

Sustainable strategic targets, sustainability indicators and sustainability reporting: the case of port authorities

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Abstract

Purpose – This study examines the sustainability reports of Italian port authorities to highlight the connection between strategic sustainability objectives, financial and non-financial indicators and sustainability reports.

Design/methodology/approach – The research context includes all the Italian port authorities. The theoretical framework used considers sustainability reporting as part of a comprehensive process that includes strategic planning and management, sustainability targets and indicators, and is linked to sustainability accounting. Accordingly, for each port authority, strategic plans, financial statements and sustainability reports are evaluated through a manual content analysis to examine their contents and also any links between them.

Findings – The analysis highlights how sustainability reports often appear as standalone documents rather than as components of a broader process. They often fail to establish a clear link between the sustainable strategic objectives, the financial resources invested in pursuing them as well as any detailed performance metrics. A further significant result is the lack of external assurance, which could undermine the credibility of sustainability reports.

Originality/value – This study contributes to current public sector literature on sustainability reporting by investigating a neglected area: port authorities, which significantly impact the environment. Unlike previous studies, this research adopts a comprehensive approach by examining the connection between strategic planning, related objectives, accounting and sustainability reports, treating them as interconnected rather than isolated.

Keywords Sustainability reporting, Sustainable strategic targets, Sustainability indicators, Port authority

Paper type Research paper

1. Introduction

The increasing relevance of environmental and sustainability issues such as pollution and climate change, the depletion of natural resources, inequality, unemployment, and poverty, is attracting the interest of public-sector organisations, academics and practitioners (Aggestam-Pontoppidan *et al.*, 2024). Public-sector organisations have a significant operational impact on the environment, society and economy (Bellringer *et al.*, 2011), as highlighted by the Sustainable Development Goals (SDGs) of the UN 2030 Agenda. In both the private and the public sector contexts, many organisations provide information on these aspects to document their environmental and sustainable performance, extending the traditional financial perspective to social and environmental areas (Ball and Grubnic, 2007). Consequently, public-sector organisations are increasingly adopting sustainability, integrated and environmental reports as well as similar reporting tools.

Several studies have investigated sustainability and SDGs reporting in the public-sector context (Bisogno, 2024; Manes-Rossi, 2024). They have documented how there may be an overlapping of these reports. Previous literature has mainly focused on sustainability reporting



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and the disclosures of local governments and universities ([Bisogno et al., 2025](#)). Less attention has been paid to port authorities (PAs), despite their significant influence on regional air pollution ([Quintano et al., 2021](#)) and, more broadly, their relevant impact on the environment and society ([Dinwoodie et al., 2012](#)). Several studies have recently highlighted the importance of sustainability issues for this type of public-sector organisation ([Acciaro, 2015](#); [Ashrafi et al., 2019](#); [Di Vaio et al., 2021](#)). Furthermore, only a few studies have examined sustainability reports (SRs) from an accounting perspective ([Cohen et al., 2023](#)). This results in a lack of accounting-related studies on sustainability and SDGs, especially in the public-sector context ([Dabbicco et al., 2025](#)). [Wang et al. \(2012\)](#) claimed that sustainability management needs to be based on strategic plans that incorporate sustainability goals.

This study aims to contribute to the debate by investigating SRs of PAs, with a focus on the relationship between strategic plans (and related sustainable strategic objectives) and both financial and non-financial data. It is argued here how examining SRs as stand-alone reports is insufficient, since SRs are the final step of a complex and broad process. The process starts when the sustainability strategies and related objectives are planned and identified, specific (financial and non-financial) metrics are established, and the outcomes are assessed and critically examined.

In line with the research aim, the theoretical framework should allow for considering SRs as a component of a process where strategic planning, accounting, and reporting are closely interconnected. Accordingly, this study refers to both [Kaur and Lodhia \(2018\)](#) as well as [Guarini et al. \(2021, 2022\)](#).

[Kaur and Lodhia \(2018\)](#) highlight how the connection between sustainability accounting and reporting is largely overlooked. Following [Schaltegger and Wagner \(2006\)](#), they maintain that this connection is pivotal since it helps avoid any superficial reporting of the sustainability performance, which can often occur when SRs are considered stand-alone reports. In the same vein, [Guarini et al. \(2021, 2022\)](#) emphasise the need to include (financial and non-financial) sustainability metrics in strategic plans due to the increasing importance citizens place on sustainability. They also point out the significance of disclosing only information supported by actual performance, which, in turn, relates to the sustainable strategic objectives. Accordingly, both [Kaur and Lodhia \(2018\)](#) and [Guarini et al. \(2021, 2022\)](#) allow considering SRs as a component of a broad process that includes strategic planning, accounting, and reporting, thereby supporting the subsequent research questions:

RQ1. How are sustainability strategic objectives identified in the PA's strategic plans and sustainability reports?

RQ2. How are financial and non-financial sustainability indicators identified?

This study investigated the Italian context. Italian PAs were selected due to their strategic geographical position in the Mediterranean Sea, making the Italian maritime sector an ideal hub for cargo ships. Moreover, the country's extensive coastline offers many berthing points, increasing the capacity to handle maritime traffic efficiently ([Castellano et al., 2020](#)). For each Italian PA, the strategic plans, financial statements, and SRs were examined through a manual content analysis, aiming to scrutinise their contents.

The results show the great development of the sustainability discourse in the PAs' context. They also document the increasing amount of attention being paid to the environmental impact of the activities carried out by PAs, as highlighted by the analysis of strategic objectives identified in the strategic plans. However, most PAs did not consider the linkage between sustainable strategic objectives and the implementation of concrete actions and, therefore, the financial resources to invest to pursue them. This means that SRs tend to be considered stand-alone reports. However, it is worth noting that in a few cases, the linkage between sustainable strategic objectives, financial indicators and the contents of SRs emerges clearly. Several implications emerge from our study from a conceptual, managerial and policy perspective.

The paper is structured as follows. [Section 2](#) will review previous studies and present the theoretical framework. [Section 3](#) will set the research context, while [Section 4](#) will illustrate the research method. Findings are analysed in [Section 5](#) and discussed in [Section 6](#). [Section 7](#) will conclude the study, also identifying its limitations and implications.

2. Literature review and theoretical framework

[Bebbington and Unerman \(2020\)](#) argue that to promote accounting research related to the achievement of SDGs, it is necessary to focus specifically on certain types of organisations. They point out that traditional accounting research does not typically prioritise selecting organisations based on their potential impact on the natural and social environment. The selection of organisations to be studied should be guided by considering their ability to influence environmental and social outcomes ([Bebbington and Unerman, 2020](#)).

The literature on sustainability reporting in the public sector has primarily focused on local governments ([Ball, 2004](#)). This is probably due to their proximity to citizens ([Benito et al., 2023](#); [Bisogno et al., 2023, 2024](#)). In recent years, scholars have also investigated universities ([Fissi et al., 2021](#); [Moggi, 2019](#)), healthcare organisations ([Pizzi et al., 2020](#)) and justice systems ([Ricci and Fusco, 2020](#)). Less attention has been given to PAs ([Geerts and Dooms, 2020](#)), despite their high impact on the environment and the maritime ecosystem ([De Vicente-Lama et al., 2021](#); [Valenza and Damiano, 2023](#)). In this regard, [Di Vaio et al. \(2021\)](#) highlighted how significantly PAs can contribute to achieving the SDGs. Therefore, although lagging behind other public-sector organisations, the concept of sustainability is increasingly gaining awareness in the maritime sector ([Hiranandani, 2014](#)). However, according to [Ruiz-Lozano et al. \(2022\)](#) and [Santos et al. \(2016\)](#), sustainability reporting within PAs remains largely underexplored, as there have only been a few studies on this topic.

New skills are required, and innovative practices are expected to be implemented to support the sustainability discourse ([Balbaa et al., 2009](#); [Comtois and Slack, 2007](#); [Darbra et al., 2009](#)). A first literature stream has examined the key environmental practices implemented by ports ([Parola et al., 2017](#)), the environmental impacts of port operations on marine ecosystems ([Acciaro et al., 2014](#); [Chang, 2013](#)), the techniques used to track greenhouse gas emissions ([Bouman et al., 2017](#)), and voluntary climate disclosure practices of container ports to achieve SDG13 for climate action ([Ehalaie et al., 2025](#)). This last study focused on New Zealand and documented both the technological limitations and the regulatory inconsistencies that could constrain progressive climate action. A larger perspective has been adopted by [Valenza and Damiano \(2023\)](#), who have investigated the ability of Italian PAs to generate public value by analysing their SRs.

Another stream of literature has investigated the determinants of sustainability initiative, documenting the role of port size ([Ashrafi et al., 2019](#)). The organisational and contextual factors explaining the decision to prepare SRs in PAs have also been studied and include the proximity to a city, a history of performance data collection, and the number of socio-environmental certifications obtained ([Geerts et al., 2021](#)). Based on a global survey, [Geerts et al. \(2021\)](#) have also found that various institutional pressures significantly influence the adoption of sustainability reporting practices in port management bodies.

A different but related literature stream analysed online sustainability reporting, highlighting how larger ports disclose more non-financial information than smaller ones ([Santos et al., 2016](#)), in agreement with [Ashrafi et al. \(2019\)](#). Similarly, [Kuznetsov et al. \(2015\)](#) pointed out that small ports are often reluctant to invest in environmental management systems due to the financial burden on their net profits. These findings indirectly highlight the importance of linking the sustainability discourse to sustainable investments and, hence, refer to accounting-related measures to assess the impact of sustainable strategies ([Cohen et al., 2023](#)). [Dabbicco et al. \(2025\)](#) maintain that sustainability issues cannot be observed solely in a non-financial manner, as sustainability reporting is not only a question of embellishing traditional financial reports with narratives. They argue that accounting systems can be used to

monitor and examine past expenditures as well as plan future actions and investments. From this perspective, there are studies that have also investigated standards and guidelines adopted to prepare SRs. They argue that the inadequate quality and transparency of PA's SRs may be due to the absence of a proper framework ([Ashrafi et al., 2019](#); [Ruiz Lozano et al., 2022](#); [Grewal and Darlow, 2007](#)). [Geerts and Dooms \(2020\)](#) contend that the port sector has not yet achieved the same levels of sustainability as others due to the lack of specific guidelines for ports and their authorities.

A further literature stream focuses on strategic planning processes. [Wang et al. \(2012\)](#) maintained that incorporating the sustainability discourse in strategic planning should be the first step in the analysis of sustainability management. They also argued that to be successful, sustainable strategic objectives should involve citizens in visioning and planning (bottom-up approach), enhance technical expertise in implementation (top-down approach), and mobilise financial resources. Strategic planning processes offer an opportunity to critically evaluate how sustainability discourse can be effectively integrated into strategies and service delivery policies, thereby contributing to the achievement of social, economic, and environmental benefits ([Guarini et al., 2021](#)). Furthermore, providing information through SRs related to sustainability performance depicts the outcomes achieved and allows PAs to evaluate their sustainability outcomes against sustainability objectives. However, from this perspective as well, studies on the topic are still few and fragmented, and a gap emerges.

To summarise, it can be argued that, despite the increasing attention of academics and practitioners, sustainability reporting among PAs is still in its infancy. Sustainable reporting has not traditionally been a common practice among maritime organisations and port operators ([Karagiannis et al., 2022](#)). Furthermore, previous studies tend to concentrate on SRs as stand-alone reports, with the connection to sustainable strategies and both financial and non-financial metrics to assess the outcome being largely overlooked. This study intends to contribute to filling this gap, and analyse the existence of the link between the planning, accounting and sustainable reporting of Italian PAs. Following [Schaltegger and Wagner \(2006\)](#), it can be argued that analysing this connection is critical since it prevents any superficial reporting of sustainability performance. This means that the only information SRs should disclose is that based on actual performance, as assessed through financial and non-financial indicators, which, in turn, are linked to sustainability strategic targets.

Consistent with this research aim, the theoretical framework used in this study is based on [Kaur and Lodhia \(2018\)](#) as well as [Guarini et al. \(2021, 2022\)](#). Both studies emphasised that the sustainability discourse should not be limited to preparing reports and the specific information they include. It is beyond mere rhetoric and isolated reporting. SRs of PAs should be considered an essential component of a broad process, including strategic planning and management ([Guarini et al., 2021, 2022](#)), sustainability targets and related (financial and non-financial) indicators, being connected with sustainability accounting ([Kaur and Lodhia, 2018](#)). To support this analysis, this study will also draw on financial information, which is considered essential for supporting sustainable reporting ([Cohen et al., 2023](#); [Dabbicco et al., 2025](#)). Through this approach, it can be verified whether SRs are not window-dressing documents but rather are based on strategic planning and concrete, verifiable data. [Figure 1](#) represents the pillars of the theoretical framework.

The starting point includes identifying the sustainability goals as the key components of the broad strategic design of the entity. According to [Guarini et al. \(2021, 2022\)](#), the inclusion of sustainability in strategic plans is important not only for stakeholder engagement—as [Kaur and Lodhia \(2018\)](#) emphasised, and according to the above-mentioned bottom-up approach—but also for understanding whether sustainability management is making progress ([Wang et al., 2012](#)). Strategic plans provide a holistic representation of the PA's multi-year policy, including financial issues. They represent an important starting point for integrating the sustainability discourse in managing the activities carried out. Hence, political and managerial vision can be considered key pillars upon which the sustainability goals and targets can be

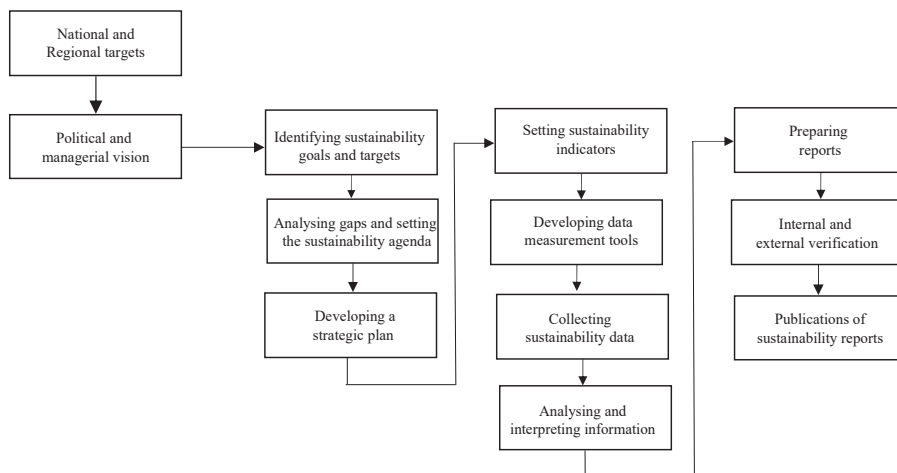


Figure 1. Sustainability strategic goals, sustainability targets, and reporting. Source: Authors' elaboration based on [Kaur and Lodhia \(2018\)](#), and [Guarini et al. \(2021\)](#)

identified in strategic plans. These targets should lead to the development of financial and non-financial indicators which will, in turn, be included in the entity's SR.

3. Setting the context

The maritime sector plays a crucial role in the European economy, significantly contributing to the movement of goods and supporting economic activities across the continent.

According to the European Union Commission, maritime transport accounted for more than two-thirds (67.8%) of freight transport performance in the EU in 2022, highlighting its central importance in logistics and transport. Over the past four years, Italy has consistently ranked among the top three European countries in terms of the gross weight of goods handled in its ports, reflecting its strong maritime infrastructure and strategic geographical position ([Assoporti, 2024](#)). Italy boasts a coastline of 7,600 km, the second longest in the EU and one of the top twenty coastlines in the world. As already observed, the Italian maritime sector benefits greatly from its strategic geographical position in the Mediterranean Sea, making it an ideal hub for cargo ships. Moreover, the country's extensive coastline offers many berthing points, increasing the capacity to handle maritime traffic efficiently ([Castellano et al., 2020](#)).

Managing this vast port system has required considerable regulatory and strategic planning efforts. Across Europe, many countries have implemented port governance reforms over the years, transforming their ports' organisational frameworks. These reforms have often necessitated greater coordination between ports. In particular, neighbouring ports have begun to adopt collaborative strategies and integrated approaches to address common challenges ([Hall and Jacobs, 2009](#); [Slack et al., 2009](#)), leading to the creation of PAs that coordinate different ports.

Over the last 30 years, Italian PAs have undergone significant reforms that have profoundly changed their governance, management and organisation. Law 84/1994 (Reorganisation of Port Legislation) marked the first comprehensive reform effort of the Italian port system, leading to the creation of 18 PAs. In subsequent years, the growth of maritime traffic, the evolution of logistical necessities and the need to promote local economic development led to the creation of six additional PAs. The most substantial recent reform occurred with Legislative Decree No. 169/2016. Known as the "Reorganisation, Rationalisation, and Simplification of Port Authorities" decree, it aimed to streamline port governance in

accordance with the “National Strategic Plan for Ports and Logistics Systems” outlined by the Ministry of Infrastructure and Transport in 2015. This reform reduced the number of PAs from 24 to 16 and reorganised them in accordance with factors such as historical contexts, political influences, port peculiarities, and geographical characteristics (Parola *et al.*, 2017). In the current scenario, PAs also perform administrative and operational functions typical of private-sector entities, especially when granting concessions and authorisations for port infrastructures (Ehalaiye *et al.*, 2025), so they could be considered hybrid organisations (Johanson and Vakkuri, 2017). However, their primary role consists of carrying out public functions, such as regulatory functions for protecting the marine environment and reducing the environmental impacts of the activities conducted in ports, regulating and controlling the navigation around the port, maritime loading and discharging of dangerous goods, adopting measures for the safety of persons who work at (or visit) the port, and so on. More generally, PAs have to plan strategic objectives and manage operations for the ports under their jurisdiction (Ferretti *et al.*, 2018). Table 1 shows the 16 Port Authorities and the 62 ports they manage.

4. Research method

The sample consists of 15 out of 16 port authorities. One authority was excluded since it has not yet prepared a report, though some information about its sustainable strategy is available on its website. In line with our theoretical framework and research questions, the analysis focused on the following documents, which were scrutinised to examine the relationship between the sustainable strategic objectives, financial and non-financial data, and SRs:

- (1) *Strategic plans (Piano operativo triennale)* allow to observe the strategic goals and concrete actions to be taken in the short and medium term. They span a three-year period, allowing for an investigation of the link between the planned activities and

Table 1. Italian port authorities and related ports

Port authority	Ports
Western Ligurian Sea	Genova, Pra', Savona, Vado Ligure
Eastern Ligurian Sea	La Spezia, Marina di Carrara
Sardinian Sea	Cagliari, Olbia, Porto Torres, Golfo Aranci, Oristano, Portovesme, Santa Teresa Gallura, Arbatax
Northern Adriatic Sea	Venezia, Chioggia
Central Adriatic Sea	Ancona, Pesaro, Falconara Marittima, San Benedetto del Tronto, Pescara, Ortona
Southern Adriatic Sea	Bari, Brindisi, Manfredonia, Barletta, Monopoli
Central-Northern Adriatic Sea	Ravenna
Eastern Adriatic Sea	Trieste, Monfalcone
Northern Tyrrhenian Sea	Livorno, Piombino, Portoferraio, Rio Marina, Cavo
Central-Northern Tyrrhenian Sea	Civitavecchia, Fiumicino, Gaeta
Southern Tyrrhenian and Ionian Seas	Gioia Tauro, Crotone, Corigliano Calabro, Taureana di Palmi, Vibo Valentia
Strait	Messina, Milazzo, Reggio Calabria, Villa San Giovanni, Tremestieri, Saline, Ginostra, Santa Maria Salina
Ionian Sea	Taranto
Western Sicilian Sea	Palermo, Termini Imerese, Porto Empedocle, Trapani
Eastern Sicilian Sea	Augusta, Catania, Pozzallo
Central Tyrrhenian Sea	Napoli, Salerno, Castellammare di Stabia

Source(s): Authors' elaboration based on www.assoporti.it data

achieved results. Detailed project descriptions, allocated resources, planned budgets, and specific timelines are included. As Table 2 shows, with one exception, two three-year strategic plans were selected for each PA to provide a broader view of the strategic evolution and better connect the sustainability targets and indicators.

- (2) *Financial Statements* corresponding to the sustainability reporting year. Assigning financial values to sustainability issues is challenging, but it is a pivotal step (Cohen, 2022). Previous studies argue that public sector organisations predominantly present information using non-financial indicators, despite both budgeting and financial accounting playing a crucial role in assessing the value of resource inputs and output volumes to support sustainability indicators (Cohen *et al.*, 2023). We considered the financial statements (including the notes) as a bridge between the strategic planning and sustainability reporting. Our analysis aimed to understand whether and how planned investments were connected with sustainable strategic objectives.
- (3) *Sustainability reports* published and accessible for the period 2021–2022 when almost all Italian PAs published SRs (see Table 2).

Once the data were collected, a manual content analysis was conducted. This research method has been largely used in a number of contexts and areas, including accounting studies (Campbell, 2017); it is a research technique that allows to make inferences from data according to their content (Krippendorff, 2012). Among the various approaches, this study uses the qualitative measurement approach (Beck *et al.*, 2010), which involves scrutinising disclosures related to several theoretically informed categories (Adams *et al.*, 1998). Following Campbell (2017) and Potter and Levine-Donnerstein (1999), the identification of these categories was based on the theoretical framework used in this study (Kaur and Lodhia, 2018; Guarini *et al.*, 2021, 2022; see Figure 1), and was coherent with our research questions. The research team scrutinised each document (including financial statements' notes) to search for the following conceptual categories: political/managerial vision and sustainability goals, sustainability indicators, both financial and non-financial, including accounting data related to sustainability goals. This approach, known as pattern content (Potter and Levine-Donnerstein, 1999), enabled the examination of how the sustainable strategic objectives were operationalised, whether any investments were planned to achieve them, as well as whether and how the financial and non-financial targets and indicators were identified to assess the performance

Table 2. Strategic plans, financial statements (FS) and sustainability reports (SRs)

Port authorities	Strategic plans	FS and SR
Western Ligurian Sea	2019–2021 — 2021–2023	2021
Eastern Ligurian Sea	2020–2022 — 2022–2024	2022
Sardinian Sea	2019–2021 — 2021–2023	2022
Northern Adriatic Sea	2018–2020 — 2022–2024	2022
Central Adriatic Sea	2022–2024	2022
Southern Adriatic Sea	2017–2019 — 2020–2022	2021
Central-Northern Adriatic Sea	2020–2022 — 2021–2023	2022
Northern Tyrrhenian Sea	2018–2020 — 2021–2023	2021
Central-Northern Tyrrhenian Sea	2018–2020 — 2021–2023	2022
Southern Tyrrhenian and Ionian Seas	2020–2022 — 2021–2023	2021
Strait	2020–2022 — 2021–2023	2021
Ionian Sea	2017–2019 — 2020–2022	2021
Western Sicilian Sea	2020–2022 — 2023–2025	2022
Eastern Sicilian Sea	2019–2021 — 2023–2025	2021
Central Tyrrhenian Sea	2017–2019 — 2020–2022	2021

Source(s): Authors' elaboration based on www.assoporti.it data

achieved. Furthermore, this approach allowed for the identification of any patterns of differences ([Adams et al., 1998](#)) due to a comparison between the PAs included in our sample. To ensure the reproducibility and reliability of the analysis, the approach proposed by [Adams et al. \(1998\)](#)—which has been largely used in several studies ([Campbell, 2017](#))—was adopted. This approach led the research team to initially examine three pilot PAs and, then—having agreed on a common approach—to develop the analysis in the light of the pilot exercise.

5. Findings

5.1 How are sustainability strategic objectives identified in the PA's strategic plans and sustainability reports?

The first phase of the sustainability framework utilised here ([Kaur and Lodhia, 2018](#); [Guarini et al., 2021, 2022](#)) focuses on identifying the key challenges to inform any future strategies while assessing the strategic importance of the sustainability issues. Accordingly, the first step of our analysis aimed to understand whether and how major sustainability targets, such as reducing emissions, managing waste, and protecting biodiversity, were expressed in the SRs of the 15 PAs. The analysis documents that all the PAs included in our sample have clearly determined sustainable strategic objectives. The analysis also reveals that all the PAs emphasised the pursuit of the SDG. Once the issues are identified, the plans focus on their strategic relevance, ensuring that the sustainability objectives are aligned with the PA's overall goals ([Wang et al., 2012](#)), as well as with the national and regional targets ([Guarini et al., 2021](#)).

The subsequent step of the analysis investigates how the *strategic* objectives have been translated into *operational* objectives and identifies the specific ad hoc investments that have been planned. The identification of the key operational objectives (for instance, the electrification of docks to reduce emissions from berthed ships, the adoption of low-emission technologies to improve energy efficiency and operational sustainability, the implementation of renewable energy systems to decrease dependence on fossil fuels, and so on) is pivotal as it allows to understand any patterns of actions ([Adams et al., 1998](#); [Potter and Levine-Donnerstein, 1999](#)) and innovative approaches implemented to managing the ports in accordance with the sustainability discourse ([Balbaa et al., 2009](#); [Comtois and Slack, 2007](#); [Darbra et al., 2009](#)). Furthermore, scrutinising whether any ad hoc investments have been planned is crucial as implementing sustainability strategies requires relevant financial resource investments ([Dabbicco et al., 2025](#); [Wang et al., 2012](#)) along with the identification of coherent indicators to assess the outcome. However, the pivotal role of this crucial step did not emerge as expected, as information related to the key operational investments and related indicators was frequently poor, and we observed significant differences. More specifically, an in-depth analysis of both the strategic plans and SRs documents that about 40% of the PAs studied were extremely accurate in presenting innovative strategies, providing accurate information on investments in green infrastructure and low-emission technologies and illustrating the measurable objectives that the PA intends to pursue. Furthermore, they also provide information on how to improve their internal competencies and skills (see, for instance, the 2022 SR of the Central Adriatic PA). This is consistent with the need highlighted in the current literature ([Comtois and Slack, 2007](#); [Darbra et al., 2009](#)) to acquire new skills, enhance internal competencies, and implement innovative practices (top-down approach; [Wang et al., 2012](#)). The remaining 60% of the sample was less accurate, making it difficult to evaluate the effectiveness and impact of these investments on the overall sustainability, while also limiting the ability to monitor and measure progress towards the sustainability objectives. This result aligns with the current literature on the importance of prioritising quality when addressing sustainability issues in maritime ports ([Balbaa et al., 2009](#)).

It is also worth noting that the PAs' strategic plans strongly focus on environmental sustainability objectives. This means that other sustainability dimensions received less attention or were substantially ignored. As a relevant example, a current delicate issue regards how to manage immigration flows, with the number of immigrants anchoring in Italian (and

European) docks increasing in the last few years. The ‘social’ dimension of the phenomenon and the related issues concerning human rights are neglected, as no SRs have addressed them. Conceptually, this approach confirms that the boundaries between sustainability and environmental reporting can be ambiguous, and that SR generally functions as an umbrella term (Bisogno *et al.*, 2025).

5.2 How are financial and non-financial sustainability indicators identified?

According to the framework utilised here (Kaur and Lodhia, 2018; Guarini *et al.*, 2021, 2022), the following steps of our analysis aimed to understand whether and how financial and non-financial indicators were identified in the SRs of the 15 PAs.

The analysis documents that in several cases (about 40% of the sample), accurate information is provided regarding how to assess the sustainability outcomes—related to the strategic objectives—through financial and non-financial indicators. More specifically, larger PAs tend to show a higher level of detail on all the topics; a greater integration with strategic planning and a greater use of financial information, linking results with sustainable development objectives, were observed. For instance, one of the most virtuous maritime authorities investigated for this study (the West Ligurian Sea Authority, which controls one of the largest Italian ports, Genoa) clearly integrates its sustainability objectives across the various documents analysed, particularly emphasising the related financial implications. Section 2 of the 2019–2021 Strategic Plan (paragraph 2.5, pages 74–78) emphasises a strong commitment to environmental sustainability as one of its key objectives. These sustainability objectives are translated into specific financial investments, also reflected in the 2021 Budget through the capital expenditures allocated for the ports of Genoa (where the resources have been allocated to the electrification of the docks to reduce emissions and improve energy efficiency) and Savona (where similar investments have supported shore power technologies). Furthermore, financial statements document expenditures related to projects such as implementing advanced waste management systems to achieve the predetermined recycling rate outlined in the strategic plan, as well as installing noise barriers in Genoa to mitigate noise pollution. These investments are further reflected in the 2021 Sustainability Report (sections 4.4.1 and 4.4.2, pages 58–84), demonstrating a clear link between financial planning and sustainability outcomes.

These results regarding larger PAs are consistent with previous literature in which the adoption of sustainability initiatives could be correlated to the size of the port (Ashrafi *et al.*, 2019; Santos *et al.*, 2016) and the financial resources available. Our analysis documents that smaller PAs have fewer financial resources and tend to provide less accurate information. The link between the strategic objectives and related indicators did not emerge both for financial and sustainability reporting. In about 60% of the cases, the link between the sustainability objectives and the indicators through which PAs assess their ability to reach those goals was not as straightforward as expected. Furthermore, a low propensity to include detailed financial information to support the data in the sustainability reports was observed. The lack of financial data identified in SRs goes beyond a mere insufficiency of information on the costs of sustainability initiatives. It reflects the lack of a structured approach to link financial planning to sustainability outcomes, which undermines the ability to demonstrate how the resources are allocated and used to achieve the strategic objectives. This is further highlighted by the already observed low propensity to include detailed financial information to support the sustainable strategic objectives. Without defined metrics, it is difficult to monitor progress, which can limit the organisations’ ability to track the development of sustainability initiatives step by step. This lack of clarity and precision in measurements can also hinder transparency and accountability, complicating comparisons with other PAs.

The different degrees of informational accuracy may also be explained in light of the informational priorities determined by the materiality analysis prepared at the beginning of each report. Where the materiality analysis gave greater attention to investments, SRs showed

more detailed information on these aspects. This issue has been specifically addressed in the PAs' contexts by [Ruiz-Lozano et al. \(2022\)](#), who highlighted the importance of a structured materiality process to improve the relevance and alignment of disclosed information. Our study further confirms these findings, showing how attention to materiality, particularly in prioritising financial aspects, can lead to more detailed SRs. A worthy-to-mention example is that of the Northern Adriatic Sea Authority, where the stakeholder interests (i.e. bottom-up approach; [Wang et al., 2012](#)) identified in the 2022 SR's materiality analysis highlighted "the economic sustainability of infrastructure investments" as a primary objective (pp. 56–58 of the report). This led the authority to focus more on the financial aspects within the SR. In fact, the same report (section 2.5.1, pp. 158–162) provides an in-depth account of the resources allocated to the key initiatives aimed at improving energy efficiency and reducing the environmental impact of the port activities.

The financial strategy implemented by the Northern Adriatic Sea Authority reflects a transparent and structured approach to resource allocation. The SR explains how the funds have been strategically allocated to renewable energy systems, infrastructure upgrades and better waste management. The authority strategically used the budget surplus to strengthen these initiatives, explicitly specifying how the surplus was allocated to key projects. This demonstrates a clear effort to align financial planning with sustainability priorities, showing an approach to resource utilisation that directly supports sustainability goals. This integration of the financial data not only demonstrates the authority's commitment to operationalising sustainability goals but also highlights the essential role of financial data in achieving these goals. This virtuous example illustrates that—following a materiality analysis that emphasises financial aspects as a priority—the clarity and transparency of financial information relating to sustainability initiatives can be concretely improved, providing a solid basis for the authority's overall strategy.

6. Discussion

According to the methodological approach used in this study, the analysis considered the various pillars of the theoretical framework that support our research questions ([Kaur and Lodhia, 2018](#); [Guarini et al., 2021, 2022](#)). Therefore, the analysis involved an in-depth examination of the strategic plans, financial statements, and SRs of the Italian PAs. This approach (known as pattern content; [Potter and Levine-Donnerstein, 1999](#)) enabled the examination of how the sustainable strategic objectives were operationalised, whether any investments were planned to achieve them, and whether and how the financial and non-financial targets and indicators were identified to assess the performance achieved. Furthermore, this approach enabled the identification of (patterns of) differences between the PAs included in our sample, allowing for a comparison between their SRs ([Adams et al., 1998](#); [Potter and Levine-Donnerstein, 1999](#)).

When examining the connection between the strategic plans and SRs (RQ1), a complex scenario arises. In some positive instances, this connection is clearly understood and effectively implemented, aligning with current literature ([Wang et al., 2012](#)) and one of the main pillars of our theoretical framework ([Guarini et al., 2021, 2022](#)) that highlights its importance role. On the other hand, in most cases, the strategic objectives are announced in the strategic plans; however, a lack of consistent operationalisation has been observed. Our findings reveal that public-sector accounting is not considered relevant for sustainable reporting ([Kaur and Lodhia, 2018](#)), as there is no adequately structured link regarding the use of financial data within the reports. The findings from the analysis support the idea that "sustainability accounting and sustainability reporting are usually regarded as two distinct and disconnected practices" ([Kaur and Lodhia, 2018](#), p. 342), while a strict link among them would be required (RQ2). The findings also support [Cohen et al.'s \(2023\)](#) argument that budgeting and financial accounting are essential for assessing the value of resource inputs and output volumes to support sustainability indicators. The lack of specific financial data integration into

SRs highlights a critical gap, limiting the ability to measure and communicate the true impact of sustainable initiatives (Bisogno *et al.*, 2025). As noted in the literature, assigning financial values to sustainability-related issues can be challenging (Cohen, 2022). However, supporting more detailed financial data would be necessary to provide a more substantive and less rhetorical foundation for sustainability reporting (Dabbicco *et al.*, 2025).

The analysis documents that about 40% of the PAs included in our sample (mainly the largest PAs) pay particular attention to the stakeholders' viewpoint through the materiality matrix. Furthermore, these PAs tend to emphasise the need to improve the skills and competencies of the workforce, along with implementing innovative practices. From a conceptual perspective, the line of action of virtuous PAs can be interpreted as a combination of both the bottom-up approach, based on the stakeholders' involvement, and a top-down approach, aimed at improving the skills and competencies of the workforce (Wang *et al.*, 2012). On the other hand, many PAs (about 60%) do not pay attention to these issues, and they barely use financial and non-financial indicators to assess their sustainability performance. The identified patterns of differences could be explained by considering the standards and guidelines used to set the sustainability indicators. As Table 3 illustrates, all the authorities prepare their SRs using the GRI standards. In this respect, two methodologies can be adopted.

Table 3. Summary of sustainability reporting practices and assurance of port authorities

Port system authorities	Year	Main framework	Sector-specific framework and guidelines	Alignment with SDGs	External assurance
Western Ligurian Sea	2021	GRI "core" option	WPSP	Yes	No
Eastern Ligurian Sea	2022	GRI "core" option	WPSP	Yes	No
Sardinian Sea	2022	GRI "referenced" option	No	Yes	No
Northern Adriatic Sea	2022	GRI "core" option	WPSP, MIMS guidelines, AIVP 2030 agenda	Yes	No
Central Adriatic Sea	2022	GRI (no specific)	No	No	No
Southern Adriatic Sea	2021	GRI "referenced" option	GBS guidelines	Yes	No
Central-Northern Adriatic Sea	2022	GRI "in accordance"	No	Yes	No
Northern Tyrrhenian Sea	2021	GRI "core" option	WPSP	Yes	No
Central-Northern Tyrrhenian Sea	2022	GRI "referenced" option	No	Yes	No
Southern Tyrrhenian and Ionian Seas	2021	GRI "referenced" option	No	Yes	No
Strait of Ionian Sea	2021	GRI "core" option	WPSP	Yes	No
	2021	GRI "in accordance"	ISO26000, UN Human Rights ("Protect, Respect and Remedy" Framework), OECD ("Guidelines for Multinational Enterprises")	Yes	No
Western Sicilian Sea	2022	GRI "core" option	WPSP	Yes	No
Eastern Sicilian Sea	2021	GRI "referenced" option	GBS	Yes	No
Central Tyrrhenian Sea	2021	GRI "referenced" option	GBS	Yes	No

Source(s): Authors' elaboration on www.governo.it and www.assoporti.it data

The first requires using the GRI as a complete set to prepare an SR “in accordance” with the Standards. The second one, known as the GRI “referenced” approach, uses only selected GRI or parts of them to report specific information.

Furthermore, organisations preparing their SR “in accordance” with the GRI Standards can refer to two approaches: the “core” option and the “comprehensive” option. The 15 authorities analysed predominantly adopted the “in accordance-core” option, while some opted for the referenced approach. Additionally, two authorities state that they prepare their reports “in accordance with the GRI Standards” without specifying whether they used the core or comprehensive option. This distinction is important, as the “in accordance-comprehensive” option builds upon the core option by requiring additional disclosures on strategy, ethics, integrity, and corporate governance. Several authorities in the sample also use sector-specific frameworks and guidelines, such as WPSP (World Ports Sustainability Program), Ministry of Infrastructure and Sustainable Mobility (MIMS) guidelines, Gruppo Bilancio e Sostenibilità (GBS) guidelines, and the Association Internationale Villes et Ports (International Association of Cities and Ports) 2030 Agenda. Indeed, those PAs disclosing more information used these sector-specific guidelines. For instance, the Northern Adriatic Sea PA is one of the few that integrates GRI disclosure 201-2 with other sector-specific sources, which pertains to the financial implications, risks, and opportunities arising from climate change, demonstrating a comprehensive approach to managing any environmental and financial issues within a broader sustainability strategy.

More widely, regarding the role of financial information in sustainable reporting, [Table 4](#) illustrates that, compared to the performance indicators used by each authority in the three categories of the GRI Topic-specific Standards (Economic: GRI 200, Environmental: GRI 300, Social: GRI 400), relatively few performance indicators are supported by the use of financial data. The analysis indicates that authorities adhering to the GRI core option utilise more financial information. This is probably due to the greater level of disclosure this option gives. In the SRs analysed, the most used financial indicators, although presented with varying levels of detail, are related to the following disclosures in the GRI 200 series: 201-1 (Direct economic value generated and distributed), 201-4 (Financial assistance received from the

Table 4. The use of financial data in performance indicators

Port system authorities	Year	Main framework	Total number of performance indicator for the three topic-specific standard	Number of performance indicators that use financial data
Western Ligurian Sea	2021	GRI “core” option	43	4
Eastern Ligurian Sea	2022	GRI “core” option	32	4
Sardinian Sea	2022	GRI “referenced” option	24	1
Northern Adriatic Sea	2022	GRI “core” option	41	5
Central Adriatic Sea	2022	GRI (no specific)	21	3
Southern Adriatic Sea	2021	GRI “referenced” option	34	5
Central-Northern Adriatic Sea	2022	GRI “in accordance”	37	1
Northern Tyrrhenian Sea	2021	GRI “core” option	29	4
Central-Northern Tyrrhenian Sea	2022	GRI “referenced” option	No info	No info
Southern Tyrrhenian and Ionian Seas	2021	GRI “referenced” option	32	1
Strait	2021	GRI “core” option	17	5
Ionian Sea	2021	GRI “in accordance”	21	2
Western Sicilian Sea	2022	GRI “core” option	29	6
Eastern Sicilian Sea	2021	GRI “referenced” option	31	4
Central Tyrrhenian Sea	2021	GRI “referenced” option	41	5

Source(s): Authors’ elaboration on www.assoporti.it data

government), 203-1 (Infrastructure investments and supported services), and 203-2 (Significant indirect economic impacts).

This result contributes to the academic debate regarding the use of GRI standards in the maritime sector. Scholars argue that these standards do not fully address the stakeholders' informational needs (Eccles *et al.*, 2012; Font *et al.*, 2016), and a specific reporting framework may be required (Grewal and Darlow, 2007; Ashrafi *et al.*, 2019; Geerts and Dooms, 2020; Geerts *et al.*, 2021; Rodrigues *et al.*, 2021). Since 2015, a trade association initiative involving larger seaports has established WG174 Sustainability Reporting for Ports of the International Association of Ports and Harbors-Permanent International Commission for Navigation Congresses (IAPH-PIANC). This working group, composed of seaport representatives, consultants and academics, aims to create port-specific sustainability reporting standards to harmonise the different approaches used by port management bodies.

Our theoretical framework also highlights the need for internal and external verification of information provided by SRs (see Figure 1). This information is expected to be reliable, meaning that external and independent assurance is required. Assurance would ensure the credibility and reliability of SRs, increasing transparency and accountability. It would also increase the possibility to compare different PAs, facilitating benchmarking and continuous improvement of the sustainable practices (Brusca, 2024). However, our findings (see Table 3) evidence that none of the analysed PAs had their SRs audited, confirming what has been observed in the public-sector context (Brusca *et al.*, 2024).

7. Concluding remarks

This study investigated the SRs of the Italian PAs to examine how sustainability strategic objectives are identified in their strategic plans and SRs as well as how financial and non-financial sustainability indicators are identified. Strategic plans, financial statements, and SRs were evaluated for each PA through a manual content analysis. The theoretical framework was based on Kaur and Lodhia (2018) and Guarini *et al.* (2021, 2022).

The analysis shows development of the sustainability discourse in the PAs' context. It also documents the increasing attention being paid to the environmental impacts of the activities carried out by PAs, as highlighted by the analysis of the strategic objectives set out in the strategic plans. However, the majority of PAs did not consider the linkage between sustainable strategic objectives and the financial resources invested to pursue them, meaning that SRs tend to be considered stand-alone reports. However, it is worth noting that in a few cases, the linkage between the sustainable strategic objectives, financial indicators and the contents of SRs emerges clearly.

Our study has some limitations. First, the analysis was based on publicly available documents, which may not fully reflect the internal practices and policies of port authorities. Second, there is the risk of the subjective interpretation of the data through a manual content analysis, although our study used a theory-based approach, as suggested by Campbell (2017) and Potter and Levine-Donnerstein (1999). A third limitation may be based on the focus on a specific context, namely the Italian PAs. However, the qualitative approach used for the analysis does not aim to achieve a generalisation of results in statistical terms. Furthermore, it can be observed that the PAs of different contexts have similar needs, meaning that they face similar issues regarding their relevant impacts on the environment.

Despite these limitations, the study provides fresh insights into the current state of the sustainability practices in a context that has been less investigated. Although sustainability is a key theme and is becoming increasingly central to the dynamics of PAs, the management process often appears disconnected in its various steps. Future research could explore how to improve the mutual integration of the sustainability information in the various documents dealing with the topic, leading to a consequent improvement of SRs.

Our study documents that the sustainability discourse is immature in the PA's context, which does not seem to perceive the need to identify measurable objectives using both

financial and non-financial indicators. Strategic plans are partially connected to the outcome of the process, namely the preparation of an SR; however, the connection with investments and financial resources, as well as the financial implications of the sustainability strategic objectives, is not adequately considered.

Accordingly, one of the main implications of this study is that identifying certain sustainable strategic objectives to be included in the strategic plans and SRs, is not an end in itself; it is a component of a broad process, whose main goal should be to allow stakeholders to understand whether the entity is sustainable (Dumay *et al.*, 2010). Considering an SR as a stand-alone report fails to achieve the concrete objectives of demonstrating that strategies have been designed to reduce the environmental impacts of the PAs' activities. This aspect is even more significant in the public sector (Manes-Rossi *et al.*, 2024). Unlike private-sector organisations, where competition and market forces often drive investments in sustainability, public-sector entities are expected to demonstrate that expenditures align with the policy objectives. Decision-making in public-sector organisations is shaped by complex political structures, where budget allocations must balance multiple, often competing, priorities. In this context, ensuring the disclosure of financial information in SRs is not only a best practice but also a response to the need to verify whether public funds are effectively allocated to sustainability initiatives.

Therefore, another related implication is that without clear financial data, it is difficult to evaluate the financial viability of the sustainability strategies, which in turn undermines their credibility and effectiveness. According to Manes-Rossi *et al.* (2024), policymakers require managerial support informed by data regarding the financial resources needed and the costs involved in implementing innovative strategies to enhance the sustainability outcomes. Similarly, Dabbicco *et al.* (2025) emphasise the important role of accounting systems, which could be used to monitor and study past expenditures and plan and budget future costs. Accordingly, future research could investigate which indicators can be used to highlight this crucial issue.

Further implications also emerge from a managerial perspective. First, while environmental issues are largely addressed in the PAs' SRs, the social features (such as those related to managing immigration flows) are not considered. Second, the ability of the SRs to provide adequate and credible information regarding the sustainable strategies and practices could be affected by the type of standards and guidelines adopted. It could be claimed that adapting private-sector standards and guidelines (such as GRI) to the public-sector context may not be the best approach to follow (Dumay *et al.*, 2010). Public-sector entities have their specificities that should be taken into account. Similarly, peculiar public-sector entities such as PAs may require further adaptations due to their significant environmental impacts. Future research on this topic is encouraged. Standard setters, such as the IPSASB, could enhance their role in this delicate process, aiming to strengthen the connection between accounting and sustainability standards (Bisogno *et al.*, 2025). Finally, as a policy implication, institutions, such as the EU Commission, could progressively stimulate all public-sector entities, including PAs, to have their SR audited, as it occurs in the private sector.

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