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THE IMPORTANCE OF DOUBLE MATERIALITY IN LIPOR'S STRATEGY: A CASE STUDY

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Internship Report

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Abstract

This internship report analyses how LIPOR, the Intermunicipal Waste Management Service of Greater Porto, integrates the concepts of Sustainability and Double Materiality into its Management Control Systems (MCS). Framed by the increasing relevance of environmental, social, and governance (ESG) concerns and the European regulatory shift introduced by the Corporate Sustainability Reporting Directive (CSRD), the study adopts the 'Management Control Systems as a Package' framework developed by Malmi and Brown (2008) to assess how Sustainability and Double Materiality are operationalized across five control dimensions: cultural, planning, cybernetic, reward and compensation, and administrative.

The report combines document analysis and semi-structured interviews to explore the extent to which LIPOR's MCS reflect the principles of sustainability and double materiality. The results reveal that sustainability is embedded in the organisation's management controls, with the exception of reward and compensation control, due to public sector constraints, and that efforts are underway to further integrate double materiality, despite challenges related to technical complexity.

This report provides a detailed description of the role of MCS in supporting LIPOR's progress on ESG issues, as well as in helping the company respond to the increasingly stringent requirements imposed by government institutions in the context of double materiality, thus contributing to the literature on sustainability management and providing practical insights for public entities seeking to align with CSRD requirements.

Keywords: Sustainability, Double Materiality, Management Control Systems, Malmi and Brown, CSRD, ESG, LIPOR

Resumo

Este relatório de estágio analisa como a LIPOR, Serviço Intermunicipal de Gestão de Resíduos da Grande Porto, integra os conceitos de Sustentabilidade e Dupla Materialidade nos seus sistemas de controlo de gestão. Enquadrado pela crescente relevância das questões ambientais, sociais e de governação (ESG) e pela mudança regulatória europeia introduzida pela Diretiva de Relatórios de Sustentabilidade Corporativa (CSRD), o estudo adota os "Sistemas de Controlo de Gestão como um pacote" de Malmi e Brown (2008) para avaliar como a Sustentabilidade e a Dupla Materialidade são operacionalizadas em cinco dimensões de controlo: cultural, planeamento, cibernética, recompensa e compensação, e administrativa.

A investigação combina análise documental e entrevistas semiestruturadas para explorar em que medida os sistemas de gestão da LIPOR refletem os princípios da sustentabilidade e da dupla materialidade. Os resultados revelam que a sustentabilidade está incorporada nos sistemas de controlo de gestão da organização, com exceção do controlo de recompensa e compensação, devido a restrições do setor público; e que estão em curso esforços para integrar ainda mais a dupla materialidade, apesar dos desafios relacionados com a complexidade técnica.

Este relatório oferece uma descrição detalhada sobre o papel dos sistemas de controlo de gestão no apoio ao progresso da LIPOR em temas ESG, bem como na ajuda à empresa a responder aos requisitos cada vez mais rigorosos impostos pelas instituições governamentais no âmbito da dupla materialidade, contribuindo, assim, para a literatura sobre gestão da sustentabilidade e fornecendo insights práticos para entidades públicas que procuram alinhar-se com os requisitos da CSRD.

Palavras-chave: Sustentabilidade, Dupla Materialidade, Sistemas de Controlo de Gestão, Malmi e Brown, CSRD, ESG, LIPOR

Abbreviations

- **AA1000AP** – AccountAbility 1000 Assurance Principles
- **B Corp** – Benefit Corporation
- **BCSD** – Business Council for Sustainable Development
- **CSRD** – Corporate Sustainability Reporting Directive
- **ESG** – Environmental, Social and Governance
- **ESRS** – European Sustainability Reporting Standards
- **EU** – European Union
- **GHG** – Greenhouse Gases
- **GRI** – Global Reporting Initiative
- **ISO** – International Organization for Standardization
- **LIPOR** – Serviço Intermunicipalizado de Gestão de Resíduos do Grande Porto (Intermunicipal Waste Management Service of Greater Porto)
- **MCS** – Management Control Systems
- **NFRD** – Non-Financial Reporting Directive
- **PERSU** – Plano Estratégico para os Resíduos Urbanos (Strategic Plan for Urban Waste)
- **RBV** – Resource-Based View
- **ROI** – Return on Investment
- **SA 8000** – Social Accountability 8000
- **SDGs** – Sustainable Development Goals
- **SIADAP** – Sistema Integrado de Avaliação do Desempenho da Administração Pública (Integrated Performance Assessment System for Public Administration)
- **TBL** – Triple Bottom Line
- **UN** – United Nations
- **WCED** – World Commission on Environment and Development

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1. Introduction

This curricular internship was carried out at LIPOR, the Intermunicipal Waste Management Service of Greater Porto, as part of the completion of the Master's degree in Economics of Business and Strategy at the Faculty of Economics of the University of Porto (FEP). The internship began on February 10 and took place within LIPOR's Sustainability and Corporate Responsibility Unit.

Throughout the internship, I was involved in a variety of activities that reflected LIPOR's strategic positioning regarding sustainability and operational transparency: one of the main tasks was supporting the analysis of the new European directive on non-financial reporting, the CSRD, and its transposition into LIPOR's organizational context; I also assisted in the preparation of LIPOR's 2024 Integrated Report, which is a key communication tool that consolidates the organization's financial, social, and environmental performance in a transparent and integrated manner; and I collaborated on the revision of LIPOR's Sustainability Agenda, a document that embodies the organization's alignment with the United Nations Sustainable Development Goals (SDGs).

This internship represented a highly enriching learning opportunity, allowing me to apply and deepen the knowledge acquired throughout my academic path, particularly in the field of corporate sustainability, but also in the field of strategy.

The main objective of this work was defined in alignment with the organization and the goal set was to understand how LIPOR integrates sustainability and, specifically, the concept of double materiality into its MCS, as the growing importance of ESG issues in the business context requires an increasingly strategic and integrated approach, making it essential to analyse how these topics are operationalized internally.

To support this analysis, the theoretical framework of *Management Control Systems as a Package*, proposed by Malmi and Brown (2008) was used, which allowed for the exploration of several dimensions of control (cultural, administrative, planning, cybernetic, and reward and compensation systems) and helped assess how each of them aligned with LIPOR's sustainability strategy.

The study was conducted through a combination of two methods: document analysis, as internal documents such as reporting materials and management procedures were reviewed

to understand how ESG topics and the principle of double materiality were embedded in the organization's management systems; and semi-structured interviews, which complemented these findings by providing insights from key staff members that helped clarify the practical implementation of these concepts.

This report is structured to provide a logical progression from the contextualization of the internship to the main findings and conclusions. So, after this introductory chapter, which outlines the context, objectives and activities of the internship, Chapter 2 presents a brief institutional and strategic overview of LIPOR, providing essential background to understand the case study.

In Chapter 3 it is offered a comprehensive literature review, addressing the emergence of ESG concerns, the role of sustainability in business strategy, the European regulatory framework (with emphasis on the CSRD and double materiality), and the relevance of MCS, particularly the framework proposed by Malmi and Brown (2008), which serves as the analytical foundation for the study.

Chapter 4 details the methodology adopted, describing the research design and data collection methods (document analysis and interviews). While Chapter 5 presents and discusses the findings of the research, which are structured in accordance with the five types of control defined by Malmi and Brown (2008) – cultural, planning, cybernetic, reward and compensation, and administrative – and analysed separately in relation to both corporate sustainability and the principle of double materiality.

Finally, Chapter 6 sets out the main conclusions of the study, summarising the integration of sustainability and double materiality into LIPOR's MCS.

2. LIPOR

LIPOR, Intermunicipal Waste Management Service of Greater Porto, is a national and international benchmark in sustainable urban waste management, playing a key role in implementing practices aligned with the principles of the circular economy and sustainable development.

It was founded in 1982 and is an intermunicipal entity that brings together eight municipalities: Espinho, Gondomar, Maia, Matosinhos, Porto, Póvoa de Varzim, Valongo, and Vila do Conde. It generates, values and treats urban waste produced by around one million inhabitants, treating approximately 500,000 tonnes of waste annually (LIPOR, n.d.-a).

LIPOR's purpose is to build a better world every day, while its mission is to transform waste into new resources through the implementation of innovative and circular practices that generate and share value. The organisation's vision is to position itself in the global market and lead trends for a sustainable future, while its institutional values are: ambition, passion, creativity, positivity, responsibility, rigour, ethics and team spirit (LIPOR, n.d.-j).

The organisation's activities are supported by an integrated waste management model that prioritises recovery and reduces landfill disposal, a strategy based on four main components: multi-material recovery, organic recovery, energy recovery and sanitary landfill (LIPOR, n.d.-a). Among the most relevant infrastructures is the Automatic Packaging Sorting Unit, responsible for separating plastics, which has a capacity of more than 30,000 tonnes/year, the largest of its kind in the Iberian Peninsula (LIPOR, n.d.-c). The Organic Recovery Plant in Baguim do Monte recovers 60,000 tonnes/year of biowaste and produces the organic soil improver NUTRIMAIS (LIPOR, n.d.-i). The Energy Recovery Plant, located in Maia, treats an average of 1,100 tonnes of waste per day, producing around 170,000 MWh/year, enough energy to supply 150,000 inhabitants (LIPOR, n.d.-e).

LIPOR offers a wide range of products resulting from the valorisation of collected urban waste. It markets: AAGE32, an artificial aggregate produced from incineration slag, used in road pavements as an ecological alternative to natural aggregates; NUTRIMAIS, a 100% natural organic compost, which is regularly applied to agricultural soils to increase their fertility; and Electricity, generated by the incineration of non-recyclable waste (LIPOR, n.d.-b; LIPOR, n.d.-h; LIPOR, n.d.-d). Among LIPOR's range of innovative products is Wallie,

a domestic wall-mounted recycling bin made from 89% recycled plastic, and Wayste, a digital platform that allows real-time monitoring, analysis and optimisation of urban waste management (LIPOR, n.d.-l; LIPOR, n.d.-m).

In addition to products, LIPOR also sells services: it offers educational and training programmes tailored to the needs of each organisation, in person or via e-learning, through the LIPOR Academy; it provides specialised technical support in waste management, particularly to educational, social and business entities; and it provides personalised consulting for waste management projects in various international contexts (LIPOR, n.d.-f; LIPOR, n.d.-k; LIPOR, n.d.-g).

LIPOR follows the principles of the circular economy, operating at the intersection of the three dimensions of sustainable development: environmental, economic and social. Its strategy includes not only waste treatment and recovery, but also energy generation and the provision of specialised services, positioning itself as an active agent in the ecological and energy transition (LIPOR, n.d.-a).

3. Literature Review

3.1 Emergence of ESG Issues and the Triple Bottom Line Concept

The debate surrounding corporate sustainability has become increasingly important in recent decades, reflecting a progressive change in the way organisations view their role in society. One of the milestones in this movement is the definition of Sustainable Development (SD) presented by the World Commission on Environment and Development (WCED) in the 1987 report *Our Common Future*, which states that sustainable development is development that "meets the needs of the present without compromising the ability of future generations to meet their own needs" (as cited in Lueg & Radlach, 2016, p.159).

In line with this integrated perspective, John Elkington introduced the concept of the Triple Bottom Line (TBL) in 1997 in his book *Cannibals with Forks: The Triple Bottom Line of the 21st Century Business*. The TBL proposes a new way of measuring organisational performance, considering three interdependent dimensions: People, Planet and Profit. This approach suggests that companies should not only pursue positive financial results (profit), but also guarantee positive social impacts (people), ensuring the well-being of employees, local communities and promoting social justice, and minimise their environmental impacts (planet), reducing carbon emissions, preserving natural resources and biodiversity.

Elkington's proposal aimed to promote an alignment between the economic objectives of organisations and environmental and social concerns, thus contributing to SD in a more comprehensive way. This thinking influenced the emergence of other conceptual frameworks, such as ESG, a term that gained notoriety in 2004 with the publication of the United Nations (UN) report *Who Cares Wins*. This report argues that in a globalised, interconnected and competitive world, the way in which environmental, social and governance issues are managed is indicative of the overall quality of a company's management and is therefore a decisive factor in its competitiveness.

According to the same document, companies that demonstrate better performance on ESG issues have the potential to increase shareholder value by adequately managing risks, anticipating regulatory actions and accessing new markets, while contributing to the sustainable development of the communities in which they operate. The report also emphasises that ESG issues have a direct impact on reputation and brands, representing a

growing part of the value of companies. Organisations are therefore called upon to take a leadership position, adopting environmental, social and governance policies and reporting their performance in a standardised and transparent way, identifying the main challenges and drivers of value creation, and prioritising ESG issues according to their strategic context.

3.2 Sustainability in the Business Context: Resource-Based View and Institutional Demands

Organisations often adopt sustainability practices for two fundamental reasons: following a resource-based strategy and responding to institutional demands (Lueg and Radlach, 2016).

From the resource-based view (RBV), sustainable development is conceived as an intangible strategic asset, capable of boosting organisational performance and generating opportunities through innovation and internal change (Bebbington, 2001; Fisher, 1995; Hamaudahu et al., 2013; Nixon et al., 2011; all as cited in Lueg & Radlach, 2016). This perspective is based on the work of Barney (1997), who, in *Gaining and Sustaining Competitive Advantage*, developed the Value, Rarity, Imitability, and Organization (VRIO) model. According to this model, a company's resources only confer a sustained competitive advantage if they are valuable, rare, difficult to imitate and properly organised.

More recently, authors such as Bhandari, Ranta and Salo (2022) have proposed an evolution of the VRIO model, arguing that for a competitive advantage to be truly sustainable in the broadest sense of the term, strategic resources must also be aligned with responsible ESG practices. This proposal reflects a growing integration between the principles of sustainability and the economic logic of competitive advantage, emphasising the role of ESG factors in creating long-term value.

On the other hand, the institutional demands perspective emphasises the role of the social context and stakeholder pressures in defining organisational practices. In this context, organisations act in social contexts in which they experience pressures from different interest groups and, in order to maintain access to resources and safeguard their legitimacy, companies seek to conform to the norms, expectations and beliefs of their stakeholders, such as sustainability concerns (Lueg & Radlach, 2016).

3.3 The European Regulatory Framework: From the NFRD to the CSRD and the Concept of Double Materiality

The growing relevance of ESG issues in the business context has been accompanied by a progressive strengthening of the European legislative framework. The European Union (EU), recognising the central role of companies in the transition to a SD model, has adopted a series of regulatory initiatives aimed at integrating sustainability into organisations' reporting and decision-making processes.

The first major initiative in this field was the adoption of Directive 2014/95/EU of the European Parliament and of the Council of 22 October 2014, known as the Non-Financial Reporting Directive (NFRD). This directive made it compulsory for certain large companies to disclose information on environmental, social, labour, human rights, anti-corruption and bribery issues. The rationale behind this requirement was clearly expressed by the European Parliament, which argued that "disclosure of non-financial information is vital in managing the shift towards a sustainable global economy, combining long-term profitability with social justice and environmental protection" (European Parliament & Council, 2014).

In a more recent and ambitious step, the EU approved Directive (EU) 2022/2464 of the European Parliament and of the Council of 14 December 2022, known as the Corporate Sustainability Reporting Directive (CSRD). This new directive came into force on 5 January 2023 and replaces the NFRD, significantly broadening the scope of entities obliged to report sustainability information. According to this directive, the companies covered will have to report their activities according to the European Sustainability Reporting Standards (ESRS), developed to guarantee the comparability, relevance and reliability of the information disclosed.

One of the structuring concepts of the CSRD and ESRS is double materiality, which reflects the evolution of regulatory thinking regarding the relationship between sustainability and corporate performance. Double materiality implies analysing two different dimensions simultaneously: impact materiality and financial materiality.

The impact materiality refers to the actual or potential effects, positive or negative, that the company has on people and the environment in the short, medium and long term. This analysis should consider not only the company's direct operations, but also its entire value

chain, including suppliers, customers, products, services and business relationships (*Delegated Regulation (EU) 2023/2772*, Article 43).

Financial materiality, on the other hand, relates to the risks and opportunities that sustainability issues represent for the company, insofar as these could significantly affect its development, financial situation and performance, cash flows, access to financing or cost of capital. This dimension is not limited to events or risks under the direct control of the company but extends to business relationships and future or past events with relevant financial implications (*Delegated Regulation (EU) 2023/2772*, Article 49).

The application of the double materiality principle is reflected in the identification of material topics that should be reported by the company. This selection is based on a systematic assessment of sustainability issues, taking into account their relevance in terms of impact materiality and financial materiality. as established in *European Sustainability Reporting Standard 1 – General requirements* (*ESRS 1*; para. 30; European Commission, 2023), once the materiality of a topic has been determined, the entity must disclose information in accordance with the specific disclosure requirements set out in the applicable thematic and sectoral standards.

3.4 Beyond Reporting: The Need for Sustainable Actions and Effective Management Systems

Despite progress in standardising and mandating sustainability reporting, several authors warn of its limits as a driver of transformation. SD, though widely assumed as strategic, "remains only a good intention unless organisations make serious efforts to implement it" (Lueg & Radlach, 2016, p. 158), reflecting the gap between sustainability rhetoric and practice.

John Elkington, creator of the TBL concept, criticises how his model has been appropriated. In *"25 years ago I coined the phrase 'Triple Bottom Line'. Here's why it's time to rethink it"* (2018), he regrets the TBL became just a reporting tool, rather than a systemic transformation instrument. According to him, it was "captured and diluted by accountants and reporting consultants" and reduced to balancing economic, social and environmental objectives.

He insists the TBL was designed as "a genetic code, a triple helix of change for the capitalism of the future", aimed at rethinking companies' roles and reinventing capitalism. While this vision is far from realised, Elkington highlights positive examples like Benefit Corporations (B Corp) firms that aim to be not just 'the best in the world', but 'the best for the world', citing Novo Nordisk, Unilever, Covestro, Natura and Danone as genuine examples of aligning business models with sustainability.

Similarly, Suhardjo, Akroyd, and Suparman (2024), in *Beyond sustainability reporting: a theoretical framework for ethical sustainability governance*, criticise overreliance on metrics and ESG ratings, warning of greenwashing and lack of concrete actions. They argue current reporting efforts "have not had the expected impact", calling for more ethical, transformative governance. Pucker (2021), in *Overselling sustainability reporting: we're confusing output with impact*, echoes this, noting that "reporting is not a substitute for progress" and that disclosure alone does not guarantee effective environmental and social performance improvements.

Thus, organisations must develop robust internal sustainability management mechanisms that go beyond reporting to integrate ESG objectives into strategy and operations. MCS play a key role here, translating sustainability into concrete, measurable practices (Ferretti et al., 2024), and are seen as essential to embedding sustainability into organisational practices (Lueg & Radlach, 2016).

3.5 The Malmi and Brown Framework (2008): An Integrated Perspective on Management Control Systems

Understanding MCS is essential to analysing how organizations align individual and collective behaviours with their strategic objectives. Malmi and Brown (2008) propose an innovative perspective by studying MCS as an interconnected whole rather than isolated tools. Earlier literature, focused on specific instruments like Activity-Based Costing, the Balanced Scorecard, or Value-Based Management, overlooked the interdependencies among control mechanisms, leading to biased conclusions and underspecified models (Fisher, 1998, as cited in Malmi & Brown, 2008; Chenhall, 2003, as cited in Malmi & Brown, 2008).

They define management control as "all the devices and systems that managers use to ensure that employees' behaviour and decisions are aligned with the organization's objectives and

strategies," excluding systems purely supporting decision-making. When structured and complete, these mechanisms form a management control system (Malmi & Brown, 2008).

Their conceptual framework identifies five groups of control mechanisms: planning, cybernetic, rewards and compensation, administrative and cultural, suggesting that they should be analysed as a package, given their interdependence and complementarity.

3.5.1 Typology of Management Controls

The framework proposed by Malmi and Brown (2008) organizes MCS into five main groups, each with distinct but interdependent characteristics and functions. This structure enables an understanding of how different mechanisms work together to align employee behaviour with organizational objectives.

Table 1. Management Control Systems as a Package

<table>
<tr><td colspan="7">Cultural Controls</td></tr>
<tr><td colspan="2">Clans</td><td colspan="3">Values</td><td colspan="2">Symbols</td></tr>
<tr><td colspan="2">Planning</td><td colspan="4">Cybernetic Controls</td><td rowspan="2">Reward and Compensation</td></tr>
<tr><td>Long range planning</td><td>Action planning</td><td>Budgets</td><td>Financial Measurement Systems</td><td>Non Financial Measurement Systems</td><td>Hybrid Measurement Systems</td></tr>
<tr><td colspan="7">Administrative Controls</td></tr>
<tr><td colspan="2">Governance Structure</td><td colspan="3">Organisation Structure</td><td colspan="2">Policies and Procedures</td></tr>
</table>

Note. Adapted from Malmi and Brown (2008).

a) Planning Controls

Planning controls: play a fundamental role in defining the strategic direction of the organization; establish the objectives of different areas and departments, clarifying expectations and guiding employees' efforts; and promote coordination between different activities, departments, or business units (Malmi & Brown, 2008).

Malmi and Brown (2008) distinguish two main types of planning:

- Action planning: Focuses on setting short-term goals and actions (usually up to 12 months), with the aim of guiding daily operations and ensuring alignment with the organization's tactical objectives.

- Long-range planning: Refers to the definition of objectives and strategies for the medium and long term, typically of a more strategic nature and oriented toward sustainable growth and the creation of future value.

b) Cybernetic Controls

According to Green and Welsh (1988, as cited in Malmi & Brown, 2008), cybernetic controls are based on a feedback loop designed to ensure that the organization's actual performance aligns as closely as possible with desired standards. This loop involves four fundamental steps: setting performance standards, measuring actual performance, comparing actual performance with desired performance, and correcting identified deviations.

Malmi and Brown (2008) identify four types of cybernetic systems:

- Budgets: Serve as both planning and control tools that define spending limits and financial targets and are also used as a basis for performance evaluation.
- Financial measures: Include indicators such as Return on Investment (ROI) or Economic Value Added (EVA), which assess the organization's financial performance in a quantitative manner.
- Non-financial measures: Include metrics related to product quality, customer satisfaction, delivery times, or other operational indicators that influence overall performance.
- Hybrid systems: Combine financial and non-financial measures. The most well-known example is the Balanced Scorecard, which allows monitoring of multiple dimensions of organizational performance (financial, customer, internal processes, learning and growth).

c) Reward and Compensation Controls

According to Bonner and Sprinkle (2002, as cited in Malmi & Brown, 2008), reward and compensation controls play a motivational role by promoting desired behaviours through incentives. These mechanisms align individual interests with organizational objectives, reinforcing behaviours that contribute to overall performance.

d) Administrative Controls

Administrative controls are mechanisms that guide employee behaviour within the organization by organizing individuals into groups, monitoring their actions, and defining who is accountable for what they do. These systems specify how tasks and behaviours should be carried out, ensuring predictability and consistency in employee performance (Malmi & Brown, 2008).

The authors divide them into three subgroups:

- Organisational design and structure: This includes the definition of hierarchies, departments, and teams, as well as the specialization of functions. According to Abernethy and Chua (1996, as cited in Malmi & Brown, 2008), the organizational structure can act as a control mechanism by shaping communication flows and the distribution of responsibilities. Similarly, Flamholtz (1983, as cited in Malmi & Brown, 2008) argues that task specialization reduces behavioural variability, thereby facilitating control.
- Governance structure: Refers to the composition and functioning of decision-making bodies, such as the board of directors, internal committees, and management teams, structures that oversee the achievement of objectives and ensure accountability for decisions made.
- Policies and procedures: Include regulations, manuals, protocols, routines, and work instructions, and serve as normative guidelines that define acceptable behaviours and how activities should be conducted.

e) Cultural Controls

Organizational culture represents the set of values, beliefs, and social norms shared by members of the organization, which in turn influence their thoughts and actions (Flamholtz et al., 1985, as cited in Malmi & Brown, 2008).

Malmi and Brown (2008) divide cultural controls into three types:

- Value-based controls: These involve the explicit communication of organizational values, mission, vision, and purpose, which are systematically reinforced by top

management and shape employee behaviour (Simons, 1994, 1995, as cited in Malmi & Brown, 2008).

- Symbol-based controls: According to Schein (1997, as cited in Malmi & Brown, 2008), these refer to symbolic elements that communicate messages about the organization's identity and values, such as workspace architecture, dress codes, visual symbols, and organizational rituals.
- Clan controls: Are based on the socialization process of employees within the organization or specific groups, through the sharing of common norms and practices that create a sense of belonging and cultural alignment (Ouchi, 1979, as cited in Malmi & Brown, 2008).

3.5.2 Justification for Choosing the Framework

Malmi and Brown's (2008) framework has been widely adopted for its holistic analysis of MCS, integrating formal and informal controls to mitigate fragmentation integrating formal and informal controls to mitigate fragmentation (Ghosh et al., 2019, as cited in Ferretti et al., 2024; Guenther et al., 2016, as cited in Ferretti et al., 2024; Chenhall, 2003, as cited in Ferretti et al., 2024; Lueg & Radlach, 2016) and underspecification (Chenhall, 2003, as cited in Ferretti et al., 2024; Lueg & Radlach, 2016).

Its empirical applicability also enables exploration of how control components coexist and articulate within organizations (Crutzen et al., 2017), while its inclusion of cultural and organizational dimensions deepens understanding of the alignment between strategy, values, and behaviours (Ditillo & Lisi, 2014, as cited in Ferretti et al., 2024; Dumay & Dai, 2017, as cited in Ferretti et al., 2024).

Furthermore, this framework has proven useful in examining how sustainability integrates into MCS. For instance, Lueg and Radlach (2016), empirically confirmed the presence of all five control types proposed by Malmi and Brown (2008) in a sustainability context, validating its conceptual value. Also, several empirical studies have reinforced its relevance and adaptability to various organizational and sustainability contexts (e.g., Crutzen et al., 2017; Ferretti et al., 2024; Bauer et al., 2023; Florêncio et al., 2023; Traxler et al., 2023; Slacik et al., 2023).

4. Methodology

This study aims to analyse how sustainability and the principle of double materiality are incorporated into LIPOR's MCS. To this end, two central scientific questions were defined to guide the research: (1) How is sustainability incorporated into LIPOR's MCS? and (2) How is double materiality incorporated into LIPOR's MCS?

Answering these questions requires a methodological approach that allows for an in-depth understanding of the management mechanisms used by the organisation and how they integrate sustainability concerns. This chapter therefore presents the methodology outlined for the study, describing the methodological options adopted, the data collection and analysis methods.

4.1 Preparatory Research

Before starting the LIPOR case study, a preparatory study was carried out with the aim of gaining a deeper understanding of the operationalisation of MCS in the context of corporate sustainability. This initial step proved to be fundamental in guaranteeing the methodological robustness of the study, making it possible to define more precisely the data collection and analysis instruments used in the empirical phase.

The starting point for this phase was the operationalisation of the five types of controls identified in the MCS as a Package framework proposed by Malmi and Brown (2008): planning, cybernetic, reward and compensation, administrative and cultural controls. The critical analysis of the literature made it possible to understand how these controls can be translated into concrete practices in the field of sustainability, contributing to the integration of this dimension into organisational strategies.

To this end, three previously published case studies were analysed, selected because they apply Malmi and Brown's framework (2008) to different organisational contexts:

- Crutzen, Zvezdov and Schaltegger (2017), who explore sustainability control patterns in large private European companies;
- Ferretti, Gonnella and Martino (2024), who study the integration of sustainability into the control systems of Italian banks;

- Bauer, Traxler and Greiling (2023), who analyse the role of municipal utilities in aligning with the SDGs.

The choice of these articles took into account the diversity of the sectors covered, such as private companies, the banking sector and the public sector, thus enabling a more comprehensive comparative analysis of management control practices applied to sustainability.

Based on this analysis, the following tables were drawn up summarising the examples of the operationalisation of each type of control, as observed in the three studies. These tables served as a basis for adapting the theoretical framework to LIPOR's reality, allowing the empirical research to be better contextualised.

Table 2. Operationalization of Sustainability in Control Types according to Malmi & Brown (2008) – Study by Ferretti et al. (2024)

Type of Control	**Components (Malmi & Brown, 2008)**	**Ferretti, P., Gonnella, C., & Martino, P. (2024). Integrating sustainability in management control systems: An exploratory study on Italian banks. Meditari Accountancy Research, 32(7), 1–34.**
Cultural	Value-based controls	Value controls (e.g. training)
	Clan controls	Symbol controls (e.g. energy reduction and efficiency initiatives)
	Symbols	Engagement in external cultural controls by undertaking several initiatives (e.g. ESG training programs) aimed at disseminating and supporting customers
Cybernetic	Budgets	Adoption of more quantitative and objective ESG metrics (e.g. the green asset ratio)
	Financial measures	ESG metrics are included in various internal processes, particularly the risk management process
	Non-financial measures	
	Hybrids (financial and non-financial measures)	
Planning	Long range planning	Long-term plans for ESG objectives
	Action planning	ESG theme as part of the strategy, resulting in clear and explicit ESG objectives included in the most recent published strategic plans
		Limited integration of long-term ESG objectives into the budgeting process
Reward and Compensation	Rewards or compensation attached to achievement of goals	ESG KPI´s in the long- and short-term incentive plans
Administrative	Organisational design and structure	Different organisational units to deal specifically with ESG issues
	Governance structures within the firm	Formal sustainability management structure (to provide oversight and strategic guidance on the definition and implementation of the ESG strategy) and ESG board committee (to support the directors in overseeing the sustaiability strategy)
	Procedures and policies	ESG issues included in policies and procedures (e.g. the risk management framework) to translate sustainability principles into rules for all employees

Note. Own elaboration.

Table 3. Operationalization of Sustainability in Control Types according to Malmi & Brown (2008) – Study by Bauer et al. (2023)

Type of Control	Components (Malmi & Brown, 2008)	Bauer, P., Traxler, A. A., & Greiling, D. (2023). Management control by municipal utilities for value creation to achieve the sustainable development goals. Utilities Policy, 84, 101641.
Cultural	Value-based controls	Mission
	Clan controls	Vision
	Symbols	Corporate Governance Code
		Codes of conduct
		Statutes
		Values or attitudes such as a sense of community, responsibility, environmental responsibility …
Cybernetic	Budgets	Management systems, for example, reporting on the successes achieved using an energy management system ("With the help of the energy management system, we were able to reduce the total energy consumption by 8.8% in 2021 compared with 2020")
	Financial measures	Certifications - the ISO 50001 energy management system has been introduced
	Non-financial measures	Sustainability Reporting prepared following the Global Reporting Initiative guidelines
	Hybrids (financial and non-financial measures)	Developement of a sustainability index to increase the contribution to SD
Planning	Long range planning	Strategic planning: explicit sustainability strategy (e.g. decarbonization; to safeguard services of general interest for generations to come; long-term staffing policy; increase in the proportion of employees with disabilities; increase the proportion of women in leadership positions)
	Action planning	Action planning: implementation of workshops on "Urban gardening", "Flowering meadow" or workshops for new trainees on the topic of sustainability; introduction of a CO2 road map; a greenhouse gas balance.
Reward and Compensation	Rewards or compensation attached to achievement of goals	The basic remuneration system is not yet linked to achieving sustainability targets or SD for employees
Administrative	Organisational design and structure	Officers or managers responsible for sustainability and/or environment. Various staff units and teams developed to promote SD. A sustainability steering committee to coordinate operational measures. A sustainability board, which consists of the board and representatives of the division heads. At the top management level, sustainability management is often assigned directly to the entire management board or individual board members.
	Governance structures within the firm	Supplier code
	Procedures and policies	Various workshops where employees from all company areas can participate

Note. Own elaboration.

Table 4. Operationalization of Sustainability in Control Types according to Malmi & Brown (2008) – Study by Crutzen et al. (2017)

Type of Control	Components (Malmi & Brown, 2008)	Crutzen, N., Zvezdov, D., & Schaltegger, S. (2017). Sustainability and management control: Exploring and theorizing control patterns in large European firms. Journal of Cleaner Production, 143, 1291–1301.
Cultural	Value-based controls	Intranet platform that served as a medium for discussing sustainability issues and distributing information on them
	Clan controls	Internal letters/emails dealing with sustainability
	Symbols	Internal company events organized in accordance with social and environmental considerations
		Opportunities to participate in community projects (volunteering)
		Social and environmental emphases in the annual reports
		Visual sustainability symbols such as architecture (e.g. green buildings)
Cybernetic	Budgets	Various cybernetic controls - budgets, financial, non financial and hybrid measurement systems - were observed
	Financial measures	
	Non-financial measures	
	Hybrids (financial and non-financial measures)	
Planning	Long range planning	Integration of either long-range or action sustainability planning into their core (strategic) management processes
	Action planning	Long-term sustainability objectives
		Sustainability action plans
Reward and Compensation	Rewards or compensation attached to achievement of goals	Rewards rarely applied. In those cases where reward systems were used with regard to sustainability performance, senior managers' performance was affected in all cases; in addition, it was also observed the extention of the reward scheme to middle managers.
Administrative	Organisational design and structure	Code of conduct or similar type of document. guidelines to enable employees to follow more abstract codes of conduct
	Governance structures within the firm	Environmental and social management systems e.g. in accordance with ISO 14001 and SA 8000 were observed throughout the sample
	Procedures and policies	Involvement of additional departments and people in sustainability management.
		Sustainability management structure, typically in the form of a shared-service sustainability department

Note. Own elaboration.

It is also important to emphasise that the existing literature still reveals a scarcity of studies that explicitly articulate management control systems with the concept of double materiality, recently reinforced with the entry into force of the CSRD. Thus, this study sought not only to apply Malmi and Brown's (2008) framework to sustainability in general, but also to explore how MCS can reflect and integrate the logic of double materiality.

This preparatory study also played a crucial role in drawing up the interview script used to collect primary data, helping to identify the key areas to be explored and to define the profiles of the interviewees.

4.2 Research Design

This research is based on a single case study (Yin, 2001; Yin, 2003), centred on the organisational reality of LIPOR. The choice of this methodological design is justified by the fact that the internship was carried out in the organisation itself, allowing privileged access to information and facilitating direct observation of the phenomena under analysis.

The case study is one of the most common strategies in qualitative research, providing a rich and contextualised understanding of the reality studied (Reichardt & Cook, 1986, as cited in Aires, 2015; Lincoln & Guba, 1985, as cited in Aires, 2015; Bogdan & Biklen, 1992, as cited in Aires, 2015). Guba and Lincoln (1985) reinforce this idea by pointing out that case studies offer dense and meaningful descriptions of social and organisational contexts.

In the field of management research, the relevance of this approach has also been emphasised, and it is considered an essential tool for building theoretical knowledge. According to Mariotto, Zanni and Moraes (2014), case studies have been responsible for generating some of the most innovative concepts in the field. Similarly, Bell, Bryman and Harley (2019) emphasise that the case study approach is a widely used and popular methodology in business research, having given rise to some of the most impactful studies in the field of management.

Based on the literature, the nature of this study can be classified as an observational case study, as it involves the use of participant observation, and also as a micro-ethnographic case study, since it was carried out in the specific context of a single organisation (Colás, 1992b, as cited in Aires, 2015). At the same time, it can be characterised as a descriptive case study,

since it aims to describe the management control systems adopted by LIPOR in the context of sustainability and double materiality (Yin, 2001; Yin, 2003), and as an intrinsic case study, since it aims to understand in depth a particular situation with its own value (Bell et al., 2019).

To structure the analysis and ensure a solid conceptual basis, the MCS as a Package framework proposed by Malmi and Brown (2008) was used. This structure makes it possible to integrate the different management control mechanisms used in an organisation and provides a coherent theoretical framework for analysing the empirical data collected. The use of a theoretical framework is, according to Yin (2001, 2003), a fundamental element in the construction of robust case studies, as it guides the analysis and strengthens the theoretical validity of the conclusions.

4.3 Data Collection

Data collection for this study was guided by the literature analysed in the preparatory study, allowing for a solid construction of the methodological process.

The process included two main sources of empirical evidence: documentary analysis and semi-structured interviews, both of which are complementary and frequently used in case studies (Bell et al., 2019).

4.3.1 Document Analysis

Document analysis was the first phase of data collection and corresponds to an indirect empirical data collection technique (Colás, 1992, as cited in Aires, 2015). This approach is particularly relevant in organisational contexts and is widely recognised in the literature as a valuable source for research in the area of business management (Bell et al., 2019).

In this study, the documentary analysis began with an exploration of LIPOR's institutional website, with the aim of identifying content related to sustainability. Subsequently, several of the company's public documents were analysed in order to map the operationalisation of the management control mechanisms described in Malmi and Brown's framework (2008), within the scope of ESG issues, as well as the integration of the double materiality logic.

The documents analysed, were the following: Integrated Report 2024; Integrated Report 2023; Materiality Management Process; act4nature Commitment; LIPOR Gender Equality Plan 2025–2027; Code of Ethics and Conduct; Statutes; Internal Regulations; Corruption and Related Offences Risk Prevention Plan.

4.3.2 Semi-structured Interviews

The second source of empirical data was based on semi-structured interviews, a direct data collection technique (Colás, 1992, as cited in Aires, 2015). This methodology is widely recognised as one of the most important in qualitative research into human behaviour (Aires, 2015). In the context of management, semi-structured interviews are particularly valued for their flexibility, allowing interviewees to address topics that may not have been initially foreseen in the script (Bell et al., 2019; Ferretti et al., 2024).

The script used in the interviews was constructed on the basis of the preparatory study previously carried out and is included in the Annex 1 to this report. The selection of participants followed a purposive sampling logic, with interviewees chosen strategically because they were in positions with the potential to contribute relevant knowledge to the issues under study (Bell et al., 2019). In addition, the snowball sampling technique was applied, which made it possible to broaden the network of participants through suggestions made by the first interviewees (Bell et al., 2019).

To ensure a more holistic view of the organisation and minimise possible biases, participants from various functional areas of LIPOR were included, in addition to the sustainability department. The four interviews took place in person, in the month of May of 2025, and lasted between 22 and 53 minutes. The interviews were transcribed in full, and the data systematised for analysis.

The following table summarises the main data relating to the interviews:

Table 5. Overview of Interviewees

Interviewee ID Number	**Department**	**Interview Duration**
1	Procurement Unit	22 minutes
2	Management Control and Quality Unit	53 minutes

3	Sustainability and Corporate Responsibility Unit	41 minutes
4	Hygiene, Safety and Environment Unit	19 minutes

Note. Own elaboration.

4.3.2.1 Ethical Considerations

Before the interviews were carried out, an informative email was sent to the participants outlining the study's purpose, objectives, scope, estimated duration, and format. The aim of this communication was to ensure the participants' informed and voluntary consent, in accordance with the ethical principles advocated by Bell et al. (2019).

All the interviewees consented to take part in the study and they were also informed about the guarantee of anonymity and confidentiality, and asked about the possibility of recording the interview, which is essential for the subsequent transcription and rigorous analysis of the data. The model Informed Consent Form is available in the Annex 2 of this report.

5. Results and Discussion

To contextualise this chapter, it is important to clarify key concepts used throughout. 'Corporate Sustainability' or simply 'Sustainability' refers to the ESG approach, reflecting organisations' focus on environmental, social, and governance dimensions. 'Double Materiality' refers to the CSRD principle that requires organisations to assess material issues considering both their impact materiality and financial materiality. This conceptual distinction underpins the analysis of how LIPOR integrates Sustainability and Double Materiality into its MCS.

5.1 Document Analysis

This section presents a description of the evidence gathered through document analysis, organised according to the different types of control identified in Malmi and Brown's (2008) framework. This analysis is carried out in conjunction with the two central axes of the study: Corporate Sustainability and the principle of Double Materiality, allowing us to understand how these themes are incorporated into LIPOR's MCS. All information drawn from LIPOR's 2023 Integrated Report was verified as still valid and applicable at the time of this study.

5.1.1 Cultural Control

5.1.1.1 Corporate Sustainability

At LIPOR, cultural control is visible through the incorporation of Sustainability as a shared organisational value, which can be seen in the fact that the organisation states that "LIPOR's approach to Sustainability is a driving force for the Organisation!" (LIPOR, 2025, p. 26).

LIPOR's vision, "We want to be in the global market and set trends for a sustainable future", reveals this cultural commitment to Sustainability and it is also reinforced by the LIPOR Manifesto, which refers to the organisation's 'sustainable lifestyle', revealing a clear attempt to align all employees with this value.

In addition, LIPOR subscribes to the Charter of Principles for Sustainable Business, promoted by BCSD Portugal, which defines six structural principles that are broken down into concrete commitments that the organisation undertakes to follow: Legal compliance and

ethical conduct, Human rights, Labour rights, Prevention, health and safety, Environment, and Management (BCSD Portugal, 2017).These principles constitute cultural references for how the organisation operates

LIPOR's Code of Ethics and Conduct also defines a set of fundamental values that guide the actions of all employees, of which three stand out as being directly linked to Sustainability issues: Good governance, through the promotion of an ethical climate and risk mitigation; Social responsibility, encouraging fair, cooperative and socially responsible attitudes; and Environmental commitment, which translates into a clear orientation towards the use of non-polluting technologies, environmental monitoring and energy rationalisation in favour of sustainable development.

These values are reinforced by concrete actions in each of the pillars of Sustainability. In the environmental pillar, for example, internal training on conscious water consumption is promoted and awareness signs are placed in the facilities. While in the social pillar, employees and their families can participate in the 'Semente' Volunteer Association, which promotes social responsibility actions. In addition, LIPOR is a signatory to the Portuguese Charter of Commitment to Gender Equality, committing itself to follow its principles and values.

In terms of governance, training initiatives on ethics and corruption prevention are promoted, and the 2024 Integrated Report places particular emphasis on the importance of loyalty, transparency and integrity as priorities for the Board of Directors: "(…) the consolidation of the values and principles of loyalty, transparency, and integrity is among the priorities of our Board of Directors and all our Employees." (LIPOR, 2025, p. 17).

5.1.1.2 Double Materiality

At LIPOR, it is also possible to identify cultural control aligned with the principle of Double Materiality. This is present in several statements in the Integrated Report, such as: "LIPOR is aware of its commitment to and impact on the communities it serves and is part of" (LIPOR, 2025, p. 27). This statement reflects the organisation's concern with the external impacts generated by its activities, translating the principle of impact materiality.

Other statements reveal a more integrated view, such as: "We strongly believe that, by pursuing the path of Sustainability, we are creating more value and having a greater impact on the Community, while being more relevant and competitive" (LIPOR, 2025, p. 26).

This statement reveals not only a concern with positive impacts on the community (impact materiality), but also the recognition that these same efforts contribute to the organisation's competitiveness and relevance (financial materiality).

In line with this, the following quote is particularly revealing: "Every day we seek to secure the prosperity of our Organisation ethically, ensuring a positive impact on the environment and the surrounding society, as we believe that only this way we'll remain relevant and competitive in our sector" (LIPOR, 2025, p. 24). Here we see once again the cultural incorporation of both sides of Double Materiality, in one hand the concern for the organisation's environmental and social impact, and on the other hand the understanding that this concern contributes to the entity's success and financial Sustainability.

5.1.2 Planning Control

5.1.2.1 Corporate Sustainability

One of LIPOR's main ESG planning tools is the Sustainability Agenda, which organises LIPOR's sustainable goals according to the three classic pillars of Sustainability (People, Planet, Prosperity and Partnerships) and according to the UN SDGs.

In addition, LIPOR has defined a set of goals focused on Circular Economy, such as: promoting local food production in urban areas; fostering the creation of sustainable green spaces; consolidating and expanding the intermunicipal network against food waste; promoting the repair, reuse and upcycling of electrical and electronic equipment, furniture, textiles and other streams with potential. Sustainability concerns are also reinforced by adherence to the 4M Strategy ('Less Waste, Less Carbon, More Climate, More Biodiversity') which guides the organisation's actions on critical issues such as emissions, waste management and ecosystem protection.

At the environmental level, specific goals have been set to be achieved by 2025, such as the following present in the LIPOR´s Integrated Report of 2023: impact ecosystem services at 5 times the amount invested; achieve 5% energy surplus; reduce waste production by 2% in prevention projects; achieve 8% circularity in activity and 45% preparation for reuse and recycling; launch 10 new circular products on the market. Targets such as a 50% reduction in carbon emissions until 2030 and carbon neutrality by 2045 also stand out in the 2024 Integrated Report.

In terms of energy and resource consumption, LIPOR sets specific targets, for example: water consumption from the public network per employee; GHG emissions (Scopes 1, 2 and 3); energy performance per facility.

LIPOR also has a Climate Change Adaptation Plan, which identifies the most relevant extreme weather events and defines 25 specific measures to mitigate their impacts.

In the field of biodiversity, joining the act4nature Portugal initiative translates into a set of concrete commitments, such as the following present in the latest published document: developing and approving the 2030 Biodiversity Strategy; maintaining and increasing green spaces of high biodiversity value by 26%; involving experts and employees in training and volunteer activities to protect ecosystems.

At the social level, goals aligned with the SDGs have also been established for the 2025 horizon, such as the following present in the LIPOR´s Integrated Report of 2023: maintaining the level of perceived social responsibility at 4.5 (on a scale of 1 to 5); investing 5% of turnover in the community; increasing the number of employees by 5% compared to benchmarking; integrating people with disabilities (5% of total employees); promoting curricular internships (15%) and international internships (4%).

The organisation has also implemented the 2025–2027 Gender Equality Plan, which includes targets in four strategic areas: organisational culture, work-life balance, equality in recruitment and progression, and prevention of harassment. Specific objectives include monitoring gender equality indicators, analysing harassment complaints, and reviewing job advertisements to ensure neutral language.

5.1.2.2 Double Materiality

The principle of financial materiality is embedded in LIPOR's planning control, as reflected in its Sustainability Agenda, which serves as the foundation of the organisation's sustainability planning: "Although the importance of Sustainability for the Creation of Value within Organisations is recognised, it is necessary to boost the debate and place it on the Agenda. LIPOR is no exception, drawing on its Sustainability Agenda to reflect its dynamism and materialise its response to the ESG challenges, in full alignment with its corporate strategy." (LIPOR, 2025, p. 25).

In addition, LIPOR´s Sustainability Agenda incorporates the material topics identified by through consultation with both the organisation's management and its stakeholders and these topics are translated into specific objectives aligned with the pillars of sustainability (People, Planet, Prosperity, and Partnerships) as well as with the UN SDGs.

In addition, LIPOR conducts a structured assessment of ESG risks that may affect the normal functioning of the organisation and definition of response plans to specific risks, which are adjusted periodically with the aim of increasing organisational resilience. This instrument mainly reflects the vision of financial materiality, as it considers the impact of ESG phenomena in the business.

As described in the 2024 Integrated Report: "The identification of ESG risks and their management are essential for LIPOR to be able to reflect, plan, anticipate, assess, and prioritise its actions, bearing in mind ever more unpredictable contexts. Considering the whole external background, it is well known that events affect organisations, positively or negatively, including the exposure and vulnerability to such events, be they of environmental (climatic or others) or non-climatic nature. To formalise this effort, the ESG Risk Management Process was created in 2024, a process which will be revised every two years, comprising a set of activities to adjust our positioning, complemented by response plans for specific risk situations, which are adapted annually to help our business become more resilient." (LIPOR, 2025, p. 52).

5.1.3 Cybernetic Control

5.1.3.1 Corporate Sustainability

One cybernetic control tool is LIPOR's Integrated Report, which presents the organisation's financial and Sustainability performance in an integrated manner and is used as a tool to assess the degree of implementation of LIPOR's strategy.

In the field of circular economy, LIPOR has adapted the European Commission's Circular Economy Monitoring Framework, composed of macro indicators, to create its own framework with metrics applicable to its activity, which allows LIPOR to assess the degree of circularity of its operation based on concrete data.

In the environmental pillar, LIPOR monitors and reports on a set of environmental performance indicators, for example: direct energy consumption broken down by primary energy source; energy intensity; total greenhouse gas (GHG) emissions in scopes 1, 2 and 3; carbon intensity; waste produced by the system.

The data registered each period is compared with annual targets and results from previous periods, for example: "Regarding Scopes 1 and 2 (scope comparable to the LIPOR 3M inventory conducted until 2020), 243,824 tCO2e were recorded in 2024, which represents an emissions reduction of 3% compared to 2023, and a reduction of 40.4% compared to the baseline year (2006). This reduction of 40.4% represents a reduction of approximately 165,503 t CO2e compared to 2006 (305 5)." (LIPOR, 2025, p. 92).

In the field of biodiversity, LIPOR monitors the objectives set out in its membership of the act4nature Portugal initiative, for example, in 2024, there was a 52% increase in the area converted to high biodiversity value compared to the previous year, totalling 295.71 hectares under LIPOR management.

In the social sphere, LIPOR uses specialised tools to monitor its social performance, namely: Social Fingerprint, which assesses the degree of development of social management systems (Social Accountability International, n.d.); Living Wage, which compares actual wages with the amounts that guarantee a decent standard of living (Social Accountability International, n.d.); Happiness Index, used to measure employee well-being and satisfaction; Perceived Social Accountability, which measures how customers perceive the organisation's social performance.

Still in the social sphere, the LIPOR 2025–2027 Gender Equality Plan is monitored using indicators such as: number of training and awareness-raising actions on harassment; employee turnover by gender; number of training hours by gender and professional category.

In addition, in accordance with the Global Reporting Initiative (GRI) standards, indicators such as the following are collected and reported: average salaries by gender and professional category; number of new hires by age group and gender; salary ratio between men and women by function.

In the area of governance, LIPOR has developed mechanisms to assess the effectiveness of its integrity and ethics tools: an internal survey is conducted periodically to assess employees' knowledge of the Code of Ethics and Conduct and the Plan for the Prevention of Corruption

and Related Offences; the organisation also assesses the functioning of reporting channels to ensure their effectiveness and responsiveness.

Within the scope of GRI standards, LIPOR monitors Governance indicators, such as: percentage of management bodies and employees who have received anti-corruption training; percentage of management bodies and employees who have been informed of anti-corruption policies and procedures; number of confirmed cases of corruption and respective measures taken.

5.1.3.2 Double Materiality

LIPOR's performance in relation to each material topic is monitored using internal management tools and systems, as well as indicators defined internally and within the scope of the GRI Standards, allowing for progress to be assessed in each relevant area and strategies and actions to be adjusted whenever necessary.

In addition to the indicators themselves, LIPOR uses management tools to manage material topics. For example, the topic 'LIPOR Workforce' is monitored through the organisation's Social Responsibility Management System: "LIPOR has implemented a certified Social Accountability Management System, (…) and monitors contents associated with this topic, presenting them in this Integrated Report on pages 102." (LIPOR, 2025, p. 176).

The LIPOR´s 2023 Integrated Report mentions that to analyse employees' level of knowledge about Double Materiality, the materiality knowledge rate is measured, a tool that allows assessing employees' familiarity with this principle and their perception of its relevance to LIPOR's strategy and Sustainability.

5.1.4 Reward and Compensation Control

At LIPOR, reward and compensation controls are not used as a direct mechanism to encourage performance in Sustainability, due to the legal framework that regulates public entities. As a public intermunicipal organisation, LIPOR is subject to the legal regime applicable to public administration, that establish uniform rules for human resources management, including careers, progression and remuneration, and do not allow for the

introduction of variable compensation systems linked to ESG or organisational performance targets.

In this context, there is no formal system that allows the remuneration of employees or managers to be linked to the achievement of objectives related to the pillars of Sustainability, which represents a limitation on the use of this type of control as a strategic management tool for Sustainability and Double Materiality.

5.1.5 Administrative Control

5.1.5.1 Corporate Sustainability

Administrative control is identified and visible in the adoption of regulatory structures, internal procedures, and formal documents that guide the organisation's actions.

Thus, LIPOR applies the GRI Standards in the disclosure of ESG information, and the adoption of this procedural structure defines how the organisation reports on its activity, ensuring transparency and comparability.

In addition, communication with stakeholders is carried out in accordance with the principles of the AccountAbility 1000 Assurance Principles (AA1000AP, 2018) standard, with the process of identifying, prioritising and responding to Sustainability challenges being conducted in accordance with this benchmark.

LIPOR also has a Code of Conduct for Suppliers and Subcontractors, which establishes criteria for behaviour aligned with the organisation's Sustainability values, ensuring consistency between internal principles and the external value chain.

Responsibility for implementing Sustainability policies is assigned to the Sustainability and Corporate Responsibility Unit, which is part of the Education, Communication and Sustainability Department. This unit's mission is to develop ESG policies and, according to LIPOR's Internal Regulations, its functions include: develop and manage the Sustainability and Corporate Responsibility portfolio; update and implement the Sustainability Agenda; define, integrate and promote the principles of Sustainability within the Association and its ecosystem; promote the Sustainability strategy internally and externally; follow up and monitor Sustainability programmes; prepare the annual Sustainability Report, ensuring compliance with non-financial reporting standards and guidelines; manage and engage

stakeholders and define materiality, ensuring compliance with the AA1000AP (2018) standard; measure the social and environmental impact of programmes; implement circularity strategies and monitoring tools; participate in the preparation of strategic documents, training programmes, technical committees, working groups and applications; collaborate with other organisational units and promote innovation, quality and creativity in the projects developed.

This approach is also formalised in institutional documents. The Code of Ethics and Conduct defines the Principle of Sustainability, which affirms the duty to preserve and enhance public material and immaterial resources or those serving the collective interest. Article 2 of LIPOR's Statutes identifies as a complementary activity of the association the "development and implementation of projects, programmes and methodologies for the consolidation of environmental policies, particularly in the areas of waste prevention, sustainable development and organic farming.".

In the environmental field, LIPOR is certified the International Organization for Standardization (ISO) 14001 standard, which establishes a procedural framework for Environmental Management Systems that guides the organisation in implementing practices for continuous improvement and pollution prevention (International Organisation for Standardisation [ISO], 2014).

In the social sphere, SA 8000 certification recognises LIPOR's compliance with international social responsibility standards, covering issues such as child labour, health and safety, and non-discrimination.

In addition, LIPOR elects a Workers' Representative for Social Accountability, whose role is to build bridges between management and employees, facilitating communication and the resolution of social and welfare issues. There is also a Social Performance Team, composed of members of management and workers, with the aim of monitoring and evaluating the organisation's social responsibility system.

In terms of governance, LIPOR's Ethics Committee ensures compliance with the Code of Ethics and provides a forum for dialogue between employees and management on ethical issues. The Corruption and Related Offences Risk Prevention Plan defines the organisation's measures and responsibilities for preventing, detecting and mitigating risks in this area.

In this context, the Regulatory Compliance Committee was also created, an independent group with the function of receiving and monitoring reports of irregularities and promoting a culture of integrity. Every quarter, the '1 Minute of Ethics' activity is promoted, through which different teams address topics covered in the Code of Ethics and Conduct, as addressed in the LIPOR´s 2023 Integrated Report.

5.1.5.2 Double Materiality

At LIPOR, administrative control is also identified in the integration of Double Materiality through formal governance documents and institutional standards that regulate the management of material issues.

The Materiality Management Process operationalises the concept of Double Materiality at LIPOR through formal rules and procedures that structure the identification, prioritisation and integration of material issues into strategy, reporting and dialogue with stakeholders. This document defines clear inputs, responsibilities and activities aligned with the AA1000AP (2018) standard and GRI guidelines and it provides a structured and systematic approach to stakeholder mapping and engagement, trend analysis and benchmarking, evaluation of impacts from both financial and environmental and social perspectives, and the development of the materiality matrix that supports strategic decisions and sustainability reporting.

5.2 Interviews

This section summarises the interview findings, highlighting how LIPOR integrates Sustainability into its organisational strategy and applies the principle of Double Materiality. It then provides a structured analysis by control type, based on Malmi and Brown's (2008) framework, detailing its operationalisation in Corporate Sustainability and Double Materiality. Finally, it identifies the main challenges and progress reported by the interviewees regarding the introduction of the CSRD and the adoption of Double Materiality.

5.2.1 Corporate Sustainability

Sustainability at LIPOR was fully recognised by respondents as a strategic pillar, based on an integrated and holistic approach. According to them, this strategy is not limited to compliance with legal requirements but aims at a real transformation of the organisation's operating model, incorporating environmental, social and economic concerns across the board.

LIPOR has been consolidating a vision of Sustainability aligned with the SDGs of the UN 2030 Agenda, reflected in the organization´s Sustainability Agenda. According to the interviewees, this agenda is the main strategic guidance tool, linking the organisation's material issues to the SDGs and promoting action in line with global sustainable development goals.

Throughout the interviews, the interviewees mentioned several areas of LIPOR's Sustainability strategy: the organisation's investment in clean energy; efforts made in the field of environmental requalification, an issue largely associated with closed landfills; investment in the community to promote a sustainable lifestyle (through programmes such as Academia LIPOR, Plano Geração +, Centro de Recuperação e Reutilização and the Comunidades Reuse project); and the 4M Strategy ('Less Waste, Less Carbon, More Climate, More Biodiversity').

In addition to its legal obligations, respondents mentioned that LIPOR has sought to go further by investing in voluntary initiatives, such as promoting biodiversity, which is an integral part of the 4M Strategy, indicating a focus on positive environmental impact. This stance indicates that Sustainability at LIPOR is not just a guiding principle, but a practice that is translated into concrete projects.

It was also mentioned that the organisation's results and commitments are communicated transparently, namely through its Integrated Report, which operates as a strategic document that brings together and articulates the organisation's financial, social and environmental information, reinforcing the consistency of its actions and accountability to stakeholders, who are an important player for LIPOR, since, according to one interviewee, it is in the entity's interest that they play an active role in the Sustainability initiatives carried out.

5.2.2 Double Materiality

The principle of Double Materiality is integrated into LIPOR's strategic management practices and is recognised by interviewees as a guiding pillar for setting priorities and making decisions. They also highlight that LIPOR adopts a participatory and structured approach to the materiality process, actively involving its stakeholders in a continuous effort of collaboration, as this involvement is important to its Sustainability strategy: "We believe that only through dialogue, transparency and cooperation can we build truly sustainable solutions" (Interviewee 2, personal communication, May 2025).

According to the testimonies collected, LIPOR conducts consultation processes with stakeholders, both external, such as communities, partners and citizens, and internal, namely the management team and employees, in order to identify the most relevant material issues. These issues are analysed in light of two complementary dimensions: on the one hand, the actual and potential impacts of the organisation on the environment and society; on the other, the risks and opportunities that ESG issues represent for LIPOR's own performance and resilience.

This Double Materiality exercise is recognised by the interviewees as a process that allows the organisation to align the concerns of its stakeholders with its own strategic objectives, reinforcing sustainable and informed management. After this consultation, material issues are prioritised and translated into specific projects, accompanied by strategic indicators that allow LIPOR's performance to be monitored in environmental, social and economic dimensions. This entire process allows LIPOR to make conscious decisions, as mentioned by one of the interviewees: "The principle of Double Materiality helps us make more responsible decisions, aligned with current challenges and expectations" (Interviewee 2, personal communication, May 2025).

Despite advances in this area, one of the interviewees still identified the need to improve external communication of projects associated with material issues as a challenge, as such an effort is considered essential to increase community recognition and awareness of strategic Sustainability issues, making LIPOR's impact more visible and understood by the public.

5.2.3 Cultural Control at LIPOR

5.2.3.1 Corporate Sustainability

The testimonies collected reveal that Sustainability is aligned with LIPOR's organisational culture, being promoted not only as a set of operational practices, but as a value shared by all employees, with a focus on training, internal communication and active team involvement: "Sustainability has a strong presence in LIPOR's organisational culture" (Interviewee 4, personal communication, May 2025).

One of the most visible internal communication tools mentioned by respondents is corporate television, which is used to communicate Sustainability-related content in an accessible and continuous manner. They also mentioned LIPOR's Intranet platform, which also serves as a vehicle for sharing this type of content among employees. In addition, internal conferences, thematic sessions and weekly programmes organised by the Innovation department are held to address issues related to strategic objectives, including ESG topics.

It was also mentioned that LIPOR develops specific organisational culture programmes, such as the 'Energia L' Programme, focused on raising awareness and promoting sustainable practices among employees, and the 'Somos pela Sustentabilidade' Programme, which aims to align employee behaviour with the organisation's Sustainability commitments. These programmes range from environmental volunteering activities to internal events and themed campaigns.

Finally, respondents mentioned that continuous training initiatives are cross-cutting across the entire organisation, including welcoming new employees with content dedicated to Sustainability. These actions seek not only to inform, but also to inspire behavioural change, promoting a collective commitment to sustainable development, reinforced in LIPOR's Manifesto and Vision: "More than just implementing projects, we seek to inspire behavioural change and create a true collective commitment to sustainable development" (Interviewee 2, personal communication, May 2025).

5.2.3.2 Double Materiality

The integration of the concept of Double Materiality into LIPOR's organisational culture is still under development, reflecting the recent nature and technical complexity of this concept.

Two of the interviewees pointed out that one of the challenges is the abstraction of the topic, which has required an increased effort to translate and simplify it for employees.

Despite these challenges, efforts to communicate and engage internally on the principle of Double Materiality are visible, as mentioned by the interviewees, with emphasis on the role of the 'Energia L' programme, which integrates the topic as an awareness-raising theme among teams.

At the same time, the 'Barómetro Social' is promoted, an internal communication section promoted by the Stakeholders group, with the aim of demystifying concepts related to Sustainability and Double Materiality, bringing them closer to the daily reality of employees.

One of the interviewees also mentioned that, as stakeholders in the organisation itself, employees are included in the consultation and communication strategy provided for by the international AA1000 standard, which structures the way LIPOR interacts with its stakeholders. Through this standard and associated practices, employees not only receive information, but are also actively involved in the process of identifying and prioritising material issues.

5.2.4 Planning Control at LIPOR

5.2.4.1 Corporate Sustainability

The interviewees indicate that the planning process is structured and aligned with the organization's Sustainability Agenda, the UN SDGs and the commitments made under the 4M Strategy ('Less Waste, Less Carbon, More Climate, More Biodiversity'): "The objectives are the result of structured planning, aligned with the LIPOR Sustainability Agenda, the UN SDGs and the commitments made under the 4M Strategy" (Interviewee 2, personal communication, May 2025) and "Strategic objectives are defined taking into account the pillars of the 2030 Agenda and the Sustainable Development Goals" (Interviewee 3, personal communication, May 2025).

According to the participants, the objectives set cover different time horizons: in the short term, annual operational objectives are set relating to areas such as waste management, energy efficiency, training actions, raising community awareness and promoting biodiversity; in the long term, LIPOR's strategic objectives are defined, including targets such as reducing

greenhouse gas emissions by 50% by 2030 and achieving carbon neutrality by 2045. Strategic objectives are generally defined for 5-year periods: the last set of strategic goals was set to the horizon of 2025 to 2030, and the previous was set to the period of 2020 to 2025.

Interviewee 3 revealed that the objectives are broken down as follows: the strategic objectives are translated into operational targets for the functional areas (HR, Operations, Innovation, etc.) and then into individual employee objectives via the Integrated Performance Assessment System for Public Administration (SIADAP) system. Compliance with these targets is monitored on a monthly basis, namely through the Monitoring Plan.

This cascade thus contributes to organizational alignment and the transversal involvement of employees in the achievement of LIPOR's sustainable strategy, as Interviewee 3 mentioned: "All of this comes about in an integrated way, so that everyone contributes to the organization's objectives" (Interviewee 3, personal communication, May 2025).

It was mentioned that public regulations, such as the Strategic Plan for Municipal Waste (PERSU), also influence the definition of these objectives, insofar as they impose targets for the sector: "The objectives set are influenced by regulations, such as PERSU" (Interviewee 4, personal communication, May 2025).

Investment planning also includes targeting investments based on ESG criteria, ensuring that the allocation of financial resources is consistent with the principles of Sustainability, as interviewee 2 mentioned.

5.2.4.2 Double Materiality

According to the interviewees, the logic of Double Materiality is also present in LIPOR's planning control, and is taken into account when defining strategic objectives, since the material themes, identified on the basis of consultation with stakeholders and top management, are integrated into the Sustainability Agenda and associated with concrete objectives.

Thus, each material theme is materialized in LIPOR's strategic objectives, which define its Sustainability Strategy. These same strategic objectives, associated with each of the material themes, are broken down into operational objectives for the different areas.

The degree of implementation of LIPOR's Sustainability Agenda is monitored annually, allowing for continuous and structured monitoring of the incorporation of Double Materiality into strategic planning, as mentioned by the interviewees.

5.2.5 Cybernetic Control at LIPOR

5.2.5.1 Corporate Sustainability

LIPOR systematically monitors environmental, social and economic performance indicators that allow it to monitor the implementation of its sustainable commitments, as mentioned by the interviewees. Among the main environmental indicators, the following were mentioned: greenhouse gas emissions, energy and water consumption, the amount of waste recycled and recovered, among others. In the social field, for example, the number of awareness-raising actions and the levels of community participation and employee satisfaction are measured.

In addition, each functional area has specific indicators associated with LIPOR's strategic objectives. In the case of supplier assessment, for example, Sustainability criteria are used to measure responsible practices, and the evolution of the number of sustainable suppliers and procedures with ecological criteria is monitored.

One of the interviewees mentioned that the GRI Standards, to which LIPOR complies, impose a wide range of indicators for the three ESG aspects. Some of these indicators are already proactively raised by the responsible areas, regardless of the regulatory requirements, while others are only monitored when the Integrated Report is prepared, which makes this document an important monitoring tool. Even so, one of the interviewees mentioned that this sporadic analysis of some indicators was an opportunity for improvement resulting from the last internal audit process and a solution is being structured.

However, the interviewees mentioned that most of the ESG indicators used by LIPOR are monitored on a regular and structured basis, with periodic analysis, internal reporting and integration of the results into the annual Integrated Report. Although there is still a constraint identified, which is the lack of a centralized platform for processing indicators, as mentioned by one of the interviewees. It is stressed that this challenge is being addressed, namely through the framework of the new CSRD, which could promote greater stability in the definition and monitoring of indicators.

Finally, the interviewees mentioned that the indicators play a direct role in decision-making, allowing LIPOR to identify deviations, adjust strategies and continuously improve its performance, with coordination between the operational and strategic areas.

5.2.5.2 Double Materiality

With regard to Double Materiality, it was mentioned that Cybernetic control is achieved through the definition of performance indicators associated with prioritized material topics.

Thus, it was explained by one of the participants that each material theme defined by LIPOR has indicators that allow it to be monitored over time and that are defined at the strategic level of the organization, allowing the degree of response to the prioritized themes to be assessed. There are also GRI indicators associated with each of LIPOR's material themes, which makes this monitoring and performance evaluation more robust.

In addition, it was mentioned that there is a correspondence between the material themes and the SDGs, and specific indicators are defined for each SDG, which LIPOR ends up monitoring as well.

Finally, the initiative 'Barómetro Social' culminates in an internal quiz, which serves to assess employees' level of knowledge about the concept of Double Materiality, also functioning as an indicator of internal awareness.

5.2.6 Reward and Compensation Control at LIPOR

The direct application of reward and compensation mechanisms linked to Sustainability and Double Materiality at LIPOR is limited, reflecting the restrictions of the Public Administration legal regime. As one of the interviewees pointed out, LIPOR's employees are covered by the civil service's evaluation and progression system, namely SIADAP, which establishes standard steps and compensation rules.

Even so, there are indirect forms of incentive related to Sustainability objectives, as one of the interviewees mentioned. LIPOR's strategic objectives, that are strongly aligned with ESG principles, are broken down into operational and individual objectives, which define the career progression of each employee through the SIADAP system. In this way, sustainable

performance can influence the employee's assessment and, indirectly, their career path within the organization.

In addition, it was mentioned that the organization promotes informal recognition of good practices, namely by highlighting teams or employees who distinguish themselves in actions linked to Sustainability. However, these recognitions do not take the form of structured financial compensation or formal promotion but reflect a symbolic appreciation of sustainable performance.

5.2.7 Administrative control at LIPOR

5.2.7.1 Corporate Sustainability

It was mentioned that one of the most important elements of LIPOR's administrative structure is the existence of thematic and transversal working groups, which address specific areas such as prevention, stakeholders, social responsibility and carbon. These groups have clear responsibilities, such as promoting internal training, monitoring indicators and periodically analysing results. For example, the carbon group meets annually to analyse CO_2 emissions avoided and emitted, contributing directly to monitoring the organization's environmental performance, as it was explained by one participant.

LIPOR's organizational structure includes a specific and autonomous unit dedicated to Sustainability and Corporate Responsibility, the result of an internal restructuring that gave it greater autonomy and capacity for action, as one of the interviewees mentioned. This unit ensures the planning, implementation and monitoring of the Sustainability strategy and works in conjunction with all areas of the organization, ensuring the transversal integration of Sustainability into the various processes and projects.

This effort is complemented by a set of guiding documents that formalize the organization's sustainable principles and practices, such as the Code of Ethics and Conduct, which serves as a guide for LIPOR's internal and external actions, reinforcing its commitment to Sustainability, as mentioned by all interviewees.

In the evaluation and decision-making process, procedural manuals were mentioned which establish a prior analysis of the environmental and social impact of new projects, ensuring that they are in line with the organization's strategic commitments. This principle is also

applied in procurement procedures, both when selecting and prioritizing suppliers and partners.

5.2.7.2 Double Materiality

LIPOR's administrative structure is present in the operationalization of the concept of Double Materiality, according to the interviewees. The Sustainability and Corporate Responsibility Unit is primarily responsible for this process, coordinating activities related to the identification, analysis and reporting of material issues. However, the Double Materiality exercise is transversal and multidisciplinary in nature, involving employees from other areas.

This collaborative approach is materialized through the creation of the Stakeholders group, a collective that brings together representatives from the Sustainability and Corporate Responsibility Unit and the Supplier and Quality areas, with the aim of applying LIPOR's Materiality Management Process. This process guides the group in conducting the assessment of material issues and articulating the two dimensions of Double Materiality: the organization's impact on the environment and society, and the risks and opportunities that ESG factors represent for the organization.

5.2.8 Challenges and Developments in the Implementation of CSRD and Double Materiality at LIPOR

The implementation of the European CSRD and the adoption of Double Materiality at LIPOR brought significant challenges and lessons, as highlighted in the interviews. Although not formally required to report under the CSRD, LIPOR demonstrates a strong institutional will to align with its requirements, reflecting a proactive and strategic stance towards European regulatory trends: "Team training is very important, so that everyone is aware of the new requirements, because although it is not mandatory for LIPOR to report according to the CSRD, there is a great desire on the part of the organization to be aligned with the requirements" (Interviewee 3, personal communication, May 2025).

Participants identified the main CSRD-related challenges as adapting existing reporting systems to the ESRS structure, ensuring data reliability and availability, and fostering cross-departmental involvement. This process demands multidisciplinary coordination and a

strategic vision that integrates Sustainability into all levels of planning and operation. Internal team training was also deemed fundamental: "Preparing for the CSRD brought challenges, particularly in terms of adapting reporting systems, the availability and reliability of data and the integration of ESRS standards. There was also the challenge of involving all areas of the organization in this process, as it requires multidisciplinary coordination and strategic vision" (Interviewee 2, personal communication, May 2025).

Regarding Double Materiality, the interviewees pointed out that the first challenge faced was understanding the concept itself and to ensure that the process was robust, LIPOR had the support of a specialized external entity, which helped define the methodology for prioritizing material issues: "The first challenge was to understand the very concept of Double Materiality" (Interviewee 1, personal communication, May 2025) and "The main challenge was to understand what needed to be done. For this process, LIPOR had the support of a specialized external entity, which helped define the methodology for surveying material issues" (Interviewee 3, personal communication, May 2025).

Despite the difficulties, the interviewees say that this process has brought significant improvements, as there is now greater internal awareness of the importance of Sustainability and Double Materiality, with teams more involved and aligned with strategic objectives: "Throughout the process of implementing the CSRD requirements, there has been greater internal awareness of the importance of Sustainability and Double Materiality" (Interviewee 2, personal communication, May 2025).

Efforts have also been made to strengthen the mechanisms for collecting, processing and reporting data, and the integration of Double Materiality has allowed for a more strategic reading of risks and opportunities, strengthening the organizational response capacity, as mentioned.

Preparing for the CSRD has also led to an evolution of the governance and reporting systems, making them more structured, resilient and prepared for future demands: "The integration of Double Materiality has allowed for a more strategic analysis of risks and opportunities, strengthening LIPOR's response capacity. Preparing for the CSRD is driving an evolution of governance and reporting systems, making them more resilient and prepared for the future" (Interviewee 2, personal communication, May 2025).

5.3 Summary of the Operationalization of Management Controls: Corporate Sustainability and Double Materiality

This section presents a summary of the management control mechanisms used by LIPOR, organized according to Malmi and Brown's 'MCS as a Package' framework (2008), highlighting how they are translated in practice into actions and instruments that integrate the principles of Sustainability and Double Materiality. By systematizing the data collected in the document analysis and interviews, it was possible to identify multiple examples of how these controls are operationalized, which are detailed in the following table.

Table 6. Operational Examples of LIPOR's Management Controls

Type of Control	Corporate Sustainability – Examples of Operationalization	Double Materiality – Examples of Operationalization
Cultural	Sustainability as an organizational value (Vision, Manifesto, Code of Ethics, statements in the Integrated Report). Internal communication on Sustainability (Intranet, corporate TV). 'Energia L' and 'Somos pela Sustentabilidade' programs. Ongoing training on ESG topics. Social responsibility volunteer association. Adherence to charters and ethical codes ('Charter of Principles of Business for Sustainability', 'Portuguese Gender Equality Commitment Charter'). Environmental awareness signage.	Statements in the Integrated Report reflecting the principle of Double Materiality. Internal awareness initiatives through the 'Energia L' program and the 'Barómetro Social'. Employee engagement as active stakeholders in the Double Materiality assessment process.
Planning	Sustainability Agenda aligned with the SDGs. 4M Strategy with goals for carbon, waste, biodiversity, and climate. Short- and long-term ESG goals. Climate Change Adaptation Plan 2025–2027 Gender Equality Plan.	Sustainability Agenda built based on Double Materiality analysis. Material topics translated into strategic goals and further into operational goals.

	Cascading of strategic goals into operational and individual objectives. ESG criteria in investment planning.	Identification of ESG risks with response plans. Alignment of material topics with the SDGs.
Cybernetic	Integrated Report as a tool to analyse ESG performance. Internal ESG indicators. GRI ESG indicators. Monitoring framework for Circular Economy. Tools to measure social aspects: Social Fingerprint, Living Wage, Happiness Index, Perceived Social Accountability. Evaluation mechanisms for organizational ethics instruments. Internal reports on ESG topics. Regular monitoring with deviation analysis. Link between performance evaluation and decision-making.	Internal indicators for monitoring material topics. GRI indicators linked to each material topic. Direct link between SDG indicators and material topics. Internal management tools for monitoring material topics (e.g., Social Responsibility Management System to monitor issues such as human rights and diversity). Materiality knowledge rate.
Reward and Compensation	No formal financial incentives due to public sector status. SIADAP system indirectly influences this control by integrating ESG goals into strategic objectives, which cascade into individual objectives for some employees. Informal recognition of sustainable best practices.	
Administrative	Code of Ethics and Conduct, Bylaws, and Code of Conduct for Suppliers and Subcontractors. Adoption of the AA1000AP (2018) Standard. Adoption of GRI Standards. ISO 14001 and SA8000 Certifications. Employee Representative for Social Accountability and Social Performance Team. Ethics Committee and Regulatory Compliance Committee.	The Materiality Management Process is a formal document structuring the Double Materiality exercise. The Sustainability and Corporate Responsibility Unit is the main team responsible for implementing the Double Materiality principle. The Stakeholder Group is also responsible for stakeholder consultation in

	Thematic working groups (carbon, prevention, etc.). Sustainability and Corporate Responsibility Unit with clear mission and functions. Corruption and Related Offenses Risk Prevention Plan. Training on ethics and the LIPOR Code of Ethics and Conduct.	the Double Materiality process.

Note. Own elaboration.

6. Conclusions

The purpose of this report was to analyse how LIPOR, the Intermunicipal Waste Management Service of Greater Porto, integrates the concepts of Sustainability and Double Materiality into its SCGs, in light of the 'Management Control Systems as a Package' framework proposed by Malmi and Brown (2008). The two scientific questions that guided the research were: (1) How is Sustainability incorporated into LIPOR's SCG? and (2) How is Double Materiality incorporated into these same systems? To answer these, a qualitative methodology combined: documentary analysis, including nine institutional documents such as the 2024 Integrated Report; and four semi-structured interviews with employees from different areas.

Regarding Sustainability (ESG issues), it is present across all control systems in Malmi and Brown's framework, except for reward and compensation, which is constrained by the public administration legal framework.

In cultural control, Sustainability is an institutional value, reinforced by LIPOR's Vision, Manifesto, Code of Ethics and Conduct, internal communication (intranet, corporate TV) and programmes like 'Energia L' and 'Somos pela Sustentabilidade', which raise employee awareness and engagement.

Regarding planning control, ESG objectives are aligned with the SDGs and integrated into the Sustainability Agenda and cascade to operational and individual levels, ensuring cross-organisational alignment. The 4M Strategy ('Less Waste, Less Carbon, More Climate, More Biodiversity') sets specific targets, complemented by plans such as the Gender Equality Plan.

In terms of cybernetic control, ESG indicators are monitored systematically, covering environmental performance (such as GHG emissions and energy consumption), social performance (such as employee well-being and perception of social responsibility) and governance performance (such as training in ethics and corruption prevention). LIPOR also uses strategic performance analysis tools, one of which is the Integrated Report itself.

As for administrative control, Sustainability is institutionalised through standards (such as AA1000AP and GRI standards), certifications (ISO 14001 and SA8000), codes of conduct, and the existence of a Sustainability and Corporate Responsibility Unit, with clear functions that are coordinated with other areas of the organisation.

In the domain of reward and compensation control, there are no formal financial incentive mechanisms associated with Sustainability performance, due to the legal framework of public administration. Nevertheless, there is an indirect influence, since ESG objectives are integrated into the SIADAP evaluation system and may affect career progression.

Turning to Double Materiality, it can be concluded that it is equally present in all types of control in Malmi and Brown's framework, again with the exception of reward and compensation control, due to the same legal limitations already mentioned.

With respect to cultural control, the integration of Double Materiality is still in the development phase, given the recent and technical nature of the concept. Even so, LIPOR is already promoting awareness and internal training efforts through initiatives such as 'Energia L' and 'Barómetro Social', which seek to translate and bring this topic closer to the reality of employees.

Within the scope of planning control, Double Materiality is of great importance, as it forms the basis for defining the Sustainability Agenda. Through this agenda, material issues, identified based on consultation with stakeholders and analysis of ESG impacts and risks, are translated into strategic objectives and then broken down to the operational level.

In the field of cybernetic control, Double Materiality is reflected in the definition and monitoring of indicators associated with each material topic, both developed internally and defined by GRI standards, which allows LIPOR's performance to be assessed against the priorities identified in the Materiality exercise and supports decision-making.

Finally, in administrative control, Double Materiality is fully institutionalised, as LIPOR has formal processes, defined methodologies and responsible teams, such as the Sustainability Unit and the Stakeholder Group, which coordinate the Materiality Management Process.

In summary, it can be seen that LIPOR's management control systems integrate the principles of Sustainability and Double Materiality in a structured manner, and that the latter plays an important role in LIPOR's Sustainability strategy, with cross-cutting application to its management control systems, with the exception of reward and compensation control, which is limited by legal restrictions. Furthermore, the new requirements regarding the CSRD and Double Materiality are helping to strengthen LIPOR's strategic vision, enhance internal awareness, and improve the resilience and robustness of its governance and reporting systems.

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8. Annexes

8.1 Annex 1: Interview Guide

Interview Guide – LIPOR Case Study

Objective of the interview: To understand how LIPOR operationalizes sustainability and double materiality in its management and reporting systems, based on the typology of management control systems proposed by Malmi and Brown (2008).

I. Introduction and Consent

- Thank you for your participation.
- Explanation of the purpose of the study and the interview.
- Guarantee of anonymity/confidentiality.
- Request for consent to record the interview.

II. Interviewee Profile

1. What is your current role at LIPOR?
2. How long have you been working at LIPOR and in this specific role?
3. Are you involved in sustainability topics (environmental, social, financial) and/or management control? In what way?

III. Sustainability Strategy and Double Materiality

4. How would you define LIPOR's sustainability strategy?
5. Do you see stakeholder engagement and the concept of (double) materiality as integral parts of that strategy?

IV. Management Control Systems (based on Malmi & Brown, 2008)

1. Cultural Control

6. How is a culture of sustainability promoted at LIPOR?
7. Are there initiatives such as training sessions, volunteering programs, employee events, or internal communications that help promote a sustainability culture within the organization?
8. Is the same true for double materiality? How is double materiality embedded in LIPOR's organizational culture? In other words, is there concern both with LIPOR's impact on the environment and society, and with the risks and opportunities that these issues might bring to the organization?

2. Planning Control

9. Are strategic and operational goals related to sustainability defined at LIPOR? If so, how?
10. Are these goals mainly short-term, long-term, or both?
11. Are there goals specifically linked to double materiality — meaning, goals that consider both the environmental/social impacts of LIPOR and how these issues might affect the organization itself?

3. Cybernetic Control

12. Are there specific indicators (KPIs) to measure environmental and social impacts?
13. Are these indicators monitored regularly? How do they influence decision-making?
14. Are there also specific indicators to monitor material topics?

4. Reward and Compensation Systems

15. Are there any incentives (monetary or non-monetary) associated with sustainability performance?
16. Do these incentives take aspects of double materiality into account?

5. Administrative Control

17. Is there a formal structure (departments, teams) responsible for sustainability within the organization?
18. Is there a formal structure responsible for integrating double materiality?
19. Are there official documents that guide the organization's conduct on sustainability topics?
20. How is coordination managed between different areas (sustainability, finance, operations) in handling sustainability and material topics?

V. Implementation and Challenges

21. What have been the main challenges in integrating double materiality into LIPOR's sustainability management?
22. What are the main challenges currently being faced in preparing for the implementation of the CSRD within LIPOR?
23. What improvements or progress have been observed in this process?

VI. Closing

24. Is there any additional information you would like to share on this topic?
25. Would you be available for a follow-up or clarification later, if needed?

8.2 Annex 2: Declaration of Informed Consent

Declaration of Informed Consent

This interview is part of a Master's degree in Business Economics and Strategy at the Faculty of Economics of the University of Porto and aims to explore how LIPOR, the Intermunicipal Waste Management Service of Greater Porto, integrates the concepts of sustainability and dual materiality into its management control systems.

In order to facilitate the recording of the information gathered, the audio of this interview will be recorded and the data collected will only be used in a research context. Aspects relating to confidentiality, anonymity and data processing are therefore guaranteed. Your participation in this study is voluntary and you can withdraw at any time or refuse to take part, without this having any consequences for you. After this interview it may be necessary to complete the data and you may be contacted again. contacted again.

The research will be carried out by master's student Maria Leonor Soares Russo, under the supervision of Professor Maria da Conceição Pereira, from the Faculty of Economics of the University of Porto. of the University of Porto. Both thank you for your availability.

I,....., consent to participate voluntarily in the research project described above, aware that my data will be kept confidential. that my data will be kept confidential and that no names of people or institutions that I do not wish will be mentioned. institutions that I do not wish to be named. I would like to add that I have been informed of the objectives of this research.