



Competitiveness in the Ports of the Strait of Gibraltar between Algeciras and Tangier Med

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ABSTRACT

The Strait of Gibraltar is a strategic maritime node where the ports of Algeciras (Spain) and Tangier Med (Morocco) compete directly for container traffic on Europe-Asia and transatlantic routes. This study develops a comprehensive competitiveness matrix that includes endogenous (port-controlled) and exogenous (external) factors to assess their relative positioning.

The matrix explicitly analyzes endogenous factors — terminal capacity, crane productivity, large-vessel service capacity, cost competitiveness, and transport cost distribution — and exogenous factors — hinterland distance, competitor port dispersion, mainline operator concentration (Maersk, MSC, CMA-CGM), hinterland accessibility (rail, road), and tourism activity.

Quantitative analysis of container throughput (TEUs, 2016-2024) reveals Tangier Med's continuous growth (10.24 million TEUs in 2024), surpassing Algeciras, particularly during the Red Sea crisis, when 90% of Asia-Europe routes diverted via the Cape of Good Hope, adding 3,800 nautical miles and 9-11 days per voyage.

Key analytical findings identify a clear hinterland-foreland disparity: Tangier Med demonstrates superior foreland connectivity to the Rotterdam, Genoa, and Hamburg hubs, with optimized vessel calling patterns that reduce waiting and handling times, while Algeciras maintains hinterland advantages through intermodal logistics areas and European market access despite delayed rail modernization.

Tangier Med benefits from greater regulatory flexibility and free zones, offsetting Algeciras's infrastructural advantages. These results provide an objective framework for understanding the strategic positioning of both ports and their supply chain implications in the Strait of Gibraltar.

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1. Introduction.

The containerization revolution has transformed competitive relationships among ports worldwide. Modern ports no longer compete solely through geographical location or physical infrastructure. Instead, competitiveness increasingly depends on a combination of operational efficiency, logistics integration, hinterland accessibility, institutional governance, digitalization, and connectivity within global shipping networks.

Within this context, the Strait of Gibraltar occupies a unique position in the global maritime system. Situated at the intersection of Europe, Africa, the Atlantic Ocean, and the Mediterranean Sea, it functions as one of the world's principal maritime chokepoints. Every year, tens of thousands of vessels transit through the strait, making it one of the busiest maritime corridors worldwide.

Within this context, the ports of Algeciras and Tangier Med dominate container activity in the region. Despite their geographical proximity —approximately fourteen nautical miles— they operate under markedly different institutional, economic, and regulatory conditions.

For decades, Algeciras represented the dominant container port in the region. Its privileged location at the southern tip of the Iberian Peninsula, combined with direct access to Euro-

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pean markets, enabled the port to establish itself as one of the Mediterranean's leading logistics hubs. Nevertheless, the emergence of Tangier Med during the last two decades has significantly altered competitive dynamics in the Strait of Gibraltar.

Since commencing operations in 2007 (Ducruet et al., 2011), Tangier Med has undergone successive expansion phases that have transformed it into one of the largest container ports in the Mediterranean basin. The port's rapid growth has attracted considerable attention from policymakers and industry stakeholders. Yet, despite its increasing global significance, Tangier Med remains comparatively underrepresented within academic research on port competitiveness.

The recent disruption of global shipping networks caused by the Red Sea crisis has further reinforced the strategic importance of the Strait of Gibraltar. Changes in vessel routing patterns, longer transit distances, and increased demand for efficient transshipment services have highlighted the importance of understanding competitive dynamics between the region's principal ports.

This study contributes to the analysis of port competition by addressing the following research questions:

1. Which factors determine competitiveness between Algeciras and Tanger Med?
2. How has container traffic evolved between 2014 and 2024?
3. To what extent can hinterland and foreland competitiveness explain recent changes in their relative positioning?

To answer these questions, the paper develops a multidimensional analytical framework integrating endogenous and exogenous determinants of port performance.

2. Literature Review.

2.1. Port Competitiveness: A Multidimensional Perspective.

Port competitiveness has emerged as a central theme in maritime economics, reflecting the structural transformation of global logistics and shipping networks. Early approaches primarily linked competitiveness to physical infrastructure, cargo throughput, and operational capacity. However, as supply chains have grown more integrated and complex, such perspectives have proven insufficient to adequately explain variations in performance.

Recent literature conceptualizes port competitiveness as a multidimensional construct, combining traditional structural factors with emerging operational and strategic determinants. Classical variables—such as infrastructure quality, cost efficiency, and geographical location—remain necessary conditions for competitiveness. Nevertheless, they must be complemented by intangible dimensions, including service quality, logistics integration, adaptability, and network connectivity (Acosta et al., 2009, 2011; Acosta Seró et al., 2012).

Within this framework, ports are increasingly viewed as integral components of global logistics systems, rather than isolated transport infrastructures. Their competitiveness depends

not only on internal efficiency, but also on their ability to integrate into maritime networks, attract cargo flows, and position themselves within global shipping alliances (Yap & Lam, 2004).

Moreover, contemporary research emphasizes the growing importance of governance quality, coordination, and stakeholder collaboration. Castelein, Geerlings, and Van Duin (2019) argue that competitiveness cannot be evaluated solely in terms of efficiency or technical capacity. Instead, the ability to coordinate diverse actors and integrate operational and logistics processes plays a decisive role in value creation, particularly in highly competitive and regulated environments.

In addition, recent studies highlight the relevance of digitalization, environmental sustainability, and resilience as key drivers of port competitiveness. These factors reflect the increasing need for ports to adapt to technological change, regulatory pressures, and global disruptions affecting supply chains.

From a strategic perspective, competitiveness also depends on the synergistic interaction between physical infrastructure, operational efficiency, governance systems, and collaborative networks. Only through this integrated approach can ports strengthen their global position and sustain long-term productivity growth (Parvin Banu & Aravind Babu, 2023).

Methodologically, the evaluation of port competitiveness has evolved toward more comprehensive frameworks incorporating operational, logistical, environmental, and commercial indicators. Benchmarking approaches based on empirical evidence, such as those proposed by Kaliszewski et al., (2020), allow for more accurate and context-specific performance assessments.

The Mediterranean region provides a particularly illustrative case of these dynamics, given its strategic location between Europe, Asia, and Africa. Intensified competition for transshipment traffic, combined with the rise of mega-vessels and increasing concentration among shipping alliances, has reinforced the importance of connectivity, efficiency, and network integration.

In sum, port competitiveness is no longer determined solely by traditional factors such as infrastructure, location, and costs. Instead, it emerges from a complex interaction of structural, operational, technological, and institutional dimensions. In this contemporary paradigm, ports are best understood as strategic logistics hubs, operating within a global system characterized by rapid digital transformation, intense competition, and a continuous need for innovation and resilience. Overall, port competitiveness is best understood as the result of a complex interaction between structural, operational, institutional, and network-based factors.

2.2. Existing Research on Algeciras.

Academic research concerning Algeciras is extensive. Studies have analyzed its operational efficiency, maritime connectivity, logistics integration, governance structures, and competitive position within Mediterranean shipping networks.

Acosta, Coronado, & Cerbán, (2007) identified several internal factors explaining Algeciras' competitiveness, including

terminal productivity, infrastructure quality, and strategic location. Subsequent research has examined challenges associated with rail connectivity, hinterland integration, and increasing competition from neighboring ports.

The result is a relatively mature body of literature capable of explaining the port's historical evolution and current challenges.

2.3. Research Gap: Tanger Med.

Despite its rapid rise as one of the leading container ports in the Mediterranean, Tanger Med remains comparatively underexplored in academic literature. While the number of publications on the port has increased in recent years, the existing body of research is still fragmented, sectoral, and largely descriptive, limiting a comprehensive understanding of its role within global maritime networks.

Most studies focus on specific dimensions such as territorial planning, industrial development policies, free-zone implementation, and the social and environmental impacts of the port complex. These analyses often concentrate on the port's immediate area of influence, governance arrangements in special economic zones, or operational aspects of terminals and logistics platforms. Although these contributions provide valuable insights into Morocco's development strategy, they tend to adopt a localized perspective, overlooking the broader function of Tanger Med as a key node in global maritime trade.

Some works have examined the port as a node of regional connectivity or as a case study in foreign direct investment attraction; however, they rarely address the port as a primary object of analysis within a comprehensive competitiveness framework. Comparative studies frequently include Tanger Med alongside other major ports but do not place it at the center of investigation, nor do they systematically analyze the drivers of its rapid growth.

This gap is particularly striking given the port's remarkable expansion since its inauguration in 2007, evolving into a major transshipment hub that has attracted leading global shipping alliances and achieved high container throughput levels. Nevertheless, the underlying mechanisms of its competitiveness and growth remain insufficiently explored, especially in relation to its integration into global supply chains and shipping networks.

More specifically, the literature reveals a lack of research in three key dimensions. First, there is limited analysis of Tanger Med's role in international trade and intercontinental container flows, particularly its position within East–West and North–South maritime routes. Second, insufficient attention has been given to its strategic geographical position in the Strait of Gibraltar, where it functions as a gateway between Europe, Africa, and Asia. Third, its structural role within global supply chains remains underdeveloped in existing research.

Although a limited number of studies explicitly address these strategic dimensions, they largely maintain a territorial or corridor-based focus rather than conceptualizing Tanger Med as a structural hub within global maritime networks. These contributions, however, highlight important elements such as the port's comparative advantages, its hub function, and its ambition to position itself among the world's leading ports.

In addition, the literature shows a broader imbalance in port studies, which remain heavily concentrated on established European and Asian ports. In contrast, North African ports are significantly underrepresented despite their increasing relevance in global logistics systems. This imbalance is particularly evident in the limited number of studies examining the competitive relationship between Tanger Med and nearby major ports using multidimensional frameworks.

Furthermore, current research has yet to fully address the impact of recent disruptions in global shipping patterns, including route diversions linked to geopolitical tensions, on the competitive positioning of Tanger Med and the Strait of Gibraltar as a whole.

In summary, although the literature on Tanger Med is thematically diverse, it lacks an integrated analytical framework capable of capturing its role in the reconfiguration of global supply chains. This gap underscores the need for more comprehensive approaches that simultaneously consider territorial, strategic, logistical, and competitive dimensions.

3. Study Area.

The Strait of Gibraltar forms the natural boundary between Europe and Africa and constitutes one of the principal gateways of international maritime trade.

The Port of Algeciras occupies a strategic position on the northern shore of the strait. Established as Spain's principal transshipment hub, it benefits from direct access to the European Union market and extensive logistics facilities. The port handles a diversified cargo portfolio and serves numerous global shipping services.

Tanger Med is located approximately forty kilometers east of Tangier on the Moroccan coast. Since its inauguration in 2007, the port has expanded through multiple development phases, creating one of the largest integrated port-industrial complexes in the world.

Although both ports compete for similar traffic flows, they represent distinct development models. Algeciras reflects the evolution of a mature European port integrated within established logistics networks. Tangier Med embodies a more recent model characterized by rapid infrastructure expansion, special economic zones, and strong institutional coordination.

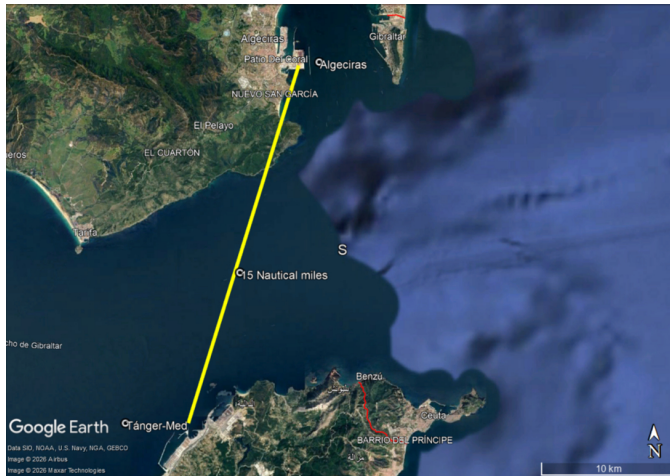
These contrasting characteristics make the Strait of Gibraltar an ideal setting for analyzing contemporary port competition.

The Strait of Gibraltar represents a unique maritime environment where geographical proximity generates direct competition between neighboring ports.

Unlike many other port systems characterized by substantial geographical separation, Algeciras and Tangier Med operate within the same maritime corridor and target similar market segments. Both ports function primarily as transshipment hubs serving major East–West shipping routes connecting Asia, Europe, and North America.

Their proximity creates an exceptional case study for analyzing port competitiveness because many geographical vari-

Figure 1: Study-area map.



Source: Authors.

ables remain constant while institutional, operational, and regulatory differences become more visible.

Consequently, the Strait of Gibraltar can be understood as a maritime cluster in which competition and complementarity coexist simultaneously.

4. Methodology.

This research adopts a comparative case-study approach to analyze the competitive relationship between the ports of Algeciras and Tangier Med. The study combines quantitative analysis of container throughput with a multidimensional assessment of competitiveness factors affecting both ports.

The methodological framework is based on the premise that contemporary port competitiveness cannot be adequately explained through traffic volumes alone. While TEU throughput remains an important indicator of market performance, competitiveness is also influenced by operational efficiency, institutional conditions, logistics integration, maritime connectivity, and accessibility to hinterland markets.

Consequently, the research develops a Port Competitiveness Matrix (PCM) that integrates both endogenous and exogenous determinants of competitiveness.

The analytical framework is based on the port competitiveness matrix approach developed in Spanish Port Authority reports.

Endogenous competitiveness refers to factors directly controlled by port authorities, terminal operators, and associated logistics stakeholders. Exogenous competitiveness refers to factors that influence port performance but are not directly controlled by port managers. The distinction between endogenous and exogenous factors allows a more comprehensive understanding of competitive dynamics.

These indicators were selected as they capture the operational, geographical, institutional, and market dimensions of competitiveness and the approach enables a systematic compar-

Table 1: Port Competitiveness Factors.

ENDOGENOUS FACTORS	EXOGENOUS FACTORS
INFRASTRUCTURE - Berth length - Draught - Handling and storage areas	LOCATION - Economic strength of the hinterland - Distance to major maritime routes - Distance to competing ports
SERVICES - Uninterrupted service - Crane capacity and productivity - Automated handling system - Value-added services - Efficiency in transshipment of large vessels/feeder vessels	DISTRIBUTION NETWORK - Optimal dispersion/concentration of flows - Quality and capacity of connections with the hinterland (road, rail, maritime) - Quality services
COSTS - Port cost competitiveness - Handling cost competitiveness - Transport and distribution cost competitiveness	ENVIRONMENTAL FACTORS - Industrial fabric - Institutional support

Source: Ministerio de Fomento (2002). Plan de Utilización de los Espacios Portuarios de Granadilla de Abona.

ison between ports operating under similar geographical conditions but different institutional frameworks.

The analysis combines information from multiple sources:

- Port Authority of Algeciras Bay annual reports.
- Tangier Med Port Authority annual reports.
- UNCTAD maritime statistics.
- World Bank logistics indicators.
- Container shipping databases.
- Academic publications.
- Shipping company reports.

Container throughput data for the period 2014–2024 were used to compare evolution of containership traffic in both ports.

5. Results.

5.1. Evolution of Container Throughput.

Container throughput represents the most visible indicator of competitive performance. The period 2014–2024 was selected as it provides a consistent and sufficiently long time series and coincides with the phase in which Tanger Med begins to record significant container volumes.

The data show that Tanger Med reaches the highest TEU levels among the three ports and, by 2025, nearly doubles Algeciras and clearly surpasses Valencia, which is usually Spain's main container port.

Between 2016 and 2024, both ports experienced growth, although their trajectories differed substantially.

Tanger Med recorded continuous expansion throughout the period, increasing from approximately three million TEUs to more than ten million TEUs. By contrast, Algeciras maintained relatively stable traffic volumes of around five million TEUs annually.

Table 2: Graphical representation of the evolution of container traffic at the ports of Tanger Med and Algeciras.

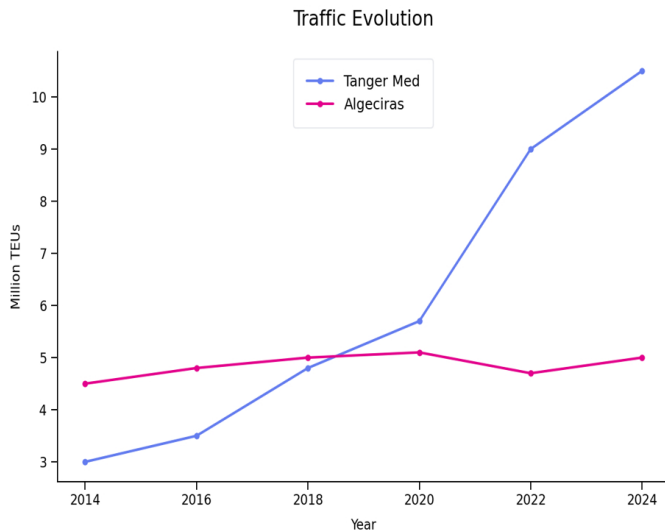
Period	TEU ALG	%	TEU TM	%	TEU VLC	%
2025	4.740.000	+0,5%	11.106.164	+8,4%	5.662.661	3,41 %
2024	4.712.793	-0,44%	10.241.392	18,8%	5.475.773	+14,15%
2023	4.733.526	-0,71%	8.617.410	13,4%	4.796.985	-5,06%
2022	4.767.282	-0,67%	7.596.845	6%	5.052.272	-9,85%
2021	4.799.497	-6,03%	7.173.870	24%	5.604.478	+3,25%
2020	5.107.873	-0,35%	5.771.221	20%	5.428.307	-0,21%
2019	5.125.385	7,37%	4.801.713	28%	5.439.827	+4,96%
2018	4.773.158	8,72%	3.472.451	5 %	5.182.665	+7,25%
2017	4.389.851	-7,81%	3.312.409	12 %	4.832.156	+2,11%
2016	4.761.444	5,43%	2 963 654	~0%	4.732.136	+2,53%
2015	4.515.768	-0,89%	2 961 837	-1,27%	4.615.196	+3,90%
2014	4.556.492	Base year	3.000 000	Base year	4.441.949	Base year

Source: Compiled by the author(s) from Port Authorities of Tanger-Med and Bay of Algeciras annual reports (2014–2024).

The divergence became particularly evident after 2020, when Tangier Med accelerated its growth while Algeciras entered a period of relative stagnation.

This trend suggests that structural factors beyond geographical location are influencing competitiveness in the Strait of Gibraltar.

Figure 2: Evolution of container traffic in Tanger Med and Algeciras (2014–2024).



Source: Compiled by the author(s) from Tanger Med and Port Authority of Algeciras annual reports.

The figure shows that Tanger Med has experienced sustained growth since 2014, with a marked acceleration after 2020. This increase is associated with the commissioning of Tanger Med 2 and the high productivity of terminals TC1, TC3, and TC4, which enabled the port to approach its nominal capacity by 2023 and maintain growth in 2024. It should be noted that major global shipping lines, including Maersk, MSC, and CMA CGM, operate in both Tanger Med and Algeciras. These

companies play a central role in shaping traffic flows and connectivity patterns in both ports.

In contrast, Algeciras remained practically at the same level, and Valencia also grew, but never reached the volumes managed by Tanger Med. The port of Valencia has been included because it now leads the national ranking in Spain. Unlike the port of Algeciras, the port of Valencia has powerful hinterland, and above all, no competing mega transshipment hub is located in such close proximity.

5.2. Competitiveness matrix.

Following the above exposed “competitiveness matrix” scheme, next step is adding input to it as follows:

• A) TANGER MED

Table 3: Tanger Med competitiveness matrix.

ENDOGENOUS FACTORS	
INFRASTRUCTURE	Source: Container activity - Tanger Med Port Authority
Berth line	4000 meters with a capacity of 9.5 million TEUs
Draft	A depth of 18 meters, only for containers
Handling and storage area	- State-of-the-art Class A and B warehouses
SERVICES	
Continuous service	24/7 operation
Crane capacity and productivity	Gantry crane and terminal cranes in container terminals, plus 4 tugboats in terminals 1 and 2 with a capacity of 60 tons complying with FI-PI standards (Fire-Fighting 1)
Automated handling system	- Integration of all logistics, customs and maritime operations processes under TM Community System and Grestech infrastructure - Cybersecurity and operational control 24SOC/NOC: operate with minimal interruption, ensuring continuity and immediate detection - Semi-automated terminals reduce berthing and handling times
Value-added services	It is a gateway to the European and African markets. It has an area of 200 hectares of logistics platforms for multinationals and SPL for fast and efficient distribution both locally and internationally, with a single customs zone. Also offers value-added logistics for consolidation, distribution and supply.
Efficiency in transshipment large vessels/feeder	Operates with feeders and mega-ships. It is positioned as a port of call for large shipping lines where containers are unloaded from large vessels and continue their journey via feeders for interoceanic routes.
COSTS	
Port costs	- Daily storage demurrage rates from the eighth day: €4.09
	- Handling tariffs from vessel to storage area and vice versa:
	• 20': between €61 and €75
	• 40': between €69 and €86
	- Tariffs from storage area to terminal gate or rail: between €17 and €21 for 20' or 40'
	- Low labor costs
EXOGENOUS FACTORS	
LOCATION	
Economic strength of the hinterland	Benefits from free zones, lower labor costs and an integrated logistics network with industrial parks such as Tanger Automotive City and Tanger Free Zone. Its hinterland has expansion potential.
Distance to major maritime routes	- The port is 3 days from Northern Europe, 10 days from America and 20 days from China.
Distance to competing ports	Algeciras: 16 nm: 1 hour
	Valencia: 392 nm: 1 day
	Marseille: 450 nm: 1-2 days
	Barcelona: 519 nm: 1-3 days
	Genoa: 700 nm: 1-2 days
	Rotterdam: 1300 nm: 2-3 days
	Hamburg: 1000 nm: 2-5 days
	Bremerhaven: 960 nm: 2-4 days
	Antwerp: 860 nm: 2-2 days
DISTRIBUTION NETWORK	
Optimal flow and efficient redistribution	The port is located at the intersection of East-West and North-South routes, allowing the concentration of intercontinental flows and efficient redistribution.
Quality/capacity of hinterland connections	A regional hinterland network of approximately 80 km.
	Rail connection: covers 10 hectares and includes 3 tracks with a total length of 800 meters; serves vehicles from Melloussa and Stellantis, as well as containers and passengers; annual capacity of 400,000 TEUs; connected to major national cities.
	Road connection: National routes N16 and N2.
	Maritime connection: regular connections to more than 180 ports and 70 countries.
	- 3 days to Northern Europe, 10 days to America, 20 days to China.
	- TEU distribution: 36% Africa (40 days), 18% Asia (20 days), 33% Europe (3 days), 11% Transatlantic (10 days).
Quality intermodal services	The port complex has a capacity of 700,000 trucks, 8 berths with 8 meters draft and a paved area of 35 hectares. The export platform processes 2,100 units per day with an average transit time of 2 hours. Passenger and Ro-Ro port allows crossing the Strait in less than 45 minutes. A modern multimodal network connects the port with the main economic regions of Morocco.
ENVIRONMENTAL FACTORS	
Business ecosystem	The port hosts the largest shipping companies in the world (MAERSK LINE, CMA CGM, HAPAG LLOYD) and leading terminal operators such as APM TERMINALS and EUROGATE.
Institutional support	Port expansion projects are driven by the monarch, giving it high political priority. It also receives support from the World Bank, the French Development Agency (AFD) and other multilateral entities.

Source: Authors.

• B) ALGECIRAS

Despite being separated by just 16 nautical miles, the two ports exhibit distinct competitive models, driven by differing infrastructure capacities, regulatory environments, and institutional backing.

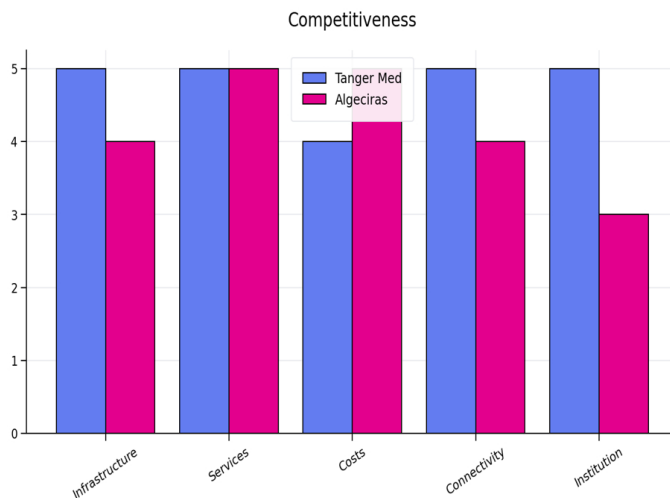
Table 4: Algeciras competitiveness matrix.

ENDOGENOUS FACTORS	
INFRASTRUCTURE	Source: Algeciras port Authorities
Berth line	Isla Verde Exterior: TTI in Phase A operates a berth of 850 meters (650 in concession and 200 in authorization). In Phase B development, it will reach up to 1330 meters of berth.
Draft	APM terminals: Juan Carlos I quay has depths of 16 to 18 meters. TTI: 18.5 meters in the East quay and 17.5 meters in the North quay.
Handling and storage area	Extensive logistics areas and container yards (more than 900,000 m ²). Storage area at Juan Carlos I quay totals 130,297 m ² . APM terminals: 67.1 hectares. Facilities allow servicing mega-ships over 18,000 TEUs. TTI terminal: 35.76 hectares of concession, plus 57,621 m ² maneuvering area, with 650 m and 550 m quay lines.
SERVICES	
Continuous service	According to service quality index studies, satisfaction is 38.6%. 24-hour operations with highly available technical and stevedoring services.
Crane capacity and productivity	APM terminal: 19 cranes, 8 of them Super Post-Panamax, plus 65 straddle carriers and 102 tractor units. TTI: 8 STS cranes, 32 automated yard cranes (ASC) and 32 Shuttle Carriers, allowing service to mega-ships up to 18,000 TEUs.
Automated handling system	- Advanced digital coordination between vessel, terminal, road and rail transport - Integration into TEN-T European corridors - Use of 5G and AI for predictive analysis, congestion prevention and efficiency - Implementation of Port Community System Teleport 2.0
Value-added services	Rail motorway and port services for reefer cargo are boosting import/export activity. The port includes a Border Control Post (PCF) of highest category operating 24/7.
Efficiency in transshipment	APM and TTI terminals handle around 200 mega-ships per year (16,000–24,000 TEUs). Over 60% of container traffic is transshipment, linking major routes (Asia–Europe–America) with regional feeder services.
COSTS	
Port costs	- Handling rates from vessel to yard approx. €26.5 with discounts up to 60% - Yard to gate/rail included in simplified tariffs - Storage rates from €0.105 to €2.10/m ² /day depending on duration and container type
EXOGENOUS FACTORS	
LOCATION	
Economic strength of hinterland	Direct connection to major industrial centers in Andalusia and southern Spain, with fast access to Europe. Connected via A-381 (Jerez/Seville), A-7 Mediterranean corridor, and N-340.
Distance to major maritime routes	Regular global routes: Asia (Shanghai, Singapore), Middle East (Jebel Ali), Africa (Dakar), North Europe (Rotterdam, Hamburg), America (New York, Santos). Transit times vary from 3–4 days (Europe) to 28–32 days (Asia).
Distance to competing ports	Main nearby competitors: Tanger Med, Sines and Valencia.
DISTRIBUTION NETWORK	
Flow concentration/distribution	High transshipment volume (>60%) showing strong concentration of flows with efficient regional redistribution, though partly limited by rail infrastructure.
Hinterland connections	Rail terminal of 10 hectares, 3 tracks, 800 m length, capacity 400,000 TEUs/year. Connected to Madrid dry port and TEN-T corridors. Includes ALBA logistics area (~300 ha).
Quality intermodal services	Integration of road, rail and maritime transport enables efficient multimodal logistics and distribution.
ENVIRONMENTAL FACTORS	
Business ecosystem	Extensive network of logistics and maritime companies such as Repsol, Moeve, Incargo Andalusia, among others.
Institutional support	Support and collaboration from local, regional and national administrations remains limited compared to Tanger Med.

Source: Authors.

5.3. Comparative analysis.

Figure 3: Comparative competitiveness factors between Tanger Med and Algeciras.



Source: Authors.

Following part evaluates the strategic and operational positioning of Tanger Med and the Port of Algeciras based on a side-by-side analysis of endogenous and exogenous competitiveness factors.

• Endogenous Factors: Infrastructure, Services & Costs.

Infrastructure.

• **Berth Line:** Tanger Med operates at a large-scale integrated system, with 4,400 meters of continuous berth line capable of handling 9.5 million TEUs. Algeciras offers substantial but fragmented capacity, with the highly capable TTI terminal currently at 850 meters and expanding to 1,330 meters via phased development.

• **Draft:** Both ports natively accommodate ultra-large container vessels (ULCVs). Tanger Med features a dedicated 18-meter depth for containers. Algeciras matches this capability, with APM at 16–18 meters and TTI reaching up to 18.5 meters.

• **Handling and Storage Area:** Algeciras provides highly quantified operational zones, boasting over 900,000 m² of yards between the APM (67.1 hectares) and TTI (35.76 hectares) terminals. Tanger Med focuses on the qualitative integration of state-of-the-art Class A and B warehouses directly into its handling ecosystem.

Services.

• **Continuous Service:** Both hubs operate 24/7. However, Algeciras highlights a specific friction point, noting a satisfaction index of 38.6%, suggesting potential operational pressure or administrative bottlenecks not present—or not reported—in the Tanger Med profile.

• **Crane Capacity and Productivity:** Algeciras operates a highly visible, heavy-duty mechanical footprint, featuring 19 cranes (including 8 Super Post-Panamax) at APM, and 8 STS alongside 64 automated yard/shuttle carriers at TTI. Tanger Med utilizes gantry and terminal cranes, emphasizing safety and auxiliary support with 60-ton fire-fighting tugboats.

• **Automated Handling Systems:** Both utilize advanced digital ecosystems. Tanger Med leverages the TM Community System and Girestech, employing semi-automated terminals with 24/7 SOC/NOC cybersecurity. Algeciras integrates 5G and Artificial Intelligence for predictive analytics, operating via the Teleport 2.0 PCS, aligning with European TEN-T digital standards.

• **Value-Added Services:** Tanger Med operates as a vast offshore processing hub, leveraging a 200-hectare logistics platform with a single customs zone designed specifically for 3PLs and multinationals. Algeciras leans on its status as a European gateway, offering a top-tier Border Control Post (PCF), rail motorways, and specialized reefer cargo services.

• **Transshipment Efficiency:** Both are world-class transshipment nodes. Tanger Med focuses on efficient mega-ship-to-feeder redistribution for African and interoceanic routes. Algeciras mirrors this, dedicating over 60% of its

traffic strictly to transshipment and servicing roughly 200 mega-ships annually.

Costs.

- **Port Costs:** The pricing models differ significantly. Tanger Med applies distinct handling tariffs (€61–€75 for a 20' container) and benefits globally from inherently low labor costs. Algeciras features a highly competitive baseline handling rate (approximately €26.5 with discounts up to 60%) and very low footprint costs (€0.105 to €2.10/m²/day), suggesting an aggressive pricing strategy to counter Tanger Med's labor advantages.
- **2. Exogenous Factors: Location, Network, and Environment**

Location.

- **Economic Strength of Hinterland:** This represents a fundamental divergence: Tanger Med's hinterland is production-oriented, directly integrated with manufacturing hubs like Tanger Automotive City and Tanger Free Zone, offering low labor costs and high expansion potential. Algeciras' hinterland is consumption-oriented, providing direct, fast access to Andalusia and the broader European market via the Mediterranean corridor.
- **Distance to Intercontinental Routes:** The geographical proximity of the two ports renders transit times functionally identical for long-haul shipping: roughly 3 days to Northern Europe, 10 days to the Americas, and 20–30 days to Asia.

Distribution Network.

- **Flow Concentration and Distribution:** Both ports sit perfectly at the intersection of East-West and North-South routes. However, Algeciras specifically notes that its capacity for inland regional redistribution is hampered by rail infrastructure limitations.
- **Hinterland Connections:** Both ports feature similar localized rail hardware (10-hectare rail terminals with 3 tracks totaling 800 meters and 400,000 TEU capacities). The difference lies in utilization: Tanger Med handles heavy industrial outputs (Melloussa/Stellantis) alongside containers. Algeciras directly feeds into the Madrid dry port and TEN-T European corridors but relies heavily on the local ALBA logistics area.
- **Intermodal Services:** Tanger Med's intermodal scale is significant, specifically in Ro-Ro (Roll-on/Roll-off) and truck processing. It accommodates 700,000 trucks annually, processing 2,100 units daily with a 2-hour transit average and a 45-minute strait crossing. Algeciras relies on standard modern integration of rail, road, and maritime logistics without matching this specific trucking throughput metric.

Environmental and Institutional Factors.

- **Business Ecosystem:** Tanger Med has successfully attracted the world's most dominant shipping lines (Maersk, CMA CGM, Hapag Lloyd) and terminal operators (APM, Eurogate) directly into its ecosystem. Algeciras hosts a robust but more localized cluster composed heavily of energy and maritime logistics firms (Repsol, Moeve, Incargo).
- **Institutional Support:** This constitutes the widest competitive gap between the two ports. Tanger Med benefits from absolute state backing, driven directly by the Moroccan monarchy and funded by international entities like the World Bank and AFD. It operates with paramount political priority. Conversely, institutional support for Algeciras from local, regional, and national Spanish administrations is reported as underperforming, placing it at a distinct disadvantage for rapid strategic expansion.

As a conclusive analysis, Tanger Med and Algeciras operate under two distinct developmental models:

Tanger Med is competing through aggressive scale, profound institutional backing, and an integrated industrial hinterland. Its capacity to act as a free-zone manufacturing extension, combined with massive state-driven investment and low labor costs, makes it an exceptionally agile and powerful hub for global mega-carriers.

Meanwhile, Algeciras maintains strict relevance through extreme mechanical capacity (crane density and advanced digital prediction architectures) and its irreplaceable function as a direct border gateway into the European Union. Its ability to offer heavily discounted handling rates keeps it strictly competitive. However, Algeciras faces structural friction—specifically concerning inland European rail bottlenecks and lukewarm institutional support—that threatens its ability to match Tanger Med's rapid structural expansion.

The analysis reveals that the two ports follow distinct competitive models shaped by differences in institutional frameworks, infrastructure development, and network integration.

First, terminal expansion projects have substantially increased handling capacity. Successive investment phases have enabled the port to accommodate larger vessels while maintaining operational flexibility.

Second, the concentration of terminal operations within a recently developed infrastructure environment has facilitated the implementation of advanced technologies and efficient operational procedures.

Third, the integration of industrial zones and logistics facilities has generated economies of scale that reduce operational costs.

Algeciras nevertheless retains important strengths:

The port possesses extensive experience in transshipment activities, highly skilled labor, and well-established relationships with major shipping lines. Furthermore, its geographical position at the entrance to the Mediterranean remains a significant competitive asset.

More pronounced differences emerge when analyzing exogenous factors.

Tangier Med benefits from an institutional framework specifically designed to attract international investment. Free-zone policies, fiscal incentives, and simplified administrative procedures have contributed significantly to its attractiveness.

The port also exhibits strong foreland connectivity. Major shipping alliances increasingly include Tangier Med within their strategic service networks, strengthening its role as a transshipment hub.

Algeciras demonstrates superior hinterland accessibility due to its direct integration within the European market. Access to Spain and broader European consumer markets remains one of its principal competitive advantages.

However, limitations associated with rail connectivity reduce the effectiveness of this advantage.

6. Discussion.

The growth of Tangier Med cannot be attributed solely to geographical location.

Many ports benefit from favorable geographical positions along major shipping routes without achieving comparable levels of competitiveness. The evidence suggests that Tangier Med's competitive performance results from the interaction of three factors.

First, infrastructure expansion has created significant operational capacity.

Second, institutional flexibility has reduced transaction costs and increased attractiveness for investors and shipping companies.

Third, strong integration with global shipping alliances has reinforced the port's role within international logistics networks.

These findings support the argument that port competitiveness is increasingly determined by network integration rather than geographical advantage alone.

6.1. The Hinterland–Foreland Competitiveness Model.

One of the principal contributions of this study is the identification of a growing distinction between hinterland and foreland competitiveness.

Traditionally, port competitiveness literature has focused on hinterland access because ports primarily functioned as gateways to inland markets.

However, contemporary transshipment hubs increasingly derive competitiveness from foreland characteristics, particularly maritime connectivity and network integration. The analysis reveals that the two ports follow distinct competitive models shaped by differences in institutional frameworks, infrastructure development, and network integration.

Tangier Med exemplifies this transformation.

Its success is not primarily based on domestic market size but rather on its ability to function as a strategic node within global shipping networks.

Algeciras, conversely, continues to derive substantial competitive advantages from its connection to European markets.

The coexistence of these two models explains why both ports remain important despite their divergent trajectories.

6.2. Implications of the Red Sea Crisis.

The Red Sea crisis fundamentally altered global shipping patterns.

Diversions around the Cape of Good Hope increased voyage distances and generated new logistical challenges for shipping companies. Under these conditions, ports capable of providing efficient transshipment services gained strategic importance. Tangier Med appears to have benefited significantly from these changes due to its flexibility and strong maritime connectivity.

The crisis therefore accelerated trends that were already visible before 2023 rather than creating entirely new competitive dynamics.

6.3. Implications for European Port Policy.

The findings raise important questions for European transport policy.

Although Algeciras remains one of Europe's principal container ports, improving rail connectivity and logistics integration appears essential for maintaining long-term competitiveness.

The Mediterranean increasingly functions as a highly competitive environment in which institutional efficiency and logistics performance may be as important as physical infrastructure.

Consequently, future investment strategies should focus not only on terminal expansion but also on strengthening multimodal transport systems and reducing inland bottlenecks. This reinforces the growing shift from hinterland-driven to foreland-driven competitiveness in contemporary port systems.

7. Conclusions.

This study analyzed competitiveness in the Strait of Gibraltar through a multidimensional framework integrating endogenous and exogenous determinants of port performance.

The findings indicate that the competitive relationship between Algeciras and Tangier Med cannot be explained solely through traffic volumes or geographical location.

Tangier Med has strengthened its position through a combination of infrastructure investment, institutional flexibility, cost competitiveness, and maritime connectivity. These factors have enabled the port to emerge as one of the leading transshipment hubs in the Mediterranean and Africa.

Algeciras retains significant strengths associated with access to European markets, logistics integration, and accumulated operational experience. Nevertheless, challenges related to hinterland connectivity, particularly rail infrastructure, constrain its ability to fully exploit these advantages.

The research contributes to academic literature in three ways.

First, it addresses the relative scarcity of studies focused specifically on Tangier Med.

Second, it introduces a multidimensional framework that moves beyond conventional throughput-based evaluations of competitiveness.

Third, it highlights the growing importance of the distinction between hinterland and foreland competitiveness in contemporary maritime transport.

Future research should extend this framework through econometric modelling, network analysis, and the incorporation of sustainability indicators. Such approaches would provide a more comprehensive understanding of the evolving geography of port competition within the Mediterranean and beyond. Overall, the study demonstrates that port competitiveness in the Strait of Gibraltar is shaped by the interaction between infrastructure, institutional coordination, and global network positioning, rather than geographical location alone.

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Conflict of Interest

The authors declare no conflict of interest.

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