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German Ports: Restructuring, Privatization Dynamics and Industrial Transformation Analysis

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Abstract

This study examines the restructuring processes, privatization dynamics, and industrial transformation of German ports within the broader context of evolving global trade and increasing inter-port competition in Europe. Despite its relatively limited coastline, Germany has established itself as a major maritime and logistics hub through an extensive network of seaports and inland waterways. German ports play a critical role not only in facilitating international trade—accounting for approximately 60% of the country's foreign trade—but also in ensuring energy security and supporting industrial supply chains.

The study adopts a structural and institutional perspective to analyze the governance, ownership models, and operational characteristics of the German port system. Particular emphasis is placed on the ports of Hamburg and Bremen–Bremerhaven as primary case studies, given their dominant role in national cargo throughput and their strategic importance within the European port hierarchy. The analysis highlights how increasing competition driven by the eastward expansion of the European Union and shifting economic centers has necessitated comprehensive reforms in port management, including greater private sector participation and organizational restructuring.

The findings suggest that the German port model reflects a hybrid governance structure in which public ownership is maintained alongside market-oriented operational mechanisms. This model has enabled German ports to enhance efficiency and competitiveness while preserving strategic public control. The study contributes to the literature by providing a comparative and policy-relevant assessment of port restructuring and privatization in a major European economy.

Keywords: German ports; port restructuring; privatization; port governance; maritime logistics; inland waterways; Hamburg Port; Bremen–Bremerhaven; European port competition; industrial transformation

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Introduction

The Federal Republic of Germany is a strategically located Central European country bordered by the North Sea and the Baltic Sea to the north; Poland and the Czech Republic to the east; Austria and Switzerland to the south; and France, Luxembourg, Belgium, and the Netherlands to the west. Germany has a federal administrative structure consisting of a central government

and 16 federal states (*Länder*), within which the distribution of legislative and executive competences is constitutionally defined. This multi-level governance framework plays a decisive role in shaping port management structures and infrastructure policies.

Figure 1: Location of German Ports

Source: Deecke & Lapple, 1996, p.334.

Despite its relatively limited coastline compared to other maritime nations, Germany hosts a significant number of ports along both the North Sea and the Baltic Sea, positioning it as one of Europe's leading maritime and logistics hubs. The northern regions of the country have historically specialized in fisheries, shipbuilding, and port-related activities. Since the 1970s, increasing investments in refinery, chemical, and energy industries have further diversified and strengthened the economic role of these regions, placing port activities at the core of industrial development. Today, Germany operates approximately 20 seaports and nearly 100 public inland ports, forming a highly integrated logistics network (Erkan, 2014, p.175).

German ports serve not only as logistical gateways for imports and exports but also as critical nodes within global supply chains. Approximately 60% of Germany's foreign trade is carried by maritime transport. The port economy directly employs around 1.35 million people, with total employment—when including indirect effects—reaching up to 5.6 million. Moreover, ports play a pivotal role in energy security and the ongoing energy transition, as approximately 70% of Germany's energy demand is met through imports handled via ports (Krpata 2024:10). In this context, the ports of Hamburg and Bremen–Bremerhaven function as principal hub ports, accounting for nearly 55% of the country's total seaborne cargo throughput (Trujillo & Tovar, 2007, p. 170).

The German port system is utilized not only by domestic actors but also extensively by international shipping and logistics companies. German industrial firms located along the Rhine corridor are closely integrated with major European ports such as Rotterdam, Amsterdam, and Antwerp, while shipping activities in southern Germany are often conducted through Mediterranean ports. This reflects the embeddedness of German ports within a highly competitive and multi-layered European port system.

Furthermore, the eastward enlargement of the European Union and the economic rise of Eastern European countries have led to a reconfiguration of economic centers across the continent. These geopolitical and economic shifts have intensified competition among Northern European ports, compelling German ports to adopt more flexible, efficient, and competitive operational models. Consequently, port restructuring, the reassessment of governance frameworks, and the expansion of private sector participation have emerged as key drivers of transformation in the sector.

This study aims to provide a comprehensive analysis of the restructuring processes, privatization perspectives, and industrial transformation of German ports. In this context, the institutional structure, ownership models, and governance frameworks of the German port industry will be examined. Particular emphasis will be placed on the cases of Hamburg and Bremen–Bremerhaven, through which port privatization experiences and restructuring practices will be analyzed in depth.

1.THE GERMAN PORT INDUSTRY AND PERFORMANCE: TRAFFIC TRENDS, CARGO VOLUMES, AND MAJOR PORTS

1.1. Transport System in Germany – A Dual-Layer Logistics Structure

The transport system in Germany is characterized by a “dual-layer logistics structure” consisting of two complementary components. Within this framework, seaport transport functions as the primary gateway for global trade flows, while inland waterway transport (IWT)—notably via the Rhine River, Elbe River, and Main-Danube Canal—serves as a complementary inland distribution network that ensures hinterland connectivity. The integrated structure between major seaports such as the Port of Hamburg, Port of Bremerhaven, and Port

of Wilhelmshaven and the inland waterway network positions Germany as one of the most advanced multimodal transport systems in Europe.

Seaport transport constitutes the backbone of Germany's export-oriented industrial economy and enables the country's integration into global supply chains. In this context, these ports hold strategic importance in terms of high-capacity container handling and the efficient management of diverse cargo types. Notably, the Port of Hamburg stands out as one of Europe's leading container hubs, while the Port of Bremerhaven plays a critical role in automotive exports. The Port of Wilhelmshaven, by contrast, benefits from its deep-water port infrastructure, allowing it to accommodate large vessels. In this regard, seaport transport represents the main carrier of foreign trade at the macro level in Germany.

In contrast, inland waterway transport emerges as a cost-efficient and environmentally sustainable logistics solution, particularly suited for the movement of heavy and bulk cargo such as coal, steel, and chemicals. Germany's dense and integrated inland waterway network—centered primarily on the Rhine River—facilitates direct connections between industrial regions and seaports through key trade corridors. This network provides vital access to major industrial zones such as the Ruhr region and has contributed to the transformation of inland ports, notably Port of Duisburg, into global logistics hubs. In this context, inland waterway transport is a decisive factor in ensuring logistical efficiency at both the micro and meso levels in Germany.

German ports are generally specialized in specific types of commercial goods or modes of transport and are limited in terms of their regional service areas. The general characteristics of German ports and the types of cargo they handle are presented in the table below (**Table 1**) (Deecke & Lapple, 1996, p. 336).

Table 1: Characteristics of German Ports

Port	**Functional Characteristics**
Hamburg	International port; container port
Bremen Ports	International port; container port
Wilhelmshaven	Bulk cargo port
Emden	Bulk cargo port
Brake	Bulk cargo port
Nordenham	Bulk cargo port

Port	**Functional Characteristics**
Cuxhaven	Ro-Ro port
Brunsbüttel	Bulk cargo port; regional port
Kiel	International port; ferry port
Lübeck	International port; ferry and transit port
Puttgarden	Ferry port
Wismar	Bulk cargo port
Rostock	Bulk cargo port; ferry port
Stralsund	Regional port; rail-connected ferry port
Sassnitz	Rail-connected ferry port
Mukran	Rail-connected ferry port

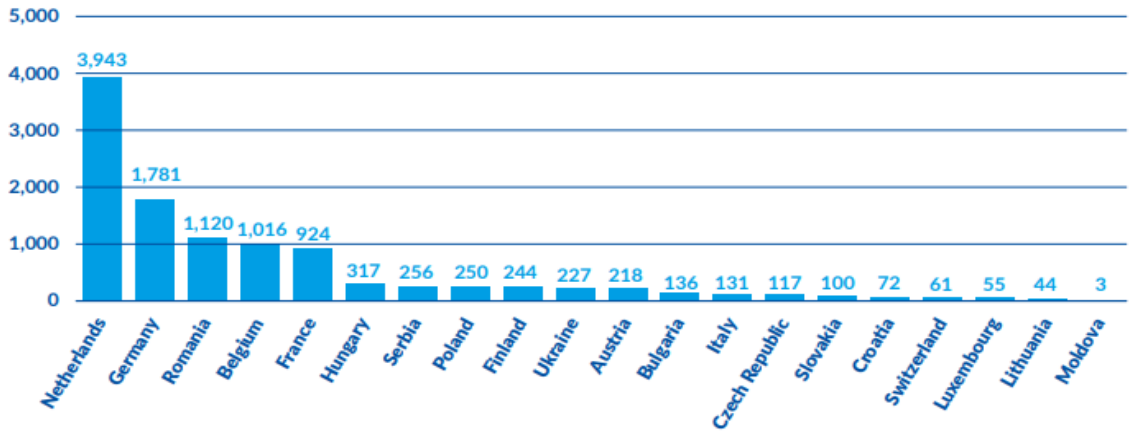
Considering the aforementioned characteristics of German ports, it is evident that the ports of Hamburg, Bremen, Kiel, and Lübeck are engaged in international port operations, whereas other major ports have specialized in specific activities.

Germany's logistics capacity is presented in the following graph.**The graph 1** illustrates the structural distribution of maritime transport by presenting the number of dry and liquid cargo vessels (including self-propelled ships and barges) across European countries. The data provide important insights into Germany's port system and logistics capacity.

First, Germany's position as the second country in Europe with approximately 1,781 vessels—following the Netherlands with 3,943 vessels—demonstrates its strong maritime and inland waterway transport capacity. This highlights that Germany operates not only through its seaports but also through an extensive multimodal transport network based on inland waterways such as the Rhine, Elbe, and other major river systems.

On the other hand, while this graph confirms that Germany is a strong actor occupying a leading position in European maritime transport, it also indicates that closing the gap with the Netherlands requires critical improvements in infrastructure modernization, digitalization, and the development of integrated logistics strategies. In this context, the restructuring and transformation process of German ports is not limited to port areas alone but necessitates the optimization of a broader transport and logistics ecosystem.

Graph 1: Number Of Push And Tug Boats Per Country In Europe

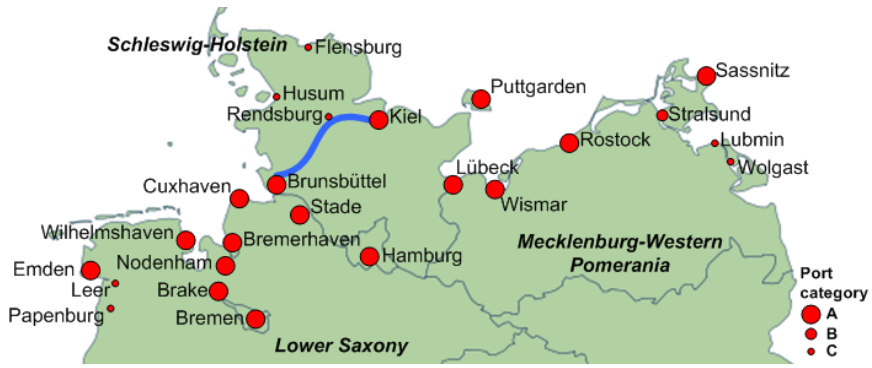


Source: Central Commission for the Navigation of the Rhine (CCNR). *Market Observation – Annual Report 2025*. In partnership with the European Commission. Strasbourg: CCNR, 2025. https://www.ccnr.eu/files/documents/om/om25_II_en.pdf

1.2. The German Port System

The German port system, with coastlines on both the North Sea and the Baltic Sea, plays a central role between Eastern and Western Europe and Scandinavia. Germany owns more than 100 ports on the North Sea coast, rivers flowing into the North Sea, and the Baltic Sea, with 17 of these ports handling over 1 million tons of cargo annually. According to the TEN-T guidelines prepared by the European Parliament and Council, **these ports are classified as follows: the study categorizes German ports into large, medium, and small-scale ports**(Erkan, 2014, p.180)**.**

Figure 2: Classification of German Ports



Source: (Caruso, 2010, s. 62)

1.2.1. German Ports and Their Classification

The states of Lower Saxony, Schleswig-Holstein, Mecklenburg-Western Pomerania, Bremen (including Bremerhaven), and Hamburg, located on the North Sea, host some of Germany's most important ports. Ports located on the North Sea coast or along rivers flowing into the North Sea (from west to east) include Emden, Wilhelmshaven, Nordenham, Brake, Bremen, Bremerhaven, Cuxhaven, Brunsbüttel, Stade, and Hamburg (Deecke & Lapple, 1996, p. 333).

Germany also boasts significant ports along its Baltic Sea coastline. These ports include Kiel, Lübeck, and Puttgarden in the former West Germany, as well as Wismar, Rostock, Stralsund, Sassnitz, and Mukran in the former East Germany.

Additionally, some of Germany's ports are not directly located on the coast but are connected to the sea via rivers and canals. Germany has an extensive canal system, including the Kiel Canal, the Mittelland Canal, and the Dortmund-Ems Canal, which spans 6,900 km, allowing for ship transport. For instance, the Kiel Canal, one of the world's busiest artificial waterways, connects the North Sea to the Baltic Sea, running from Brunsbüttel to Kiel. The Rhine-Main-Danube Canal, completed in 1992, facilitates river transport between the North Sea and the Black Sea[1].

Given their locations and characteristics, German ports can be categorized as follows:

- **International major ports**: Bremen/Bremerhaven and Hamburg ports.
- **Connection ports for Scandinavia and the Baltic region**: Baltic ports.
- **Specialized and regional ports**: North Sea ports.
- **Ports connected to the sea through rivers and canals**.

1.2.2. Key German Ports' Cargo and Container Handling Volumes

Germany's port system is well-developed, with five major ports defining the country's port industry. The two primary ports, Hamburg and Bremen/Bremerhaven, play a central role in the

[1] Inland waterway cargo transport, see: Central Commission for the Navigation of the Rhine (CCNR). *Market Observation – Annual Report 2025*. In partnership with the European Commission. Strasbourg: CCNR, 2025. https://www.ccnr.eu/files/documents/om/om25_II_en.pdf

country's maritime activities, handling approximately 55% of Germany's sea cargo. **Table 2** below presents the cargo and container throughput of these five major ports.

Table 2: Key German Ports' Cargo and Container Handling Volumes (2022-25)

Rankings for the major German ports (traffic 2022)					
Goods (million tonnes)			Containers (million TEU)		
Port	Volume	2022/2021 (%)	Port	Volume	2022/2021 (%)
Hamburg	103.4	- 7.2 %	Hamburg	8,300,000	- 5.1 %
Bremerhaven	42.8	- 8.7 %	Bremerhaven	4,600,000	- 6.1 %
Wilhelmshaven	31.8	+ 7.6 %	Others	1,000,000	- 14.6 %
Rostock	21.3	- 3.2 %			
Lübeck	1.4	- 6.9 %			
Others	63.4	+ 2.6 %			
TOTAL	279.1	- 3.2 %	TOTAL	13,900,000	- 6.3 %

Major German Ports – Goods Throughput (Million Tonnes) (2023-25)

Port	2023	2024	2025 (Trend)
Hamburg	114.3	111.8	~112–115 (stable)
Bremerhaven/Bremen	58.5	61.9	~63–65 (rising)
Wilhelmshaven	~30	~32	~34 (rising)
Rostock	~20	~21	stable
Lübeck	~1.3	~1.4	stable
Others	~60	~62	stable
Total	~284	~290	~295

Container Throughput (Million TEU)

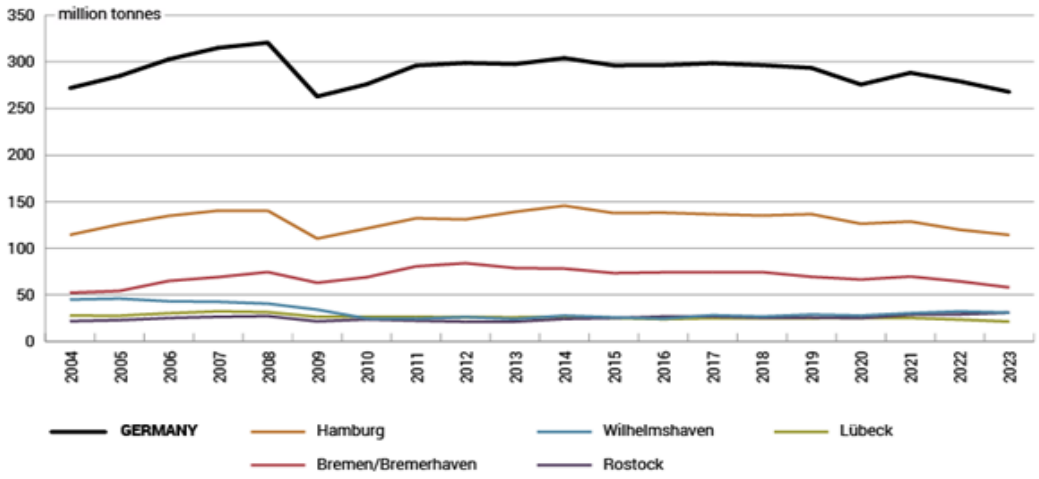
Port	2023	2024	2025 (Trend)
Hamburg	7.7	7.8	~8.0
Bremerhaven	4.2	4.4	~4.6
Wilhelmshaven	0.53	0.58	~0.7
Others	~1.0	~1.1	~1.2
Total	~13.4	~13.9	~14.5

Source: The data were obtained from the German Ports Association (ZDS, 2024), the Federal Statistical Office (Destatis, 2024), and UNCTAD (2023), Review of Maritime Transport 2023.

Elbe River's estuary hosts the Port of Hamburg, which, in 2023, handled approximately 114.3 million tonnes of cargo, making it the largest port in Germany and accounting for 37% of the total throughput of all German ports. Hamburg also maintains a leading position in container shipping, with 7.7 million TEU. It is followed by Bremerhaven/Bremen (~58.5 million tonnes; 4.2 million TEU) and Wilhelmshaven (~30 million tonnes; 0.53 million TEU). Rostock (~20 million tonnes) and Lübeck (~1.3 million tonnes) exhibit relatively limited traffic in terms of both total throughput and container handling. The three largest ports (Hamburg, Bremerhaven/Bremen, and Wilhelmshaven) are located along the North Sea coast, whereas the Baltic Sea ports of Rostock and Lübeck display comparatively lower container activity[2].

[2] Deiss, H. (2023). Germany: A Solid Fabric of Ports and Maritime Operators. Upply Market Insights. https://market-insights.upply.com/(24 May 2025).

Graph 2: Cargo Volume at Major German Ports (2004-2023)



Source:https://www.osw.waw.pl/en/publikacje/osw-commentary/2024-05-07/germanys-port-strategy-a-disappointing-response-to-crisis

The cargo handling performance of major German ports over the past decade is presented in **Graph 2** below. As illustrated, the performance of German ports has shown a downward trend in recent years. In 2023, a total of 267.8 million tonnes of cargo was handled at these ports—marking the worst result since the 2009 financial crisis and representing a return to levels observed two decades ago. Compared to 2014, the total cargo throughput in 2023 was 12% lower, and approximately 17% lower than the record year of 2008. A similar trend is evident in Germany's two largest ports, Hamburg and Bremen-Bremerhaven, which achieved their peak performances in 2014 and 2012, respectively. Since then, both ports have experienced a consistent decline in cargo volume over the past 20 years (Kędzierski, 2024, p. 2)[3].

At the port level, it is observed that the Port of Hamburg, despite experiencing a slight decline in 2024, is expected to regain stability in 2025[4], while the Port of Bremerhaven demonstrates a more dynamic performance with increasing cargo volumes. The Port of Wilhelmshaven, on the other hand, exhibits a rising profile, particularly due to its deep-water port advantage. In this

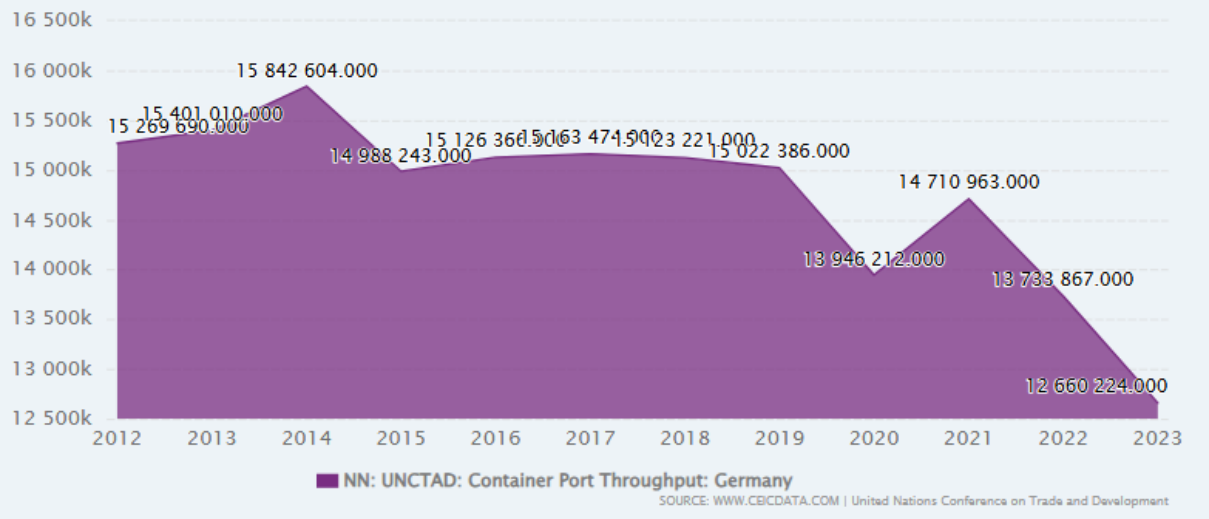
[3] Kędzierski, M. (2024). Germany's port strategy: a disappointing response to the crisis. OSW Centre for Eastern Studies, 07/05/2024, https://www.osw.waw.pl.

[4] With a container throughput of 7.8 million TEU, the Port of Hamburg is expected to rank 23rd among ports worldwide in 2024, thereby consolidating its position as the third-largest container port in Europe after Rotterdam and Antwerp-Bruges. At the Port of Hamburg, HHLA is a direct competitor of Eurogate, particularly in overseas services: while HHLA operates three container terminals in Hamburg, Eurogate operates one terminal. Hamburg Port Annual Rapor 2024 https://report.hhla.de/annual-report-2024/services/downloads.html

context, the overall outlook of German ports in terms of goods throughput during the 2024–2025 period indicates a cyclical recovery trend, despite the persistence of structural constraints[5].

Considering the data for 2024 and 2025 presented in **Table 2**, the total goods throughput of German ports reached approximately 290 million tonnes in 2024, reflecting a modest increase compared to 2023. Despite this rise, the growth remained limited and generally indicates a stagnant trend. Indeed, the low economic growth rates observed in Germany, along with the contraction in industrial production, exerted downward pressure particularly on bulk cargo transport. Nevertheless, projections for 2025 suggest that total cargo volume will reach approximately 295 million tonnes, signaling a gradual recovery process. This recovery is associated with the expansion of global trade and the revitalization of commercial relations, particularly with Asian markets.

Graph 3: Germany's container port handling volumes from 2008 to 2023



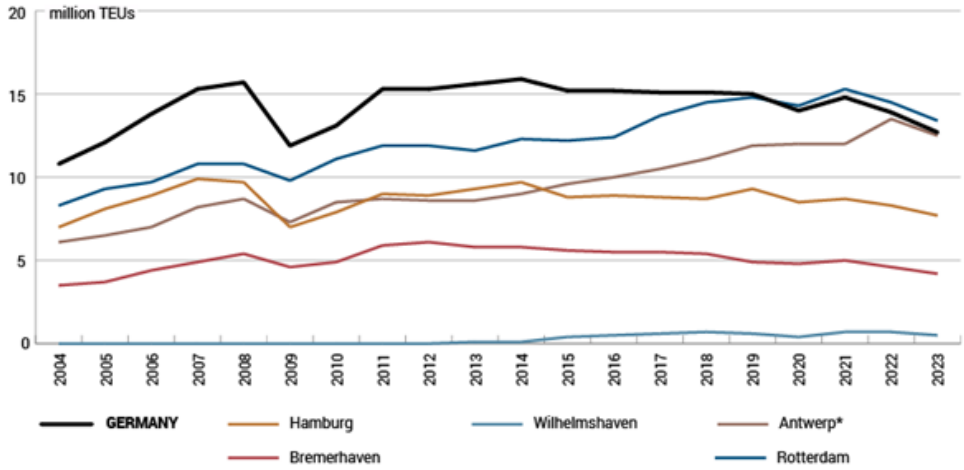
Source:https://www.ceicdata.com/en/indicator/germany/container-port-throughput

The trend in container handling has not been markedly different. As illustrated in **Graph 3** below, German ports handled a record total of 15.9 million TEUs in 2014. Since then, both

[5] As in the previous year, the **German** economy continued to shrink in 2024. This economic weakness was partly due to high energy prices, which put strain on industrial output. As an export nation, Germany also suffered from weak global demand. Creaking infrastructure and a stagnating construction sector only served to further hamper economic growth. According to IMF estimates, economic output for Europe's largest economy decreased by 0.2 % in the year as a whole. Hamburg Port Annual Rapor 2024 https://report.hhla.de/annual-report-2024/services/downloads.html

inbound and outbound container volumes have steadily declined, reaching 12.7 million TEUs in 2023. These levels were last observed in the mid-2000s and temporarily during the 2009 financial crisis (Kędzierski, 2024, p. 2).

Graph 4: Container Handling Volume at Major German Ports (2004-2023)



Source:https://www.osw.waw.pl/en/publikacje/osw-commentary/2024-05-07/germanys-port-strategy-a-disappointing-response-to-crisis

According to **Graph 4,** at the Port of Hamburg, the largest container handling port in Germany, the peak performance was recorded in 2007 with 9.9 million TEUs. This level was approached again in 2008 and 2014, but volumes subsequently declined to 7.7 million TEUs in 2023. At Bremerhaven, the second-largest container port, the upward trend ended in 2012 with a peak of 6.1 million TEUs. Since then, container volumes have fallen to 4.2 million TEUs by 2023 (Kędzierski, 2024, p. 2).

When the data presented in **Table 3** and the aforementioned figure are considered together, the year 2024 can be evaluated as a period of moderate recovery for German ports in terms of container throughput. Total container volume reached approximately 13.9 million TEU, indicating an increase compared to the previous year. This growth can be attributed to the continued normalization of global supply chains in the post-pandemic period and the rebalancing of trade flows. Nevertheless, it is evident that German ports have experienced a relative loss of competitiveness vis-à-vis their North European counterparts, particularly reflected in their limited market share in transshipment traffic.

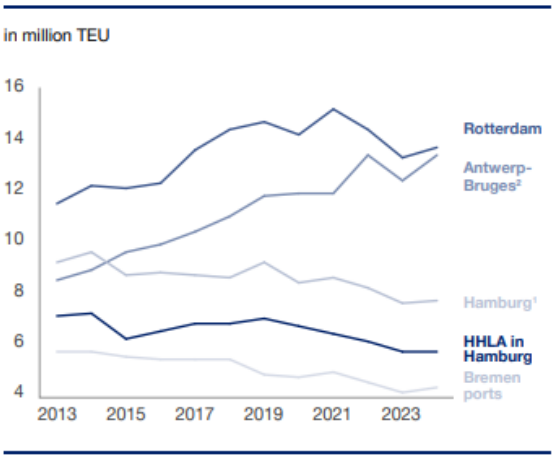
Table 3: **Container throughput in the leading ports of Northern Europe**

in million TEU	2024	2023	Change
Rotterdam	13.8	13.4	2.8 %
Antwerp-Bruges	13.5	12.5	8.1 %
Hamburg	7.8	7.7	0.9 %
Bremen ports	4.4	4.2	6.3 %

Source: Hamburg Port Annual Rapor 2024 https://report.hhla.de/annual-report-2024/services/downloads.html

By 2025, a more pronounced increase in container volumes is projected (approximately 14.5 million TEU). This growth is supported in particular by the expansion of Asia-related shipping lines and the introduction of new services at the Port of Hamburg. Similarly, the Port of Bremerhaven demonstrates a strong growth performance in container handling, thereby enhancing its competitive position. In contrast, the Port of Wilhelmshaven, although handling lower volumes, exhibits a steady upward trend. In this context, container transport emerges as the most dynamic segment in the recovery process of German ports during the 2024–2025 period; however, competitive pressure from major rival ports such as Rotterdam and Antwerp-Bruges continues to persist **(Graph 4 and Table 3).**

Graph 5: Container Throughput at te North Range ports



Source: Hamburg Port Annual Rapor 2024 https://report.hhla.de/annual-report-2024/services/downloads.html

When the **Table 3 and Graph 5** illustrating container throughput in the leading ports of Northern Europe are examined together, the regional trend of German ports becomes evident.

An overall assessment of these data reveals that the trend among the major container ports of the North Range, as well as the largest ports of the Baltic Sea, presents a mixed pattern.

At the Port of Hamburg, throughput volume during the reporting period increased by 0.9% compared to the previous year, reaching 7.8 million TEU (previous year: 7.7 million TEU). Europe's largest container port, the Port of Rotterdam, handled 13.8 million TEU in 2024, recording an increase of 2.8% compared to the previous year. Container throughput at the Port of Antwerp-Bruges rose by 8.1% in 2024, reaching 13.5 million TEU. At the Bremen ports, container traffic increased by 7.3% in the first eleven months of 2024. JadeWeserPort (Wilhelmshaven) reported a remarkable year-on-year growth of 40.6%, reaching 580 thousand TEU in the first three quarters of 2024. Meanwhile, with a year-on-year increase of 9.7%, the Port of Gdańsk achieved a record container throughput of 2.2 million TEU[6].

2. OWNERSHIP AND MANAGEMENT STRUCTURE OF GERMAN PORTS

According to the German Constitution, matters related to ports fall under the responsibility of the federal states (Länder). Neither the national nor the federal administration owns any commercial port for operational purposes. The federal states, on the other hand, are governed through different administrative structures depending on their historical, social, and demographic characteristics. For instance, northern states such as Lower Saxony (Niedersachsen) reflect an administrative system influenced by the British model, whereas southern states such as Bavaria (Bayern) and Baden-Württemberg follow a French-style administrative system. Moreover, Hamburg, Bremen, and Berlin are governed under a special city-state structure and do not have a subordinate regional administrative tier.

This diversity among federal states and their administrative structures has led to a wide range of ownership and management models across German ports. The ownership structures of ports can generally be classified as follows (Zachcial, Kramer, & Lemper, 2006, p. 143):

- Ports owned jointly by a federal state and a municipality (e.g., city-state ports such as Bremen and Hamburg),
- Ports owned by a municipality (e.g., Kiel, Flensburg, Wolgast),
- Ports partially owned by a federal state and a municipality (e.g., Wilhelmshaven),

[6] Hamburg Port Annual Rapor 2024 https://report.hhla.de/annual-report-2024/services/downloads.html

- Ports owned by a limited liability company (GmbH) in which both the state and municipality hold shares (e.g., Wismar, Rostock, Sassnitz/Mukran),
- Ports owned by private companies (e.g., Nordenham, and various ports such as Emden and Cuxhaven in Lower Saxony).

In general, **port authorities in Germany** are not legally or economically independent from the state administrations. They are integral parts of public administration. Port areas and water spaces are owned by regional authorities. At the federal level, there is no single port authority responsible for all public duties related to ports. These duties are fulfilled by different departments within regional or municipal administrations and, where relevant, federal authorities. However, the allocation of responsibilities has started to shift partially in recent years.

German port authorities typically function as **landlord port authorities**. In other words, while port superstructure is provided and operated by private users or tenants, the infrastructure is publicly funded and managed by port authorities. In this framework, responsibilities for port infrastructure investment are divided between the federal and regional levels. Although similar legal regulations may apply to ports, financing responsibilities for infrastructure and superstructure differ.

The fundamental principle in Germany is that **all port infrastructure**—both general and specific-purpose infrastructure—is publicly funded. General infrastructure refers to the construction and maintenance of all public transport systems within the port area and includes the following national and international connections (Zachcial, Kramer, & Lemper, 2006, p. 145):

- Natural and artificial waterways providing sea access,
- Connections to inland waterways,
- Port areas including breakwaters and locks,
- Traffic safety facilities such as radars, lighthouses, and other navigational aids,
- Roads,
- Railway infrastructure,
- Facilities for security, flood protection, and environmental preservation.

All related costs of these investments are covered by the public sector, not by the port operators. These assets are regarded as public goods and are provided to meet the needs of all users.

Special-purpose infrastructure, which includes shipyards, quay construction, land reclamation, and technical and sanitary services, is also largely financed by the public sector in addition to navigable waterways. Hence, other expensive elements of port infrastructure are also publicly funded in Germany.

Accordingly, **public authority responsibilities vary by national and regional level**. While the federal government is responsible for land and maritime transport infrastructure outside the port area, regional (state) governments are responsible for infrastructure within the port areas. Therefore, the federal government is not held financially accountable for infrastructure expenses within port areas.

In contrast to the public infrastructure system, port **superstructure** such as cranes, warehouses, and equipment is exclusively financed and operated by the private sector without any public subsidy. These investments are designed to serve the operational needs of terminal operators.

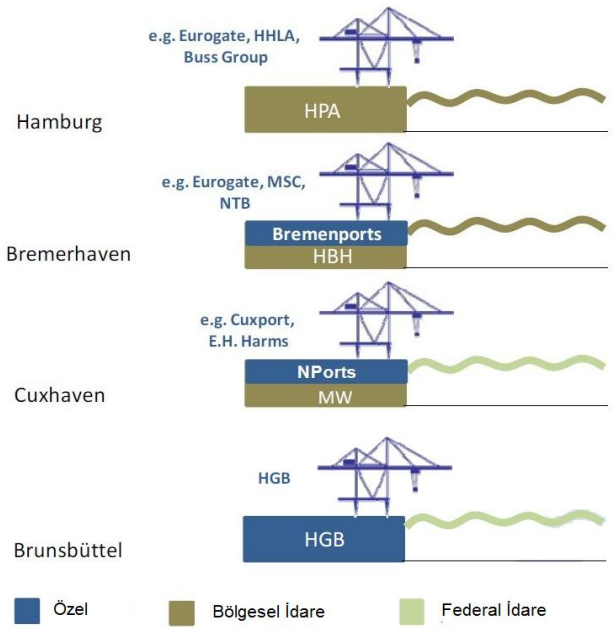
German port authorities do not have independent budgets for infrastructure investments. All public expenditures and expected revenues from port operations are decided by the respective state parliaments.

Despite this general principle, the **Federal Government employs a financial equalization mechanism**—the *Länderfinanzausgleich (LFA)*—to balance economic disparities between states. This mechanism, which allocates financial resources, constitutes a unique instrument within the German system. Given the importance of ports to the national economy, coastal states such as Bremen, Hamburg, Mecklenburg-Vorpommern, Lower Saxony, and Schleswig-Holstein receive **annual** financial support through the LFA (e.g., €38,346,000 in 2005)[7]. These payments are considered contributions from landlocked states to coastal states for the construction and maintenance of essential port infrastructure (Zachcial, Kramer, & Lemper, 2006, p. 146).

[7] According to the German Constitution, the five coastal federal states receive an annual compensation from the federal budget (Hafenlastenausgleich) to cover part of the maintenance costs of existing ports; since 2005, this subsidy has been fixed at €38 million.

The different models of ownership and responsibility in German ports are illustrated below using **four port examples** (**Figure 3**). As seen in the figure, in **the Port of Hamburg**, superstructure is financed by the private sector, while both general and special infrastructure costs are entirely covered by regional authorities. **In Bremerhaven**, both superstructure and special infrastructure are privately financed, whereas only general infrastructure is publicly funded. The difference in **the Port of Cuxhaven** is that the cost of sea access via natural and artificial waterways is covered by the federal government. In contrast, in **the Port of Brunsbüttel**, all remaining costs—including general and special infrastructure and superstructure—are covered solely by the private sector, except for the sea access routes funded by the federal government.

Figure 3: Different Models of Ownership and Responsibility in German Ports



- **HPA**: Hamburg Port Authority, a public institution
- **HBH**: Hanseatic City of Bremen Port Authority, a public institution
- **MW**: Ministry of Economic Affairs of Lower Saxony
- **HGB**: Brunsbüttel Port Company
- **NPorts**: Lower Saxony Port Authority

Source: Caruso, 2010, p.69.

3. PORT OPERATIONS AND PRIVATIZATION PRACTICES

In Germany, there is a clear distinction between the provision of port services through official channels and those driven by market mechanisms. Port authorities do not provide any operational services within the ports. These functions are entirely carried out by the private sector.

Core cargo handling services—such as transport, transshipment, dock labor, cargo inspection, warehousing, packaging, container loading and unloading, the distribution of consolidated external cargo to terminals, and the transfer of maritime freight by truck or similar vehicles—are provided by private entities.

Furthermore, there is no restriction on the number of service providers in German ports. All workers employed in German ports operate under the same legal status provided by labor and social security laws. Wages are fixed through collective bargaining agreements. The education and training of port workers are organized by private companies. In addition, a joint training school for port workers is maintained through the collaboration of port enterprises and labor unions in Hamburg and Bremen (Zachcial, Kramer, & Lemper, 2006, p. 144).

Technical maritime services such as towing and mooring are also organized by private sector companies. However, **pilotage services** are performed by public pilot associations under the supervision of the federal government. Regional authorities are responsible for port pilotage services. In the ports of Hamburg and Bremen/Bremerhaven, pilotage services are carried out by port pilot associations under the supervision of local port authorities. In Mecklenburg-Vorpommern, pilotage services are conducted by marine pilots based on contractual agreements with the federal government (Zachcial, Kramer, & Lemper, 2006, p. 144).

Regulatory functions—such as traffic control, cargo transport regulations, environmental supervision, and security—are provided by the police forces of Niedersachsen and Schleswig-Holstein in Mecklenburg-Vorpommern.

Secondary port services such as the supply of fresh water, fuel bunkering, and waste disposal are provided under legal regulations by the private sector not only in the ports of Hamburg and Bremen but also in those of Mecklenburg-Vorpommern, Niedersachsen, and Schleswig-Holstein.

Accordingly, private sector involvement in port operations in Germany generally takes place through **the leasing** of **publicly owned** port facilities and services. In other words, the

privatization of German ports is realized primarily through leasing arrangements. Due to the presence of major ports in Northwest European countries, competition in the port sector has become a fundamental aspect of economic life, which has contributed to an increasing role of the private sector in port operations.

Under German law, states are free to determine the user charges for public/general infrastructure and terminal-related infrastructure.

With regard to the leasing of port areas and berths, in **Bremen, Schleswig-Holstein, Mecklenburg-Vorpommern, and Niedersachsen**, these services are leased based on long-term contracts by entities authorized to lease port facilities (Zachcial, Kramer, & Lemper, 2006, p. 151).

In the Port of Hamburg, lease contracts may last up to 30 years, with areas and berths leased by the city. Rental periods and fees are revised every five years and depend on the quality of the area (e.g., water depth, railway connection) or the quality of the berths. Similarly, in Bremerhaven, rental negotiations are conducted every five years (Zachcial, Kramer, & Lemper, 2006, p. 151).

In the ports of Schleswig-Holstein, Mecklenburg-Vorpommern, and Niedersachsen, superstructure investments are generally carried out by the private sector. In Schleswig-Holstein ports, private companies own the superstructure, including passenger terminals and cargo handling equipment. Terminal offices are rented to freight companies, agents, and other entities based on market pricing. The leasing of cranes is subject to published tariffs (Zachcial, Kramer, & Lemper, 2006, p. 151).

Germany's two largest ports—Hamburg and Bremen/Bremerhaven—represent distinct roles in the country's maritime trade. While Hamburg focuses primarily on deep-sea trade with Asia (over 50% of its cargo), Bremen/Bremerhaven predominantly serves mid-sized vessels and plays a significant role in transatlantic trade.

As the two largest container ports in Germany, both are recognized as major gateways in international transportation, jointly handling approximately 55% of Germany's total maritime cargo. Other German ports are more specialized in certain types of cargo or transport and are generally limited to regional service areas. Accordingly, since the German port system is essentially defined by the two core ports—Hamburg and Bremen/Bremerhaven—an overview

of privatization practices in Germany is best illustrated through an examination of these two ports.

4. PRIATIZATION PRACTICES AT THE PORTS OF HAMBURG AND BREMEN-BREMERHAVEN

The ownership, administration, and operational structures of the ports of Hamburg and Bremen/Bremerhaven are examined below to explain the privatization practices implemented.

4.1. Port of Hamburg

4.1.1. Port Ownership and Port Management

Located approximately 120 kilometers inland from the North Sea coast on the Elbe estuary, the Port of Hamburg spans an area of roughly 75 kilometers and is classified as a river port.

The Port of Hamburg is Germany's largest and Europe's third-largest container port. For years, it has consistently ranked among the world's top ten container ports. Its four high-capacity container terminals enable an annual handling capacity of approximately 12 million TEUs (twenty-foot equivalent units). Additionally, its numerous multipurpose terminals contribute to the handling of both conventional general cargo and containerized goods.

With over 500 rail connections, the Port of Hamburg is the largest central port in Europe and serves as a critical hub for container shipments from the North Sea to the Baltic region. This strategic location, along with its traditional hinterland and the reopening of Eastern and Central European markets under the influence of the European Union, has continually enhanced the port's significance.

Despite its broad functions encompassing large volumes of dry bulk and general cargo, container shipping has emerged as the primary growth driver at the Port of Hamburg. Over half of the container traffic is related to East Asia, while more than 25% of the port's handling volume involves trade with the Baltic region and Eastern Europe.

Under Germany's Basic Law (Grundgesetz), there is no provision granting the federal government responsibility for port management within port boundaries. The federal state is only responsible for inland waterways, road connections, and links between ports and maritime areas. Conversely, according to the German constitution, matters related to ports fall within the

jurisdiction of individual federal states (Länder). Accordingly, as one of Germany's 16 federal states, **the Free and Hanseatic City of Hamburg** holds ownership and administrative authority over the Port of Hamburg.

In Hamburg, the responsibilities concerning the port previously held by the Ministry of Economic Affairs and the Ministry of Finance were consolidated into a single independent legal entity separate from the city-state administration. **The Hamburg Port Authority (HPA)** officially commenced operations on October 1, 2005.

The establishment of the Hamburg Port Authority was guided by three primary objectives (Zachcial, Kramer, & Lemper, 2006, p. 143):

- **Implementation of commercial principles**: ensuring market orientation in cost management and investments through an independent budget, enabling direct allocation of revenues and expenditures within the port;
- **Enhancement of operational efficiency**: increasing economic efficiency by focusing all public functions within the port on customer satisfaction and streamlining processes;
- **Improvement of flexibility**: facilitating faster project financing and support by expanding access to credit mechanisms.

With the establishment of the HPA, the port assets and properties located within the Hamburg port area were transferred to this newly created authority.

As a result, the Port of Hamburg was restructured to operate under commercial principles. The HPA maintains financial accounts and annual reports in accordance with commercial law and engages with private sector actors and other public institutions through service contracts.

4.1.2. Provision of Port Services and Privatization Practices

The relationship between the public and private sectors regarding the financing responsibility for port infrastructure at the Port of Hamburg has been regulated by the Local Port Act enacted in 1970. According to this legislation, **responsibility for port infrastructure** has been assigned to the Free and Hanseatic City of Hamburg. The infrastructure services include regional transport facilities, quay walls, internal waterways, roads up to the boundaries of leased areas, railway connections, and marine installations. The port areas remain publicly owned by the city and are leased to commercial port operators for a limited duration.

Pilotage services at the Port of Hamburg are carried out by independent associations of ship captains. These pilots operate under licenses issued by the Federal Ministry of Transport, which also has the authority to regulate compulsory pilotage services and set tariffs. Tugboat services, on the other hand, are provided by private companies.

Due to this structure, the Port of Hamburg operates **as a *landlord port*,** wherein numerous private companies lease terminal areas (typically for 30 years) from the city-state of Hamburg, which retains port ownership. While the tenants finance superstructure elements such as storage facilities, transport equipment, and internal terminal roads, the landlord is responsible for providing and maintaining infrastructure including piers, basic services, and transport links.

With the establishment of the Hamburg Port Authority (HPA), the port administration gained access to public support for infrastructure investments in addition to its own revenue. The Free and Hanseatic City of Hamburg allocates the necessary budgetary appropriations to the HPA for infrastructure expenditures related to the Port of Hamburg.

In Hamburg, the HPA has introduced a differentiation between user-related infrastructure and general infrastructure. While user-related infrastructure—such as leased land and quay walls—is financed through revenues obtained from leasing activities, general infrastructure is funded through port charges, public financial instruments of the City of Hamburg, and contributions from public authorities.

Unlike many other northwestern European ports, where core port services (cargo handling, storage, cargo routing, etc.) are exclusively the domain of private operators and not of port authorities, the Port of Hamburg exhibits a hybrid model. **The public port authority remains actively involved in providing a full range of port services, including labor.** Therefore, Hamburg exemplifies both the *landlord* and *service port* models simultaneously (Cass, 1998, p. 189).

Currently, four container terminals operate at the Port of Hamburg. Three of these terminals—Burchardkai, Tollerort, and Altenwerder—are operated by ***Hamburg Hafen und Lagerhaus***

***Gesellschaft* (HHLA)**[8], a private company in which the City of Hamburg holds a 66.8%[9] stake. The fourth terminal is operated by Eurogate Container Terminal, owned by Eurogate. HHLA, the largest terminal operator at the port, handles over 70% of Hamburg's container traffic[10].

Until the early 1970s, HHLA was the sole terminal operator and was responsible for managing the port, including leasing and subleasing of facilities. This monopolistic position was criticized for creating a competitive disadvantage for other prospective operators seeking to enter the Hamburg port market.

To remedy this issue, the Port Development Act of 1970 revised HHLA's role. HHLA was removed from its position as the landlord representing the city in lease negotiations, and this authority was transferred to **the Hamburg Ministry of Economic Affairs**, which was considered a more neutral party.

Following this institutional reform, during the subsequent two decades, the Port of Hamburg became home to several terminal operators, including Eurokai, Buss, and Unikai, alongside HHLA. In 1997, for example, Buss sold the Tollerort Container Terminal (TCT) to HHLA[11] (Cass, 1998, p. 192).

[8] Today, it operates as Hamburger Hafen und Logistik AG (HHLA). Founded in 1885, the company's shares were publicly listed on the stock exchange in 2007. As of December 31, 2023, the Free and Hanseatic City of Hamburg retains ownership of 66.8% of Class A shares and 100% of Class S shares. Additionally, MSC Mediterranean Shipping Company holds Class A shares in HHLA (12.4% acquired, 9.7% offered in a tender). The remaining 7.5% has been publicly offered.

[9] The committed capital of the HHLA Group consists of two different share classes: Class A shares (for the Port Logistics subgroup) and Class S shares (for the Real Estate subgroup). Only Class A shares are traded on the stock exchange.

[10] At the Port of Hamburg, HHLA is a direct competitor of Eurogate, particularly in overseas services: while HHLA operates three container terminals in Hamburg, Eurogate operates one terminal. In the 2024 financial year, with a throughput of 5.8 million TEU, HHLA remained the largest container handling company in the Port of Hamburg despite a slight decline in its market share to 74.8% (previous year: 75.6%). The main shipping regions included Asia, North America, Scandinavia, the Baltic region, as well as other European routes. Hamburg Port Annual Rapor 2024 https://report.hhla.de/annual-report-2024/services/downloads.html

[11] The main argument for this transfer was the necessity for the Port of Hamburg to follow the same model as other European ports. While Rotterdam Europe Combined Terminals, Rostock Seehafen Rostock Umschlagsgesellschaft, Antwerp Hessenatie and Noordnatie, and Bremen-Bremerhaven BLG dominate their respective markets, the idea that HHLA's dominant position could hinder competition with these operators played a significant role in the transfer of TCT (Cass, 1998, p. 192).

As a result, container terminals in Germany are primarily operated by German companies such as Eurogate and HHLA. **However, Hamburg's port authorities were compelled to revise their policy framework in 2023**. In that year, a 24.99% share of the Tollerort terminal was sold to the Chinese company COSCO. Following this transaction, the Swiss-Italian shipping giant **MSC Mediterranean Shipping Company**—the world's largest shipping company at the time—acquired a 49.9% stake in HHLA (Kędzierski, 2024, p. 5).

In conclusion, with the formal launch of the Hamburg Port Authority on October 1, 2005, port operations began to be increasingly conducted by the private sector. The incorporation of private actors into port services aimed to provide greater decision-making flexibility to better respond to market demands and to reduce the burden of public investment in ports. Consequently, the privatization strategy adopted in the Port of Hamburg has contributed to a shift in the role of the state in the German port sector—from direct port operations toward regulation, oversight, and strategic guidance.

4.2. Bremen/Bremerhaven Port

Bremen is not only one of the largest cities in the Federal Republic of Germany but also the smallest federal state. The State of Bremen, one of Germany's 16 federal states, consists solely of the cities of Bremen and Bremerhaven. Situated on the Weser estuary, the Bremen ports comprise two main port facilities: Bremen-Stadt and Bremerhaven. Both ports belong to the city-state of Bremen and, from a legal and economic standpoint, form a single administrative and operational entity.

The Bremen ports rank among Germany's most significant global ports. They serve as an international hub for hinterland and transshipment traffic and are of vital importance to other European countries. In addition to this key role in global trade, the twin ports of Bremen generate high value-added industrial output, creating numerous highly skilled jobs both in the region and across Germany.

This success is due to the coordinated operation of the Bremen and Bremerhaven ports. The Bremen port specializes in handling conventional general cargo, heavy lift, and bulk goods, while Bremerhaven functions as an international hub for maritime container, vehicle, and fruit

shipments. With a quay stretching more than three miles, Bremerhaven boasts the longest continuous quay in Europe and ranks among the world's top 20 largest ports[12].

Germany's leading automobile manufacturers—such as Mercedes Benz, BMW, Ford, VW, Audi, and Porsche—export their vehicles via the automobile terminal located in Bremerhaven. In 2023, approximately five million vehicles were imported and exported through the Bremerhaven port, making it the leading automotive port in Europe. Export destinations primarily include the United States, East Asia, and the Middle East, while imports originate mostly from Asia and the United States[13].

Bremerhaven is also known as Europe's cold storage hub, with around 500,000 metric tons of fruits, vegetables, and other perishable goods transported annually.

The COVID-19 pandemic negatively impacted the German economy and, by extension, the Bremen ports. In 2020, the number of jobs in the manufacturing and processing industries fell by about 2.5%, with the decline in the automotive sector—crucial to Bremen's ports—amounting to 2.8%[14]. Nevertheless, the ports of Bremen experienced a relatively swift recovery.

In 2021, the quays and terminals in Bremen and Bremerhaven handled 69.7 million tons of maritime cargo, marking a 4.8% increase compared to the previous year, when volume had dropped to 66.5 million tons due to the pandemic. This figure slightly surpassed the pre-pandemic total of 69.4 million tons recorded in 2019. Provisional figures for 2021 indicate that 12.9 million tons were handled at Bremen's port facilities (up by 23.6%), and 56.8 million tons at Bremerhaven (up by 1.3%), signifying a return to pre-pandemic levels at both locations.

By 2023, the total maritime cargo throughput at Bremen and Bremerhaven ports had reached approximately 70.2 million tons. This total comprised 13.5 million tons at Bremen-City and 56.7 million tons at Bremerhaven. Together, the ports handled 5.5 million twenty-foot equivalent units (TEU) annually, making them Germany's second-largest and Europe's fourth-

[12] The Container Terminal in Bremerhaven offers a total of 14 berths for these massive vessels, making the port one of the most important container hubs in Northwest Europe. With a quay length of 4,930 meters and an operational area of 2,900 hectares, Bremerhaven is home to one of the largest integrated container terminal facilities anywhere in Europe.

[13] http://www.wfb-bremen.de/en/wfb-facts-figures-tr

[14] According to data from the Institute of Shipping Economics and Logistics (ISL), jobs directly related to the ports in the Bremen Federal State decreased by approximately 3.3% in 2020. See: https://www.bremenports.de/en/press/port-performance-annual-throughput-in-2021-improves-significantly-compared-with-2020 (Accessed 18.08.2024).

largest container port. Trade and import-oriented companies in Bremen take advantage of this strategic infrastructure to distribute their products throughout Germany and Europe.

Port governance is carried out through **the Ministry for Economic Affairs and Ports, the Bremen Port Authority (Hansestadt Bremisches Hafenamt/HBH)**, and **Bremenports GmbH & Co. KG**[15], a company wholly owned by the Bremen state government. The Ministry is responsible for policy and strategic planning, while Bremenports oversees the management of port assets. This includes development, expansion, construction, infrastructure maintenance, port charges, and marketing. The Port Authority handles port security, vessel traffic management, and pilotage services (Lampe, 2011, p. 7).

While port infrastructure is financed with public funds, superstructure investments at the terminals are provided by private operators.

Port operations in Bremen-Bremerhaven are conducted by **Bremer Lagerhaus-Gesellschaft AG & Co. (BLG)**[16]. Although not the sole operator, BLG ranks among the largest port operators in Europe. Due to its monopolistic position, BLG has faced criticism regarding port management and operations, especially since it operated at a significant loss until the mid-1990s. As a result, restructuring was initiated to grant BLG greater economic flexibility and enhance its commercial and customer-oriented services.

In 1998, BLG Holding was restructured as a private company governed by private law. It now consists of numerous subsidiaries and 20 affiliated companies. As of December 31, 2023, 50.4% of BLG's shares were owned by **the Free Hanseatic City of Bremen (municipality)**. Other major institutional investors include **Finanzholding der Sparkasse and Panta Re AG** (each with 12.6% ownership), and **the Waldemar Koch Foundation** (5.9%). Publicly traded shares account for 18.5% of total ownership[17].

[15] Since its establishment in 2002, Bremenports GmbH & Co. KG has set a milestone in German port operations. On behalf of the Free Hanseatic City of Bremen, it manages the infrastructure of the Bremen/Bremerhaven port group. Therefore, it functions as a consulting and engineering company that owns its own port. It is responsible for port development, port planning, port construction, and port maintenance.

[16] BLG Logistics Group is a logistics service provider that operates container terminals and automobile terminals, offering various logistics services. They manage operations such as the handling and storage of containers and vehicles at ports.

[17] BLG LOGISTICS GROUP AG & Co. KG. (2023). *Annul Report 2023*. BLG LOGISTICS GROUP AG & Co. KG. https://www.blg-logistics.com/en/annual-report-2023, p.8.

For over a century, BLG has operated port facilities under a lease agreement with the city. Under this agreement, which is subject to periodic renewal based on performance, BLG is responsible for constructing all superstructures necessary for storage and distribution. The municipality's significant shareholding explains BLG's continued role as port operator and tenant (Cass, 1998, p. 193).

In December 2021, a strategic partnership was established with Hyundai GLOVIS, one of the world's largest RoRo shipping companies, to manage automobile transshipments in Bremerhaven. The resulting joint venture, "BLG GLOVIS BHV GmbH," began operations in May 2022. Hyundai GLOVIS plans to develop the BLG AutoTerminal Bremerhaven as a central European hub for vehicle transportation between Asia and Europe[18].

The container terminals in Bremerhaven are operated by BLG Logistics Group and Eurogate. Heuer Port Logistics GmbH operates the fruit terminal, while BLG Automobile manages the car terminal. Global Ports Holding is set to assume operations of the Columbus Cruise Terminal in Bremerhaven starting in 2025.

Accordingly, the City of Bremen acts as a landlord port authority, both through its ownership stake in BLG Holding and its responsibility for infrastructure via the Ministry for Economic Affairs and Ports, headed by a Senator. The terminals are operated by private entities under long-term lease agreements.

5. POLICY IMPLICATIONS AND RECOMMENDATIONS

While German ports maintain a strong position within the European port system due to their institutional capacity, advanced logistics infrastructure, and well-developed hinterland connections, they are increasingly confronted with structural weaknesses in the face of intensifying global competition and growing geopolitical uncertainties. Addressing these vulnerabilities is essential to sustaining their long-term competitiveness and strategic relevance.

One of the primary structural challenges lies in the fragmented governance framework resulting from Germany's federal system. The division of authority between the federal government and

[18] annual-report-2023, p.9.

the *Länder* often leads to coordination inefficiencies and the absence of a unified national port strategy. This fragmentation can generate suboptimal outcomes, including intra-national competition between major ports such as Hamburg and Bremen/Bremerhaven, thereby weakening Germany's overall competitive position vis-à-vis major European rivals.

In addition, infrastructure bottlenecks and delays in capacity expansion—particularly in rail and inland waterway connections—pose significant constraints on port performance. Compared to leading competitors such as Rotterdam and Antwerp, German ports face challenges in ensuring seamless hinterland integration and high-capacity intermodal connectivity. These limitations risk undermining their efficiency and attractiveness within global supply chains.

Another critical area of concern is the relatively slow pace of digital transformation. Although German ports have initiated steps toward automation and digitalization, the adoption of advanced technologies—such as artificial intelligence, real-time data integration, and smart port systems—remains uneven. This lag reduces operational efficiency and limits the potential for cost optimization and service innovation.

Furthermore, increasing engagement with global logistics actors through equity partnerships and partial privatization has introduced new strategic considerations. While such collaborations enhance financial capacity and global network integration, they also raise concerns regarding the influence of foreign entities over critical infrastructure. The growing presence of major international shipping companies in port ownership structures necessitates a careful balance between openness to investment and the safeguarding of strategic autonomy.

Geopolitical developments further complicate this landscape. In particular, tensions and instability in the Middle East—especially in the context of Gulf conflicts—pose significant risks to global energy supply chains and maritime trade routes. Given Germany's high dependence on imported energy, disruptions in the Gulf region may have cascading effects on port operations, logistics flows, and national economic stability. These risks underscore the need to enhance the resilience and adaptability of port systems.

In light of these challenges, the following policy recommendations are proposed:

(i) Strengthening a Coherent National Port Strategy

A more integrated and coordinated national port policy should be developed to overcome

governance fragmentation. Aligning federal and state-level strategies would reduce inefficiencies and promote complementarity rather than competition among ports.

(ii) Upgrading Hinterland Connectivity

Targeted investments in rail freight corridors and inland waterways are essential to eliminate capacity bottlenecks and enhance intermodal transport efficiency. Strengthening hinterland connections will be critical to maintaining competitiveness against leading European ports.

(iii) Accelerating Digital Transformation

German ports should prioritize the adoption of smart port technologies, including AI-driven logistics systems, digital platforms, and automation. Public incentives and regulatory support can play a key role in facilitating this transition.

(iv) Ensuring Strategic Balance in Foreign Partnerships

While foreign direct investment should continue to be encouraged, regulatory frameworks must ensure that critical infrastructure remains under effective national oversight. Screening mechanisms and governance safeguards should be strengthened where necessary.

(v) Enhancing Resilience to Geopolitical Risks

Ports should develop contingency strategies to mitigate disruptions in global trade and energy flows. This includes diversifying supply routes, strengthening storage and logistics capacities, and integrating risk management into port planning.

(vi) Promoting Green Port and Energy Transition Policies

In line with European climate objectives, German ports should accelerate the transition toward low-carbon operations. Investments in alternative fuels, shore-side electricity, and sustainable logistics solutions will be essential for long-term competitiveness.

In conclusion, while the German port model—characterized by a landlord structure and hybrid public-private governance—has demonstrated considerable strengths, it must evolve in response to emerging economic, technological, and geopolitical challenges. A proactive and strategically coordinated policy approach will be crucial to ensuring that German ports remain resilient, competitive, and central to global trade and energy networks in the decades ahead.

6. CONCLUSION AND EVALUATION

Since the last quarter of the 20th century, the political and economic transformations experienced in Europe, together with the eastward and northward expansion of the European Union, have led to a restructuring of economic centers across the continent. In parallel with the increase in international trade volumes, this process has intensified competition within transport and logistics networks, particularly giving rise to a pronounced competitive environment among Northern European ports. This competition has compelled German ports to undergo a comprehensive transformation in structural, managerial, and operational terms.

Despite its relatively limited coastline, Germany has secured a central position within the European port system thanks to its strong hinterland connections, advanced logistics infrastructure, and institutional capacity. German ports, particularly Hamburg and Bremen–Bremerhaven, have become key nodes in global supply chains, experiencing significant technical and organizational restructuring in intercontinental container transport. In this context, the adopted "landlord port model" has supported the competitiveness of German ports by combining public ownership with the operational dynamism of the private sector within a hybrid governance framework.

However, recent global developments have also revealed the limitations and vulnerabilities of this model. In particular, fluctuations in cargo and container volumes during the COVID-19 pandemic have necessitated more flexible and market-oriented port policies. The transfer of part of the Tollerort Terminal in the Port of Hamburg to COSCO in 2023, followed by the acquisition of a significant stake in HHLA by MSC Mediterranean Shipping Company, demonstrates the deepening integration of German ports into global logistics networks. At the same time, these developments have triggered new debates regarding the exposure of strategic infrastructure to foreign actors.

An examination of criticisms directed at the German port system reveals that the multi-layered governance structure leads to significant coordination deficiencies. The fragmented implementation of port policies at the federal and state levels hinders the development of a coherent national strategy, resulting in inefficient competition between major ports such as Hamburg and Bremen/Bremerhaven. Furthermore, capacity constraints and insufficient modernization in rail and inland waterway infrastructure weaken hinterland connectivity and adversely affect competitiveness.

Another significant weakness is the relatively slow progress in digitalization and automation. In an era where smart port applications are rapidly expanding globally, the insufficient adoption of data integration systems, artificial intelligence–supported logistics solutions, and automation technologies limits the operational efficiency and cost advantages of German ports.

Moreover, the risks confronting ports today are not limited to economic and technological dimensions. Increasing tensions in the Middle East and conflicts that can be analyzed within the context of Gulf-related instability create substantial uncertainties for global energy supply security and maritime trade routes. For Germany, which is highly dependent on energy imports, this situation further elevates the importance of ports as not only commercial but also strategic and geopolitical infrastructure assets.

In this context, sustaining the long-term competitiveness of the German port system requires a multi-dimensional policy approach. First, a comprehensive national port strategy should be developed to overcome the fragmented federal and state-level structure. Second, investments in rail and inland waterway infrastructure should be accelerated to strengthen hinterland connectivity. Third, advancing digital transformation, expanding smart port applications, and adopting data-driven management models are essential for enhancing operational efficiency.

In addition, while maintaining the economic benefits of partnerships with foreign investors, regulatory mechanisms should be strengthened to ensure the continued control of strategic infrastructure. In response to geopolitical risks, it is crucial to enhance ports' crisis management capacity, develop alternative supply and logistics scenarios, and support energy diversification policies. Finally, in line with the European Green Deal, reducing the carbon footprint of ports and promoting sustainable port management practices are indispensable for long-term competitiveness.

In conclusion, although the German port system is grounded in strong institutional foundations and advanced logistics infrastructure, it must reposition itself in response to increasing global competition, digital transformation pressures, and geopolitical uncertainties. In this regard, further developing the existing hybrid model—based on public–private cooperation—within a more strategic, coordinated, and innovative framework will be the determining factor shaping the future role of German ports.

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