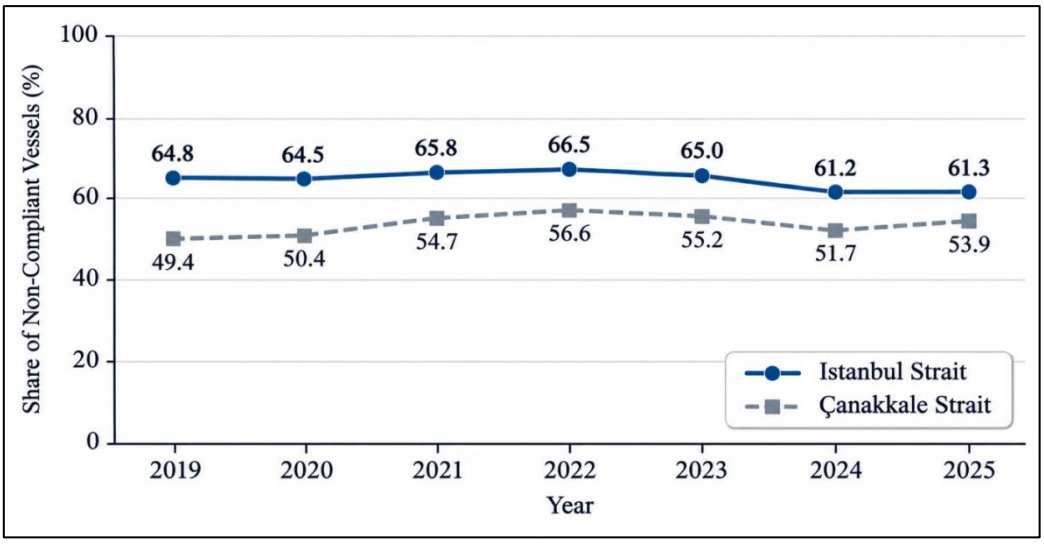


Fig 1: Aggregate pilot uptake rate (%), Istanbul and Çanakkale, 2019–2025.
***Source**: MTI (2026); calculation by this study. Total transits excluding local traffic; not solely optional merchant-vessel pilotage.*

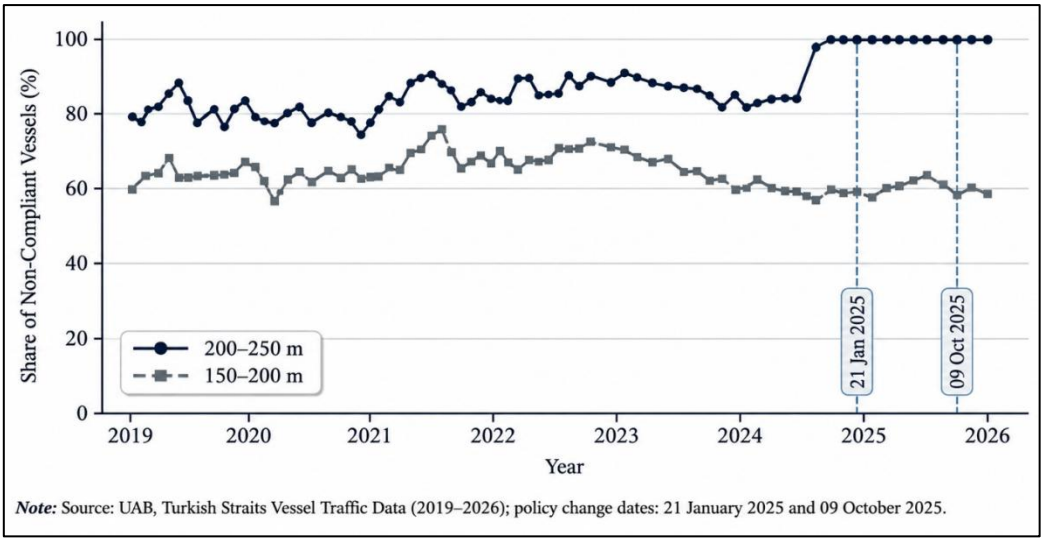


Fig 2: Monthly pilot uptake rate (%) in the 200–250 m and 150–200 m classes, Çanakkale Strait, 2019–2025
***Source**: MTI (2026), monthly length × pilot tables; calculation by this study. Vertical lines indicate the dates of the Ministerial Approvals that amended the Directive.*

In Fig 2, the jump in the 200–250 m class is seen in August–September 2024. In the 150–200 m class, the rate was 65–72% in 2022, declined through 2023 to 62% in December 2023, and stayed between 56% and 62% in 2024 and between 57% and 63% in 2025; there is no single break in the monthly series for this class.

In the military-vessel sensitivity calculation, the rate of transits outside the Naval class lies between 64.63% and 65.06% in 2019 and between 61.23% and 61.30% in 2025 for Istanbul; for Çanakkale the ranges are 49.15–49.64% and 53.85–53.97%, respectively. Even under extreme assumptions, the direction of the decline in Istanbul and the increase in Çanakkale does not change; but this check does not separate the effect of port-call transits and does not mean that the legal target group has been measured.

The main scope uncertainty comes from port-call transits. In 2025, port-call transits make up 41.2% of the total in Istanbul and 46.8% in Çanakkale; the share of the military class is about 0.07–0.49%. The possible range for the pilot rate of non-call vessels is therefore wide (Table 5): in 2025, 34.1–100% in Istanbul and 13.4–100% in Çanakkale. This gap between the lower and upper bounds

Copyright © 2022 The Author(s): This work is licensed under a Creative Commons Attribution- NonCommercial-NoDerivatives 4.0 (CC BY-NC-ND 4.0) International License

Publisher: SARC Publisher

shows numerically that the aggregate rate cannot be interpreted as a measure of optional merchant-vessel pilotage.

Table 5: Bounds for the pilot uptake rate of non-call vessels (%)

Strait	Year	Port-call share	Lower bound	Upper bound
Istanbul	2019	36.4	44.6	100.0
Istanbul	2022	41.2	43.1	100.0
Istanbul	2025	41.2	34.1	100.0
Çanakkale	2019	40.2	15.4	82.6
Çanakkale	2022	51.4	10.8	100.0
Çanakkale	2025	46.8	13.4	100.0

***Source**: MTI (2026); calculation by this study. The number of port-call transits is total transits minus the number of non-call vessels. The lower bound is the extreme case in which all port-call transits took a pilot; the upper bound that in which all pilot-assisted transits were non-call.*

DISCUSSION AND POLICY OPTIONS

The Limit of Drawing Legal and Causal Conclusions from the Aggregate Rate

Looking at the research questions together, pilot uptake did not change in the same direction across all vessel groups: there is a net decline in Istanbul and a net increase in Çanakkale; in both straits the aggregate movement after 2022 is downward. High use in the large length groups and partial use in the small classes coexist; this distribution narrows the scope of the assessment that "pilotage is declining". The decomposition shows that the aggregate movement does not stem solely from the length distribution; more detailed information is needed to explain the within-class change.

The legal rationale for high use cannot be read from totals: compliance with recommendations, services connected with port calls, special transit conditions, operator preferences and service access may be different explanations and have not been tested here. It would not be correct to count all pilotless vessels as merchant vessels forgoing the service on the basis of the optional rule of Montreux; this requires the intersection of non-call and pilot-assisted transits.

The near-complete use in the upper length classes is the legally most striking observation of the study and has deliberately been left without interpretation. This level may be explained by compliance with recommendations, conditional transit rules, port pilotage or commercial practice; whether the conditional rules in fact operate like a general pilotage obligation is a legal question that cannot be answered without vessel-level data and dated regulatory texts.

Interpretation is even more limited with respect to accidents: the current series contains no accident, incident, damage or fatality variable, and the decision to take a pilot may also be made in response to risky conditions. Bahadır *et al.* (2026), Ece (2016) and Ulusçu *et al.* (2009) investigate the relationship with different designs; their results do not share the same outcome variable as the usage indicators of this study.

Targeted Information and Data Design

The first policy option is pre-arrival information explaining the rationale for the recommendation in terms of the vessel's observable conditions. The Çanakkale 150–200 m class, where the pilot uptake rate is relatively low, and the classes under 150 m in both straits are groups for which such information could be monitored; low use does not mean that these groups have the highest accident risk. For prioritisation, the absolute number of pilotless transits, length and draught, hazardous cargo declarations and incident records could be used; their weights cannot be derived from the findings of this study.

The second option is training that supports bridge teams' preparation for Strait transit. Kim *et al.* (2021) examine simulator-based maritime training and education; the limited recommendation that can be drawn from this is that scenarios tailored to Strait conditions can be used in training design. Training should not be presented as an assurance that replaces the pilot service; this study does not calculate the accident effect of such a programme.

The third option, and the fundamental one from a measurement perspective, is to broaden the cross-coverage of the official statistics. If length class, vessel type, port-call status, civil/military category and pilot uptake are published together, the legal target group can be better defined; whether the service was taken because of a recommendation, a port operation or a specific transit condition could also be recorded. Aggregated cross-tabulations that

Copyright © 2022 The Author(s): This work is licensed under a Creative Commons Attribution- NonCommercial-NoDerivatives 4.0 (CC BY-NC-ND 4.0) International License

Publisher: SARC Publisher

contain no vessel identity are an option compatible with privacy.

A separate set of indicators is needed for safety performance: accident and incident counts should be presented with piloted and pilotless transit denominators for the same scope and periods. Comparing raw accident rates without adjusting for differences such as length and cargo may confound selection effects with service effects. This design is the starting point of a future effectiveness analysis; no such analysis has been conducted with the current 14 strait-year observations.

Right of Transit and Transparency of Practice

The information and training proposals are cautious options that can be made on the basis of the limited findings of this study. A general pilotage obligation for all peacetime merchant vessels is not proposed. In practices tied to particular conditions, the nature of the recommendation, the basis of the requirement and the rationale communicated to the vessel should be clear; tying transit priority or timing to the use of a service should require a concrete legal assessment.

Transparency of practice also has a research counterpart: dated and accessible versions of regulations and category definitions would make it easier to compare studies that examine the same period. The monthly tables already present in the annual files showed the timing of the increase in Çanakkale's 200–250 m class (Fig 2); to explain its cause, pilotage requests, transit conditions and port-call status should be tracked at vessel level, and a comparison group and simultaneous changes should be assessed separately.

CONCLUSION

Between 2019 and 2025, the aggregate pilot uptake rate fell from 64.8% to 61.3% in Istanbul and rose from 49.4% to 53.9% in Çanakkale. In both straits, use in the upper length classes in 2025 is almost complete; Çanakkale's 150–200 m class stands out markedly. In the five-common-group decomposition, both the composition and within-class components are negative in Istanbul and both positive in Çanakkale. Monthly data show that the rise in Çanakkale's 200–250 m class occurred in August–September 2024, before the Directive amendments examined. Because the possible range of the pilot rate for non-call vessels is wide (34.1–100% in Istanbul and 13.4–100% in Çanakkale in 2025), the aggregate rate cannot be interpreted as a measure of optional pilotage. The optional provision of Montreux can coexist with high service use; but because the aggregate rate does not measure only optional merchant-vessel pilotage, this coexistence is not evidence of legal conformity or obligation. The contribution is the comparison of class patterns in the two straits and making visible the difference in legal scope of the measurement. The annual aggregation, missing port-call and type cross-tabulations, and the absence of accident data are the main limitations; more detailed data, targeted safety information and transparent grounds of practice offer a path for later research.

REFERENCES

1. Bahadır, M., Arlı, E., & Okşaş, O. "The Effect of Pilotage on Navigational Accidents: Time Series Analysis of Cointegration for the İstanbul Strait." *Transportation Research Record* (2026): 03611981261422139.
2. Chamber of Shipping. "Türk Boğazları Deniz Trafik Düzeni Yönetmeliği Uygulama Yönergesi [Implementation Directive of the Turkish Straits Maritime Traffic Regulation]." Circular No. 943 (27 December 2024). https://www.denizticaretodasi.org.tr/tr/sirkuler/turk-bogazlari-deniz-trafik-duzeni-yonetmeligi-uygulama-yonergesi-21546
3. Ece, N. J. "Contribution of the pilotage services to maritime safety: An analysis of the relation between ships involved in accidents in the strait of İstanbul and whether if they used pilotage services." *Journal of ETA Maritime Science* (2016).
4. International Maritime Organization (IMO). "Guidelines for Vessel Traffic Services." *International Maritime Organization, Resolution A. 857 (20)* (1997).
5. Kamal, B., & Çakır, E. "Data-driven Bayes approach on marine accidents occurring in Istanbul strait." *Applied Ocean Research* 123 (2022): 103180.
6. Karlıklı, Y. "'80. Yıldönümünde Montrö Boğazlar Sözleşmesi'ni Yeniden Düşünmek''." *Public and International Law Bulletin* 37.1 (2017): 29-49.
7. Kim, T. E., Sharma, A., Bustgaard, M., Gyldensten, W. C., Nymoen, O. K., Tusher, H. M., & Nazir, S. "The continuum of simulator-based maritime training and education: Kim T.-e. *et al.*" *WMU Journal of Maritime Affairs* 20.2 (2021): 135-150.
8. Ministry of Transport and Infrastructure - MTI. "Türk Boğazları Gemi Geçiş İstatistikleri

Copyright © 2022 The Author(s): This work is licensed under a Creative Commons Attribution- NonCommercial-NoDerivatives 4.0 (CC BY-NC-ND 4.0) International License

Publisher: SARC Publisher

[Turkish Straits Vessel Transit Statistics].” Annual data files, 2019-2025 (2026.).
9. Ministry of Transport and Infrastructure. “Türk Boğazları Gemi Geçiş İstatistikleri metaverisi [Metadata of the Turkish Straits Vessel Transit Statistics].” 2020.
10. Ministry of Transport and Infrastructure, General Directorate of Maritime Affairs. “Türk Boğazları Deniz Trafik Düzeni Yönetmeliği Uygulama Yönergesi [Implementation Directive of the Turkish Straits Maritime Traffic Regulation].” File with the Approval dated 4 December 2023 (2023).
11. Ministry of Transport and Infrastructure, General Directorate of Maritime Affairs. “Türk Boğazları Deniz Trafik Düzeni Yönetmeliği Uygulama Yönergesi [Implementation Directive of the Turkish Straits Maritime Traffic Regulation].” File dated 26 December 2024 (2024).
12. Ministry of Transport and Infrastructure, General Directorate of Maritime Affairs. “Türk Boğazları Deniz Trafik Düzeni Yönetmeliği Uygulama Yönergesi [Implementation Directive of the Turkish Straits Maritime Traffic Regulation].” File dated 7 October 2025 (2025).
13. Montreux Convention regarding the Regime of the Straits. League of Nations Treaty Series 173 (1936): 213, No. 4015.
14. Oaxaca, R. L., & Sierminska, E. "Oaxaca-Blinder meets Kitagawa: What is the link?." *Plos one* 20.5 (2025): e0321874.
15. Gazete, R. "Türk Boğazları Deniz Trafik Düzeni Yönetmeliği." *Başbakanlık Basımevi* (2022).
16. Türk Boğazları Deniz Trafik Düzeni Yönetmeliğinde Değişiklik Yapılmasına Dair Yönetmelik [Regulation on Amendments to the Turkish Straits Maritime Traffic Regulation]. Resmî Gazete No. 31336 (2020), *Presidential Decision No. 3305*.
17. Ucan, E., & Nas, S. "Analysing Istanbul strait maritime pilot capacity by simulation technique." *The Journal of Navigation* 69.4 (2016): 815-827.
18. Ulusçu, Ö. S., Özbaş, B., Altıok, T., & Or, İ. "Risk analysis of the vessel traffic in the strait of Istanbul." *Risk Analysis: An International Journal* 29.10 (2009): 1454-1472.
19. UN. "United Nations convention on the law of the sea." (1982): 1-16.

Source of support: Nil; **Conflict of interest:** Nil.

Cite this article as:
Koçali, E. O. “Optional Pilotage under the Montreux Convention and Pilot Uptake Patterns in the Turkish Straits (2019–2025)." *Sarcouncil Journal of Economics and Business Management* 5.11 (2026): pp 20-29.

Copyright © 2022 The Author(s): This work is licensed under a Creative Commons Attribution- NonCommercial-NoDerivatives 4.0 (CC BY-NC-ND 4.0) International License

Publisher: SARC Publisher