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NAVIGATING STRUCTURAL DUALITY IN SEAPORTS: TRADE PATTERNS AND HINTERLAND INTERFACES OF ANTWERP-BRUGES

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Dzenis O. O., Shestakova O. A., Piddubna L. I. Navigating Structural Duality in Seaports: Trade Patterns and Hinterland Interfaces of Antwerp-Bruges

European maritime hubs currently navigate a complex structural duality: maintaining the strict cadence of regional short-sea networks while simultaneously absorbing the growing volatility of intercontinental deep-sea corridors. To understand how major nodes physically and strategically reconcile these conflicting pressures, this study conceptualizes the trade patterns and underlying logistics structures of the Port of Antwerp-Bruges within the broader International Supply Chain Management framework. Drawing on 2024 operational statistics, Eurostat datasets, and UNCTAD macro-assessments, the research quantifies the port's origin-destination profile. It strategically contrasts its stable intra-European base (42.5% of total maritime freight) against highly concentrated global exposures across key intercontinental corridors, such as the Far East and North America. The empirical evidence indicates that sustained gateway competitiveness relies on systemic coherence rather than mere quayside capacity. Specifically, the port's dual-platform configuration and multimodal hinterland synchronization act as a robust buffering ecosystem. Furthermore, integrated governance mechanisms and compliance protocols ensure operational discipline during periods of high cargo bunching. By actively managing shared terminal assets and access regimes, the node effectively prevents schedule disruptions in long-haul routes from spilling over into regional distribution chains. Ultimately, the findings shift the strategic focus of port evaluation from pure throughput maximization to end-to-end interface reliability, offering a concrete framework for assessing operational resilience in an era of persistent supply chain instability.

Keywords: *logistics systems; maritime trade; port system; hinterland; supply chain management.*
Fig.: *4.* ***Tabl.:*** *3.* ***Bibl.:*** *8.*

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Дзеніс О. О., Шестакова О. А., Піддубна Л. І. Навігація структурною дуальністю в морських портах: торговельні моделі та взаємодія з внутрішніми регіонами порту Антверпен-Брюгге

У сучасних умовах, європейські морські вузли стикаються зі складною структурною дуальністю: підтримання строгого ритму регіональних мереж короткого морського сполучення із одночасною абсорбцією зростаючої нестабільності міжконтинентальних глибоководних коридорів. Щоби зрозуміти, як основні перевалювальні вузли фізично та стратегічно узгоджують такі суперечливі навантаження, дане дослідження концептуалізує торговельні моделі та підґрунтові логістичні структури порту Антверпен-Брюгге, розглядаючи їх у ширшій рамковій структурі Міжнародного управління ланцюгами поставок. Спираючись на оперативну статистику 2024 року, дані Eurostat та макропоказники UNCTAD, дослідження кількісно оцінює профіль портових відправлень та прибуттів. Дослідження також стратегічно порівнює стабільну внутрішньоєвропейську основу (42,5% від загального морського вантажопотоку) із висококонцентрованими глобальними ризиками на ключових міжконтинентальних коридорах, таких як Далекий Схід і Північна Америка. Емпіричні дані свідчать про те, що стійка конкурентоспроможність портів, що слугують перевалювальними вузлами, залежить від системної узгодженості, а не лише від місткості причалів. Зокрема, двоплатформова конфігурація порту та синхронізація мультимодального підхідного регіону виступають у якості надійної буферної екосистеми. Крім того, інтегровані механізми управління та протоколи дотримання норм забезпечують дисципліну операцій під час періодів надмірного скупчення вантажів. Активно керуючи спільними термінальними активами та режимами доступу, перевалювальний вузол ефективно запобігає порушенням магістральних маршрутів регіональних ланцюгів розподілу. У висновку показано, що отримані результати зміщують стратегічний акцент оцінки порту з простої максимізації пропускної спроможності на надійність взаємодії від початку до кінця певного процесу, пропонуючи конкретну основу для оцінки операційної стійкості в епоху постійної нестабільності ланцюгів постачання.

Ключові слова: *логістичні системи; морська торгівля; портова система; підхідний регіон; управління ланцюгами постачання.*
Рис.: *4.* ***Табл.:*** *3.* ***Бібл.:*** *8.*

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European maritime trade is structured around two complementary geographies: high-frequency regional circulation and longer-haul corridors linking Europe with global markets. For ports within the Hamburg-Le Havre range, strategic performance is shaped not merely by local infrastructure, but by their capacity to act as supply chain nodes that synchronise maritime services with hinterland logistics and stabilise end-to-end flows under volatility. In this context, the Port of Antwerp-Bruges serves as a critical empirical setting to examine how distinct trade patterns dictate specific logistics structures, ultimately redefining the strategic positioning of a major European port system.

Analysis of Recent Research and Publications. The theoretical foundation for evaluating modern port nodes is rooted in the paradigm that competition occurs between end-to-end supply chains rather than individual entities, a core principle of international supply chain management [1]. Building upon this macrologistic framework, the contemporary discourse on European port systems has progressively shifted from traditional throughput maximization toward systemic integration and supply chain resilience. Recent scholarship [3] highlights that the competitive locus has moved inland, emphasizing the co-production of reliability across port-hinterland interfaces. Concurrently, industry macro-assessments, including the latest UNCTAD reports [8], underscore the persistent volatility of global shipping driven by geopolitical realignments and rerouting imperatives. This literature collectively frames a transitional phase where gateway ports must function as buffering ecosystems capable of absorbing external shocks while preserving end-to-end flow coherence. Against this conceptual backdrop, the paper operationalises trade-pattern and interface differences using official EU statistics and port authority reporting [2; 4; 7].

Identification of Previously Unresolved Parts of the General Problem. While contemporary port economics acknowledges the necessity of supply chain integration, the prevailing analytical dichotomy often isolates intercontinental deep-sea volatility from intra-European short-sea circulation, treating them as distinct operational domains. Consequently, the literature lacks comprehensive empirical investigations into how hybrid port nodes physically and strategically reconcile these divergent trade contours within the same logistics structures. Specifically, it remains theoretically underserved how shared terminal assets, multimodal hinterland interfaces, and administrative regimes absorb the conflicting pressures of erratic global arrivals alongside the strict cadence required for regional feedering. Deciphering the mechanisms that contain spillover risks between these overlapping networks is fundamental for advancing the conceptualization of gateway resilience.

The Aim of the Article. The ***aim*** of this article is to investigate the basic patterns of maritime trade relevant to the Port of Antwerp-Bruges, covering both the Intra-European contour and Europe with the rest of the world, and to interpret the associated logistics structures that enable these patterns in an International Supply Chain Management and Logistics frame. The ultimate value of this research is to demonstrate how major port nodes can maintain strategic resilience, stabilise supply chains, and prevent global disruptions from spilling over into regional networks. To achieve

this aim, the analysis sequentially establishes the port's origin-destination profile to quantify the relative weight of European and non-European trade in 2024. It then compares the two contours by trade area, including concentration and directionality. Following this, the study identifies the associated logistics structures most directly linked to the observed patterns, including platform configuration, cargo and terminal profile, maritime connectivity, hinterland modal interface, and governance/compliance arrangements. Finally, the findings are synthesised into strategic implications for the port node, with particular attention to interface reliability and spill-over risks across shared assets.

Methodology of Research. The methodological basis of this study integrates a systemic approach with methods of comparative and statistical analysis. Specifically, comparative analysis is applied to contrast the intra-European and intercontinental trade contours, while a systemic approach is used to conceptualise the port and its hinterland connections as an integrated logistics node. Empirically, the article relies on three complementary evidence layers. European-level context is taken from Eurostat's Statistics Explained dataset on maritime transport of goods to position Antwerp-Bruges within the broader European trade structure and to frame the intra-European versus extra-European split. Port-level trade patterns and associated operational indicators are derived from the Port of Antwerp-Bruges' official Facts & Figures 2025 (annual figures 2024) and the Yearbook of Statistics 2024, which are used to quantify origin-destination profiles, trade-area distribution, container geography, connectivity, and hinterland interfaces. Finally, to situate the findings within the current operating environment, the UNCTAD Review of Maritime Transport 2025 overview is used to characterise volatility and rerouting effects relevant to gateway resilience.

Results and discussion. A century ago, Antwerp was already known as a safe and well-sheltered gateway on the North Sea range. Currently, Port of Antwerp-Bruges, formed by the merger of the ports of Antwerp and Zeebrugge in 2022, is positioned among Europe's leading trading ports with 277.7 million tonnes of maritime freight handled in 2024 (*Fig. 1*). The second most important trading port in Europe and 14th in the ranking of most important ports that handle containers worldwide.

Eurostat [2] lists Rotterdam, Antwerp-Bruges and Hamburg, all located on the North Sea coast, as the top three European ports both in terms of gross weight of goods handled and volume of containers handled in the ports, confirming Antwerp-Bruges' strategic role in intra-European supply chains. The port's geography explains this role. The Antwerp platform is located about 80 kilometres inland, enabling deep access into continental markets, while the Zeebrugge platform complements this with direct coastal accessibility. A 2025 study commissioned by Port of Antwerp-Bruges and Port of Rotterdam notes that 60% of Europe's purchasing power lies within 500 kilometres of both ports, implying that over 500 million consumers can be reached within 24 hours via multimodal networks [4].

With more than 300 liner services and over 800 destinations, Antwerp-Bruges reports a dense schedule network that supports both intra-European circulation (short sea, feedering, RoRo where relevant) and intercontinental gateway functions. This service density is a core enabler of reliability and flexibility in ISCM terms, because it increases routing options, sailing frequency and resilience against disruptions.

For the strategic analysis of Port of Antwerp-Bruges in an International Supply Chain Management and Logistics frame, the most informative starting point is the port's origin-destination profile. It shows where demand is generated, whether flows are balanced, and where pressure is most likely to build up across terminals and hinterland interfaces. At the level of the European Union, Eurostat reports that maritime transport

Port	Tonnes
Rotterdam	435,700,000
Port of Antwerp-Bruges	**277,745,708**
Hamburg	111,803,000
Haropa	82,862,000
Amsterdam	77 549 210
North Sea Port	66,163,000
Bremen	61,933,000
Dunkirk	45 909 000
Wilhelmshaven	33,500,000

As an essential link in the global supply chains, Port of Antwerp-Bruges has developed into a leading European port with significant cargo-generating capacity.

Fig. 1. Maritime freight volume Hamburg-Le Havre range

Source: [4, p. 13].

remains predominantly connected to partners outside the European Union: in 2024, 68.4% of seaborne goods transported to or from the main ports was extra-European Union, while international intra-European Union transport accounted for 21.2% (with national maritime transport at 8.5%) [2]. This macro-pattern matters for Antwerp-Bruges because it frames the port's strategic task as managing both high-frequency regional circulation and intercontinental volatility that originates in global corridors.

In this context, the port's own figures confirm that the Intra-European contour represents a substantial and relatively stable throughput base. In 2024, Europe accounted for 60.5 million tonnes of unloading and 57.7 million tonnes of loading, indicating broadly two-way European flows rather than a strongly one-sided import or export pattern. Europe-linked maritime freight amounted to 118,169,452 tonnes, equal to 42.5% of the total maritime freight volume of 277,745,708 tonnes [4].

To consolidate the comparison between the Intra-European contour and Europe with the rest of the world, the distribution of maritime freight by trade area is summarised in *Fig. 2*, which visualises the relative weight of Europe and the major non-European regions within the port's total maritime freight volume in 2024.

in 2024, full-container traffic linked to Europe totalled 3,509,189 TEU, with loaded volumes (2,087,417 TEU) exceeding discharged volumes (1,421,772 TEU) [7].

This pattern is consistent with a port role that includes consolidation and distribution within European supply chains. Strategically, it increases the value of predictable cut-offs, stable terminal performance, and dependable hinterland connections, because service reliability is created across the end-to-end interface rather than at the quay alone.

At the same time, Antwerp-Bruges is even more exposed to Europe with the rest of the world in tonnage terms. Non-European origin-destination flows reached 159,576,256 tonnes, i.e., 57.5% of 2024 maritime freight. The largest blocks were Indian subcontinent and Far East (43,747,348 tonnes; 15.8%) and North and Central America (41,712,134 tonnes; 15.0%), followed by the Middle East (30,090,800 tonnes; 10.8%) and Africa (29,081,795 tonnes; 10.5%). Directionality differs across corridors: loading exceeds unloading for Africa and the Middle East, while the reverse holds for North and Central America and Indian subcontinent and Far East (*Tbl. 2*). For strategic analysis, these asymmetries matter because they translate into different operational stresses, ranging from storage and inland evacuation needs in import-heavy corridors to equipment positioning and export cut-off discipline in export-leaning corridors [4; 7].

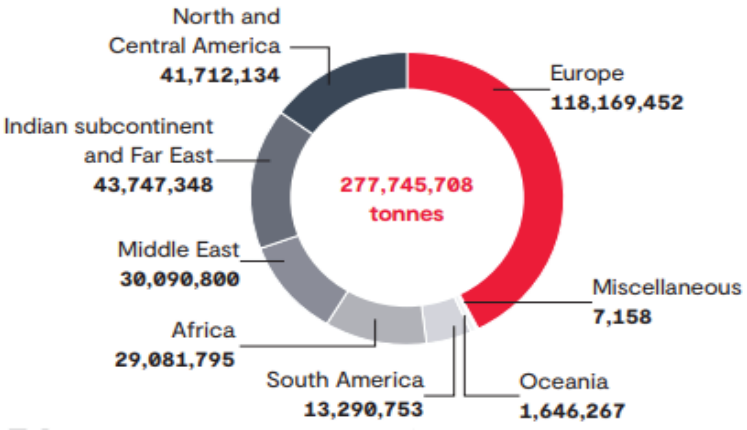

Fig. 2. Maritime freight volume in Antwerp and Zeebrugge by trade area, 2024 (tonnes)

Source: [4, p. 7].

From a strategic perspective, this share is large enough to treat Intra-European trade not as a peripheral add-on but as a backbone shaping berth and yard allocation, capacity planning, and the reliability of the port-hinterland interface, because these flows compete for the same operational resources as long-haul traffic (*Tbl. 1*) [4; 7].

A container-specific perspective strengthens this interpretation. The Yearbook of statistics reports that

Finally, the strategic salience of Europe with the rest of the world is amplified by the global operating environment. UNCTAD characterises current maritime transport conditions as volatile and influenced by rerouting, with a more subdued outlook for 2025 [8]. For a port whose throughput is more than half connected to non-European regions, this context raises the premium on service redundancy, diversified trade-area exposure, and robust terminal-hinterland

Table 1

Intra-European trade patterns relevant for Antwerp-Bruges (2024)

Analytical dimension	Key indicator	2024 value	Strategic reading
Scale within the port's trade profile	Europe-linked maritime freight (unloading + loading)	118,169,452 tonnes (42.5% of total maritime freight)	The Intra-European contour is structurally material in tonnage terms; it must be treated as a core demand base in strategic positioning, not as a marginal segment
Directionality and balance (tonnage)	Europe unloading vs Europe loading	60.5 vs 57.7 million tonnes	European flows are broadly two-way and near-balanced, suggesting a stable regional trading base with only a slight import tilt in tonnage
Container geography of the Intra-European contour (full containers)	Europe full containers (discharged / loaded / total)	1,421,772 / 2,087,417 / 3,509,189 TEU	The full-container pattern for Europe is export-leaning (loaded > discharged), consistent with a role as a European distribution and consolidation node in containerised supply chains

Table 2

Europe with the rest of the world trade patterns relevant for Antwerp-Bruges (2024)

Analytical dimension	Key indicator	2024 value	Strategic reading
Scale within the port's trade profile	Non-European total (all regions outside Europe)	159,576,256 tonnes (57.5% of total maritime freight)	Europe with the rest of the world accounts for the larger share of tonnage; it is the dominant contour shaping the port's global exposure
Concentration by trade area (tonnage)	Top 2 non-European trade areas combined (Indian subcontinent and Far East + North and Central America)	85,459,482 tonnes (53.6% of non-European total)	A high concentration in two trade areas implies corridor dependence; strategic risk and performance sensitivity are disproportionately linked to these corridors
	Top 4 non-European trade areas combined (Top 2 + Middle East + Africa)	144,632,077 tonnes (90.6% of non-European total)	The non-European pattern is strongly clustered; diversification by tonnage is limited, which increases the strategic value of resilience planning around the top four areas
Directionality by trade area (tonnage)	Indian subcontinent and Far East (unloading / loading)	24.0 / 19.8 million tonnes (net –4.2)	Import-leaning tonnage profile, indicating that inbound flows dominate for this corridor
	North and Central America (unloading / loading)	22.8 / 18.9 million tonnes (net –3.9)	Import-leaning tonnage profile, again suggesting inbound-dominant corridor dynamics
	Middle East (unloading / loading)	14.3 / 15.8 million tonnes (net +1.5)	Export-leaning tonnage profile, indicating outbound-dominant corridor dynamics
	Africa (unloading / loading)	10.3 / 18.8 million tonnes (net +8.5)	Strongly export-leaning tonnage profile, signalling a pronounced outbound orientation in this trade area

synchronisation to absorb schedule variability and demand shocks.

The trade patterns described above rest on a set of associated logistics structures that shape service reliability, flexibility and resilience at the port node. These structures are best analysed as one integrated port system serving both the Intra-European contour and Europe with the rest of the world, because most assets and interfaces are shared. Where a functional distinction is meaningful, it is made explicitly: high-frequency regional circulation is primarily enabled through short-sea shipping and feeder services, whereas intercontinental trade relies more strongly on deep-sea liner connectivity and the capacity to absorb larger call sizes and greater schedule variability within the same terminal and hinterland interfaces [4; 8].

A defining feature is the "one port, two platforms" configuration: the inland Antwerp platform and the coastal Zeebrugge platform operate under one authority yet provide distinct access profiles and operating options. Strategically, this dual set-up broadens the port's room to manoeuvre across different route logics and cargo requirements, rather than forcing all flows through a single physical gateway.

The second structural pillar is the terminal and commodity portfolio. The 2024 maritime freight composition is led by containers and liquid bulk, with additional significant volumes in rolling stock, dry bulk and breakbulk (*Fig. 3*). This profile signals that Antwerp-Bruges functions through multiple specialised handling environments and planning regimes operating in parallel; in strategic terms, performance depends on the coherence of these subsystems rather than on a single dominant cargo segment.

Network connectivity provides the third pillar, and it is the point where a clear distinction between the two contours becomes analytically useful. On the Intra-European side, short-sea shipping and feeder services sustain dense, high-frequency maritime links around Europe and adjacent sea basins. Antwerp-Bruges reports more than 200 weekly short-sea and feeder services and short-sea connections to 598 ports; the short-sea footprint amounts to 137.6 million tonnes (49.6% of total maritime cargo throughput) and 5.9 million TEU (43.8% of container throughput). The port also reports 6 dedicated short-sea terminals offering a wide range of short-sea services. Taken together, these indicators confirm that short-sea connectivity is a structural component of the port's network model rather than a peripheral segment [4, p. 34].

For Europe with the rest of the world, the complementary network structure is intercontinental liner connectivity. Compared with regional circulation, intercontinental networks typically combine larger exchanges with lower call frequency and higher schedule variability. In strategic terms, the relevant associated structure is therefore the stability of interfaces: the port's ability to keep terminal processes and inland evacuation predictable when long-haul arrivals bunch or when upstream delays propagate through schedules. This emphasis is consistent with UNCTAD's assessment of volatility and disruption effects shaping recent maritime transport conditions, which increases the value of resilience at gateway nodes [8].

Finally, hinterland connectivity converts maritime flows into continental distribution and industrial supply. The port's hinterland modal split (including industry) shows a strong role for inland navigation, followed by road transport, pipelines and rail (*Fig. 4*). This pattern underlines that the port's effective market reach is co-produced with inland corridors: it supports competitive access to inland markets, while making the overall system's resilience partly dependent on performance beyond the quay wall.

In an International Supply Chain Management and Logistics perspective, associated logistics struc-

Fig. 3. Structure of maritime freight volume by cargo type at Port of Antwerp-Bruges, 2024 (tonnes)

Source: [4, p. 13].

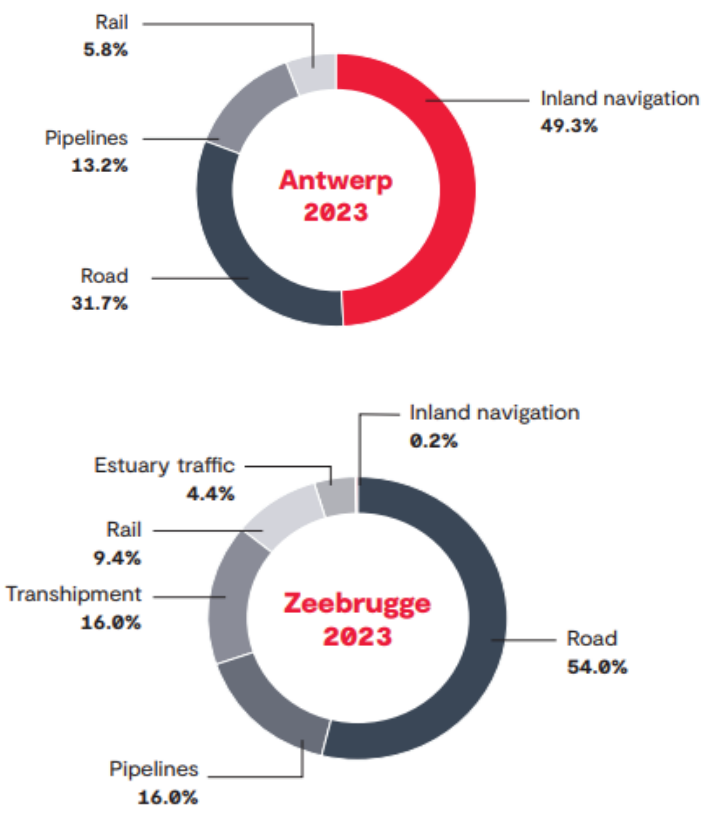

Fig. 4. Hinterland modal split of Port of Antwerp-Bruges (shares, 2023)

Source: [4, p. 30].

tures also include governance and compliance mechanisms that keep throughput feasible under security and regulatory constraints. Port of Antwerp-Bruges states that port operations are framed by local port regulations and bylaws overseen by the Harbour Master's Office, and it also confirms that it falls under the International Ship and Port Facility Security Code and operates with an approved security plan. These arrangements shape access regimes, movement rules and operational discipline, supporting predictability in a high-value environment and becoming more salient when wider shipping conditions are volatile [5–7].

Within the scope of this article, associated logistics structures are examined through maritime network connectivity, cargo and terminal configuration, and the port-hinterland interface as the elements most directly linked to the observed trade patterns. Detailed technical parameters of nautical access and compliance arrangements (for example, draught constraints, pilotage regimes, and customs or security procedures) are not discussed, as they require dedicated primary documentation and exceed the analytical focus of this section.

Taken together, the trade patterns and associated structures indicate that the strategic task for Port of Antwerp-Bruges is to manage two logics within one shared system: stable international circulation in the Intra-European contour and more volatile corridor exposure in Europe with the rest of the world. The port does not gain robustness by prioritising one contour at the expense of the other; it gains it by preventing disruption in one contour from spilling into the other through the same terminals and hinterland interfaces. This interpretation is consistent with the International Supply Chain Management view that service outcomes are produced across end-to-end interfaces and that ports should be assessed by how well they support flow coherence beyond the port perimeter, as embedded nodes in wider networks [1; 3].

For the Intra-European contour, the main implication is to treat short-sea and feeder connectivity as a protected service backbone. Because regional flows compete with intercontinental flows for the same quayside, yard space and inland capacity, reliability has to be engineered into everyday planning rather than restored after disruption. Strategically, this points to safeguarding cadence: stable sailing frequency, predictable cut-offs, and consistent port-hinterland synchronisation that preserves routing choice for European circulation even when intercontinental schedules become irregular [4].

For Europe with the rest of the world, corridor concentration and higher schedule variability imply

that resilience depends on the ability to absorb uneven arrivals without converting variability into congestion at the node. The strategic stance is therefore oriented less to maximising throughput and more to maintaining controllability: adequate buffers, rapid inland evacuation options, and operational discipline that limits delay propagation from maritime arrivals into landside queues and dwell time accumulation [6]. This emphasis is aligned with UNCTAD's framing of a volatile operating environment in maritime transport and the persistence of disruption effects.

Synthesised as a competitiveness statement, Antwerp-Bruges performs as a hybrid node that creates value when gateway functions and regional circulation can coexist without mutual disruption. Competitive advantage emerges not from the absolute dominance of either contour, but from interface quality: the capability to stabilise flows through coherent terminal routines, multimodal inland optionality, and disciplined access regimes. Within this logic, two strengths stand out: the dual-platform configuration, which widens operating options, and the structurally strong hinterland interface, which supports inland reach and provides multiple pathways for evacuation and distribution [3; 4].

At the same time, the analysis highlights two vulnerabilities. First, concentration within a limited set of non-European corridors increases sensitivity to corridor-specific shocks, which can disproportionately affect performance. Second, systemic coupling across shared assets means that deep disruptions in intercontinental schedules can erode regional cadence unless buffers and coordination mechanisms are sufficient. In strategic terms, the decisive criterion for judging future performance is whether the operating model can protect European circulation reliability during periods of global volatility while keeping intercontinental arrivals controllable at the node [4; 6].

Finally, governance and compliance are treated as part of productive capability rather than as external constraints. Local port regulations and bylaws overseen by the Harbour Master's Office, and security arrangements under the International Ship and Port Facility Security Code implemented through an approved security plan, structure access control and operating discipline. In a high-value environment, these mechanisms support predictability and reduce the probability that external volatility translates into uncontrolled disruption within the port area [7; 8].

The matrix in *Tbl. 3* consolidates the author's reading of the article's findings by linking the two trade contours with the enabling port system structures and their strategic meaning for the port–hinterland system. It highlights that Antwerp-Bruges' positioning is best interpreted through interface reliability and spill-over containment across shared assets, rather than through isolated within-port metrics. In this sense, the table functions as a structured bridge from empirical observations to the strategic conclusions drawn for the port node.

CONCLUSIONS

This article examined the maritime trade patterns relevant to Port of Antwerp-Bruges across the Intra-European contour and Europe with the rest of the world, and interpreted how these patterns translate into associated logistics structures that matter for strategic port analysis. The analysis established the port's 2024 origin-destination profile and used it to clarify the relative weight of European and non-European flows, showing that both contours are strategically material within one operating system. A trade-area comparison then demonstrated that non-European exposure is concentrated across a limited set of corridors and that corridor directionality differs, implying distinct operational pressures and sensitivity to disruption.

Against this background, the associated logistics structures were interpreted as an integrated port system serving both contours: a dual-platform configuration, a multi-cargo terminal and commodity portfolio, dense regional connectivity through short-sea and feeder services, complementary intercontinental liner connectivity, and a port-hinterland interface shaped by multimodal inland links. The synthesis indicates that the port's positioning is best understood through interface reliability and the ability to contain spill-overs across shared assets, rather than through isolated within-port characteristics. To make this logic transparent and compact, Tbl. 3 was formulated as an authorial framework that consolidates the article's evidence into a structured strategic reading of the port-hinterland system. ■

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Table 3

Author's framework for consolidating trade patterns and logistics structures into strategic meaning at Antwerp-Bruges

No.	Analytical focus	Evidence anchor in the article	Analytical reading	Strategic meaning for Antwerp-Bruges
1	Two trade contours within one node	Origin-destination profile; Europe vs non-Europe split visualised	The port simultaneously serves a stable European circulation base and a larger non-European exposure; both are processed through shared terminals and inland interfaces	Strategy is defined by managing coexistence and preventing spill-overs across shared capacity and interfaces
2	Non-European concentration and sensitivity	Non-European flows clustered in a small set of trade areas; volatility context	Exposure is corridor-driven; performance sensitivity is concentrated rather than evenly diversified	Resilience planning should be corridor-aware (buffers, controllability, prioritisation rules under bunching)
3	European circulation as service backbone	Europe-linked tonnage and European container pattern; short-sea and feeder intensity indicators	Regional circulation is not peripheral; it is a dependable throughput base that competes for the same resources as long-haul flows	Protect cadence and predictability of European services (regularity of handovers, stable planning discipline)
4	Enabling port system structures	Dual-platform configuration; multi-cargo handling profile; network connectivity logic	The port operates as a portfolio system (multiple cargo regimes, multiple route logics) rather than a single-cargo gateway	Competitiveness is expressed through system coherence: interfaces that remain predictable while handling heterogeneous flows
5	Port-hinterland co-production	Modal split including industry (inland navigation, road, pipelines, rail)	Market reach and reliability are co-produced with inland corridors; inland performance shapes the port's service promise	Hinterland synchronisation and multimodal optionality are strategic capabilities, not "external conditions"
6	Governance and security as operational capability	Local regulations/ bylaws; ISPS security plan	Access regimes and operating discipline are part of throughput feasibility in a high-value environment	Governance mechanisms support predictability and integrity; they reduce the probability of uncontrolled disruption within the port area

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ЗЕЛЕНІ ОБЛІГАЦІЇ ТА ІНШІ ІНСТРУМЕНТИ СТАЛОГО РОЗВИТКУ В ЄС: ПРАКТИКА ЗАСТОСУВАННЯ ТА ПЕРСПЕКТИВИ ДЛЯ ПІСЛЯВОЄННОГО ВІДНОВЛЕННЯ УКРАЇНИ

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Шубенко І. А., Куровська Н. О. Зелені облігації та інші інструменти сталого розвитку в ЄС: практика застосування та перспективи для післявоєнного відновлення України

Посилення кліматичних викликів та необхідність переходу до низьковуглецевої економіки зумовлюють зростання ролі інструментів зеленого фінансування. У країнах Європейського Союзу сформовано розвинену систему сталих фінансів, у якій важливе місце займають зелені облігації та інші фінансові механізми підтримки екологічно орієнтованих інвестицій. Для України, особливо в умовах післявоєнного відновлення, актуальним є вивчення європейського досвіду використання таких інструментів. Мета дослідження полягає в дослідженні основних інструментів зеленого фінансування в Європейському Союзі, зокрема зелених облігацій, та обґрунтуванні перспектив їх використання у процесі післявоєнного відновлення України. Під час дослідження використано загальнонаукові та спеціальні методи: аналіз і синтез – для узагальнення теоретичних підходів до зеленого фінансування; порівняльний аналіз – для зіставлення практики застосування інструментів сталого фінансування у країнах ЄС і в Україні; економіко-статистичний метод – для аналізу динаміки випуску зелених облігацій у ЄС; метод систематизації та узагальнення – для класифікації інструментів зеленого фінансування. У статті досліджено основні інструменти сталого фінансування, серед яких: зелені кредити, екологічні податки, зелене страхування, зелений лізинг та зелені облігації. Проаналізовано динаміку розвитку ринку зелених облігацій у країнах ЄС, визначено роль регуляторної бази, зокрема Таксономії ЄС та Європейського стандарту зелених облігацій. Обґрунтовано значення цих інструментів для мобілізації інвестицій у проєкти з енергоефективності, відновлюваної енергетики та екологічної модернізації економіки. Встановлено, що інструменти зеленого фінансування є важливим механізмом забезпечення сталого економічного розвитку та можуть стати ефективним джерелом фінансування післявоєнної відбудови України. Імплементація європейських стандартів і розвиток національного ринку зелених фінансових інструментів сприятимуть залученню інвестицій та інтеграції України в європейський фінансовий простір.

Ключові слова: *зелене фінансування; зелені облігації; зелене страхування; зелений лізинг; сталий розвиток; післявоєнне відновлення України; фінансові інструменти.*

Рис.: *2.* ***Табл.:*** *1.* ***Бібл.:*** *21.*

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