



Libera Università degli Studi Sociali Guido Carli
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**Cost–Benefit Analysis of Large-Scale Port Infrastructure:
The Case of the New Breakwater of the Port of Genoa**

Thesis Supervisor
Gabriele Galli

Student
Marcello Brancati
ID: 304621

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1. Introduction

The argument I decided to talk during my thesis is: “Infrastructure Investment as Competitive Strategy: The Economic Impact of the New Breakwater on the Port of Genoa”.

Maritime transport represents the backbone of global trade, accounting for approximately 80– 90% of the volume of internationally traded goods. An international merchant fleet of around 100,000 vessels ensures the continuous supply of raw materials, food, energy resources, and manufactured products across continents. [Significance of maritime shipping for global trade] The functioning of the global economy is therefore deeply dependent on the efficiency and reliability of maritime shipping.

In recent decades, the shipping industry has undergone significant structural transformation. The increasing size of container vessels and the pursuit of economies of scale have reshaped competitive dynamics within the sector. As vessels become larger and more technologically advanced, ports must adapt their infrastructure to accommodate these developments. Port capacity, accessibility, and operational efficiency have become critical determinants of competitiveness in the global logistics network.

Particularly relevant to this thesis is the strategic importance of maritime routes within the Mediterranean Sea. The Mediterranean represents a key corridor connecting Asia, Africa, and Europe, making its ports central nodes in global trade flows. In this context, infrastructure is no longer merely a physical asset but a strategic competitive factor. The growing involvement of major shipping companies, such as MSC, in acquiring stakes in Italian port infrastructure reflects the recognition of ports as long-term strategic assets capable of influencing competitive positioning within the industry.

During the thesis we will analyze the economic impact of the New Breakwater on the Port of Genoa.

1.1 Background Motivation

Genoa is the city where I came from and after realizing the importance of this new infrastructure, I was really interested in understanding what this infrastructure could take to my city, the economic and social benefits, but also understanding if there will be any environmental disadvantage for the city.

I decided to talk about this argument because and infrastructure isn't only building it, it also understanding the risks, organizing team, how to better use it and don't miss chances to develop it

and using it in the best way possible. Also meet investors, find new sponsors, capacity, access, service quality and more other strategic stuff.

1.2 Methodological Approach

The main reference for this thesis is the “ACB Diga Foranea Genova”, which provides the official dataset and the full cost–benefit calculations developed during the planning of the project, involving the main public institutions and stakeholders (including the local administration and the Ministry of Infrastructure and Transport). However, this source alone may not be sufficient, since the ACB was published on 21 April 2021 and, in the following years, the global economic and logistics environment has changed significantly (post-COVID adjustments, geopolitical tensions, and major supply-chain disruptions). For this reason, I will update the empirical context using recent official traffic evidence, particularly the Ports of Genoa (2025) traffic report, with a focus on container volumes (TEU), the composition of flows (hinterland vs transshipment), and rail traffic performance.

The research questions are addressed by combining these written sources with additional qualitative information collected through documents and interviews gathered over the past months. Insights come from professional experience during my internship at the Ministry of Infrastructure and Transport, as well as from meetings held with RINA and with the “Struttura Commissariale”, which supported the interpretation of the project framework and the main implementation assumptions.

The main reason for building the new Breakwater is really easy: shipping industry needs big ports, Genoa port was built last century and new shipping boats are too big for the infrastructure, so shipping company needs to move to new and bigger ports, around Europe like the newest ports in the North of Europe, Such a scenario would significantly weaken Genoa’s competitive position, the port has the best geographical position in the Mediterranean Sea and as we will see, it has a great time and money competition rather to other Ports in Europe because is shorter for roots coming from Asia and South America, helping shipping company to save not only time, but a lot of money. Shipping companies look at these cheaper and faster roots to decrease cost and increase revenues. Genoa is also located in the Italian triangle (Genoa- Milan- Turin) so the Hinterland connectivity represents a strategic advantage for the port.”.

Today shipping company have a high bargaining power, making ports like Genoa losing competitive to other ports that have larger infrastructures, Shipping alliances pursue economies of scale to reduce unit costs and increase operational efficiency, (reducing the cost, increasing the revenues)

1.3 Research Question

During the writing of the thesis, I will follow the question: “Is the new Breakwater necessary for the economy of the city? What will be the externalities for the local community? What impact will have on the future generations?”

1.4 Structure of the thesis

The thesis will follow mainly the “ACB Diga Foranea Genova”, and it will be implemented with other official Documents given me during my meetings in Genoa from different agencies Like “Spediporto”, where they gave me a last update of the few years.

2. Literature review

2.1 Cost–Benefit Analysis in Public Investment Decisions

The main purpose of the ACB is to measure the cost and benefit of the infrastructure for the port and the city, the whole document follows European Guidelines and insert the requirements born after the public debates during the organization of the Project.

The port Authority decided to have big and deep public discussion about economic, social and environmental reasons for the importance of the project; they also released a document with the option “Do Nothing” that shows that this would lead to significant negative impact for the economy of the port, because it would get progressively unfit for the new exigency for the commercial transport, especially for the transport from Asia that are the one with highest expect economic growth that use boats with the biggest dimensions.

The main objective of the infrastructure is to modify the actual Breakwater, adding a new part making it possible for bigger boats to enter in the port making possible to use most of the port and increase the actual efficiency, other than that, it will also improve the operational methods making it safer for the port’s operators.

Italian public administrations are required to carry out an ex-ante evaluation of major public investments, as established by Law 196/2009 and subsequent implementing legislation and ministerial guidelines for infrastructure appraisal.

In this context, the Cost–Benefit Analysis (CBA/ACB) report for the New Breakwater of the Port of Genoa is prepared in line with EU and national methodological guidelines, which aim to ensure comparability of results across projects and require transparent assumptions, data, and calculation methods.

The report’s objective is to quantify the social costs and benefits of the selected infrastructure option for the port system and the wider community, and it explicitly incorporates the inputs and requirements that emerged during the public debate conducted on the project.

In line with standard CBA practice, the analysis is built around a comparison between the project scenario and a counterfactual “do-nothing” baseline. The report argues that, without the investment, the port would become progressively unable to meet evolving requirements of international maritime transport—particularly container traffic on Europe–Asia routes, which increasingly relies on larger vessels—with negative consequences for the port’s attractiveness and performance over time.

Finally, in addition to monetary estimates, the report develops a CO₂ balance expressed in physical terms, accounting—where possible—for emissions during both the construction phase and the operational phase of the breakwater.

2.2 Financial vs Economic analysis

The financial analysis was made by the Port Authority ‘Sistema Portuale del Mar ligure Occidentale’, they are part of the government administration and not as an individual business, so their aim is to control the access to the port, regulated by Italian laws and they act as a natural monopoly, as it is a port.

So, the financial analysis as the goal to show the amount of money that will be managed by the AdSP, so will make it possible to enable an assessment of the amount of equity contributions required to implement the project.

On the base of the organization of the project, we can estimate the total amount of money required for the Water brake during time, the project will be divided in two phases, A and B; in a phase of time started in 2021 with the prevision ending in 2028, with expenses as reported in the following table:

Spesa per investimento	Totale	2021	2022	2023	2024	2025	2026	2027	2028	2029
Spesa complessiva Fase A	950,0	110,0	190,0	220,0	240,0	100,0	90,0	-	-	-
Spesa complessiva Fase B	330,0	-	-	-	-	-	-	195,0	135,0	-
Impianto di energia eolica	4,0	-	-	-	-	-	2,4	-	-	1,6
Spesa totale per investimento	1.284,4	110,0	190,0	220,0	240,0	100,0	92,4	195,0	135,0	1,6

Dati in milioni di euro

(ACB report,2021)

2.3 “Do nothing”

Cost–Benefit Analysis (CBA) evaluates a project by comparing the “with-project” scenario to a counterfactual “without-project” scenario. In this case, the counterfactual is defined as the “do-nothing” scenario. This term does not imply a complete absence of investment, but rather the continuation of already planned or ongoing projects without the implementation of the new breakwater.

At present, no alternative infrastructure projects have been identified that could substitute for the role of the breakwater. Therefore, the “do-nothing” scenario represents a situation in which the port of Genoa does not undergo any significant structural upgrade in its maritime accessibility.

However, it is important to note that some complementary investments are already underway, such as the “Terzo Valico dei Giovi” railway project. This project aims to strengthen the hinterland connectivity of the port and improve its competitiveness within the European logistics network. At the time the original Cost–Benefit Analysis was conducted; the completion of this railway infrastructure was expected by the end of 2023. To date, the project has experienced delays, and its final completion timeline remains uncertain.

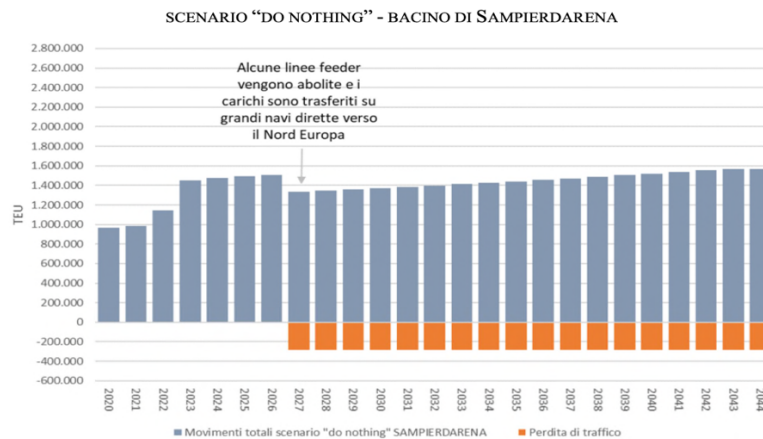
Despite these delays, the railway upgrade is expected to significantly enhance freight transport efficiency by enabling the circulation of trains exceeding 2,000 tons. This would allow for a reduction in unit transport costs and transit times, thereby improving the overall efficiency and competitiveness of the Genoa port system. This project will also improve the mobility inside the city, helping the full use of the infrastructure already available.

The “do nothing” scenario want to highlight what could be the natural evolution of the traffic’s demand for the Sampierdarena’s port, without the investment and without the break water.

The main conclusion is a decrease in attractivity for the port rather to other in Europe, with a reduction in the expected demand in the following years. All of this is highly related to the impossibility to host ships with dimension higher then 14.000 TEU.

One of the main findings is that the whole research of the ACB is based on the container traffic, ma it doesn’t exclude the direct effect on other sectors for the port that could have other benefits for the city.

All the previsions for the “do nothing” case were calculated using Drewry’s forecast the paper “Global Container Terminal Operators, Annual Review and Forecast, Annual Report 2019”. In the paper is reported that growth rate for the container sector in the Occidental Mediterranean Sea is 2,8% per year until 2023; we can apply this data as the Ligurian’s port rate has increased by 2.05% between 2000 and 2020.

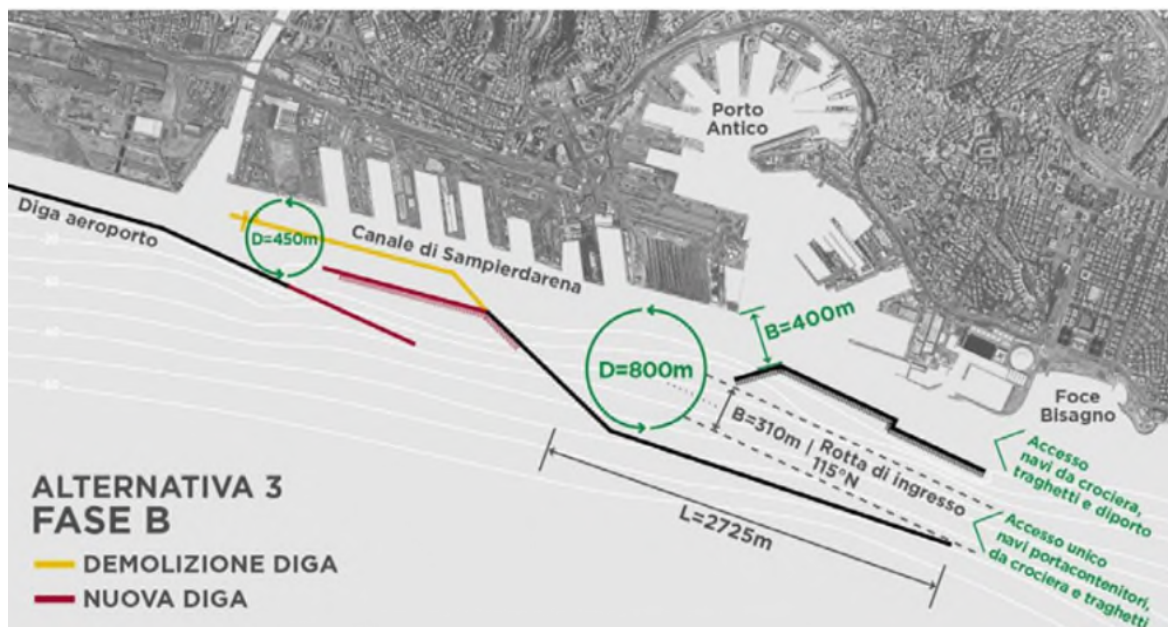


(ACB report, 2021)

2.4 Benefit Identification

The various internal and external cost has already been explained in the past sectors, will all the data and tables that reported the cost for the next 5 to 10 years for both part A and part B for projects beyond the breakwater, but for the wind turbines too. Now we will talk about the benefit cost that the breakwater will bring to the port, creating externalities for the city and for the daily worker in a place where a single mistake could create enormous cost and problems for the city, for the people and the companies working in Genoa.

The first main benefit is the cost decrease for the port security. This will be the most visible one and it will be seen immediately. This will be possible to an increase of the maneuverability space. As we can see from the picture below, the new breakwater will have a bigger turning basis, that will increase from 550 meters as shown in in the first picture, to an 800 in the second picture. This makes ships movement easier and safer at the same time, making able at the same time to host bigger ships inside the port. The breakwater will also divide the traffic from commercial vessels and passenger traffic, shorten backward movements inside the port and allowing smoother tug operations. In the ACB report is also studied that these changes will reduce operational risk, delays, inefficiencies and it monetizes this safety improvement as a relevant economic benefit for the whole port system.



(ACB report, 2021)

The second main benefit is producer and consumer benefits. As said many times before the new breakwater will make possible to host the biggest ships coming from all around the world, so this could mean an increase in the ships market if some internal infrastructure inside the port will be updated. Most of this ships are the one that right now completely skip Genoa and go directly in the North of Europe; if these instead are able to stop in the Mediterranean Sea, They will be able to save in transportation cost and around 8 days of navigation trough the European continent, so more efficient and shorter routes. Connected to this benefit there will be saving in rail transport too, because part of the cargo can reach final destinations through shorter inland routes, while road transport costs increase slightly, since a small share of freight shifts from rail to truck in the project scenario. Another major benefit is the reduction in cargo immobilization time, because goods spend less time traveling

and waiting in transshipment. The document stresses that these efficiency gains benefit not only shipping companies, but also producers and consumers through lower overall logistics costs.

Third and last benefit are externalities, in the report are also included social and environmental environments created by the changes that will be developed once all the project will be finished. Positive externalities about the project are reduces air pollution, climate-changing emissions, and other external costs because it shortens maritime routes, replaces feeder services with direct services, and reduces some rail distances.

The paper also evaluates impacts on accidents, noise, and congestion; Here though the result is mixed, because it will reduce the railway external cost, but at the same time it will increase some variable external cost. Overall, the externalities will be positive for the environment and for the society helping the economy not only for the city but also for shipment companies and other companies that will be able to increase their market share and their market opportunity.

However, in the paper are explained some negative externalities during the construction phase, such as emissions and transport impacts linked to moving materials, but these do not outweigh the long-term benefits.

Overall, the CBA shows that the main economic rationale of the new breakwater lies in safer navigation, lower logistics costs for operators and users, and positive net externalities, especially in terms of environmental and climate impacts.

2.5 Uncertainty, sensitivity & scenarios

An important part for the determination of the result is the residual value of the investment, looking at the last value in the report (that is still high as we are considering 50 years of expected value). However, there is no need to use that date, we can consider the NPV that is extremely positive, close to 645.358.864 euros and a financial rate of return that is 7.9%. All these data confirm that the project will bring benefits in the short-medium term, so in less of the 25 years considered, that were 19 when the ACB was published in 2019.

- **Scenario only phase A:**

If only the phase A will happen, the overall benefit shouldn't really decrease from the current analysis, in this case it will be expected to only attract the routes coming from Asia that will be allocated to Calata Bettollo. With the phase B other Port quays will be adequate to host bigger ships but will be necessary other investment for their suitability.

- **Effects of the Reduction in Rail Modal Share in Genoa:**

One of the most important factors of the project is based on the possibility of moving goods transport from and for Genoa's port. As this is one of the weaknesses of the region Liguria caused by the difficult geographical location, it was considered efficient to simulate the effects of a transaction between railway and street on. A model based 40% railway and 60% street. The following table shows the result with the results that there will be with both the maximum capacity of the railway (60%) and with the minimum (10%). In any case the project will be extremely positive, but not the environmental one if the capacity of the railway is low, this gives another point in favor of the realization of the project.

Confronto risultati con e diverse quote di inoltro ferroviario	40% (base)	10%	60%
INVESTIMENTO E COSTI DI GESTIONE	-973.213.960	-973.213.960	-973.213.960
VALORE RESIDUO	1.258.618.732	1.093.973.339	1.368.382.326
SICUREZZA	97.669.566	97.669.566	97.669.566
BENEFICI DEI PRODUTTORI E DEI CONSUMATORI	835.721.091	743.726.283	897.050.963
ASPETTI AMBIENTALI	390.633.833	279.721.696	464.575.258
ASPETTI CLIMATICI	294.548.335	272.370.612	309.333.483
VALORE ATTUALE NETTO ECONOMICO	1.903.977.596	1.514.247.535	2.163.797.636

(ACB report, 2021)

3. Regulatory and Institutional Framework

3.1 European Guidelines on Cost–Benefit Analysis

This cost–benefit analysis is required by the European Union and serves as the basis for the decision-making process regarding the co-financing of major projects under the Operational Programme (OPs) of the European Regional Development Fund (ERDF) and the Cohesion Fund. For this reason, it is fundamental that all the information about the ACB must be easy to find and well described from the project beneficiary. It must include all the methods and the instruments used during the whole project (the calculations methods must be included too), all the assumptions done with a particular clarification about the future numbers given. So, the ACB must be clear, verifiable and credible; these are the three most important steps that must be in the report, all this can be verified by the European Commission that has developed a ‘Guide to Cost–Benefit Analysis of Investment Projects.

The report follows strictly all the requirements given by the European Commission and the MIT. Furthermore, inside the report it has been developed a clear CO2 balance sheet, able to understand the environmental impact during and when the project is done.

3.2 National Regulatory Framework for Public Infrastructure

In Italy there is the Law 196/2009 that says: the public administration has the obligation of ex-ante evaluation for public works.

Legislative Decree 228/2011 set the rules for preparing the Multiannual Planning Document and introduced a process aimed at improving the efficiency of public programming and the effectiveness of public investments. This planning framework was incorporated into Legislative Decree 50/2016 (the Public Procurement Code), which requires a sequence of evaluations ranging from the assessment of infrastructure needs to ex-ante project appraisal, monitoring during implementation, and finally ex-post evaluation.

The Prime Minister’s Decree of 3 August 2012 provided a reference model for defining sector-specific guidelines for both ex-ante and ex-post evaluation and set a standard template for the Multiannual Planning Document. Subsequently, the Ministry of Infrastructure and Transport adopted, through Ministerial Decree No. 300 of 16 June 2017, the “Guidelines for evaluating public investment projects” in the sectors under its responsibility.

These guidelines also indicate standardized calculation methods to estimate the economic benefits of projects within the same sector. Cost–Benefit Analysis (CBA) is identified as the main methodology for ex-ante evaluation, although in some cases it can be replaced by cost-effectiveness analysis. Since the national guidelines are relatively concise, they explicitly refer—especially for large projects (over €10 million)—to more detailed European guidance, including the European Commission’s CBA Guide and the UVAL-IRPET guide on feasibility studies for local partnership projects.

3.3 The Role of Public Debate in Infrastructure Planning

The ACB is built on the preliminary document prepared for the Public Debate and integrates its outcomes. Public debate is intended as “deep and public discussion” on economic, environmental, and social reasons and it discusses the impacts of the final selected option.

The legal basis for the public debate process is established by DPCM 76/2018, which regulates the planning and development of major public infrastructures and defines the final project configuration to be discussed during the consultation phase. Under Italian law, the infrastructure is classified as a project of international interest. It was presented to the public and relevant stakeholders during the public debate held in January 2021, with the aim of collecting feedback, proposals, and alternative solutions to enhance the project. The debate was organized to identify the three most suitable design alternatives to be further developed and evaluated within the Preliminary Feasibility Technical and Economic Plan (PFTE).

In the Dossier were presented 4 alternatives for the project, without considering the alternative of not proceeding with the project. At the end of the discussion between the harbor master's office and nautical technic service it was decided that the best option was the solution number 3. In the first image there how, the breakwater was before the realization of the project.



(ACB report, 2021)

The alternative chosen, the number 3, the construction of a new eastern entrance (“imboccatura a Levante”), through which all vessels directed to the commercial terminals of Sampierdarena will be able to access the port. This configuration ensures a high degree of operational flexibility in vessel maneuvering, allowing for the simultaneous entry of a commercial ship through the new entrance and a cruise ship through the existing one.



(ACB report, 2021)

The promoter of the whole project is AdSP of Western Ligurian Sea, AdSP is a public entity that manage a port system, these entities are regulated by the decretal legislative of 4 August 2016, n. 169. So AdSP aren't economical operator, but they are part of the Italian Government that operate in specific area, completely regulated by the government, with the final objective to permit a regulated

access to the port, regulated by the Italian law, to create a natural monopoly, following what a port is in Italy.

As AdSP is not a profit-maximizing firm, we can't consider their financial analysis the typical "business cost vs revenue". The analysis was made with the object to show to the public the dimension of the cash flow that will be regulated by the AdSP, Consequently, this allows for an assessment of the magnitude of the capital contributions required to finance the implementation of the project.

An important framework works the whole project is the Decree-Law No. 109 of 28 September 2018 (commonly referred to as the "Decreto Genova" or "Reconstruction Law"), it was adopted as an emergency measure following the collapse of the Polcevera viaduct (Morandi Bridge) in Genoa. Its official scope is broader than bridge reconstruction: it provides urgent provisions for the City of Genoa, for the safety of the national transport and infrastructure network, and for other emergencies (including those related to the 2016–2017 earthquakes and labour measures).

A central feature of the decree is the establishment of a special governance framework aimed at accelerating decision-making and implementation, notably through extraordinary procedures and a dedicated institutional setup for the reconstruction process. The decree was later converted into law, with amendments, by Law No. 130 of 16 November 2018; the consolidated ("coordinated") text of Decree-Law 109/2018 as amended by the conversion law was published in the Official Gazette and represents the most appropriate version to cite for legal accuracy.

(Decree-Law 28 September 2018, No. 109, converted with amendments by Law 16 November 2018, No. 130 (consolidated text). Official Gazette of the Italian Republic.)

4. The Strategic Context of the Port of Genoa

4.1 The Global Evolution of Container Shipping

In the introduction of the paper, the ACB discuss the global container trends and it reports that Genoa has the potential to be one of the most important ports in the Mediterranean Sea for its strategic position for the routes that go from Asia to Europe; Also because if the ships that should go in the North of Europe from Asia would be able to save up to 5 days of Navigation with a save of more than 1.000 Nautic miles.

Another important reason to consider a Port, as written in the ACB, there must be not also the capability to take on and take off goods, but also how easy would it be to move those goods from the port to the other cities, so it is very important the railway system too. This is still a huge problem for Italian's port that are ranked 19th in the world for the Logistic Performance Index.

Other factors to consider are the Sector megatrends, for example the fleet evolution, the consolidation and alliances and the market dynamics.

For the fleet evolution there will be a big change in 2030, where all the floats coming from outside the Mediterranean Sea will reach 300 meters long, so a port that doesn't have the capability to host LOA (length Over All), will be completely cut out from the market.

The second factor to consider is all the new alliances and fusion operations born in the past few years, this caused an increase in the supply. The second reason that explain this trend is that from 2018 there were new boats with a capacity of over 22.000 TEUs; this required to an increase in investment, being able only with new alliances.

About the market dynamics, Genoa's main competitors are Valencia, Marseille and Barcelona; they are already able to host 350 meters long boats, while the one in the north like Rotterdam and Hamburg can host 450 meters.

4.2 Ultra-Large Container Vessels (ULCVs) and Port Adaptation

As already written in the last part, is going on an evolution through the Post Panamax/ULCV for all the main directors, The classification of container vessels into Panamax, Post-Panamax, and Ultra-Large Container Vessels (ULCVs) reflects the evolution of maritime transport driven by economies of scale. Panamax ships were originally designed to fit within the dimensional limits of the Panama Canal, with capacities typically up to 5,000 TEU. As global trade expanded, shipping companies introduced post-Panamax vessels, which exceed these size constraints and can carry significantly

larger volumes of cargo, generally ranging between 6,000 and 13,000 TEU. More recently, the development of Ultra-Large Container Vessels (ULCVs), with capacities exceeding 18,000 TEU, has further transformed the industry. These vessels are primarily deployed on major intercontinental routes, particularly between Asia and Europe, and require ports to provide deep-water access, advanced infrastructure, and high operational efficiency. This evolution has increased pressure on ports to adapt their facilities to remain competitive within the global shipping network. And the evolution has continued until 2018 with the introduction of vessels bigger than 22.000 TEUs.

Genoa will be able to host large Far East vessel after the completing of Phase A, expected to be in. 2027. The vessels will stay in Sampierdarena, in Calata Bettolo; at the same time another project should be done, the infrastructural network TEN-T Reno-Alpi.

The TEN-T Rhine–Alpine Corridor is one of the core network corridors of the Trans-European Transport Network (TEN-T), designed to enhance connectivity and facilitate the efficient movement of goods and passengers across Europe. It connects major ports of the North Sea, such as Rotterdam and Antwerp, with key industrial regions in Germany, Switzerland, and Northern Italy, extending to the port of Genoa. This corridor plays a crucial role in integrating maritime and inland transport systems, strengthening intermodal connections between sea, rail, and road networks. For the Port of Genoa, its inclusion in the Rhine–Alpine Corridor represents a strategic advantage, as it enhances its accessibility to central European markets and reinforces its role as a key gateway between the Mediterranean and the European hinterland. In this context, infrastructure investments such as the new breakwater and railway upgrades become essential to fully exploit the opportunities offered by this trans-European corridor.

A further strategic effect associated with the completion of Phase A is the potential activation of a new direct North America service calling at the Intermodal Marine Terminal (IMT). Under the project scenario, the ACB assumes that from 2030 the new port configuration enables higher overall productivity in the Sampierdarena basin; however, for IMT the analysis adopts a conservative assumption and does not forecast ultra-large Far East calls, given operational constraints linked to the proximity of Cristoforo Colombo Airport. Instead, the additional North America service is framed as complementary to IMT's existing network, which is currently oriented toward Africa and the Middle East, and partly substitutes feeder traffic and volumes currently routed through Northern European ports.

As a result, the project scenario implies an IMT capacity utilization of approximately 98%, corresponding to an annual throughput of 491,096 TEU. At system level, the Sampierdarena basin is

expected to reach 2,419,240 TEU per year, i.e., about 103% of the available capacity, reflecting both traffic growth and the assumed productivity improvements enabled by the new breakwater.

4.3 Competitive Positioning of Mediterranean Ports

As noted by Notteboom (2010), over the past decades European container flows have increasingly concentrated in so-called “gateway regions”—port ranges located close to large final-demand markets and well-integrated with inland transport networks. This pattern is illustrated in the figure below, which identifies the main European gateway regions and highlights how Genoa is positioned as a natural gateway for Northern Italy and parts of Central Europe. Within the Mediterranean, Genoa competes with other major gateway ports (including Barcelona/Valencia and Marseille–Fos, among others), but its strategic advantage lies in its proximity to Europe’s core economic corridor—often described in economic geography as the “Blue Banana”—and in its potential to function as a southern maritime access point to that dense industrial and consumption belt. In practical terms, this means that, when hinterland connections are efficient (especially rail corridors linking Genoa to inland hubs), Genoa can reduce the need for cargo serving Northern Italy, Switzerland, and Southern Germany to be routed through the Northern Range (e.g., Rotterdam/Antwerp) and then transported south overland. In this sense, Genoa’s competitiveness is not only a matter of port operations, but also of its gateway role within wider European logistics networks.



Fonte: Notteboom (2010)

(ACB report, 2021)

This gateway advantage is also reflected in pure sailing times: the Far East–Genoa route is shorter than the Far East–Rotterdam route, meaning that a call at Genoa can reach European markets with

fewer days at sea. In the ACB is reported a table created from the report SRM “Italian Maritime Economy” from 2020 calculated with www.sea-distances.com. In the table are written down the distance (expressed in Nautic miles) and the navigation time (expressed in days). In the table is reported that from Shanghai’s port to Rotterdam is 10.525 miles and 29 days, while to Genoa port is 8.670 miles and 24 days. Almost 2.000 miles of difference and 5 days of navigation; this is a great opportunity for company to save on travel costs. Another clear example is the route from Yokohama; for Rotterdam is 11.133 miles and 31 days while Genoa 9.325 miles and 26 days.

As already said in this paper is crucial to improve the railway system, with project around Genoa already in construction. Under the long-term scenario, the project is a full upgrade of the rail yard layout, including the construction of eight centrally managed tracks, each designed to accommodate 750-metre trains, and controlled through a new station signaling system. As described in RFI’s Freight Business Plan, these interventions aim to make rail freight fully competitive by developing an enhanced rail corridor through both infrastructure upgrades and operational measures that improve service quality. The programme focuses on upgrading the loading gauge (target P/C 80), increasing the train length standard on the network (target module 750 m), strengthening the line to meet axle-load class D4 (approximately 22.5 tones per axle), and implementing the ERTMS signaling system.

A further element that strengthens Genoa’s competitive positioning is the role of the hinterland system, especially the relationship between the port and the inland terminals/interports connected by rail. According to the report “Fedespedi”, with the growing role of ports in international logistics chains, port rail services become decisive in defining a port’s hinterland. In container traffic, this makes the link between ports and inland terminals crucial: when rail connections are adequate in terms of frequency, cost and reliability, the port can expand its effective market reach and consolidate stable traffic corridors toward the main industrial and urban areas. The report also highlights that traffic tends to concentrate on a limited number of ports due to selective choices by shipping lines, which further reinforces the strategic importance of having a strong inland-terminal network (freight corridors) located near large demand centers. In the Italian case, the report explicitly mentions the relevance of the connections between the Tyrrhenian ports (including Genoa) and inland terminals in Northern Italy, showing that competitiveness is not only a matter of maritime access, but also of how efficiently the port can distribute cargo inland.

4.4 Structural Constraints of the Existing Breakwater

The ACB explains today's physical/operational constraints: the old breakwater was built in the first years of the last century and was made for the ships that were navigating the seas in that historical period, so to remove an infrastructure obstacle obsolete for today's commerce.

Today's configurations consent the access to Sampierdarena and to "Porto Antico" from two sides: Levante (at east) and Ponente (west). Ponente's entrance allows the entrance only to vessels smaller than 200 meters. In the current configuration of the Port of Genoa, vessels calling at the western terminals (Ponente) may enter bow-first but then must proceed astern along the Sampierdarena channel, turn in the eastern outer harbor (Avamporto di Levante), and finally leave the port area with the bow aligned toward the eastern entrance.

The eastern entrance allows access for larger ships, up to a maximum length of 368 meters. These vessels are maneuvered using a turning basin with a diameter of approximately 550 meters. In practice, this implies that the turning circle available is roughly 1.5 times the vessel length for the largest ships currently admitted. Port operations report that such maneuvers require at least three tugboats, and in some cases a fourth tugboat may be needed.

As commonly recommended in port design guidance, the minimum turning-basin diameter for tug-assisted maneuvers is typically in the range of 1.5 to 2 times the length of the largest vessel. While a 550-metre turning basin is therefore technically sufficient for ships of 368 meters, the ACB notes that maneuvers are often not easy, particularly under adverse wind and current conditions in the channel. Moreover, the same turning-basin diameter may be inadequate for 400-metre ships, since the ratio between basin diameter and vessel length would fall below the 1.5 benchmark. Also, during these operations, other boats cannot enter in the port all the all process requires usually between 1.5 to 2 hours. These operations happen 1-2 times a week blocking for that period all the accesses to the port. The new breakwater would help to regulated this, creating two entrances from Levante, one only for the big vessels and the second one for tourist vessels, all this without one blocking the other one for the whole operation. Moreover, the new configuration would help to save time during the operation of branching the vessels, this other than a cost saves, it makes a huge difference for people safety because different boats would not have to share the port transit.

4.5 Strategic Rationale for the New Breakwater Project

The core rationale is to remove the bottleneck created by the old breakwater, with benefits to the local community and European too, enabling companies in Switzerland, North Italy and other countries to reduce cost.

The option “Do nothing” would lead to a progressive lose in competitiveness against other ports, leading Genoa’s port to a progressive decrease in income and vessels caused by the loss from the new routes coming from Asia, Africa and North America.

Under the project scenario, the new breakwater increases the port’s ability to accommodate larger vessels and improves the overall attractiveness of the Sampierdarena basin. From the end of Phase A (from 2027), the ACB assumes the activation of direct deep-sea services—particularly linked to Far East traffic—partly replacing feeder operations. The scenario also includes a diversion of flows currently routed via Northern Range ports toward Genoa as a more “natural” gateway for Northern Italy and nearby markets. These mechanisms generate higher annual container volumes compared with the do-nothing baseline and raise basin utilization close to (and slightly above) nominal capacity. Overall, the project is framed as a capacity-and-network upgrade that shifts Genoa’s role toward more direct and efficient global connections. The ACB identifies safety and operational efficiency as an immediate and essential benefit of the new breakwater, primarily through improved navigability within the protected basin. By widening navigable spaces and increasing turning-circle dimensions, the project reduces the complexity of maneuvers and the need for restrictive operating procedures that currently generate delays and higher service costs. The new configuration is expected to enable smoother traffic management, limiting situations in which large-ship movements constrain or block other port operations. It also strengthens intrinsic safety margins, particularly under adverse wind and current conditions, by providing more maneuvering room and better flow separation. In short, the breakwater is presented as a structural solution that simultaneously improves safety, fluidity, and operational reliability.

5. Scenario Analysis

5.1 The Counterfactual Scenario

In the ACB, the counterfactual scenario is defined as “do nothing”, meaning no alternative solution is planned, while all already committed investments (notably key rail upgrades such as the Genoa node and the Terzo Valico) are treated as invariants and therefore included in both scenarios.

Under this baseline, the Sampierdarena basin is expected to face a progressive loss of attractiveness, primarily because the current configuration cannot accommodate vessels above 14,000 TEU, which are increasingly deployed on Asia–Europe services.

The traffic path of the do-nothing scenario is built using Drewry market forecasts and terminal-specific assumptions, providing the quantitative benchmark against which the project scenario is evaluated.

5.2 The Project Scenario

In the project scenario, the ACB assumes that the new breakwater becomes operational from the completion of Phase A (2027), enabling Sampierdarena terminals to accommodate larger vessels and increasing overall system productivity. The scenario includes the activation of two direct Far East services at Calata Bettolo, partly substituting existing feeder patterns and partly diverting cargo currently routed through Northern Range ports toward Genoa as a more natural gateway. In addition, from 2030 the ACB assumes a new North America service at IMT, while adopting a conservative approach regarding Far East calls at IMT due to operational constraints linked to the airport. At regime, Sampierdarena is expected to reach approximately 2.42 million TEU per year, with utilisation slightly above nominal capacity, reflecting assumed productivity gains in terminal operations and inland dispatch.

5.3 Traffic Forecast Assumptions

In this subsection, the “do-nothing” traffic forecast is presented for the five main container terminals in the Sampierdarena basin: Southern European Container Hub (SECH), Genoa Port Terminal (Gruppo Spinelli), Terminal San Giorgio, Intermodal Marine Terminal (IMT), and Genoa Mediterranean Gateway (Calata Bettolo). The objective is to explain how the ACB constructs the baseline scenario at terminal level before comparing it with the project scenario.

The baseline growth assumption is based on the Drewry forecast (2019), which indicates an average annual growth rate of 2.8% for the container sector in the Western Mediterranean up to 2023. The ACB considers this value broadly consistent with the historical performance of the Ligurian port system (about 2.05% per year over 2000–2020) and applies it as a reasonable reference for the do-nothing scenario over the analysis horizon.

For SECH, which handled 270,002 TEU in 2020, the do-nothing scenario assumes growth in line with the baseline rate until the terminal approaches capacity saturation, without attributing major differential effects to the project in this section.

For Genoa Port Terminal (Gruppo Spinelli), which handled 351,472 TEU in 2020, the do-nothing scenario similarly assumes baseline growth toward capacity. The ACB also notes that some areas between Ponte Idroscalo Ponente and Ponte Etiopia could represent potential future expansion zones enabled by the relocation of the breakwater; however, since these developments are not yet supported by a mature design and implementation schedule, they are not included in the quantified scenario, adopting a conservative approach.

Terminal San Giorgio, the smallest among the terminals considered, handled 86,789 TEU in 2020 and is also assumed to grow according to the baseline trend under the do-nothing scenario, gradually approaching capacity saturation.

For IMT, which handled 246,518 TEU in 2020, the do-nothing scenario initially incorporates the capacity increase linked to the development of Calata Ronco Canepa, which is assumed to enable additional feeder activity. However, in the medium term the ACB considers it realistic that the Sampierdarena basin would progressively lose attractiveness for feeder traffic under the do-nothing scenario, reflecting shipping lines' tendency to restructure or discontinue lower-profit routes.

Finally, Genoa Mediterranean Gateway (Calata Bettolo) started operations in 2020 with 10,327 TEU. In the baseline scenario the terminal's growth is partly associated with feeder connections via Mediterranean hub ports, but the do-nothing scenario also assumes a medium-term decline in attractiveness for feeder services, consistent with the broader trend toward fewer Mediterranean calls and greater concentration on direct services operated with larger vessels.

TABELLA 4-1 - PREVISIONI DI TRAFFICO

ANNO	Do nothing	Diga	ANNO	Do nothing	Diga
2021	1.270.281	1.270.281	2034	1.426.615	2.276.048
2022	1.290.668	1.290.668	2035	1.441.320	2.290.754
2023	1.454.296	1.454.296	2036	1.456.437	2.305.871
2024	1.475.840	1.475.840	2037	1.471.978	2.321.411
2025	1.494.476	1.494.476	2038	1.487.953	2.337.387
2026	1.505.945	1.505.945	2039	1.504.376	2.353.809
2027	1.334.302	2.030.302	2040	1.521.259	2.370.692
2028	1.346.422	2.052.166	2041	1.538.614	2.388.047
2029	1.358.882	2.074.643	2042	1.556.455	2.405.889
2030	1.371.691	2.199.657	2043	1.565.221	2.414.654
2031	1.384.859	2.223.410	2044	1.569.807	2.419.240
2032	1.398.395	2.247.828	2045	1.569.807	2.419.240
2033	1.412.310	2.261.743			

(ACB report, 2021)

Table 4-1 from the ACB report compares annual container traffic in the Sampierdarena basin under the counterfactual (“do nothing”) and the project (“Diga”) scenarios. The figures show that the two trajectories diverge markedly from 2027 onward, when Phase A becomes operational in the project scenario: traffic rises to around 2.03 million TEU in 2027 under the project scenario versus about 1.33 million TEU under do-nothing, and it reaches approximately 2.42 million TEU at regime, compared with roughly 1.57 million TEU without the breakwater.

Recent evidence supports the need to treat traffic assumptions with caution and to complement the ACB baseline with updated market signals. According to the Ports of Genoa “Report Traffici Q4 2025”, the containerized segment in 2025 shows a mixed pattern: in terms of tonnes it is broadly stable/slightly negative (−0.4% year-on-year), while in terms of TEU it records a clear increase (+6.3% year-on-year). This divergence suggests that recent performance is influenced not only by underlying demand growth, but also by changes in the composition of flows (including a stronger role of transshipment, particularly of empty containers) and by a more volatile operating context. Therefore, while the ACB traffic path remains the reference scenario for the appraisal, integrating updated traffic statistics helps interpret the forecast as a scenario-based projection rather than a deterministic outcome.

From an economic perspective, these projections support the interpretation that the new breakwater is expected to strengthen the port’s capacity and competitiveness by enabling larger vessel calls and attracting services that would otherwise be routed elsewhere. More broadly, higher throughput can

generate wider local effects through increased demand for terminal operations and logistics services; however, the magnitude of employment and urban-development impacts depends on additional factors (e.g., organization of terminal activities, hinterland connectivity, and market conditions) and should therefore be discussed as potential outcomes rather than direct results of the traffic forecast alone.

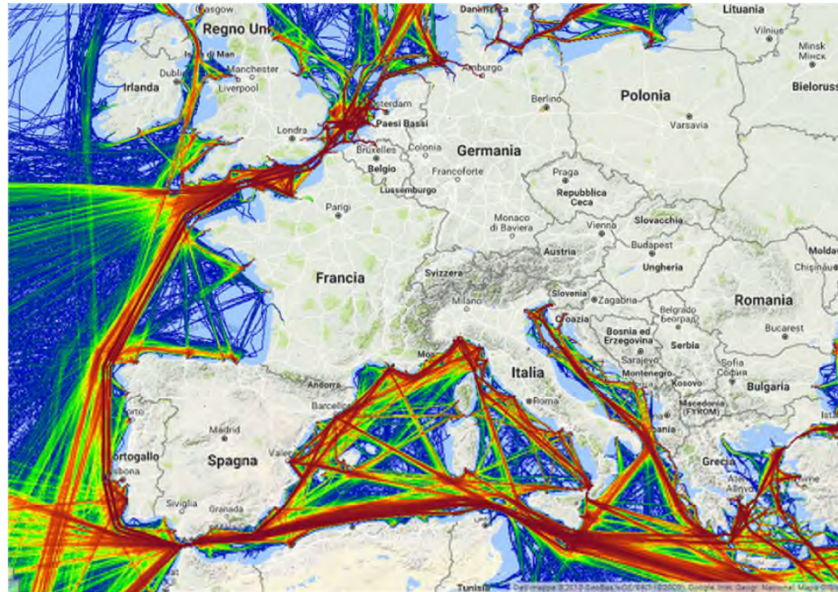
5.4 Impacts on Maritime Flows

The ACB identifies two main mechanisms through which the new breakwater affects maritime transport demand. First, it enables a reduction in sea distances by allowing part of the traffic currently routed through alternative Northern European ports to be served more directly via Genoa. Second, it improves the efficiency of vessel deployment by replacing some feeder services with direct calls operated by larger ships, thereby reducing intermediate transshipment and network fragmentation.

For the remaining traffic, the project is not expected to change routes or sailing times, because many container services in the Western Mediterranean typically call at several ports in sequence for example La Spezia, Genoa, Fos, Barcelona; therefore, from a purely maritime navigation perspective, the “with project” and “without project” scenarios are similar for those flows.

The following figure (based on vessel-tracking data) illustrates the scale of shipping flows that, after transiting the Suez Canal, continue through the Mediterranean and via Gibraltar toward the Northern Range. In the ACB, this is used to highlight the potential inefficiency of serving Northern Italy, Switzerland, and Southern Germany through Northern European ports when a closer Mediterranean gateway could reduce maritime detours.

IMMAGINE 4-3- PRINCIPALI ROTTE DEL MEDITERRANEO



(Fonte: Marinetraffic)

The first main effect from the project is to make Sampierdarena able to host big vessels New Panamax/ ULCV, making able to take a significant part of all the vessels that right now can't stop in Genoa but they have to travel until Rotterdam, the ACB reports that the project will make possible to attract vessels over 18.000 TEU, with goods that have the final destination in Piedmont, Lombardy and Switzerland. This will let companies save 3.710 Nautic miles, 6.871 kilometers and 206 hours of travel, 8 days and 14 hours. All these numbers have been precisely calculated inside the ACB, the report also says that if every year, with an estimated 48 touches in total (a weekly service with 4 blank sailing in periods with low traffic caused by European and Asian holidays, there is a reduction of 178.080 Nautic miles, around 329.804 kilometers, 9.893 hours of travel, around 412 days.

The operative cost of these vessels is close to 102.052 euros per day, that multiplied for the navigation days saved per year is a save in expenses for 42.0 million per year. Then in period considered thanks to the shorter routes the final amount will be 799.293.942 euro.

This is a benefit for the import and export traffics, for the goods producer, for the transport operators and consumers.

The second key mechanism identified in the ACB is the possibility of serving Genoa through direct deep-sea calls from Asia, reducing the need for intermediate transshipment that is currently required because large vessels cannot efficiently access the port under the existing breakwater configuration. For the comparison, the report takes Port Said (Suez Canal) as the reference point, since the route segment south of Suez is common to both scenarios.

In the current configuration, a share of Asia–Genoa container flows are assumed to be transshipped at Mediterranean hub ports such as Malta or Tanger Med and then carried to Genoa by feeder vessels.

Under the project scenario, these feeder connections can be partially replaced by direct services operated by larger ships calling Genoa without an intermediate hub stop. This implies a trade-off: the direct service increases the mileage and operating costs of the ultra-large vessel on the Genoa leg, but it eliminates the operating costs associated with multiple feeder routes.

Overall, the ACB estimates that the reduction in feeder operations more than offsets the additional cost of the direct service, resulting in net operating cost savings over the analysis period; in total, the report quantifies these savings at approximately €216,234,926 (non-discounted).

5.5 Impacts on Hinterland Transport (Rail and Road)

Re-routing part of the traffic that is currently diverted to Northern European ports also allows a substantial reduction in inland transport distances, thereby lowering both operating costs and the associated negative externalities (e.g., emissions, accidents, congestion). Although the incremental volumes assigned to Genoa in the ACB are smaller than the overall flows exchanged between Northern Italy and the Northern Range, the analysis adopts a conservative distribution assumption for the destination markets. Specifically, it assigns 70% of the recovered flows to Northern Italy (using Milan as the reference centroid) and 30% to Northern Switzerland and Southern Germany (using Basel as the reference centroid).

By contrast, the replacement of feeder services with direct calls affects the maritime leg but does not generate additional changes in inland routes; therefore, in the ACB it is assumed to have no effect on hinterland transport distances.

The possibility of accommodating larger vessels at the Port of Genoa allows the logistics system to be reorganized and inland routes to be optimized at European scale, reducing total transport costs. By redirecting part of the traffic currently handled through Northern European ports back to Genoa—especially flows destined south of the Alps—the project scenario shortens inland distances that are assumed to be travelled mainly by rail (90%) and, to a smaller extent, by road (10%). As a result, the project scenario is characterized by a substantial reduction in rail kilometers.

At regime (2030), the ACB estimates that about 2.9 million tons per year are redirected to the “natural” Genoa corridor, with 90% of this volume transported by rail. To quantify distance savings, the analysis assumes that 70% of the cargo originates from or is destined to the Western Po Valley (centroid: Gallarate), which is 1,208 km from Rotterdam, while 30% is linked to Transalpine

Switzerland and Southern Germany (centroid: Basel), 795 km from Rotterdam. This yields an avoided, weighted-average distance of 1,084.1 km for the flows previously routed via Rotterdam.

The same flows are then routed via Genoa. Given the shorter inland distance, the ACB prudentially assumes that rail captures a smaller share of the inland leg (40%). Distances from Genoa are taken as 148 km to Milano Smistamento (for 70% of flows) and 521 km to Basel (for 30%), corresponding to a weighted-average distance of 259.9 km. Based on these assumptions, the rail transport saving at regime is estimated at approximately 4.3 billion tone-kilometers per year. Using a rail freight production cost of €0.02122 per tone-km and applying a conversion factor of 0.88, the ACB derives annual savings of about €71.8 million (2030) and total non-discounted savings over the analysis period of €1,374,210,487.

The same will happen for the road transport, there will be a huge decrease in kilometers that are needed to be done, decreasing not only the costs, again, but also having an impact on the environment reducing CO₂ emissions. Using an estimated economic unit cost for road haulage of maritime containers equal to €0.0518 per tone-kilometers, the ACB derives additional road operating costs of approximately €15.2 million per year. Over the full analysis period, this corresponds to a total non-discounted increase in road transport costs of €291,794,878.

5.6 Modal Shift and Logistics Reconfiguration

To evaluate the project beyond private operating costs, the ACB includes external costs (externalities), meaning impacts generated by transport that are paid by society rather than by users. For this reason, externalities are measured as a difference between the project scenario (“Diga”) and the baseline (“do-nothing”). The ACB uses the European Commission Handbook on the External Costs of Transport (2019) and applies standard unit values to changes in transport activity, measured mainly in tonne-kilometres (tkm).

The ACB considers accidents, noise, congestion, air pollution, climate change (CO₂), and “well-to-tank” effects (upstream emissions from producing fuels/electricity).

First, the ACB evaluates accidents, noise and congestion, mainly linked to hinterland transport. Since the project reduces rail activity but increases some road activity, the result is mixed: savings on rail are partly offset by higher road impacts. Overall, the ACB still finds a positive net effect, equal to about €25.3 million (present value, euro2021).

Second, the ACB estimates air pollution impacts. The project reduces some inefficient maritime routing (especially compared to Northern Range detours) and reduces part of feeder activity, even if it adds some direct deep-sea mileage and some road transport. After applying the Handbook parameters (and a prudential 50% correction for some intercontinental maritime components), the ACB obtains a net air pollution benefit of about €237 million (present value, euro2021).

Third, for climate change (CO₂), the ACB finds a strong net benefit, around €332 million (present value, euro2021). Here no 50% correction is applied because climate is a global externality.

Finally, the ACB includes well-to-tank effects (fuel and electricity supply chain). The estimated net benefit is about €159.7 million (present value, euro2021), again using a prudential correction for some maritime components.

A final point is that modal shift is not automatic. The Fedespedi report notes that road transport often remains very competitive and that intermodal corridors need strong coordination between ports and inland terminals to guarantee frequency, reliability, and cost competitiveness. This supports the idea that rail-share outcomes depend not only on infrastructure, but also on how the hinterland system is organized.

6. Financial Analysis — ACB page mapping

This chapter presents the financial appraisal of the New Breakwater project from the perspective of its proponent, the Autorità di Sistema Portuale del Mar Ligure Occidentale (AdSP). Since the investment structure, phasing, and cost components have already been detailed in previous sections of the thesis, this chapter does not repeat the full technical and accounting breakdown. Instead, it builds on those inputs to discuss the logic of financial cash flows and the resulting funding requirements.

6.1 Investment Structure and Phasing

According to the ACB, the breakwater is expected to be completed in 2028, with Phase A scheduled for completion in 2026 (the current year) and Phase B commencing immediately thereafter in 2027, to be finished by 2028. However, as of now, the project is slightly delayed, with construction still ongoing for Phase A. The infrastructure is designed to have a lifespan spanning several decades—far longer than the typical period assessed in an ACB, which is why the analysis covers a shorter timeframe throughout the report.

The decision to divide the project into two phases was made to allow for a gradual financial commitment. Phase A aims to ensure the operability of Calata Bettolo, providing immediate access and safety for large vessels and improving operations for terminals adjacent to Sampierdarena. Phase B will subsequently ensure that all terminals can operate safely and accommodate larger vessels.

During the public debate, some stakeholders suggested implementing only Phase A, leaving the Ponente side unchanged. Others argued that this approach would hinder the development of certain terminals and prevent some vessels from transiting. Ultimately, following public consultation, AdSP decided to proceed with the completion of the entire project.

The financial analysis was conducted by the Autorità di Sistema Portuale del Mar Ligure Occidentale specifically to illustrate the scale of cash flows AdSP will manage throughout the project.

6.2 Capital Expenditure and Timing

Capital expenditure is distributed over time according to the phasing described above. The ACB reports the financial investment profile in Table 6-1, which details yearly expenditures for Phase A, Phase B, and the additional wind-energy component. In this thesis, these values are used as the

baseline financial inputs for the subsequent discussion of net financial performance and funding requirements.

6.3 Operating and Maintenance Costs

In the ACB's financial appraisal, operating costs are largely represented by ordinary and extraordinary maintenance. Extraordinary maintenance is modelled as a periodic intervention (linked to a percentage of the investment cost) to preserve the effectiveness of the infrastructure over time, while ordinary maintenance is treated as a recurring annual cost. In addition, the ACB computes a financial residual value based on technical depreciation assumptions (including a long useful life for the breakwater and a shorter one for the wind component). These parameters are not re-derived here; they are taken directly from the ACB and are used as inputs for the financial sustainability assessment presented in the next section.

6.4 Financial Sustainability from the Port Authority's Perspective

In the financial analysis, the concession fees considered are only those linked to the increased value of the assets within the Sampierdarena port area, which will allow certain terminals to be upgraded to meet the requirements of large container vessels. Since the level of concession fees is set by law, the ACB estimates them at €1,208,043 per year, starting from the full completion of the project.

The calculation of this tax is highly uncertain, operators can decide to pay a monthly or yearly subscription that are accepted in all Italian ports. When estimating the revenues generated by the project, the financial analysis includes the incremental anchorage tax associated with the additional traffic. To quantify this item, the ACB uses the 2019 average by expressing the collected tax relative to the total tonnage handled in the port. This yields a unit value of €0.3059 per tonne, which is then applied to forecast future revenues. The following table reports the estimated amounts starting from the completion of Phase A of the breakwater.

Port taxes are charged based on the quantity of cargo unloaded and loaded in the port. In the ACB, these revenues are estimated using the official unit-tax tables published each year by the Italian Customs Agency, together with an average container load factor of 9.85 tones per TEU. Using data provided by the Port Authority, the 2019-unit tax on handled cargo is €0.8872 per tonne.

In addition, the Port of Genoa can apply an extra cargo surcharge, which in 2019 amounts to €0.1793 per tone. This surcharge is discretionary (each Port Authority can decide whether to apply it). It was not applied in 2019–2020 to limit the impact on terminal operators after the Morandi Bridge collapse,

but the ACB assumes it is reinstated from 2021. Therefore, total port taxes are estimated at €1.0665 per tone of cargo handled.

VAT revenues collected on imported goods accrue to the Italian State. Until 2016, a share of these VAT receipts was allocated to a fund supporting Port Authorities (AdSP). In 2016, the AdSP of the Western Ligurian Sea received a contribution equal to €0.6621 per tone. In subsequent years, however, no further amounts were assigned from this fund. Given the uncertainty and the fact that this mechanism is only indirectly related to the breakwater project, the ACB does not project this revenue stream over the 25-year evaluation period.

In addition, the installation of wind turbines on the breakwater is expected to generate, at regime, about 3,400 MWh per year. Since the Port Authority pays approximately €0.20 per kWh for electricity, the ACB estimates that self-consumption would produce annual savings of around €680,000.

The ACB discounts the Port Authority's financial cash flows using a real financial discount rate of 4%. This choice is justified by referring to the standard reference rate commonly adopted in EU and national appraisal practice for large projects, intended to approximate the long-run opportunity cost of capital. The report also acknowledges that, given the low interest-rate environment observed in recent years, a lower rate could arguably be considered; however, it maintains the 4% rate as a prudent and conservative assumption for the financial appraisal.

Once the annual inflows and outflows are discounted at 4%, the ACB computes a Financial Net Present Value (VANF) equal to –€745.5 million. In practical terms, this result indicates that the revenues that accrue directly to the AdSP (e.g., certain fees and charges linked to port activity) are not sufficient to offset the scale of investment and maintenance expenditures over the evaluation horizon, when capital is required to earn a 4% return. The same conclusion is confirmed by the Financial Internal Rate of Return (FIRR), which is reported as negative (–1.65%). A negative FIRR means that, even in the absence of any required return, the project's direct financial inflows would not fully cover its outflows, reinforcing the idea that the project is not financially attractive under a private, profit-oriented investment logic.

The ACB therefore frames the project as not financially bankable if it had to rely solely on project-generated cash flows, and it discusses financial sustainability in terms of the Port Authority's institutional nature and funding model. Because the AdSP is a public entity and the breakwater has a very long useful life, the investment cannot be supported through conventional project finance

mechanisms based only on revenues. The financial feasibility of the project is instead linked to the availability of public capital contributions.

Consistent with this interpretation, the ACB estimates a funding gap: to implement the project while remunerating capital at 4%, it would require a grant-type contribution equal to approximately 94.83% of total investment (reported in non-discounted terms). This funding gap reflects the structural mismatch between very large upfront capital expenditure and the limited revenues that, by design and regulation, can be captured by the Port Authority.

Finally, the ACB summarizes the full financial appraisal in a dedicated financial overview table (“quadro di sintesi”), which consolidates the main investment, maintenance, revenue, and residual-value components and confirms the negative VANF, the negative FIRR, and the dependence on public funding for implementation.

6.5 Limitations of Financial Analysis in Public Infrastructure

The ACB explicitly notes that the financial analysis is carried out from the perspective of the Port Authority (AdSP), which is a public administration rather than an “enterprise” operating under market conditions. As a result, the usual business logic of matching project costs to project revenues is weak: the AdSP manages a public-domain asset and regulates access to a natural monopoly (the port), while many of the project’s benefits accrue to wider users and society rather than generating direct revenues for the Authority. For this reason, the main purpose of the financial analysis is not to prove profitability, but to show the magnitude and timing of cash outflows and inflows and, consequently, to assess the capital contributions required to implement the project.

Consistent with this institutional setting, the ACB concludes that the new breakwater is not financially bankable under a market-based logic if it had to rely solely on project-generated cash flows. The project’s scale, long lifetime, and limited direct revenue streams imply a substantial funding gap, meaning that implementation depends on public funding (grant-type contributions) rather than conventional project finance.

7. Economic Cost–Benefit Analysis: ACB page mapping

7.1 From Financial to Economic Analysis

The economic analysis analyzes the potential economic advantage the community could benefit; in the whole document are reported a social prospective that will influence local, regional and international community. However, the financial analysis is based on market prices and it can't measure adequately the project's cost-opportunity because of the imperfection of the markets, and other cost-benefit generated by other projects that aren't available (like the environmental, social or health impact that cannot be have a price on the market, but they have to be considered for the final realization of the project).

In the ACB is followed the approach used by the European Commission for the economic analysis inside the cost-benefit, so to start from the financial analysis and moving to the economic analysis through the application of appropriate factors of conversion and the calculation of the positive and negative externalities from the project to the community.

With this we arrive to a new methodology that includes cost and social benefit of the project that allows to evaluate the project under a collective point of view. This methodology is divided in 5 different points: Conversion of market prices into shadow prices, Monetization of non-market impacts and externalities, Inclusion of additional indirect effects, where relevant, Discounting of estimated costs and benefits using an appropriate discount rate and lastly Computation of economic performance indicators (Net Present Value, Economic Rate of Return, and the Benefit–Cost Ratio).

The best scale to use to understand the effect on the community of the project is the European Union one. The time horizon follows the regulation DG REGIO (2014), with a period that goes from 2021 to 2045 (both included).

7.2 Conversion to Shadow Prices

In the economic CBA, the ACB moves from financial (market) prices to economic (shadow) prices to measure the real opportunity cost of resources for society. The key idea is that some items included in market prices, especially taxes, social contributions, and other transfers to the public sector, do not represent a net cost for society, but rather a redistribution within the same reference community. For this reason, the ACB applies conversion factors to “clean” financial costs and obtain their economic cost equivalents, avoiding double counting in the social account.

The procedure is implemented through a set of standardized conversion factors assigned to the main cost categories (e.g., civil works, plant works, maintenance, labor, administrative/management costs, and services). These factors are reported in a dedicated table and are used to convert each financial cost item into an economic cost by multiplying the financial value by the relevant factor. For example, the ACB applies specific factors for civil works and plant works, different factors for ordinary and extraordinary maintenance, and a separate factor for labor (a “shadow wage” adjustment) to reflect distortions in labor markets and the fact that gross labor costs include components that are transfers rather than resource costs.

A practical implication is that the economic investment cost is generally lower than the financial one, because the conversion removes fiscal components and other transfer elements that do not represent a net social cost. The ACB explicitly frames this step as essential to ensure that the economic appraisal is consistent with welfare analysis: it converts market prices into shadow prices, then adds non-market effects (externalities) and discounts the resulting stream to compute economic performance indicators.

7.3 Identification of Economic Costs

After converting market prices into shadow prices (Section 7.2), the ACB constructs the economic cost account of the project by identifying all cost items that represent a real resource use for the reference community. The starting point is the Port Authority’s investment costs already listed in the financial analysis, which are then converted into economic values using the appropriate conversion factors. In addition, the ACB explicitly includes costs borne by other agents that are necessary for the project to deliver its expected effects. It adds the investment required to upgrade terminal equipment (*attrezzaggio delle banchine*) so that terminals can effectively operate the larger vessels enabled by the new breakwater. This is important because, in a social appraisal, the relevant cost is not only the public infrastructure itself, but also the complementary investments needed for the system to function under the new scenario.

Economic costs are then organized into three main groups. First, economic investment costs, obtained by applying conversion factors to the financial CAPEX and adding the additional equipment investment. Second, renewal/extraordinary maintenance costs, modelled as periodic interventions (linked to a percentage of the investment) to maintain the infrastructure’s effectiveness over time. Third, operating costs, which in the ACB are mainly represented by ordinary maintenance; operational cargo-handling costs are treated as invariant because the breakwater does not directly change the number of loading/unloading operations but rather affects routing and accessibility within

the same reference community. Finally, the ACB includes an economic residual value, reflecting the remaining useful life of the asset at the end of the analysis horizon, computed consistently with the assumed technical life of the infrastructure.

7.4 Identification of Economic Benefits

After identifying economic costs, the ACB constructs the economic benefits generated by the new breakwater. Since Chapter 5 already explained the scenario logic (diversion from Northern Range and partial substitution of feeder with direct calls), here the focus is on how those mechanisms are translated into monetary benefits in the economic account. In general, the ACB groups benefits into maritime operating savings, variations in rail and road transport costs, time and inventory cost reductions, safety improvements, and environmental and climate benefits.

A first relevant component is maritime operating cost savings. The ACB estimates savings when part of the traffic currently routed through Northern European ports can instead be served through Genoa, reducing maritime distance and navigation time for deep-sea vessels. The report converts time savings into monetary terms using an operational cost per day and the number of calls assumed in the scenario. Over the evaluation period, this mechanism produces large cumulative savings (non-discounted) because it avoids a systematic maritime detour for flows destined south of the Alps.

A second maritime-related component is the optimization of vessel utilization through the replacement of feeder services with direct calls. In the baseline configuration, part of Asia–Genoa flows are assumed to be transshipped in Mediterranean hub ports (e.g., Malta or Tanger Med) and then carried to Genoa by feeder vessels. Under the project scenario, some of these flows can be shifted to direct calls operated by larger ships. The ACB uses Port Said (Suez Canal) as reference point for the comparison because the route segment before Suez is identical under both scenarios. The key trade-off is that direct calls may increase the deep-sea mileage to Genoa, but they reduce feeder operations and intermediate handling. Overall, the ACB estimates that the feeder-cost reduction more than offsets the additional deep-sea cost, generating net savings on the maritime side.

A third important block of benefits concerns hinterland transport costs, especially because rerouting flows from the Northern Range to Genoa shortens inland distances for the target markets. The ACB adopts a conservative assumption for destination markets (70% Northern Italy with Milan as centroid, 30% Switzerland/Southern Germany with Basel as centroid) and quantifies the avoided inland distances and tonne-kilometres. On this basis, the report estimates significant rail operating cost savings, because the project scenario implies a reconfiguration of routing that reduces rail tonne-

kilometres on longer routes previously associated with Northern Range entry points. These savings are monetized using a unit production cost per tonne-kilometre and a conversion factor, producing a large cumulative benefit over the evaluation horizon.

At the same time, the ACB also accounts for road transport cost variations. Because the inland reconfiguration does not translate into a pure increase of rail usage in every segment, the model assumes some additional road tonne-kilometres for part of the inland leg and monetizes them using an economic unit cost for road haulage. As a result, the road component appears as an additional operating cost that partially offsets the rail savings but does not eliminate the overall benefit generated by the shorter inland routing.

Beyond pure operating costs, the ACB includes benefits related to time savings and inventory cost reductions. The rationale is that shorter and more direct routes (including fewer transshipment/feeder operations) reduce the time goods spend in transit or waiting, which lowers the implicit cost of “immobilized” cargo. In economic terms, this captures an efficiency gain for the logistics chain: goods arrive earlier and capital is tied up for less time, generating a welfare benefit for users of the transport system.

The ACB also identifies safety improvements as a relevant benefit. The project changes the navigational configuration of the Sampierdarena basin, increasing maneuverability, improving flow separation, and reducing operational constraints that currently create delays and higher risk. In this framework, safety is not treated only as a technical outcome, but as an economic benefit because it reduces expected accident costs and disruption risks for the port system and the wider community.

Finally, the ACB includes environmental and climate benefits as part of the economic account. This is important because many of these impacts do not have a market price, but they generate real welfare effects. The report monetizes externalities using standard unit values from the EU Handbook on the External Costs of Transport (2019) and applies them to the scenario-driven changes in transport activity (in tonne-kilometres) for maritime, rail, and road. The largest external benefits are linked to local air pollution and climate impacts (CO₂), while social externalities (accidents, noise, congestion) are positive but smaller because the reduction on rail is partly offset by increased road activity.

7.5 Social Discount Rate, Time Horizon, and Economic Performance Indicators

Once the ACB has constructed the stream of economic costs and benefits (including shadow pricing and monetized externalities), it applies discounting to compute welfare indicators in present value

terms. In line with EU guidance, the economic appraisal adopts a social discount rate (SDR) of 3% and a reference horizon covering 2021–2045.

Based on these assumptions, the ACB calculates three main economic performance indicators. First, the Economic Net Present Value (ENPV), which measures the discounted difference between total economic benefits and total economic costs. The ACB reports a clearly positive ENPV of €1,903,977,596, meaning that the project generates a strong net welfare gain for the European reference community under the base-case assumptions.

Second, the ACB reports the Economic Internal Rate of Return (EIRR/IRR), defined as the discount rate that would make the ENPV equal to zero. The report indicates an IRR equal to 11.9%, which is far above the 3% social discount rate and confirms the high socio-economic convenience of the investment.

Third, the Benefit–Cost Ratio (BCR) is calculated as the ratio between discounted benefits and discounted costs. The ACB reports a value of 2.96, implying that each euro of economic cost generates almost three euros of economic benefits in present value terms.

Overall, these indicators show the key conclusion of the economic appraisal: although the project is not financially profitable for the Port Authority (Chapter 6), it is strongly justified from a social welfare perspective, because the economic analysis includes benefits that are not captured as revenues by the AdSP (such as logistics savings for users, safety improvements, and reduced environmental damages).

All the numbers come from the ACB, and they are the official data used by the public discussion.

7.6 Distributional Effects

A final important element concerns the distribution of benefits. In the ACB framework, a large share of the direct operating savings is initially captured by shipping companies and logistics operators, through lower maritime and feeder costs and more efficient routing. Over time, under competitive conditions, part of these savings can be transmitted to producers and consumers through lower logistics costs and improved reliability of supply chains.

In parallel, society benefits from the reduction of external costs, especially those linked to air pollution and climate change, which are valued as welfare gains for the reference community.

This distribution logic also explains the financial–economic gap highlighted in the thesis: the AdSP does not directly capture most benefits as revenues, while the welfare gains are real at the level of the reference community. This is why the project can require public funding from a financial perspective but still show a clearly positive economic outcome in the CBA results.

8. Sensitivity and risk analysis

8.1 Alternative Traffic Growth Assumptions

All the future result in the demand for traffic will be based on the demand that companies will be in the future, we saw that today companies rather choose a port where to deliver all their goods, so it is important that Genoa's will be seen as strong from these companies, otherwise the investment will be inefficient if the port will not be seen as an useful and strategic point. If this will happen, we can assume Genoa in the next Years will be following the scenario "do thing" where it will lose all its competitiveness, and having only a 2,05% increase by Year like it is reported in the Drewry Forecast. However, we need to consider this in only a prevision that doesn't count all the Geopolitics event happened in the few years, so it is only a mathematical provision.

As seen already in the "Tabella 4-1 Previsioni Traffico" thanks to the new breakwater, from 2027 will be able to move 1.000.000 more TEU per year than what it already does, with the new routes for the north America and Asia. All these are TEU "stolen" from North Europe ports, if, and only if, Genoa other than completing the new breakwater making able to host the biggest vessels available today, will be able to improve its railroad system, making It easier to transfers good in the area called "Blue Banana" and also if the AdSP will make it easier and faster for company to accept their goods and making them able to commerce them in the least amount of time possible. This again is one of the main issues; Because if the custom doesn't approve them in a few days, for the companies in the interlard doesn't change much to go to a north Europe port if the need to wait the same amount of time for their goods to be moved away from the port.

Another reason is that as we have already seen in chapter 7. Economic Cost–Benefit Analysis: ACB page mapping, the Breakwater has a positive ENPV in the medium term (next 25 Years), providing not only a benefit for the AdSP, but also to locals with some benefit that will come but only in case of competitive market, and without considering other cost that will be necessary for the maintenance and the security of the port.

8.2 Exclusion of Residual Value

In the ACB, the period of evaluation is only 25 years, this however, it is a very limited time for such an infrastructure, for example the actual breakwater has been made already more then 100 years ago. This is one of the main reasons why during the whole evaluation there is a such a high residual value, that it can be seen has a "unused period of the asset".

To test whether results depend too much on this assumption, the ACB performs a sensitivity exercise where the residual value is excluded. In practice, this means assuming that, at the end of the evaluation period, the asset has no remaining value in the economic accounts. This is a very conservative test, because it penalizes projects with long useful lives.

The purpose of this sensitivity is simple: if the project remains economically convenient even without the residual value, then the conclusion is more robust and does not rely on benefits that occur only “after the horizon”. In other words, this test checks whether the project’s economic justification is driven mainly by near-term benefits or depends strongly on the long-term remaining value of the infrastructure. (Report Genova 2025)

8.3 Modal Split Variations

As reported, I the ACB, all the benefit from the Breakwater will be able to be seen also thanks to the modal split between rail and road transport into the hinterland. This is important because many benefits in the economic appraisal (operating costs and externalities) depend on how much of the inland leg is carried by rail rather than by trucks. For this reason, the ACB has run a specific sensitivity scenario, assuming a reduction in the rail share from Genoa, and then recalculates the economic results under this less favorable assumption. The 10% represent the minimum usage while the 60% the most optimistic usage.

All these assumptions are shown in the Tablle 9-1

TABELLA 9-1 - SALDO BENEFICI MENO COSTI
CON DIVERSE QUOTE DI RIPARTIZIONE MODALE FRA FERROVIA E STRADA

Confronto risultati con e diverse quote di inoltro ferroviario	40% (base)	10%	60%
INVESTIMENTO E COSTI DI GESTIONE	-973.213.960	-973.213.960	-973.213.960
VALORE RESIDUO	1.258.618.732	1.093.973.339	1.368.382.326
SICUREZZA	97.669.566	97.669.566	97.669.566
BENEFICI DEI PRODUTTORI E DEI CONSUMATORI	835.721.091	743.726.283	897.050.963
ASPETTI AMBIENTALI	390.633.833	279.721.696	464.575.258
ASPETTI CLIMATICI	294.548.335	272.370.612	309.333.483
VALORE ATTUALE NETTO ECONOMICO	1.903.977.596	1.514.247.535	2.163.797.636

(ACB report)

Instead in the Report Genova Port the result is more specific for the trend in the last 6 months.:“Report Traffici Q4 2025”, which shows that the rail component can be highly exposed to external constraints. In 2025, despite a +2% increase in gateway volumes, rail traffic did not increase accordingly: rail transport recorded a strong slowdown, largely driven by interruptions due to works on the national

railway network, especially in the summer months. The report quantifies this weakness clearly: in 2025 container volumes moved by rail declined to 322,451 TEU (−11.6%), the number of trains fell to 7,935 (−14.2%), and the rail ratio dropped to 13.2%, about 2 percentage points lower than in 2024.

8.4 Risk Considerations and Scenario Robustness

One of the main risks is that the port will not attract a ULCV line from north Europe, this because the investment for big vessels would have been inefficient and the rail roads for the interlard useless. The table report the expected loss:

Saldo benefici meno costi senza recupero linea dal nord Europa	VANE € ₂₀₂₁
Costi economici di investimento iniziali	-949.557.735
Valore residuo	777.709.225
Spese di manutenzione	-23.656.225
Δ costi operativi navali per sostituzione di feeder	140.619.108
C/B per Δ tempi di immobilizzo delle merci in mare	157.810.492
C/B per Δ emissioni mare per sostituzione di feeder	292.312.171
Benefici per produzione di energia eolica	7.063.926
C/B per variazioni emissioni inquinanti in fase di cantiere	-31.381.097
C/B per variazione altre esternalità (WTT) mare	97.329.236
C/B per Δ emissioni CO2 mare per sostituzione di feeder	180.248.606
Benefici per aumento della sicurezza	97.669.566
Valore attuale netto economico	714.786.177
Saggio di rendimento interno economico	6,79%

(ACB report, 2021)

9. Environmental and Sustainability Assessment

This chapter complements the economic CBA by focusing on the environmental and sustainability dimension of the New Breakwater project. The discussion is based on the ACB report, which already frames climate and environmental effects, and I'll implement everything with the online documents updated monthly on the website: "Realizzazione della Nuova Diga Foranea del Porto di Genova. Ambito Bacino Di Sampierdarena - P.3026 - Documentazione - Valutazioni e Autorizzazioni Ambientali - VAS - VIA – AIA"

The main documents I relied on are: the PMA monitoring report for the first semester of 2025 (air quality, noise, vibrations, marine components and Marine Strategy descriptors) ; the University of Genoa health surveillance protocol (how air/noise monitoring is connected to epidemiological indicators) ; the report on compensation measures and sustainability interventions required under VIA prescriptions (carbon footprint update, carbon management, restoration ecology, macro-litter, cold ironing and related actions) ; and the GE.CO report on the translocation of valuable biocenoses (operational procedures and evidence of implementation, with transfers to the Aquarium of Genoa) .

9.1 CO₂ Balance and Climate Implications

A first key sustainability aspect is the CO₂ balance and the related climate implications of the project. In the ACB, climate impacts are treated within the economic appraisal through monetized external costs of CO₂ and related categories (including upstream emissions), using EU reference values and a scenario-based comparison between project and do-nothing.

Alongside the ACB appraisal, the environmental prescriptions adopted under the VIA process strengthen the climate dimension by requiring a more "engineering" carbon accounting. In particular, the compensation and sustainability report recalls that the proponent must update the project Carbon Footprint in line with ISO 14067:2018, explicitly including the transport and treatment of waste generated by demolition activities, so that CO₂-equivalent emissions are measured with a clear system boundary.

The same document also frames carbon management as a lifecycle process. It requires a structured approach to reducing carbon emissions across all phases of the project, referencing recognized standards such as PAS 2080:2016 (carbon management in infrastructure). The logic is that, for large civil works, the main climate objective is not only to "measure" emissions, but also to identify

reduction levers (e.g., reuse of materials, optimization of logistics, lower-carbon construction solutions) and to document these decisions transparently.

Finally, where residual emissions remain, the sustainability framework links climate management to compensatory measures. The same VIA-related prescription explicitly opens the possibility of accessing the voluntary carbon market through third-party verified credits, if credits are additional, permanent, and do not compromise biodiversity or social justice.

Overall, in the thesis framework, the CO₂ balance should be read as a “double layer” system: (i) a welfare-based climate effect embedded in the CBA appraisal, and (ii) a project-level carbon accounting and reduction strategy required by the environmental approval process, which aims to make climate commitments operational and verifiable.

9.2 Air Quality and Local Environmental Effects

Air quality is one of the most sensitive local sustainability topics, especially during the construction phase, because potential impacts on the population mainly arise from surface works, machinery, and transport logistics. The University of Genoa health surveillance protocol explicitly states that “human health” is a transversal environmental component and that the main potential impacts on the population are linked to atmospheric emissions and noise during construction.

From a methodological perspective, the protocol clarifies which pollutants are relevant when assessing incremental risk for public health in this context. It highlights the role of particulate matter PM₁₀ and PM_{2.5} and nitrogen oxides (especially NO₂), as these are the fractions most associated with potential health effects; it also notes that monitoring must be integrated and aligned with the environmental monitoring plan and the prescriptions set by competent authorities.

The PMA monitoring report for the first semester of 2025 provides the operational evidence on how air quality monitoring is implemented. It explains that measurements are carried out at specific stations (including installed stations and reference stations managed by ARPAL), and that results are compared to legal limits (D.lgs. 155/2010) and to guard thresholds defined and updated during the compliance process.

In terms of results, the same report indicates that, at the monitored stations, gaseous pollutants such as NO₂, SO₂, CO and benzene were found below legal limit values in the considered period.

For particulate matter, the report provides descriptive statistics and peak analysis for PM10/PM2.5 and includes a key interpretative point: when peaks occur, the report discusses whether these events are plausibly attributable to the construction site or to external drivers such as abnormal traffic conditions near port access gates.

A final important element is that air quality monitoring is not treated as purely technical reporting. It is linked to a broader health protection strategy: the UNIGE protocol proposes an epidemiological monitoring approach based on time-series analysis, correlating pollutant concentration patterns with health indicators (hospital admissions for respiratory diseases), so that the monitoring system can support decisions on mitigation measures if critical patterns emerge.

9.3 Impacts on Marine Ecosystems

Because the intervention is in a complex port environment, the project's sustainability profile depends heavily on how it manages marine ecosystem impacts. The VIA-related compensation report clearly frames marine sustainability as a combination of monitoring and compensatory actions, including restoration ecology measures, macro-litter removal, and targeted actions for sensitive biological components.

A very concrete example is the translocation of valuable biocenoses. The compensation report states that, where biocenoses of interest are found, they may be relocated after evaluating the health status of organisms and identifying a suitable receiving site; if translocation is not feasible, alternative ecological restoration actions may be considered to support biodiversity.

The GE.CO report provides the operational detail of how translocation is performed. It explains that the identification phase relies on multiple ROV campaigns, and that the selection of what to relocate considers both the potential perturbation area and the condition of specimens. Operationally, organisms are collected using an ROV equipped with a dedicated manipulator that minimizes damage; specimens are then transferred to the surface, stabilized in oxygenated tanks, and moved within hours to the Aquarium of Genoa, where they are maintained in controlled conditions until post-construction re-deployment is possible.

In addition, the same report documents that, in an April 2025 delivery, 52 specimens (Octocorallia) were transferred, including *Leptogorgia sarmentosa* and *Eunicella verrucosa*, and notes that in some cases the rocky substrate also hosted other benthic organisms (e.g., algae, sponges, polychaetas).

Beyond benthic communities, the PMA monitoring report also treats broader ecosystem components, including marine mammals and reptiles. It states that monitoring continues in a wide area using visual and acoustic methods consistent with ante-operam monitoring and introduces a practical “exclusion zone” logic: if animals are detected in zones where noise could be harmful, mitigation measures can be activated, and activities can be managed more cautiously.

Overall, the marine ecosystem strategy is structured around a simple sustainability principle: whenever impacts cannot be completely avoided, the project aims to ensure (i) early detection through monitoring, (ii) mitigation during construction when risk conditions arise, and (iii) compensation/restoration actions supported by documented procedures and traceable implementation.

9.4 Visual and Cultural Heritage Considerations

Even if visual impacts are harder to express in monetary terms, they matter in infrastructure planning because they affect acceptability, permitting constraints, and the choice of mitigation solutions. The governance of this project explicitly includes cultural-heritage safeguards: the compensation report recalls that the project obtained a positive environmental compatibility judgement through a process involving the competent environmental authority together with the Ministry of Culture (Soprintendenza Speciale for the PNRR), showing that cultural and heritage considerations are embedded in the approval framework, not treated as a secondary add-on.

From a thesis perspective, the main point is therefore institutional and practical: visual and heritage issues are part of the same compliance structure that governs air, noise, and marine impacts. This implies that the sustainability assessment should not only look at “environmental indicators”, but also at the consistency between the project’s design choices and the prescriptions that protect landscape and cultural values. In other words, even when these impacts are not monetized in the CBA, they remain part of the project’s overall sustainability profile because they shape design constraints and require monitoring, reporting, and corrective actions where necessary.

10. Conclusion

Now I will resume all the findings during the process of my thesis and the key points essentials to understand better this project and his future benefits for the economy of the city and for the people that live and work with for the port.

10.1 Summary of Findings

The first key point about this case is about Italian infrastructure policy: the breakwater can't be evaluated trough a "business" logic, in the ACB we can clearly see that the financial analysis and the economic analysis are separated, The financial analysis is from the AdSP perspective, while the economic is under a social welfare point, these two distinctions are crucial for public decision-making.

From a financial side, the project generates limited revenues for the AdSP respect to the size of the investment, we stated in the thesis that this figure is an Authority and not an "enterprise", and that the relationship between cost and revenues is weak in public infrastructure because the benefit are captured by users rather than a balance sheet. So, under a bank point of view, the infrastructure requires public support by the founding gap as showed in Chapter 6.

For national policy, the implication is that public funding should be guided by a clear welfare logic: if the project generates strong economic benefits like logistics efficiency, safety and environmental gains; then it can be justified even when it does not "pay for itself" financially. This is exactly why the ACB procedure matters: it converts financial costs into economic costs (shadow prices), includes non-market impacts and externalities, and then uses discounting to measure overall welfare effects.

A second policy lesson is the importance of coordination and bottleneck removal. The breakwater is framed as a structural solution to an operational constraint that limits vessel access and maneuverability, meaning that the investment has value mainly because it unlocks the performance of the whole port system. However, this also implies that national infrastructure policy must treat port projects as part of a wider system: benefits depend on complementary actions, especially on the hinterland side (rail capacity and last-mile connectivity), and this is why sensitivity tests on rail share and service assumptions are necessary.

10.2 Implications for European Port Strategy

Genoa can be seen as a clear example for the other ports; in today's economy, competitiveness increasingly depends on the ability to operate with global shipping networks, these are formed by alliances, new vessels always bigger, and service reconfiguration. In the ACB are framed these macro-trends as a structural driver.

From an European point of view, the new breakwater can be seen as a “gateway-enabling” investment, because this will reduce operational constraints and strengthens Genoa's potential role as a Mediterranean access point for core markets.

Instead, the paper Ports of Genoa 2025 report shows that EU strategy must include a resilience dimension. Last year global shipping operated on a highly volatile environment caused by the geopolitical tension in the world, with the container market influenced also by policies.

Overall, the Genoa case supports an EU-level conclusion: port investments should be assessed not only as local projects, but as strategic nodes in European corridors, where benefits derive from network efficiency, competitiveness, and greater robustness of supply chains.

10.3 Long-Term Competitiveness of the Genoa Port System

In the long term, the competitiveness of the Genoa port system depends on two structural dimensions: nautical accessibility and hinterland performance. On the first dimension, the ACB shows that the current configuration imposes constraints on large vessels: maneuvers are complex, require tug assistance, and are not always smooth under wind and current conditions; the available turning space is adequate for today's largest ships but becomes critical when considering larger vessel sizes. The new breakwater is therefore framed as a competitiveness enabler because it improves maneuverability, reduces operational frictions, and increases safety margins, contributing to smoother traffic flows in the Sampierdarena basin.

On the second dimension, competitiveness is strongly linked to the ability to distribute cargo inland through efficient rail corridors and inland nodes. This is also consistent with the ACB scenario logic, where a significant part of the project's benefit is related to improved routing and to the repositioning of flows that currently enter through Northern Range ports. However, the Ports of Genoa 2025 report highlights that rail performance is sensitive to external constraints: in 2025 rail container volumes declined and the rail ratio fell, largely due to interruptions and works on the national railway network, showing that hinterland competitiveness depends on factors beyond the port itself.

For this reason, the long-term competitiveness of Genoa should be read as a “system outcome”: the breakwater removes a major nautical bottleneck, but its full strategic effect requires stable rail performance and coordination with inland logistics platforms.

10.4 Public Investment Decision-Making

The Genoa breakwater also provides clear lessons for public investment decision-making. First, it confirms the importance of separating financial and economic logic. The ACB explicitly explains that the Port Authority is not a profit-maximizing firm and that many benefits do not translate into direct revenues; as a result, the project can be financially negative while still generating strong social value. This is exactly why the economic CBA framework is crucial: it converts market prices into shadow prices, includes non-market impacts, and evaluates welfare effects rather than accounting profits.

Second, the case shows the value of structured robustness checks. The ACB includes sensitivity scenarios such as excluding residual value, implementing only Phase A, reducing rail share, and assuming that a key ULCV service is not attracted. This approach is important because it makes the decision less dependent on a single “best case” narrative and clarifies which variables drive the results.

Third, external evidence suggests that assumptions about hinterland performance should be treated carefully. The Ports of Genoa 2025 report documents that rail volumes can deteriorate even when gateway traffic grows, due to constraints on the national network. In the same direction, the Fedespedi report stresses that intramodality is not automatic: road remains competitive and stable rail corridors require coordination with inland terminals and adequate reliability and frequency.

Overall, the main lesson is that public infrastructure decisions should combine CBA with realistic sensitivity tests and with an explicit system view (port + inland nodes + rail network), because the welfare benefits of strategic projects depend on coordination and implementation conditions, not only on engineering design.

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