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The evolution of sustainability reporting in SMEs: Toward CSRD-Aligned disclosure, the case of Pavia Acque

Relatore:

Chiar.ma Prof.ssa Magliacani Michela

Tesi di Laurea

di Vincifora Riccardo

Matr. n.527689

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Table of contents

Abstract 1

Introduction 6

Chapter 1 THE EVOLUTION OF SUSTAINABILITY REPORTING 8

1.1. Sustainability, Reporting and Corporate Social Responsibility 9

1.2. The Global Reporting Initiative, the Non-Financial Reporting Directive and the Corporate Sustainability Reporting Directive 13

1.3. The European Sustainability Reporting Standards 21

1.4. The implications for undertakings and stakeholders 25

1.5. The key concept of double materiality 28

Chapter 2 STUDY CONTEXT: THE WATER UTILITY SECTOR 31

2.1. An overview of water utility companies 32

2.2. The link between water services and environmental impact 39

2.3. Regulatory framework in Italy 44

Chapter 3 THE CASE OF PAVIA ACQUE S.C.A.R.L 50

3.1. The research protocol 52

3.2. Results from the documental analysis 54

3.3. Results from the interview 65

3.4. Discussion 70

Chapter 4 THE FUTURE OF SUSTAINABILITY REPORTING 76

4.1. Company type, commitments, and economic burden 77

4.2. Sustainability and profitability: two sides of the same coin 83

4.3. Future challenges and emerging opportunities 88

Conclusion 94

References 97

Abstract

Negli ultimi anni, la reportistica di sostenibilità ha progressivamente assunto un ruolo centrale all'interno dei sistemi di comunicazione e rendicontazione delle imprese, arrivando ad affiancarsi in modo sempre più strutturato alla tradizionale reportistica finanziaria. Se in passato la misurazione delle performance aziendali si concentrava quasi esclusivamente su indicatori economico-finanziari, oggi si assiste a un ampliamento significativo del perimetro informativo, che include anche gli impatti ambientali, sociali e di governance generati dall'attività d'impresa. Questo cambiamento riflette una trasformazione più profonda del modo in cui viene concepito il valore aziendale, sempre meno legato alla sola dimensione economica e sempre più orientato a una logica di creazione di valore sostenibile nel lungo periodo.

La sostenibilità, infatti, non rappresenta più un elemento accessorio o meramente reputazionale, ma si configura come una dimensione strutturale dell'attività aziendale. I principi ESG (Environmental, Social, Governance) costituiscono oggi un riferimento fondamentale per orientare le strategie, le politiche e i processi decisionali delle imprese, contribuendo a ridefinire il rapporto tra azienda, ambiente e società. La crescente attenzione da parte degli stakeholders nei confronti del tema sostenibilità ha ulteriormente accelerato questo processo, rendendo la trasparenza e la rendicontazione delle informazioni non finanziarie un requisito sempre più rilevante.

Le origini del concetto di sviluppo sostenibile possono essere ricondotte al Rapporto Brundtland del 1987 ("Our Common Future"), che ha introdotto una definizione ancora oggi ampiamente condivisa: uno sviluppo in grado di soddisfare i bisogni del presente senza compromettere la capacità delle generazioni future di soddisfare i propri. A partire da questo momento, si è sviluppato un percorso evolutivo che ha portato alla progressiva formalizzazione di standard, linee guida e politiche in materia di sostenibilità, sia su base volontaria sia su base normativa.

Tra gli strumenti volontari, un ruolo centrale è svolto dalla Global Reporting Initiative (GRI), che ha contribuito in modo determinante alla diffusione di pratiche di rendicontazione standardizzate e comparabili a livello internazionale. Le linee guida GRI rappresentano ancora oggi uno dei principali riferimenti per le imprese nella redazione dei report di sostenibilità, grazie alla loro capacità di fornire un quadro strutturato e coerente per la divulgazione delle informazioni ESG. Parallelamente, gli Obiettivi di Sviluppo Sostenibile (Sustainable

Development Goals) definiti dall'Agenda 2030 delle Nazioni Unite hanno introdotto un ulteriore livello di indirizzo, individuando 17 obiettivi globali che fungono da guida per le politiche pubbliche e le strategie aziendali in materia di sostenibilità.

Accanto a queste iniziative, negli ultimi anni si è assistito a un rafforzamento significativo dell'intervento normativo, in particolare a livello europeo. L'Unione Europea ha progressivamente sviluppato un quadro regolamentare volto a promuovere la trasparenza, la comparabilità e l'affidabilità delle informazioni non finanziarie, con l'obiettivo di favorire un sistema economico più sostenibile e responsabile. In questo percorso si inserisce la Direttiva 2014/95/UE (Non-Financial Reporting Directive), che ha rappresentato il primo tentativo di introdurre obblighi di rendicontazione non finanziaria per le grandi imprese. Tuttavia, l'applicazione della NFRD ha evidenziato alcune criticità rilevanti, tra cui la scarsa omogeneità delle informazioni, la limitata comparabilità tra i report e l'assenza di standard vincolanti comuni.

Per superare tali limiti, l'Unione Europea ha introdotto la Direttiva (UE) 2022/2464 (Corporate Sustainability Reporting Directive), che rappresenta un'evoluzione significativa del quadro normativo in materia di sostenibilità. La CSRD amplia in modo sostanziale il numero di imprese coinvolte, passando da circa 12.000 a oltre 50.000 aziende, e introduce requisiti più stringenti in termini di contenuto, standardizzazione e verifica delle informazioni. Tra le principali innovazioni si evidenziano l'obbligo di utilizzare standard europei comuni (European Sustainability Reporting Standards), l'introduzione della revisione dei report da parte di soggetti terzi indipendenti e l'adozione di un approccio basato sulla doppia materialità, che considera sia l'impatto dell'impresa sull'ambiente e sulla società sia i rischi e le opportunità che le tematiche ESG comportano per l'impresa stessa.

In questo contesto teorico e normativo, la presente tesi si focalizza su un settore particolarmente rilevante dal punto di vista della sostenibilità, ossia quello delle water utilities. Le water utilities sono le aziende responsabili della gestione del servizio idrico. Si tratta di un ambito caratterizzato da un forte impatto ambientale e sociale, in quanto legato alla gestione di una risorsa essenziale per la vita umana e per lo sviluppo economico. L'acqua, spesso definita "blue gold", rappresenta un bene strategico la cui gestione richiede un delicato equilibrio tra efficienza operativa, tutela ambientale e accessibilità per i cittadini.

In Italia, il settore idrico è disciplinato principalmente dalla Legge Galli (Legge n. 36/1994), che ha rappresentato una riforma fondamentale nel processo di riorganizzazione del servizio idrico nazionale. Tale normativa ha introdotto il concetto di servizio idrico integrato, inteso

come l'insieme coordinato delle attività di captazione, adduzione, distribuzione, fognatura e depurazione delle acque, con l'obiettivo di garantire una gestione unitaria, efficiente e sostenibile della risorsa idrica su base territoriale. La legge ha inoltre promosso il superamento della frammentazione gestionale, favorendo l'aggregazione dei servizi in ambiti territoriali ottimali e ponendo le basi per una maggiore attenzione agli aspetti economici, ambientali e sociali del servizio.

A livello europeo, il quadro normativo di riferimento è stato profondamente influenzato da due direttive fondamentali: la Water Framework Directive (2000/60/CE) e la Wastewater Directive. La prima ha introdotto un approccio innovativo e integrato alla gestione delle risorse idriche, basato sul principio del bacino idrografico e orientato al raggiungimento del "buono stato" ecologico e chimico delle acque superficiali e sotterranee, promuovendo la tutela quantitativa e qualitativa delle risorse e incentivando la pianificazione a lungo termine. La Wastewater Directive, invece, ha disciplinato in modo specifico la raccolta, il trattamento e lo scarico delle acque reflue urbane, imponendo standard tecnici e ambientali volti a ridurre l'inquinamento e a proteggere gli ecosistemi acquatici e la salute umana.

All'interno di questo contesto normativo multilivello, l'analisi empirica della tesi si concentra sul caso di Pavia Acque S.c.a.r.l., una società consortile che gestisce il servizio idrico integrato nella provincia di Pavia. Tale realtà rappresenta un esempio significativo di operatore locale impegnato nell'adozione di pratiche orientate alla sostenibilità e alla trasparenza. Dopo una fase iniziale di inquadramento dell'azienda, in termini di struttura organizzativa, dimensioni, governance e principali indicatori economico-finanziari, il lavoro si focalizza sull'analisi del modello di rendicontazione adottato.

A partire dall'anno 2024, Pavia Acque ha intrapreso un percorso evolutivo nella propria comunicazione aziendale, adottando il bilancio integrato come strumento di rendicontazione. Questa scelta implica l'unificazione in un unico documento delle informazioni finanziarie e di quelle non finanziarie, con particolare riferimento agli aspetti ambientali, sociali e di governance (ESG). L'adozione del bilancio integrato riflette una visione avanzata della gestione aziendale, fondata sull'idea che la creazione di valore nel lungo periodo non possa essere analizzata esclusivamente attraverso indicatori economici, ma richieda una considerazione congiunta degli impatti sull'ambiente e sulla società. In questo senso, la sostenibilità non viene trattata come un elemento accessorio o separato, ma come parte integrante del modello di business e delle strategie aziendali.

L’analisi è stata condotta attraverso un mix di approccio quantitativo e qualitativo. Un’intensa analisi di tipo documentale, finalizzata a valutare la qualità delle informazioni contenute nel bilancio integrato e il livello di trasparenza e chiarezza della comunicazione. Tale analisi è stata arricchita da un’intervista con figure interne direttamente coinvolte nel processo di redazione del report, che ha consentito di approfondire i meccanismi decisionali, le logiche organizzative e le motivazioni alla base delle scelte adottate in materia di rendicontazione.

Dai risultati emerge come Pavia Acque, pur non essendo formalmente soggetta agli obblighi previsti dalla Corporate Sustainability Reporting Directive (CSRD) per via della propria forma giuridica di società consortile, abbia scelto di adottare volontariamente un approccio in linea con i principi e gli standard introdotti dalla direttiva europea. Tale scelta non appare dettata da esigenze di conformità normativa, bensì da una volontà consapevole di rafforzare la trasparenza e la qualità della comunicazione nei confronti degli stakeholder, in particolare dei cittadini e delle comunità servite. In questo contesto, la sostenibilità viene interpretata non solo come un obbligo gestionale, ma come un vero e proprio dovere etico, coerente con la natura pubblica e collettiva del servizio idrico.

Il caso di studio evidenzia inoltre come la reportistica di sostenibilità possa costituire una leva strategica anche per realtà territoriali di dimensioni non elevate. Attraverso una comunicazione chiara e strutturata degli impatti ESG, le imprese possono rafforzare la propria reputazione, aumentare il livello di fiducia degli stakeholder e consolidare la propria legittimazione sociale. Nel caso specifico di Pavia Acque, l’elevata qualità del servizio idrico offerto, riconosciuta anche a livello nazionale, si accompagna a un impegno concreto nella tutela ambientale, nella gestione efficiente delle risorse e nella promozione di pratiche sostenibili.

Nella parte conclusiva, la tesi analizza le principali opportunità e criticità legate allo sviluppo della reportistica di sostenibilità. Da un lato, l’evoluzione del quadro normativo europeo, in particolare con l’introduzione della CSRD, rappresenta un’importante opportunità per migliorare la qualità, la comparabilità e l’affidabilità delle informazioni non finanziarie, favorendo una maggiore trasparenza e una più efficiente allocazione delle risorse. Dall’altro lato, emergono alcune sfide rilevanti, tra cui il rischio di utilizzo strumentale della sostenibilità a fini puramente comunicativi, con fenomeni di greenwashing, e la necessità di rafforzare i sistemi di controllo, verifica e standardizzazione delle informazioni riportate.

In conclusione, la reportistica di sostenibilità si configura come uno strumento sempre più centrale nel panorama economico contemporaneo, non solo in termini di adempimento normativo, ma come leva strategica per la creazione di valore nel lungo periodo. Il caso di

Pavia Acque dimostra come anche organizzazioni non obbligate possano adottare volontariamente pratiche avanzate di rendicontazione, contribuendo alla diffusione di una cultura orientata alla trasparenza, alla responsabilità e alla sostenibilità. In un contesto caratterizzato da crescenti pressioni normative e da aspettative sociali sempre più elevate, la capacità di integrare dimensione economica e sostenibilità rappresenta non solo una sfida complessa, ma anche una delle principali opportunità per le imprese del futuro.

Introduction

In recent years, sustainability reporting has gained increasing relevance within corporate communication, gradually moving from a secondary, voluntary practice to a more central element of how companies present their performance and strategies. Firms are no longer evaluated solely on the basis of financial results, but also on their ability to generate value in a broader sense, taking into account environmental, social and governance dimensions. This shift has been driven not only by regulatory developments, but above all by a growing awareness among stakeholders, including investors, institutions, and local communities.

As stakeholder expectations have intensified, companies have been pushed to expand the scope of their disclosures and to adopt more structured approaches to sustainability. This growing attention has also led to the progressive development of regulatory frameworks, particularly at the European level, aimed at improving the quality, comparability, and reliability of non-financial information. Rather than being a purely compliance-driven activity, sustainability reporting is increasingly becoming a strategic tool through which firms communicate their long-term vision, manage risks, and strengthen relationships with their stakeholders.

Within this broader context, this thesis focuses on the water utility sector, a field that is particularly relevant when discussing sustainability. Water is an essential resource, fundamental for both human life and economic activity, and its management raises critical environmental and social challenges. Companies operating in this sector are therefore required to balance efficiency, environmental protection, and accessibility of the service, making them especially suitable for analyzing how sustainability principles are applied in practice. For this reason, the choice of focusing on a water utility allows to observe sustainability not as an abstract concept, but as a concrete operational and strategic issue.

The empirical analysis is centered on the case of Pavia Acque S.c.a.r.l., a consortium company responsible for managing the integrated water service in the province of Pavia. The company represents a significant local example of an organization that operates in a sector with strong environmental and social implications. In recent years, Pavia Acque has shown a growing commitment to sustainability and transparency, particularly through the adoption of integrated reporting, which combines financial and non-financial information into a single document. This approach reflects an effort to provide a more comprehensive and coherent representation of the company's activities and impacts.

The structure of this thesis is organized into four main chapters, each addressing a specific aspect of the research topic. The first chapter provides an overview of the evolution of sustainability reporting at the European level, focusing on the main regulatory developments that have contributed to shaping the current framework. The second chapter focuses on the water utility sector, analyzing its main characteristics, the activities involved in the integrated water service, and the regulatory context in Italy. The third chapter presents the empirical analysis of the case study. It is based on a mixed quantitative and qualitative approach that combines the document analysis of Pavia Acque's integrated report with insights derived from interviews conducted with individuals directly involved in the reporting process. This allows for a deeper understanding of how sustainability reporting is implemented in practice, as well as the motivations and challenges faced by the organization. Finally, the fourth chapter discusses the main findings of the research, highlighting the relationship between profitability and sustainability, and examining the opportunities and challenges that companies face in integrating these dimensions. Particular attention is given to the future evolution of sustainability reporting, considering both regulatory pressures and stakeholder expectations.

Overall, this thesis aims to contribute to the understanding of sustainability reporting as an evolving practice, showing how it is increasingly embedded in corporate strategy and decision-making processes. Through the analysis of a local case in a highly relevant sector, the study seeks to provide insights into how sustainability reporting can be effectively integrated into business models.

Chapter 1
THE EVOLUTION OF SUSTAINABILITY REPORTING

This chapter aims to provide the conceptual and historical foundations necessary to understand the emergence of corporate sustainability reporting and its role within modern systems of corporate accountability. The discussion begins with the origins of the concept of sustainable development, tracing its introduction to the work of the World Commission on Environment and Development and the publication of the Brundtland Report in 1987. This Report laid the normative groundwork for subsequent international initiatives and for the progressive involvement of economic actors in sustainability goals. The chapter then reconstructs the evolution of sustainability as a global policy agenda. It examines key milestones such as the Rio Conference and Agenda 21, the Millennium Development Goals, and the Agenda 2030, highlighting how sustainability gradually shifted from a broad ethical aspiration to a structured and measurable framework for global development. These initiatives, together with the growing relevance of corporate sustainability and stakeholder expectations, created a context in which companies were increasingly required to explain not only their financial performance but also their environmental and social impacts, making sustainability reporting a central tool for transparency and corporate responsibility. The core of the chapter then focuses on the European regulatory evolution that responded to the limits of voluntary disclosure. Early reporting practices and international frameworks such as the Global Reporting Initiative helped to spread sustainability reporting, but the absence of binding rules often produced fragmented, selective and hardly comparable information. This context explains the progressive shift toward mandatory reporting regimes in the European Union, starting with the Non-Financial Reporting Directive and culminating in the Corporate Sustainability Reporting Directive. The NFRD, adopted in 2014, was the first attempt to impose minimum disclosure obligations on large public-interest entities. The chapter explains the objectives of the NFRD, the type of information it required, and the main weaknesses that emerged in practice, especially the high level of discretion left to companies, the limited comparability across Member States, and the lack of strong assurance requirements. The analysis follows with the shift toward the Corporate Sustainability Reporting Directive (CSRD), as a response to the growing ambition of EU sustainability policies and to the need for more reliable and enforceable sustainability data. The

CSRD is presented as the regulatory framework that significantly expands the scope of reporting entities, strengthens disclosure requirements, introduces mandatory assurance, and relies on the European Sustainability Reporting Standards to ensure harmonisation and comparability. This structure provides the basis for understanding how sustainability reporting has become a key instrument through which corporate responsibility has been translated into measurable disclosure and necessary accountability within the European Union.

1.1. Sustainability, Reporting and Corporate Social Responsibility

The Brundtland Commission, formally known as the World Commission on Environment and Development, was established in 1983. It was led by Gro Harlem Brundtland, the former Prime Minister of Norway. The Commission was aimed at exploring the bonds between environmental issues, social safeguard and economical development. Four years later, in 1987, the World Commission on Environment and Development published the report 'Our common future', that was later called Brundtland Report. This report represents the introduction of the concept of sustainable development, defined as the "development that meets the needs of the present generations without compromising the ability of future generations to meet their own needs". The report responds to the growing realization that patterns of economic growth, industrial expansion, and resource consumption were creating environmental degradation, social inequalities, and long-term risks that could no longer be ignored. The main idea behind this report is the need for urgent action, the common awareness that a markable change was necessary. Ecological damage and persistent poverty are two different problems that, however, must be treated together to be solved. In addition, countries cannot address sustainability challenges alone because environmental impacts and resource flows cross national borders. It calls for international cooperation, stronger institutions, and integrated policies that link environment and development. and this is what happened in the following years. (Hajian & Kashani, 2021)

Sustainability is not simply about environmental protection, nor is it synonymous with economic growth; rather, it concerns maintaining the ecological systems that support life while ensuring that social structures remain just, inclusive, and capable of meeting human needs. Sustainable development requires living within the planet's biophysical limits, reducing inequality, and shifting from short-term, growth-oriented policies to strategies that prioritize

resilience, resource efficiency, and intergenerational justice. In this perspective, sustainable development becomes both a guiding principle and a practical agenda for reforming how societies produce, consume, and organize economic activity. (Haller, 2017)

The concept of sustainable development gained always more relevance and, some years later, in 1992, it was the key topic of the Conference on Environment and Development that was held in Rio de Janeiro. During this Conference, the United Nations introduced the Agenda 21, a detailed work of 351 pages resulting from 5 years of several consultations and negotioations. The Agenda was seen as a committment, to which all the 178 governments present at the Conference decided to comply. The Agenda highlighted the importance of the cooperation between countries, considered as the real key to success. Another big step for sustainability evolution was the Millennium Summit, held in New York in 2000. It was the largest reunion of world leaders in the history, with 189 countries that took part. The output of the conference was the formulation of the Millennium Development Goals, a list of eight goals that United Nations member states agreed to try to achieve by 2015. Poverty, disease, environmental degradation, and discrimination were the main topics treated during the Summit. (Dănescu et al, 2021)

The most relevant initiatives addressed to sustainable development in the 21st century are the Agenda 2030 and the European Green Deal. Both these two initiatives share the will to accelerate the ecological transiction, but they take origin from two different contexts.

The Agenda 2030 was approved in 2015 by all the United Nations member states. It establishes 17 sustainable goals, with 169 targets, aiming at reaching many global challenges by 2030. The Agenda is based on a multi-level approach, touching economical development, social inclusion and environmental safeguard. It is an international document, adopted as a successor to the Millennium Development Goals. Unlike the MDGs, which applied mainly to developing countries, the SDGs concern every nation and require coordinated global action. Scientific evidence on climate change, ecological limits and social inequalities played a crucial role in shaping the Agenda 2030, highlighting the need for an integrated plan capable of balancing human development with the planet's biophysical boundaries. Furthermore, the Agenda emphasises the importance of science, innovation and strong institutions as essential enablers for achieving the goals. This document is not coercitive, it is aimed at inspiring corporate policies and strategies founded on the principles treated in the Agenda, promoting shared responsibility among governments, businesses and civil society in advancing sustainable development. (Colglazier, 2015)

The European Green Deal is an European strategy, presented in Bruxelles in 2019 by the European Commission. The carbon neutrality by 2050 is the main objective of the Green Deal. Its horizon is not that wide like the Agenda's one, it is more limited to the field of carbon emissions, circular economy and sustainable pattern. It wants European countries to move towards green investments, highlighting the idea that technology and modern policies are essential to foster sustainable development. The Green Deal represents a strong and binding policy, a precise roadmap flanked by specific financing plans to fund the necessary investments; indeed, the financial dimension is the decisive element that transforms the strategy from a set of political commitments into an operational pathway for systemic change. The Commission recognised that achieving climate neutrality, decarbonising energy and mobility, renovating Europe's infrastructures, and supporting a circular industrial model requires unprecedented capital mobilisation. For this reason, the Green Deal is anchored in the European Green Deal Investment Plan, also known as Sustainable Europe Investment Plan, that is considered the engine for its implementation. The financing plan predicted to mobilise at least one trillion euros for green investments during the 2021-2030 decade. The EGDIP consisted of both public and private funds, with a huge public part of 500 billion euros that served to leverage and attract large private investments. Futhermore, the InvestEU programme played a central role in stimulating private sector engagement by providing guarantees that encourage banks and financial institutions to lend to green projects. The plan also incorporates the Just Transition Mechanism, a 55 billion facility designed to cushion the social and economic costs of decarbonisation in the regions most dependent on fossil fuels. (Fetting, 2020)

The evolution from the Brundtland Report to the recent European Green Deal, passing through the Millennium Development Goals and the Agenda 2030, shows how sustainability has progressively gained relevance, from a simple secondary matter to a comprehensive framework that requires everybody's active participation. These international strategies make clear that achieving long-term sustainable development depends not only on public policy, but also on the capacity of companies to reduce environmental impacts, promote social well-being and adopt responsible economic models. As sustainability objectives became more detailed, measurable and universally applicable, businesses were increasingly expected to demonstrate how their operations align with global and regional goals. Since sustainable development is founded on the idea that economic progress, environmental protection, and social well-being must advance together in a unique and regulated way. This suscitated the need for structured corporate sustainability practices and transparent reporting systems, allowing firms to

communicate their contributions. Corporate sustainability translated these global principles into the business context: companies are expected not only to pursue financial performance but also to manage their environmental and social impacts responsibly. This broader vision reshapes accountability by expanding it beyond shareholders to a wider set of stakeholders who are affected by corporate actions. As a result, firms must justify not only how they generate profit, but how their strategies align with long-term ecological stability, social equity, and ethical governance. Sustainability reporting emerges from this expanded notion of accountability. In this way, global sustainability frameworks laid the foundations for corporate sustainability and for the emergence of sustainability reporting as an essential tool of accountability, strategic orientation and stakeholder communication.

Sustainability reporting is the companies' practice that consists of disclosing their environmental, social, and governance performances. Its birth dates back to the 1990s, when the Coalition for Environmentally Responsible Economies (CERES) was established. They set a list of basic principles regarding the sustainable use of natural resources, as a response to the Exxon Valdez accident on March 24, 1989. This went down in history as one of the biggest environmental disasters, causing an oil spill along 1,300 miles of Alaska's coastline. The penalties and cleaning costs were very high, involving both shareholders and stakeholders. Thus, this was the first real call for deeper environmental accountability (Gokten et al., 2020). Over time, the topic has become increasingly important. At the end of the 1990s, Elkington, a leading sustainability expert and founder of the SustainAbility agency, introduced the triple bottom line approach. It is also called the 3P measurement system, where the Ps stand for people, planet, and profit. This approach changed the way companies and organizations were viewed. They are not just profit-oriented mechanisms; they also have social and environmental relevance. This construct includes three lines. The economic line highlights that the organization's activities must create value both for themselves and for the whole system, fostering development. The social line refers to fair behavior, respect for human capital, and positive interaction between entities and communities. The environmental line, the real emerging topic, addresses the improvement of activities that compromise natural resources for future generations (Alhaddi, 2020).

The Triple Bottom Line pattern is important because it demonstrates that pursuing social and environmental objectives does not exclude financial profitability. Rather than replacing the traditional financial bottom line, the TBL expands the scope of corporate performance, including people and planet. TBL principles also align with the rise of environmental, social

and governance metrics, which assess corporate sustainability efforts from an external, investor-focused perspective. Evidence shows that firms with strong ESG performance often deliver higher financial returns, strengthening investor interest in sustainability-oriented business models. Implementing the Triple Bottom Line, however, requires leadership, commitment and the willingness to integrate long-term societal values into daily decision-making. (Miller, 2020)

As corporate sustainability became increasingly central to business strategy and investor expectations, the need for structured, comparable and transparent disclosure practices grew rapidly. Early sustainability reports, inspired by concepts such as the Triple Bottom Line, demonstrated commitment but lacked standardization, making it difficult to evaluate companies' real impacts or compare performance across sectors. This gap led to the development of formal reporting frameworks, beginning with the Global Reporting Initiative, which provided the first widely adopted guidelines for disclosing environmental, social and governance information. Over time, policymakers recognised that voluntary frameworks alone were insufficient to ensure consistency and accountability, prompting the European Union to introduce the Non-Financial Reporting Directive in 2014. The NFRD marked a transition from voluntary to mandatory sustainability disclosure for large European companies. However, growing ambition around climate neutrality and sustainable finance required even more detailed and comparable reporting standards. This evolution culminated in the Corporate Sustainability Reporting Directive, which significantly expands the scope, depth and assurance requirements of sustainability information, positioning reporting as a fundamental tool for aligning corporate behaviour with Europe's broader sustainability objectives.

1.2. The Global Reporting Initiative, the Non-Financial Reporting Directive and the Corporate Sustainability Reporting Directive

Sustainability reporting has expanded significantly over the last decades. Companies widely vary across sectors, even for structure and consistency of the information provided. In the early 1990s and early 2000s, firms began publishing environmental and social reports as a response to the increasing stakeholder pressure for sustainability disclosure. The focus on corporate responsibility was becoming an important theme in companies'accountability, but sustainability disclosure was shaped by the reporting frameworks and standards that companies

decided to adopt. The absence of mandatory rules meant that firms could choose what to report and how to report it, often underlining positive initiatives while omitting risks or negative impacts. These circumstances led to highly heterogeneous reports, marked by different structure, scope and reliability. During this period, international frameworks were not specific at all, providing the only reference points for standardised disclosure. Three main international models dominated global sustainability reporting practices. The UN Global Compact, which encouraged companies to disclose their progress, was based on ten principles relating to human rights, labour standards, environment and anti-corruption. The Global Compact framework required companies to issue annual "Communication on Progress" reports, reinforcing transparency on sustainability commitments. Another reporting model was promoted by the International Integrated Reporting Council (IIRC). It was the Integrated Reporting framework, which introduced the idea of linking financial and non-financial information in a unique document. The most used and influential model was the Global Reporting Initiative, that offered accurate guidelines indicators for environmental, social and governance topics. It quickly became the global benchmark for voluntary sustainability reporting. (Ehnert et al, 2016)

The Global Reporting Initiative (GRI) was set up in 1997 by the United states-based non-profit Coalition for Environmentally Responsible Economies (CERES) and consulting agency Tellus Institute. The aim of GRI was developing globally applicable guidelines, useful for reporting on economic, environmental and social performance. It took into account the effects that these dimensions have on each other. Their work led to the development of the first sustainability reporting framework. The GRI organization is composed by different companies of different areas, and their reporting activity is continously monitored by a stakeholder council. The strenght of GRI was its flexibility, thanks to which the guidelines are always updated and renewed. The updating is facilitated by a system of reciprocal and self-assessment. Structured feedback companies played a main role to improve the guidelines; they had to communicate strenghts and weaknesses, through forms and meetings, in order to highlight the areas which need to be fixed. Before GRI guidelines development, corporate environmental reports and, later, corporate sustainability reports, had not a guiding pattern to follow, making comparisons impossible. The first official edition of the GRI Guidelines was released in 2000. (Hedberg and Von Malmborg, 2003)

Initially, GRI was part of CERES, a division created with the aim of developing a reporting system for environmental and social disclosure. In 2001, GRI communicated its intention to

make the organization independent, with an European headquarter. In 2002, GRI officially became an independent organization based in Amsterdam. It steadily gained power and importance worldwide, becoming the main reference for reporting on corporate responsibility. This organization completely changed business practices. GRI created an official process for developing reporting guidelines. Furthermore, the guideline-making process was institutionalized, setting specific criteria and fields of application. Finally, the crucial point was the creation of an independent organization whose mission was to provide "stewardship of the Guidelines through their continuous enhancement and dissemination" (Brown et al., 2009).

In 2016, the publication of the GRI Sustainability Reporting Standards represented a crucial step, as it consolidated the role of the Global Reporting Initiative as the main international reference framework for non-financial disclosure. By moving from guidelines to formally structured standards, GRI contributed to the maturation of sustainability reporting, providing a more stable and recognisable system. The standards were based on the G4 guidelines (2013), setting a list of specific requirements, recommendations, and guidance. Furthermore, in 2014 the Global Sustainability Standards Board was established. It is an independent body aimed at setting and updating the GRI Standards. The GRI Standards set out the reporting principles, such as accuracy, balance, clarity, completeness, verifiability, comparability, etc. In addition, they clarified the required disclosures and regulated the process to define sectors with higher impacts on the economy, environment, and people (Adams et al., 2022).

Despite its widespread adoption, the Global Reporting Initiative presents significant limitations as a mechanism of corporate accountability. The voluntary nature of GRI allows companies substantial discretion in selecting indicators and defining the scope of disclosure, which often results in selective reporting and reduced comparability across firms. This flexibility facilitates reputational management rather than rigorous transparency, enabling companies to emphasize positive performance while downplaying negative impacts. Additionally, the absence of binding enforcement and mandatory external assurance contributed to weaken the reliability of reported information. Moreover, GRI's multi-stakeholder governance structure was subject to strong corporate influence, leading the framework to reflect managerial priorities more than societal or environmental concerns. GRI tended to promote incremental disclosure improvements without challenging underlying business models, revealing that it represented a significant advance in the institutionalization of sustainability reporting, even though its limits prevented it from functioning as a robust accountability mechanism. Thus, to strengthen the credibility and effectiveness of corporate sustainability disclosure, policymakers have

increasingly turned toward mandatory reporting regimes, such as the NFRD and later the CSRD. (Levy and Brown, 2013)

In 2014, the Non-Financial Reporting Directive (Directive 2014/95/EU) was introduced at the European level following a proposal by the European Commission and was formally adopted by the European Parliament and the Council of the European Union. This was an amendment to the Accounting Directive and obliged public interest organizations to report "an understanding of the undertaking's development, performance, position, and impact of its activity, relating to environmental, social, and employee matters, respect for human rights, anti-corruption, and bribery matters. This includes a brief description of the undertaking's business model; a description of the policies pursued, the due diligence processes implemented, the outcomes and risks related to those matters and, ultimately, non-financial key performance indicators relevant to the business". The NFRD completely renewed the accountability system of the listed companies operating in the EU capital markets. It represented a key step in the transition towards sustainable development. The crucial point was that non-financial information has shifted from a voluntary activity to a mandatory regime. Before its implementation, transparency was not required but only encouraged. Companies could report anything in their annual accounts without being controlled. Under the NFRD, listed companies, banks, and insurance companies with more than 500 employees have been required to publish reports on the abovementioned matters. At the beginning, around 6,000 EU companies were required to provide non-financial disclosure (Fiandrino et al., 2021).

Obviously, as it was a revolutionary change, it took a few years to be implemented. December 2016 was the transposition deadline; each Member State had to transpose the NFRD into its own national law. The undertakings mentioned by the Directive had to report non-financial information for the first time in 2018, referring to the 2017 financial year. To help the undertakings, the Commission published non-binding guidelines in 2017; these provided useful instructions on how to report non-financial information. The NFRD and GRI Standards are deeply connected. They both belong to the same area of interest and cover the same topics. Their development occurred almost simultaneously, and thanks to this, it was possible to exploit the synergies coming from their mutual application. All the disclosure requirements contained in the NFRD are covered by the GRI Standards. Furthermore, they equally focus on the concept of materiality, which underlines and facilitates their cooperation. Material topics reflect the relevant economic, social, and environmental impacts, influencing stakeholders' choices and assessments. Another main theme is the value chain. Companies have direct

effects, due to their activities, that are easier to report. Despite this, a large part of reporting concerns indirect effects, those that companies contribute to through business relationships. These are less evident and, for this reason, more important to check and report. Before the NFRD, non-financial reporting had been widely adopted because of stakeholders' growing interest in it. The most important and used framework was the GRI Standards. The aim was to raise non-financial information to the same level as financial information in terms of completeness, transparency, and comparability. However, the quality of the disclosures was not completely effective. The lack of an institutionalized system was evident, raising concerns about the quality of the information. Without a specific and regulated scheme to follow, the phenomenon of greenwashing became common. It is a smart but counterproductive practice consisting of disclosing only the positive information about environmental and social performance while hiding negative aspects. It was simple: non-financial reporting was not mandatory, so companies could report whatever they wanted. That is why the NFRD represents a major improvement in sustainability reporting (Aluchna et al., 2023).

Over the years, the debate on non-financial disclosure has always been intriguing and complex, with some people considering a voluntary regime more efficient and others supporting a mandatory framework. On one hand, the imposition of specific rules and reporting patterns through regulations could lead to standardized practices and a higher number of reports; on the other hand, a quantitative increase does not necessarily imply a qualitative one. Different sectors do not share the same characteristics, and they must be treated differently. Thus, standardized patterns should be anything but rigid. Flexibility is a key requirement. Many studies showed an average qualitative increase in non-financial information after the implementation of the Non-Financial Reporting Directive. Furthermore, it has been demonstrated that early adopters, those who started non-financial reporting before the Directive, adapted their existing reporting activity better to the new regulatory requirements (Caputo et al., 2019).

One of the fundamental aspects of the NFRD was the movement towards a more comparable system, where two or more organizations, even from different sectors, would be able to disclose their non-financial information on equal terms, analyzing their impacts on society and the environment. The main purpose was the harmonization of each Member State's law, aiming to "enhance the consistency and comparability of non-financial information disclosed". Here, important clarification is needed: standardization and harmonization do not have the same meaning. Harmonization is a weaker commitment; it means bringing one country's accounting

standards closer to another's. The Directive is not coercive and does not impose any specific standards or rules for non-financial reporting. Entities are still free to use whichever standards they prefer, from the most popular ones like the GRI Standards to the less common national standards. It does not represent a major step forward in terms of comparability, as it only establishes minimum requirements for information disclosure (La Torre et al., 2018).

Prior to the implementation of Directive 2014/95/EU, even though the disclosure of non-financial information was mainly voluntary, the number of firms reporting their sustainability data was consistently increasing. Reporting activity has a cost, but it also provides benefits. Organizations balanced the benefits and marginal costs of disclosing non-financial information: if the benefits exceeded the costs, it was worth adopting this type of reporting; if the costs exceeded the benefits, the organization preferred to avoid the activity, withholding disclosure until the regulation came into force. Of course, this possibility of choosing whether or not to disclose lasted only until the implementation of the Directive (Breijer et al., 2022).

As already seen, the impact of the Directive was not particularly strong. Many academics found that the main reason for its limited effect was the lack of specific reporting standards. The NFRD did not require strict disclosure rules, giving entities more freedom regarding what to report. In this way, the information provided could be biased, inaccurate, or manipulative. Indeed, no form of third-party verification was foreseen (Hao et al., 2023).

The real improvement in the sustainability reporting world came in 2022, with the implementation of the Corporate Sustainability Reporting Directive. The new EU regulation, amending the previous ones, requires all large companies to publish regular sustainability reports. It could be said that the CSRD is the daughter of the Paris Agreement. In December 2015, 197 countries of the United Nations signed the Paris Agreement at COP21, a new international treaty on climate change. It aimed to concretely face climate change, keeping the increase in global average temperature "well below 2°C above pre-industrial levels". The Agreement's main goals are to achieve climate mitigation and sustainable finance through regulations and mechanisms. As stated in the Agreement, the establishment of rights and obligations of the parties is needed, as well as the mobilization of resources, transparent communication of information, sustainable investments, and further implementation measures. New laws and effective institutions are crucial to impose transparency and accountability in climate finance (Segger, 2016).

A few years later, in December 2019, the European Commission introduced the European Green Deal, an initiative composed of policies and actions intended to reach European climate

neutrality by 2050. In 2021, the European Climate Law entered into force. These evolutions could no longer coexist with the weaknesses of the NFRD, and in April 2021 the European Commission published a proposal for a new directive, the Corporate Sustainability Reporting Directive. It was published in the Official Journal of the EU in December 2022. Its implementation has been set through a series of phased applications. In 2025, the companies already subject to the NFRD must report for the financial year 2024. In 2026, other large companies that meet the CSRD criteria will report for the financial year 2025. From 2027, small and medium-sized enterprises listed on EU regulated markets, small and non-complex credit institutions, and captive insurance undertakings will start reporting for the financial year 2026 (Hummel and Jobst, 2024).

The CSRD can be seen as a revolution of the system. After all the criticism directed at the NFRD and the doubts about its real effectiveness, the implementation of the new directive represents a turning point, marking a real change in sustainability reporting. The Directive applies to all large companies operating in the EU. "Large" refers to companies that meet two of the following three criteria: €40 million net turnover, €20 million on the balance sheet, and 250 employees. Furthermore, it applies not only to EU-based firms but also to the subsidiaries of global non-EU companies that have securities on EU markets. The importance of the improvement brought by the CSRD can be easily shown by the number of companies subject to the directive: the NFRD applied to only about 12,000 entities across the EU, while the CSRD extends its application to more than 50,000 organizations. For the first time, sustainability reporting has been considered equal to and as important as financial reporting. It has defined a mandatory and common reporting framework (Martinčević et al., 2024).

The main issue with the previous directive was the complete absence of a universal and standardized system that could make companies' reports comparable and equally assessed. Organizations could choose the reporting standards they preferred without considering the international, European, or national dimension. Instead, the CSRD introduced a regulatory framework specifying methods, requirements, and obligations that companies must fulfill in the clear disclosure of their environmental, social, and governance performance. Another great improvement introduced by the CSRD is the very detailed description of the matters to disclose. It is a meaningful change: sustainability reports now have a defined structure to follow; the content of the disclosure no longer depends on each organization's discretion. Each company must now present every single detail about the three main key areas. Regarding the environment, the disclosure must include greenhouse gas emissions and climate change

impacts, energy consumption and renewable energy use, water and marine resource management, pollution and waste management, and biodiversity and ecosystem impacts. The second area focuses on social aspects, analyzing workforce information, respect for human rights, child labor prohibitions, gender equality, working conditions, and social impacts in the value chain. Finally, the governance area includes structures and policies, business ethics, anti-corruption and anti-bribery matters, management of sustainability-related risks, governance bodies, and employee representation (Faqih and Kramer, 2024).

In addition, a major problem previously concerned was the credibility of the information provided. In fact, disclosures were not checked or verified by anyone, raising doubts about the reliability of the data. Thus, the CSRD introduced the obligation of assurance of non-financial information provided. As with financial documents, sustainability reports must be reviewed, analyzed, and ultimately confirmed by statutory auditors. This gives trustworthy assurance to sustainability reporting, preventing counterproductive behaviors such as greenwashing.

Greenwashing is defined as a strategic misrepresentation of environmental responsibility. It is a set of communication practices through which companies carry out to distort their actual environmental performance. It is an illegal practice, since it is aimed at influencing stakeholders' perceptions through an unfair method. There has been identified several recurring forms of greenwashing. These include selective disclosure, where companies highlight positive environmental aspects while omitting significant negative impacts; vague or ambiguous claims, using undefined terms such as "eco-friendly" or "green" without verifiable evidence; irrelevant claims, focusing on environmentally positive characteristics that are not legally required or insignificant; and misleading narratives, which create environmental associations without factual basis. Another important form is false or unverifiable claims, where environmental benefits are asserted without credible data, standards or third-party verification. This practice was frequently used by companies' managements, creating deep asymmetries between firms and stakeholder, and making it difficult to trust corporate sustainability reporting. The introduction of binding frameworks, with specific standards to follow, has been necessary to avoid these types of unfair behaviours. (SV de Freitas Netto et al, 2020)

1.3. The European Sustainability Reporting Standards

The development of the European Sustainability Reporting Standards (ESRS) represents the cornerstone of the Corporate Sustainability Reporting Directive. Through the creation of a single and mandatory reporting framework, organizations will be able to communicate, assess, and compare their information more easily and consistently. The process of developing this unified and standardized system was complex and involved several key institutions.

The European Financial Reporting Advisory Group (EFRAG), established in 2001 to serve the public interest, played a central role. In January 2020, the European Commission tasked EFRAG with developing the ESRS, leading to the creation of the Project Task Force on European Sustainability Reporting Standards (EFRAG PTF-ESRS), which prepared the first drafts between June 2021 and April 2022. In March 2022, EFRAG also established the Sustainability Reporting Board (SRB), an internal body responsible for all sustainability reporting positions of EFRAG, including the provision of technical advice to the European Commission. The initial exposure drafts were issued in April 2022, followed by a consultation and assessment period. Starting in August 2022, the EFRAG SRB, supported by the EFRAG Sustainability Reporting Technical Expert Group, reviewed stakeholder feedback, revised the drafts, and submitted an amended version to the European Commission on 22 November 2022. In accordance with Article 49(3b) of the Accounting Directive, the Commission then sought the opinions of the three European Supervisory Authorities, the European Banking Authority, the European Securities and Markets Authority, and the European Insurance and Occupational Pensions Authority. The Commission confirmed that the drafts complied with the CSRD, although several modifications were introduced to reduce the reporting burden and simplify implementation. The first final version of the ESRS was officially published in July 2023 (Hummel and Jobst, 2024).

The ESRS are organized into three categories: cross-cutting standards, topical standards, and sector-specific standards. Cross-cutting and topical standards are sector-agnostic, meaning they apply regardless of the industry in which an undertaking operates. The cross-cutting standards, ESRS 1 and ESRS 2, address general requirements and general disclosures, defining overarching principles and introducing the sustainability topics covered by the other categories. The ten topical standards cover environmental (E1–E5), social (S1–S4), and governance (G1) matters, and are further structured into topics, sub-topics, and, when necessary, sub-sub-topics.

Sector-specific standards, instead, apply only to companies within a particular sector, providing tailored requirements for different industries.

ESRS 1 outlines the reporting areas, specifying the required information, the due diligence activity and the time horizon. Inside this standard, there are the key concepts highlighted, such as the importance of the value chain, the stakeholder engagement, and the double materiality perspective. The value chain is an important point highlighted in the ESRS. The reporting undertaking must provide extended information on material impacts and risks related to its business relationships. It means each kind of link in the upstream and downstream value chain. There are circumstances where the undertaking isn't capable of monitoring and knowing the activities placed up or down in the value chain. In these cases, the undertaking shall estimate the information to be reported by using all reasonable tools.

Appendix B of ESRS 1 specifies the qualitative characteristics that all sustainability statements must meet: relevance, faithful representation, comparability, verifiability, and understandability. These principles ensure that reported information is accurate, transparent, and useful for decision-making.

ESRS 2 establishes that undertakings shall report about four main areas: Governance (GOV), which addresses processes and procedures used to manage impacts and risks; Strategy (SBM), which explains how sustainability is integrated into the business model and strategy; Impact, Risk and Opportunity Management (IRO), which assesses sustainability risks, impacts, and policies; and Metrics and Targets (MT), which report on performance and the alignment between objectives and results. This standard also includes a list of 'minimum disclosure requirements' that must be reported for each material topic. Cross-cutting standards are followed by five topical standards concerning environmental issues, identified with the letter "E." The first, ESRS E1, deals with climate change. Companies must report on their climate transition plans, describing their efforts to reduce greenhouse gas emissions, manage energy consumption, and implement climate-friendly policies. ESRS E2 focuses on pollution, requiring undertakings to provide information about the identification and assessment of air, water, and soil pollution, including both positive and negative effects, or potential ones, caused by their activities. Any actions or strategies undertaken by management to prevent, mitigate, or avoid pollution must be clearly reported in the sustainability statement. ESRS E3 addresses water and marine resources, examining how corporate actions affect oceans and other aquatic ecosystems, as well as the commitments made by companies to reduce water consumption and promote the sustainability of the blue economy. ESRS E4 concerns biodiversity and

ecosystems, highlighting issues such as biodiversity loss, the state of species, and the condition of ecosystems. ESRS E5 refers to the circular economy, focusing on the sustainable use of resources, the minimization of waste, and the transition toward renewable and efficiently managed materials.

The second group of topical standards focuses on social matters and is divided into four categories. ESRS S1 covers the company's own workforce, requiring the disclosure of information about workers' conditions, such as social protection, health, engagement, and remuneration. ESRS S2 concerns workers in the value chain, asking companies to report their policies, processes, and due diligence measures adopted to protect workers beyond the direct workforce. ESRS S3 refers to affected communities, requiring disclosure on the cultural, social, and political rights of communities directly or indirectly influenced by the company's operations. ESRS S4 relates to consumers and end-users, requiring information about relationships with consumers in areas such as stakeholder engagement, safety, inclusion, and privacy. The third group of topical standards concerns governance and consists of a single standard, ESRS G1, which focuses on corporate culture, anti-bribery and anti-corruption practices, political influence, and payment practices (Delegated Regulation EU 2023/2772).

To comply with the ESRS, companies must first conduct an internal assessment to identify their key reporting areas. Although the standards are designed to be applied by all organizations, firms from different sectors will inevitably disclose diverse types of information. A careful internal analysis is essential to understand the company's double materiality assessment, the structure of its value chain, and the most relevant effects of its activities. The preparation of a well-balanced sustainability report requires collaboration among all departments and effective stakeholder engagement to collect a wide range of reliable data. External assurance providers also play a fundamental role in verifying the accuracy and completeness of the information reported in the sustainability statement.

After the first period of implementation, the ESRS revealed their complexity, raising concerns and difficulties among undertakings. To address these issues, EFRAG announced a plan to simplify the standards. In June 2025, EFRAG confirmed its ongoing work to reduce the reporting burden and improve the usability of the ESRS. The simplification aims to strike the right balance between meeting stakeholders' needs and minimizing compliance costs, while maintaining a sufficient level of quality. The proposed adjustments focus on several key areas: simplifying the double materiality assessment by removing unnecessary steps and emphasizing relevance and practicality; improving the readability of sustainability statements by allowing

the aggregation of secondary information and avoiding repetition; redefining minimum disclosure requirements so that information provided under ESRS 2 does not need to be repeated in topical or sector-specific standards; enhancing the clarity of the standards by distinguishing more clearly between mandatory and optional content; reducing the overall reporting burden by eliminating calculations and data requests for matters unlikely to significantly affect impacts, risks, or opportunities; and improving interoperability with global standards, particularly by aligning ESRS with the IFRS Sustainability Disclosure Standards to facilitate comparability and consistency across reporting systems.

Table 1 – European Sustainability Reporting Standards: an overview

ESRS 1	General requirements
ESRS 2	General disclosures
ESRS E1	Climate change
ESRS E2	Pollution
ESRS E3	Water and marine resources
ESRS E4	Biodiversity and ecosystems
ESRS E5	Resource use and circular economy
ESRS S1	Own workforce
ESRS S2	Workers in the value chain
ESRS S3	Affected communities
ESRS S4	Consumers and end-users
ESRS G1	Business conduct

1.4. The implications for undertakings and stakeholders

Non-financial reporting has strengthened corporate social responsibility, making sustainability an essential element of modern business strategy. Corporate sustainability reporting is now an integral part of how organizations plan and operate, promoting a transversal approach that extends from production to consumption and involves all the people and processes in between. These relationships create a broad network of individuals and entities who share an interest in the company's activities, even though they perform different roles. They are the company's stakeholders: anyone directly or indirectly connected to the organization and affected by its performance. The concept includes a wide range of actors that can vary by sector. There are stakeholders directly influenced by corporate activity, such as employees, customers, and suppliers, while other stakeholders, including investors, financial institutions, and public authorities, depend on organizations' disclosure.

The Corporate Sustainability Reporting Directive is reshaping how companies interact with these groups by addressing the traditional information asymmetry that limited stakeholders' understanding of sustainability performance. The new disclosure requirements promote transparency and comparability, strengthening trust and confidence between companies and their stakeholders. Better access to information also supports more efficient capital markets, reduces uncertainty about future cash flows, and allows investors to monitor managerial actions more effectively in relation to environmental, social, and governance (ESG) matters. Stakeholder engagement plays a key role in this process. It involves actively including interested parties in the reporting activity through consultations, meetings, or surveys. Because the CSRD demands detailed and reliable data, involving stakeholders helps companies identify relevant impacts, risks, and opportunities, improving the quality and credibility of the information disclosed. Stakeholder's engagement is a key feature of the stakeholder theory. Stakeholder theory highlights that companies must consider the interests of all parties affected by their activities, not only those of shareholders. It has become a dominant framework in explaining sustainability reporting practices across various industries, reflecting the growing alignment between sustainability disclosures and stakeholder expectations. The theory argues that firms are part of a broader social system and have a responsibility to act transparently and accountably toward those they influence. This relationship involves two complementary

perspectives: accountability and operational necessity. Accountability refers to the duty of companies to consider stakeholders in their decision-making, while operational necessity emphasizes that meeting stakeholder expectations is essential for long-term success. In this view, responding to stakeholder needs is not only ethically justified but also strategically beneficial. Effective stakeholder management begins with identifying relevant stakeholders and assessing their influence. Companies must recognize who their stakeholders are, understand their relationships, and prioritize them according to the legitimacy of their claims and the immediacy of their concerns. All stakeholders with legitimate interests in corporate activity deserve consideration, regardless of whether the company benefits directly from them. (Fontaine, 2006)

Stakeholder engagement refers to the active involvement of these groups in corporate decision-making. It is both a form of corporate responsibility and a tool for improving accountability, helping firms clarify their obligations and increase transparency. Engaging stakeholders benefits both sides: companies gain insight into relevant social and environmental issues, while stakeholders receive recognition and influence over corporate actions. However, engagement alone does not guarantee responsible treatment; true responsibility requires acting in the genuine interest of legitimate stakeholders and balancing competing claims in a fair and transparent way. (Scamans, 2024)

Sustainability reporting is thus reaching the same level of relevance as financial reporting, with both forming part of the company's annual report and being accessible to the public. However, while financial data often require technical expertise to interpret, sustainability information is more understandable to a wider audience, including consumers and suppliers. The content of sustainability reports also differs substantially from financial ones, as they cover a broader and more dynamic range of topics that evolve over time and vary across sectors and countries. This multidimensional nature makes standardization and comparison more challenging, but also highlights the need for flexible and adaptable rules capable of reflecting ongoing developments. Unlike financial reporting, which includes both short and long-term perspectives, sustainability reporting focuses on the long run, as demonstrated by the European Green Deal's objective of achieving carbon neutrality by 2050. Many sustainability aspects cannot be expressed in monetary terms, which complicates their evaluation but also enriches the understanding of corporate performance beyond purely economic measures. The CSRD's effort to harmonize standards through the European Sustainability Reporting Standards therefore represents a significant step towards greater transparency and comparability. Even if a precise economic

assessment of sustainability disclosure remains complex, the Directive contributes to create a more informed, accountable, and forward-looking corporate environment. (Christensen et al, 2019).

Despite the benefits of transparency, the new requirements also pose significant challenges for undertakings. The need to collect, verify, and disclose large volumes of non-financial data entails organizational, technological, and financial costs. Smaller companies, in particular, may face difficulties in developing the internal expertise and systems required to meet ESRS standards. SMEs face several challenges in implementing the CSRD, mainly due to its complexity, the extensive reporting requirements on supply chains, and the financial and human resources needed for compliance. Additional obstacles include changing internal behaviors and overcoming language barriers. Early preparation is therefore essential to allocate sufficient time and resources. Many SMEs also lack adequate personnel, capital, and technological tools, making compliance costly and difficult. Although not all SMEs are directly required to report under the CSRD, many are indirectly affected through their relationships with larger companies that depend on their sustainability data. Despite these difficulties, SMEs generally view the CSRD positively, recognizing opportunities for growth and improved sustainability practices. Addressing the identified resource gaps and implementation barriers will be crucial for ensuring a smooth transition and widespread compliance. (Donk, 2024)

The CSRD also introduced a limited assurance requirement for sustainability information, which will gradually evolve into a reasonable assurance level. This enhances reliability and integrates sustainability reporting more closely with financial auditing practices. Sustainability reporting assurance is different from financial assurance. The sustainability assurance market is widely fragmented. There are many types of providers that use different assurance standards. The market is quite young, without common assurance contracts. Rather each company can adjust its assurance contract in a customized way, in relation to the scope it needs. There are mainly two groups of providers: the accounting firms composed by accounting professionals, like the Big Four and other accounting companies. Engineering firms and small consulting companies. Tendentially, the sustainability assurance provided by one of the Big Four has higher relevance. (Krasodomska et al, 2025)

The CSRD also focuses on the links between companies. The obligation varies significantly depending on the degree of parental control. If the undertaking is part of a consolidated group, all impacts, risks, and opportunities must be disclosed for the entire group. As stated, “The sustainability statement shall be for the same reporting undertaking as the financial statements.

For example, if the reporting undertaking is a parent company required to prepare consolidated financial statements, the sustainability statement will be for the group". The disclosure must include all subsidiary undertakings under control, even when control is exercised without holding the majority of voting rights. Therefore, it is important to identify the parental bonds of the company in order to report all required information at the consolidated level. In this case, a parent undertaking that reports at the consolidated level is exempt from the obligation to publish its individual sustainability statement, and the same exemption applies to subsidiary undertakings whose disclosure is already included in the consolidated sustainability report. The phased approach follows the same pattern as individual sustainability reports. In 2025, public-interest entities that are parent undertakings of a large group with an average of 500 employees during the financial year began reporting for 2024. Other parent undertakings of a large group will begin publishing their reports in 2026.

1.5. The key concept of double materiality

The NFRD presented two different analytical perspectives: the outside-in and the inside-out approaches. The first aims to describe how sustainability issues impact companies' activities, financial position, and performance. The inside-out perspective adopts the opposite direction, focusing on the effects that organizations' activities have on people and the environment. Both perspectives are relevant for sustainability disclosure, as confirmed by the European Commission, which stated that only material information shall be disclosed. Information is considered material when there is a substantial likelihood that the omission of a fact would influence the decisions of a reasonable investor. In this sense, a matter is material when it triggers, or could trigger, financial effects (Mezzanotte, 2023).

With the publication of the "Non-binding Guidelines on Non-Financial Reporting: Supplement on Reporting Climate-Related Information", the European Commission formally introduced the concept of double materiality, which later became one of the core pillars of the CSRD. This concept reflects a broader understanding of corporate accountability, as the impacts of an undertaking are relevant not only for direct stakeholders, such as investors and creditors, but also for indirect stakeholders, including employees, consumers, local communities, and society at large. Under the CSRD, materiality is articulated through two complementary dimensions:

impact materiality and financial materiality. Impact materiality focuses on how a company's activities affect the environment and society, either positively or negatively, following an inside-out perspective. These impacts must be considered across the entire lifecycle of activities and, where relevant, along the value chain. Financial materiality, on the other hand, adopts an outside-in perspective and requires companies to assess how sustainability-related risks and opportunities may affect financial performance, position, and future prospects, potentially influencing profitability and enterprise value (Bossut et al., 2021).

A sustainability matter is considered material under the principle of double materiality if it is material from the impact perspective, the financial perspective, or both. This "either/or" logic represents a significant evolution compared to traditional financial reporting and ensures that sustainability reporting captures a broader range of relevant issues. In this sense, double materiality provides a more comprehensive representation of the relationship between business activities and sustainability outcomes, enabling companies to align their strategies with the expectations of a wide range of stakeholders.

Within the CSRD framework, double materiality is not merely a conceptual principle but a structured and mandatory assessment process. Companies are required to identify sustainability matters, evaluate their impacts, risks, and opportunities, and prioritise them through documented methodologies. Impact materiality is assessed by considering both the severity and the likelihood of impacts. Severity is analysed in terms of scale, scope, and irremediability of the impact on people or the environment, while likelihood refers to the probability of occurrence. Financial materiality, instead, is evaluated by estimating the likelihood and magnitude of potential financial effects arising from sustainability-related issues. This structured approach aims to reduce discretion, enhance comparability, and improve the decision-usefulness of disclosed information.

The adoption of double materiality offers several advantages. It helps companies identify which activities are most closely linked to sustainability impacts, allowing for more effective risk management and strategic planning. Moreover, it fosters stronger stakeholder engagement, as it requires organizations to consider multiple perspectives and expectations. By integrating both impact and financial considerations, double materiality enhances the credibility and completeness of sustainability reporting, enabling companies to present a more accurate and transparent account of their operations. At the same time, the implementation of double materiality presents relevant challenges. The assessment process is complex and resource-intensive, particularly in terms of data collection, stakeholder involvement, and impact

measurement. A degree of subjectivity remains in evaluating severity and likelihood, which may lead to heterogeneous outcomes across companies. Without robust governance mechanisms and clear methodologies, there is the risk that double materiality assessments become formalistic exercises rather than effective tools for decision-making. Nevertheless, double materiality assessment remains a crucial instrument for guiding sustainability strategies. Although investments in sustainable policies often generate short-term costs and require significant economic resources, empirical evidence suggests that they produce long-term benefits, including improved financial performance and enhanced corporate visibility. Higher quality and transparency in sustainability reporting contribute to reducing uncertainty, improving forecasts, and strengthening stakeholders' trust, thereby reinforcing the strategic value of sustainability disclosure (Adams et al., 2021).

In light of the regulatory evolution and the central role of double materiality in sustainability reporting, it becomes necessary to examine the sectoral context in which these principles are applied. The water utility sector represents a particularly relevant field of analysis, given the essential nature of water services and the significant environmental, social and economic impacts associated with their provision. For this reason, the following chapter focuses on the water utility sector, outlining its structural characteristics, operational logic and economic features, in order to provide the contextual background required for the subsequent analysis of sustainability reporting practices.

Chapter 2
STUDY CONTEXT: THE WATER UTILITY SECTOR

Water utility companies play a central role in modern societies, as they are responsible for the provision of one of the most essential services for human life. Access to safe drinking water and adequate wastewater treatment is a fundamental requirement for public health, social well-being and sustainable development. For this reason, water services are universally recognised as services of general interest and are subject to strong public oversight, regardless of the specific management model adopted. Understanding how water utility companies operate, how water supply systems are structured and which functions they perform is therefore a necessary starting point for any analysis of the water sector. (World Health Organisation, 2017)

In the most developed countries of the EU, water utilities operate within a highly complex technical and institutional framework. Their activities encompass the entire water cycle, from the abstraction of water resources to treatment, distribution to final users, and the collection and purification of wastewater before its return to the environment. These processes require large-scale infrastructure, long-term planning and continuous maintenance, as well as the coordination of engineering, environmental and managerial expertise. As a result, water utilities are capital-intensive organisations whose performance depends not only on operational efficiency but also on the quality of governance, regulatory stability and investment capacity. (OECD, 2015)

From an economic perspective, the water utility sector is characterised by specific structural features that distinguish it from competitive markets. High fixed costs, network-based infrastructures and the essential nature of the service mean that water provision is commonly organised as a natural local monopoly. This implies that, within a given geographic area, a single operator can supply the service more efficiently than multiple competing firms. (Abbott & Cohen, 2009).

While this structure can generate efficiency gains, it also necessitates strict regulation to ensure affordability, service quality and universal access. Consequently, water utilities' activitiy is strictly linked to public policy objectives, limited by economic constraints and marked by heavy environmental responsibilities.

In addition to their technical and economic functions, water utility companies are increasingly required to respond to broader societal and environmental challenges. Population growth,

urbanisation, climate change and the deterioration of water resources place growing pressure on existing systems. At the same time, international and European policy frameworks, such as the United Nations' Sustainable Development Goals and EU water directives, above all the Water Framework Directive, require water utilities to pursue sustainability, resource efficiency and ecosystem protection. These evolving expectations are reshaping the traditional role of water utilities, pushing them beyond simple service provision, towards more integrated and forward-looking water management models.

This section provides an overview of European water utility companies, in particular of the Western Europe, by outlining the structure and functioning of water supply systems, the key components of water abstraction, treatment and distribution, and the main organisational and economic characteristics of the sector. By illustrating how water services are technically delivered and institutionally organised, this section establishes the analytical foundation for the subsequent examination of environmental impacts, regulatory frameworks and sustainability challenges addressed in the following parts of the chapter.

2.1. An overview of water utility companies

The water utility sector is aimed at providing essential water supply and wastewater treatment. More precisely, water utilities focus on providing, managing, and distributing water resources among different users, such as families, industries, and the public sector. The primary purpose of water companies is to provide wholesome, affordable, and safe drinking water in adequate quantities, thereby gaining customers' trust. Wholesome water is fundamental for everyday life: it is unpolluted water, free from toxic substances that could affect its quality.
To understand the functioning of water utility companies, it is useful to illustrate how the water supply system works.

In the US, a public water system is defined as a network of pipes or other structures that provide water for human consumption to at least 15 service connections or to at least 25 individuals for a minimum of 60 days per year. It is possible to outline three types of public water systems. The community water system is marked by the provision of water to the same population throughout the whole year. Non-transient non-community water system is a system that regularly supplies water to at least 25 people in the same place for at least 6 months per year,

but not for the entire year. This is the case of schools, factories, and offices. At last, transient non-community water system is characterized by the supply of water to small places where people do not stay for long periods of time (U.S. Environmental Protection Agency, 2021).

In Europe, there is no single harmonised definition of a public water system at EU level, nor uniform numerical thresholds that identify it. Instead, public water systems are defined through a functional and regulatory approach. In general terms, a public water system is understood as a water supply system managed by a public authority or by a regulated utility, providing water to the population as a service of general interest and operating under public health, environmental and economic regulation. (EU Drinking Water Directive, 2020)

The functioning of water supply systems is complicated. First, It is necessary to estimate the amount of water required by a certain group. Then, a reliable source of water is needed for provision throughout the year. Furthermore, a collection system, a treatment plant, and a distribution system are essential to complete the water supply system. The water is taken from the source and collected through specific intakes. Afterwards, it is pushed into treatment plants that purify the water, increasing its quality and making it usable by consumers. Eventually, the distribution system is essential to deliver drinking water to final users (Mays, 2011).

The major sources of supply are surface water and groundwater. Water comes in the form of precipitation. A part of it runs across the surface of the ground through lakes, rivers, and oceans. This type of source requires specific treatment, as it picks up many different polluting substances that must be removed. Another part of precipitation sinks into the ground and goes deep while picking up minerals and organic compounds. Moving downward through the layers of the earth, the water is filtered from most microorganisms and polluting substances. It ends up in deep aquifers, which contain a low concentration of contaminants and thus require less specific treatment than surface water. Water supply systems require large engineering works. Water must be conveyed from the source to the treatment system by means of intakes, aqueducts, and pumping stations. Then, the raw water reaches the treatment plant, the part of the system where water is treated to remove turbidity, taste, contaminants, smell, and corrosive elements. The last step is the distribution system. It is necessary to deliver water to final consumers, satisfying different requirements of quality, quantity, and pressure. Often this phase represents the major investment for utility companies, as it includes costs for pipe networks, storage tanks, pumps, and other connected services. (Spellman, 2017)

To sum up, each water utility company, in the process of planning the water supply system, must take into account: estimation of future population and local conditions to forecast the

gross amount of water needed; determination of a reliable water source; development of a collection and distribution system capable of providing the necessary amount of water and storing the unused part; definition of quality requirements and design of an adequate treatment plant; and provision of a team able to maintain the system, manage its functioning, and fix potential issues. These are the processes and key elements that each water utility company must be provided with.

Additionally, Water providers face several challenges related to their activity. Aging infrastructure is a critical issue that requires time and money to be addressed. Furthermore, climate change raises concerns about the availability of water sources, especially where weather conditions reach extreme levels. The only way for water utilities to be successful today is to invest adequately in innovative technologies. Rising temperatures, changes in precipitation patterns and the growing frequency of extreme weather events directly influence both water supply and wastewater systems. Prolonged droughts reduce water availability and place stress on abstraction sources, while intense rainfall events overwhelm drainage and sewer networks, increasing the risk of flooding, sewer overflows and contamination of water bodies. Climate change also accelerates the physical deterioration of water infrastructure. Higher temperatures and altered soil moisture conditions contribute to pipe degradation, ground instability and increased failure rates, particularly in ageing networks. Flood events can damage treatment plants, pumping stations and distribution systems, causing service disruptions and significant economic losses. At the same time, sea-level rise poses a serious threat to coastal water infrastructure, leading to saltwater intrusion into freshwater aquifers and corrosion of underground assets. These impacts reduce system reliability and increase operational and maintenance costs for water utilities. Adaptation strategies such as infrastructure reinforcement, nature-based solutions, flexible system design and integrated urban water management are needed. (Ferdowsi et al, 2024)

The activity of water utility companies should be inspired to the SDG 6, titled “clean water and sanitation”, which aims to ensure availability and sustainable management of water and sanitation. Specifically, some of its targets include providing safe and affordable drinking water (Target 6.1), improving water quality, wastewater treatment, and safe reuse (Target 6.3), implementing integrated water resource management (Target 6.5), and protecting water-related ecosystems (Target 6.6). Water utility companies are directly involved in achieving these goals. The old traditional mechanism no longer works and must be replaced with a more advanced and technological approach in order to achieve sustainability goals. Centralised, outdated, and

purely piped infrastructures is a system that no longer can coexists with modern needs. It is required a shift towards service improvements, based on efficiency, reuse, and green infrastructure. Water utility companies play a key role in ensuring access to safe water. It is essential for health, hygiene, and quality of life. For this reason, these companies are periodically monitored to ensure compliance with public standards. (Agenda 2030)

Water utilities act under the strict control of the European Commission which, through multiple directives, regulates their activity. Historically, European legislation in the water sector can be divided into three waves. The first was led by the Surface Water Directive and the Drinking Water Directive (Directive 80/778/EEC, 1980). These were mainly aimed at setting minimum water quality standards and protecting surface waters. The second wave introduced the control of emission levels related to the water supply sector. The main regulations of this period include the Waste Water Directive (Directive 91/271/EEC, 1991), which established quality thresholds for wastewater treatment structures, the Nitrate Directive (1991), and the Directive on Integrated Pollution Prevention and Control (1996). The Waste Water Directive had huge relevance because it set higher infrastructure standards that required major investments in green technologies. It had a strong impact on financing models of the water sector. Indeed, such financial efforts could not be sustained by municipalities alone, requiring the involvement of the private sector. The third wave of European water legislation is represented by the Water Framework Directive (WFD) (Directive 2000/60/EC). Its development began in 1995, when the Environment Commission of the European Parliament and the Council of EU Environment Ministers agreed to create a common framework for EU water policy. The WFD was published in the Official Journal of the EU in December 2000. From that date, Member States had three years to transpose it into their national legislation. The WFD established a regulatory framework for organisations operating in the water field, emphasising the need to prevent deterioration, protect ecosystems, promote sustainable water use, reduce pollution, and mitigate the effects of floods and droughts. Article 2(38) of the WFD defines water services as "*all services which provide for households, public institutions or any economic activity: (a) abstraction, impoundment, storage, treatment and distribution of surface water or groundwater; (b) wastewater collection and treatment facilities which subsequently discharge into surface water*". It introduced for the first time the concept of water management based on river basins, linking water source planning with physical planning and identifying competent authorities responsible for managing water supply. These authorities are national or regional public bodies whose role is to manage and enforce the WFD's rules. Additionally, the Directive

strengthened the idea that water quality must be associated with emission controls and groundwater protection (Kaika, 2003).

As previously mentioned, the Waste Water Directive and, later, the Water Framework Directive set higher standards for water infrastructures, such as more sustainable treatment plants and distribution systems. These stricter requirements were meant to be implemented through renovation and modernisation of water facilities. Until the nineties, the water service belonged to the public sector and was composed of state-owned enterprises. In 1992, the Maastricht Treaty required Member States to keep public debt below 60% of GDP and public deficit below 3%. This strongly affected the management system of the water supply sector; indeed, state-owned enterprises could not afford the expenses required by the Water Directives while still respecting the thresholds imposed by the Maastricht Treaty. This situation led to the involvement of the private sector, which became the only way to access significant capital expenditure within a short timescale. The influence on public services, including the water service, was twofold. First, many public enterprises were sold to reduce debt. Second, the restructuring activity needed to comply with the WFD involved private companies through the use of public-private partnerships (Hall and Lobina, 2007).

For several years, there was great optimism about the involvement of the private sector and its capacity to solve the performance and financial issues faced by the public sector. Unfortunately, expectations did not prove as successful as anticipated. Although a major impact on financing was expected, between the end of the 20th century and the beginning of the 21st century, private funds represented only a small share of the total investments in the water supply sector. At the same time, many public utilities became more autonomous and accountable, improving their performance. Often, the decentralisation of control and management to municipal governments proved to be a good strategy to enhance efficiency (Baietti et al., 2006).

Over the years, most water and sanitation services have remained under public ownership and control. Even when private operators participate in service delivery, the underlying infrastructure, long-term strategic decisions, and regulatory authority remain public. For this reason, public-private partnerships (PPP) are not classified as private models but rather as mixed arrangements situated within the sphere of public service provision. In a PPP, the private partner may operate the service, maintain the network, or finance part of the investment, but ownership of assets, approval of tariffs, and performance oversight remain under the control of the public authority. These partnerships are designed to support public service delivery rather than replace it, and the public body retains the power to renegotiate or terminate the contract.

Such arrangements form part of a broader system shaped by long-term concession and lease contracts, which limit the scope for competition because only a small number of large private companies has the capacity to compete for them. As a result, market mechanisms play a minor role, and PPPs tend to be stable, negotiated systems rather than competitive ones. This is due to the high capital intensity and asset specificity of water infrastructure, the long duration of concession contracts, and the limited number of qualified operators. As a consequence, competition is largely confined to the initial tendering phase, while service provision is governed through ongoing contractual relationships and regulatory oversight (Lima et al, 2021)
In recent years, remunicipalisation has emerged as a significant development in water policy, following several decades of widespread reliance on privatisation and public-private partnerships. Remunicipalisation refers to the process through which the management of water services shifts from private operators back to public or municipal control. As a result, water services are today predominantly operated under public or municipal responsibility, although private actors may still be involved through delegated arrangements. Many municipalities have expressed concerns about service quality, insufficient investment, high regulatory and monitoring costs, and the limited availability of credible bidders in tender processes. This combination of factors has given rise to an international pro-public movement. Despite this momentum, remunicipalisation is neither uncontested nor linear. International financial institutions continue to support private sector participation in infrastructure (McDonald & Swyngedouw, 2019).
The Treaty on the Functioning of the European Union is one of the two treaties that form the constitutional basis of the EU. Its original name was the Treaty of Rome, signed in 1957. In 2009, the Treaty of Lisbon renamed it "Treaty on the Functioning of the European Union". The Treaty, more specifically Article 14 and Protocol No. 26 on services of general interest, states that services of general economic interest must be handled by individual Member States within their legislation at national, regional, or local level. Each Member State can assess and decide the best way to provide, delegate, and organise services of general economic interest, such as the water supply service. The Treaty also underlines the importance of high quality, safety, affordability, equal treatment, and universal access. Therefore, decisions on the organisation and choice of management model for water services fall under the competence of Member States. Four different management models can be outlined (The European Federation of National Associations of Water Services, 2020). Direct public management is the system in which the entire public service is handled and provided by the public entity, which is the sole

responsible actor. Delegated public management still features a responsible public authority, but in this case it delegates service provision to another entity, which manages the service. These management entities are usually publicly owned. The last two models are private. Delegated private management is a system regulated by a contract, typically in the form of a lease or concession. Responsibility remains with the public entity, but the service is assigned to private specialised companies, which can use publicly owned infrastructures. The last model is direct private management, where all tasks, responsibilities, and ownership related to the water service lie with the private entity. In this case, the public authority conducts monitoring and control activities to ensure compliance with established standards. Full privatisation in Europe is not common, and is limited to countries such as England, Wales, and the Czech Republic. The most widespread model is a mix of direct public, delegated public, and delegated private management. Usually, water infrastructures across Europe are publicly owned. The public sector is also responsible for defining quality standards and setting tariffs, which are essential to cover the costs associated with the water service.

Water and wastewater tariffs represent the main source of revenue for water utilities. Tariffs enable water companies to cover the costs mentioned above. Thus, on the one hand, tariffs must fund the necessary infrastructure; on the other hand, they must be balanced so as not to compromise consumers' ability to pay. In general, the most commonly used water tariffs include a fixed part and a volumetric part. The fixed component does not vary with consumption. Access to water and wastewater services implies payment of this fixed amount, which depends on meter size. The other part is calculated based on consumption, so higher use will increase the volumetric charge. The most globally adopted tariff structure is the increasing block-rate tariff. The payment of an affordable price allows consumers to obtain a minimum amount of water. Water usage beyond this minimum is charged according to increasing blocks, meaning that the cost of water rises more than proportionally after a certain threshold. This mechanism is intended to discourage waste and penalise major consumers. The key decisions needed to design an increasing block structure concern the number of blocks, the volume of water attributed to each block, and the prices to be charged within each block (Damkjaer, 2020).

2.2. The link between water services and environmental impact

Water utility companies are strictly connected to environmental impacts. The regular activities of these companies include water extraction, treatment, distribution and wastewater management. The whole activity depends on one main resource: water. Within their operations, water utilities face issues related to resource consumption, ecosystem protection and climate-related risks. Furthermore, in recent years, increasing urbanisation and global population growth have directly caused a higher demand for drinking water and wastewater services. The main problem is that excessive and unsustainable water use has deeply negative effects. The most significant consequence of excessive water use is the reduction of surface water and groundwater resources. Water sources such as rivers, lakes and aquifers are able to regenerate over time; however, if their consumption exceeds their regeneration capacity, the result is the depletion of water sources. Lower water levels in rivers and lakes drastically harm aquatic habitats, disrupting fish species and underwater vegetation. This damages biodiversity and increases the risk of the disappearance of certain species. Another consequence of water use is undoubtedly pollution, particularly in fields such as agriculture, industrial processes and wastewater treatment. Restrictive measures and rigorous quality controls are essential to avoid the release of pollutants into the environment (Pfister et al., 2009).

The provision of drinking water and wastewater services has been increasingly affected by rising population levels and growing urban demand. These services are essential for daily life and public health, yet they also generate negative environmental externalities, particularly in the form of greenhouse gas emissions. In the water utility sector, energy-intensive activities such as wastewater treatment, drinking water production and the pumping of water from sources to treatment plants and final users require substantial electricity consumption. In many contexts, these energy needs are still largely met through fossil-fuel-based electricity, resulting in significant indirect greenhouse gas emissions (Ananda, 2019).

In addition to energy-related emissions, wastewater treatment processes generate direct greenhouse gases, mainly methane and nitrous oxide, which arise from biological treatment stages and sludge management. Although these emissions contribute to the overall carbon footprint of water utilities, the literature indicates that energy consumption remains the dominant source of emissions in most systems. This highlights the close relationship between infrastructure efficiency, energy intensity and environmental performance within the sector.

The level and composition of greenhouse gas emissions vary considerably across water utilities and depend on a wide range of factors. These include the type and quality of water sources, the configuration and age of network infrastructure, the reliance on pumping versus gravity-based systems, geographical and topographical conditions, demand patterns associated with large consumers, and the national energy mix and emissions policies in place (Ananda, 2018).

Consequently, greenhouse gas emissions are not only the result of operational choices but also reflect long-term infrastructural and regulatory conditions. From a strategic perspective, this variability implies that emission reduction potential differs significantly across utilities. Improving energy efficiency, modernising infrastructure and integrating sustainability considerations into investment planning become crucial levers for mitigating environmental impacts while maintaining service reliability. As energy costs and climate-related regulatory pressures increase, the management of emissions increasingly represents not only an environmental concern but also a financial and operational challenge for water utilities.

In recent years, the European Union has reinforced its climate policy framework through instruments such as Regulation 2024/1735 (the Net-Zero Industry Act), which aims to accelerate the deployment of net-zero technologies and reduce external dependencies across strategic industrial sectors. It has applied since June 2024. The regulation forms a core component of the Green Deal Industrial Plan, presented in 2023 by the European Commission, responding to concerns over external dependencies, supply chain vulnerabilities, and global competition in clean technology manufacturing. The regulation applies to 19 key net-zero technologies, including renewable energy generation, energy storage, heat pumps, hydrogen, and hydropower, as well as to energy-intensive industrial decarbonisation projects that are integral to net-zero technology supply chains and significantly reduce carbon dioxide emissions. The overarching objective is to ensure that, by 2030, the EU can manufacture at least 40 % of its annual deployment needs for net-zero technologies and, by 2040, account for 15 % of global production. Within this context, the water and wastewater sector plays a relevant role due to its energy-intensive operations and process-related emissions. Greenhouse gas emissions in the sector are commonly classified according to the GHG Protocol, which distinguishes Scope 1, Scope 2 and Scope 3 emissions. The first one includes direct emissions from owned sources, including fuel combustion and fugitive emissions such as methane and nitrous oxide from wastewater treatment. Scope 2 is about indirect emissions from purchased electricity used for water abstraction, treatment, distribution and wastewater processing. Scope 3 emissions refer to the other indirect emissions along the value chain, such as outsourced

desalination, long-distance water transfers, chemical use and infrastructure-related activities. Urban water systems are significant energy users and therefore indirect contributors to climate change, primarily through carbon dioxide emissions associated with electricity consumption. In addition, wastewater treatment processes generate direct emissions of methane and nitrous oxide, which have a high global warming potential. The relative importance of emission sources changes over time as cities grow, service standards increase, and treatment technologies become more advanced. (Yan et al, 2025)

Water has been described as the "*blue gold*" of the 21st century, highlighting its strategic value for human well-being, economic development and ecological stability. Over time, increasing attention has been dedicated to the protection and sustainable management of water resources, reflecting rising concerns about scarcity, pollution and climate change. In the 2030 Agenda for Sustainable Development, the efficient use and long-term safeguarding of water as a natural resource represents a central objective, especially under SDG 6, which calls for universal access to clean water, improved water quality, sustainable withdrawals and integrated water resource management. Furthermore, the United Nations declared the decade 2018-2028 as the "*International Decade for Action: Water for Sustainable Development,*" reinforcing global awareness that water governance is essential for resilience, public health and environmental protection. Within this framework, the concept of the circular economy becomes particularly relevant. A circular economy aims to minimise waste generation and maximise the value of resources by keeping products, materials and inputs in use for as long as possible. In the water sector, this approach translates into multiple strategies: reducing water losses, promoting reuse and recycling of treated wastewater and improving efficiency across the entire water cycle. (D'Inverno et al., 2021)

Circular economy strategies in water and wastewater systems have traditionally concentrated on waste management and resource recovery. However, the management of electromechanical assets in wastewater treatment plants represents another relevant field, which can significantly contribute to circular economy objectives by reducing resource consumption, waste generation, and environmental impacts. Extending the useful life of equipment through effective asset management is a key strategy to pursue sustainable goals. Circular economy concept is commonly understood as an approach aimed at minimizing resource extraction, reducing waste and pollution, and maintaining materials and products in use for as long as possible. In the wastewater sector, this approach is particularly relevant because wastewater contains valuable recoverable resources. However, wastewater treatment facilities themselves rely on large

quantities of electrical and electronic equipment, whose production and disposal generate substantial environmental damage, especially when the management of old infrastructures is inadequate. In this context, asset management emerges as a key strategy to preserve asset value, extend service life, and reduce electronic waste. Equipment condition assessment is identified as a crucial practice, as it informs decisions on maintenance, repair, and replacement. Effective maintenance is shown to be central to circular economy implementation, aligning with the idea that prioritising repair and maintenance can be as useful as promoting reuse and recycling. (Castellet-Viciano et al, 2022)

Circularity therefore allows water utilities not only to limit environmental pressures but also to optimise costs, reduce dependence on freshwater withdrawals and contribute to climate mitigation. Despite these goals, the structural characteristics of the water utility sector present challenges. In many European countries, such as Italy, England, and the Netherlands, water utilities operate within natural monopolies, derived from the high fixed costs, network-based nature and essential-service characteristics of water provision. A natural monopoly is an economic reality where one single company can supply the whole market at lower costs than a situation with more competing firms (Nauges & Van Den Berg, 2007). There are multiple reasons behind the existence of natural monopolies. First, to enter the market it is required huge investments to fund infrastructure, networks and plants. Then, economies of scale have big impact, as the average cost falls after a big increase of the output. Finally, competition should be useless, as well as duplicating infrastructure, leading to inefficiency and social waste. Water is also an essential service with inelastic demand, reinforcing this structure. Because of this monopoly position, water utilities are heavily regulated. Regulators control prices, service quality, infrastructure maintenance, and expansion to prevent abuse of market power and ensure safe, reliable, and affordable water for all users. While this structure can ensure stability and long-term investment, it does not always align with sustainability objectives, as the absence of competition may reduce incentives for innovation, efficiency improvements and rapid adoption of green technologies. For this reason, regulatory frameworks and sustainability-oriented governance mechanisms are increasingly necessary to push water companies towards environmentally responsible behaviour and to ensure that the transition to circular and sustainable water management effectively takes place.

Among the services provided by water utilities, urban wastewater is one of the main sources of water pollution. It is crucial that wastewater is collected and treated through a highly meticulous process, in accordance with EU rules. Urban wastewater often contains bacteria

and viruses; therefore, its improper treatment and release into the environment can irreversibly damage water sources. The adoption of the Waste Water Directive in 1991 had great positive effects, reducing wastewater pollution on rivers, lakes and seas. Recently, in January 2025, the directive was revised. The revision was essential to update a framework that needed to be adapted to a more complex and modern context. The main points concerning the amended wastewater directive include stricter water treatment requirements to improve water quality, a strengthened polluter-pays principle, the promotion of water reuse, stricter limitations on greenhouse gas emissions from treatment plants and the guarantee of equal access to clean water for everyone.

The activities of water utilities generate both direct and indirect environmental impacts, as discussed above. At the same time, this relationship is inherently bidirectional, forming a complex and potentially vicious cycle in which environmental change increasingly affects the performance, reliability and sustainability of water services themselves. Among these drivers, climate change represents the most significant challenge currently addressed by global and European policy agendas and must be explicitly integrated into the analysis of water utilities and water infrastructure systems.

Water infrastructures play a fundamental role in supporting sustainable development, safeguarding public health and preserving environmental quality. Drinking water treatment processes remove physical, chemical and biological contaminants, ensuring safe water supply for human consumption, while wastewater collection and treatment systems are essential to protect water bodies and maintain their ecological status. However, the ability of these systems to deliver such services is increasingly constrained by external pressures, including climate change, population growth and accelerated urbanisation. Climate change, in particular, amplifies stress on urban water systems through more frequent and intense extreme events, such as prolonged droughts, heatwaves, heavy precipitation and flooding. These phenomena can disrupt water availability, increase pollutant loads, overload wastewater treatment plants and compromise infrastructure integrity. As a result, urban water infrastructure can no longer be designed solely on the basis of historical climate patterns, but must instead be adaptive and resilient, capable of operating under a wider range of uncertain and rapidly changing conditions. This requires flexible system design, enhanced capacity for peak events, and integrated planning approaches that account for long-term climate risks and environmental interactions (Ferdowsi et al., 2024).

The environmental impacts associated with water services highlight the need for effective governance and regulatory oversight. Water abstraction, treatment, distribution and wastewater management generate significant pressures on ecosystems, contribute to greenhouse gas emissions and are increasingly affected by climate-related risks. Addressing these impacts cannot rely solely on operational or technological solutions, but requires clear regulatory frameworks that define quality standards, environmental objectives, investment obligations and accountability mechanisms. In this context, the regulatory frameworks adopted by each goverment play a decisive role in shaping how water utilities manage environmental challenges, allocate resources and comply with sustainability requirements. The following chapter therefore examines the regulatory framework in Italy, analysing how national rules translate environmental and climate objectives into concrete obligations for water utility companies.

2.3. Regulatory framework in Italy

The regulatory framework plays a decisive role in shaping how water utility services are organised, financed and monitored. In Italy, the water sector is governed by a complex and multi-level regulatory system that reflects both its nature as an essential public service and its strong environmental implications. Water supply and wastewater services are recognised as services of general economic interest, which justifies extensive public intervention aimed at ensuring universal access, affordability, service quality and environmental protection.

Over time, Italian water regulation has evolved in response to structural inefficiencies, territorial fragmentation and increasing investment needs. National reforms have progressively strengthened coordination and oversight, introducing clearer rules on service organisation, tariff setting, infrastructure investment and performance monitoring. At the same time, the Italian regulatory framework has been strongly influenced by European Union legislation, which has imposed increasingly stringent requirements in terms of water quality, environmental standards, cost recovery and sustainability. Within this context, regulation in Italy serves a dual function. On the one hand, it aims to correct market failures arising from the natural monopoly structure of water services. On the other hand, it acts as a key policy

instrument to guide long-term investments, promote efficiency and ensure compliance with environmental and climate objectives. Understanding the Italian regulatory framework is therefore essential to assess how water utilities operate in practice and how public authorities balance economic, social and environmental priorities in the management of water services.

In Italy, legislation in the water utility sector began with the introduction of the Galli Law (Law n. 36/94) in 1994. This marked the beginning of a complex reform process aimed at defining and organising the regulatory structure of the sector. The law extended the concept of water service to all activities related to water supply, including the collection and distribution of drinking water, as well as wastewater treatment and purification. The general advantage of considering all these services under a single vision is easier management and the possibility of achieving economies of scale. The unification of water-related services under one management created the so-called "*Servizio Idrico Integrato*". It represents the conglomeration of water services, designed to overcome the fragmentation of the sector. A new system of territorial, supra-municipal and centralised entities was established. It operates through territorial entities responsible for organising, controlling and entrusting the management activities of the integrated service, called Ambito Territoriale Ottimale (ATO). These correspond to geographically defined areas. Each ATO is identified by regional administrations and governed by its respective Authority, Autorità di Ambito Territoriale Ottimale (AATO), which is empowered with strategic planning, tariff determination and performance monitoring. A supervisory committee for water resources, called COVIRI (Comitato di Vigilanza sull'uso delle Risorse Idriche), was also established, with duties related to the correct implementation of the water system reform. Therefore, the introduction of the Galli Law marked the end of the municipalism phase, completely reorganising the Italian water sector. It represents a major step towards vertical integration in the sector, aiming to create large-scale management of production, distribution and purification of water. One of the key objectives behind this decision was to encourage investments in the drinking water sector while ensuring a system capable of self-financing. Indeed, the Galli Law introduced the European principle of "*full cost recovery*," which means recovering the entire cost of the service through tariff revenues. It also introduced the Normalised Tariff Method (NTM), a mechanism through which tariffs paid for the water service must cover its costs and ensure adequate remuneration of invested capital (Macchiaroli et al., 2019).

In 1995, Italian Law n. 481 established Autorità per l'Energia Elettrica e il Gas (AEEG), an independent authority at the national level. It was the main regulatory body responsible for

controlling and managing the gas and electricity sectors. Meanwhile, Law 42/2010 abolished the system based on ATO subdivision, declaring these entities null within one year. Thus, responsibilities were reassigned to regional authorities. In 2011, through Decree-Law 201, AEEG extended its scope including the water system, becaming Autorità per l'Energia Elettrica, il Gas e il Sistema Idrico (AEEGSI). Finally, with the introduction of Law n. 205 of 27 December 2017, AEEGSI was renamed ARERA, Autorità di Regolazione per Energia Reti e Ambiente. This is an independent public body and the national regulatory authority for energy, water and waste services. Its role is essential for regulating these sectors. Indeed, it is responsible for setting tariffs and quality standards. ARERA must ensure consumer protection and its activity must focus on achieving economic, social and environmental objectives. ARERA is still active today and represents a point of reference for entities operating in the energy, water and waste sectors. Furthermore, prior to its creation, the system was highly fragmented, with substantial differences across regions (Guerrini and Manca, 2020).

Following Decree-Law 152/2006, water is a public resource that must be managed according to principles of efficiency, effectiveness and affordability. The service can be carried out by municipalities or entrusted to a third-party operator. The infrastructures remain publicly owned. Three main management models are chosen by each EGA to administer the water sector. In-house providing is the model in which the public company is fully owned by the local authority. Another common model is the mixed public-private company, where the private partner is selected through a tender procedure. The full private concession is very rare today. In Italy, 97% of the population is served by public entities. More specifically, 85% is served by fully public or public-majority companies, while the remaining 12% is represented by municipalities directly managing the service (UTILITALIA, 2022). Therefore, the percentage of private or private-majority entities is very low, almost negligible. Today, ARERA operates at the national level, supervising the entire sector, while EGAs represent the competent entities at the local level. As previously mentioned, ARERA is responsible for setting tariffs. It introduced the MTI (*Metodo Tariffario Idrico*). The current framework is MTI-4, valid for the period from 2024 to 2029. (ARERA, 2023)

Tariff regulation in the Italian water sector must balance financial sustainability with social equity. While full cost recovery is essential to support investment and infrastructure renewal, water tariffs must remain affordable, given the essential nature of the service. For this reason, the regulatory framework integrates social protection mechanisms and affordability considerations, reinforcing the role of water services as services of general economic interest

rather than purely commercial activities. The current Italian regulatory framework is deeply influenced by European Union water and environmental policy. ARERA operates within a system shaped by EU directives, in particular the Water Framework Directive, which requires integrated water management, environmental protection and cost recovery. In this context, tariff regulation is not limited to ensuring financial equilibrium but is increasingly used as a policy tool to steer investments towards sustainability objectives. The MTI-4 links tariff recognition to investment programmes aimed at infrastructure renewal, reduction of water losses, service quality improvement and environmental compliance. Through MTI-4, ARERA translates European policy goals into binding economic incentives at utility level, reinforcing alignment between national regulation and EU environmental and climate objectives.

Beyond its formal structure, the Italian regulatory framework is characterised by a strong emphasis on governance coordination and long-term system resilience. Despite the progress achieved through centralised regulation and tariff harmonisation, the sector continues to face structural challenges related to territorial fragmentation, ageing infrastructure and uneven investment capacity across regions. Differences in managerial efficiency, financial strength and technical performance persist between northern and southern areas, reflecting broader socio-economic disparities. In this context, regulation plays a crucial role not only in standardising rules but also in compensating for local weaknesses through incentive-based mechanisms and targeted investment planning. Increasing climate pressures, including water scarcity, extreme weather events and growing demand variability, further reinforce the need for a robust regulatory framework capable of integrating environmental risk management into economic regulation. The Italian model therefore relies on regulation as a stabilising force, ensuring continuity of service, safeguarding public ownership of strategic assets and aligning local water utilities with national and European sustainability objectives. This evolving regulatory approach highlights the strategic role of institutions such as ARERA in steering the sector beyond short-term efficiency concerns towards a more resilient, integrated and sustainable management of water resources, in line with the principles embedded in the Water Framework Directive.

The first part of the "*Il Servizio Idrico Integrato"* report published in April 2025 by the Camera dei Deputati provides an integrated assessment of the main structural weaknesses affecting the Italian water sector. Despite the progressive consolidation of the regulatory framework, the document highlights how the system continues to suffer from deep and persistent inefficiencies that undermine service quality, environmental protection and long-term sustainability. A central

issue concerns the condition of water infrastructure, which in many areas is outdated and poorly maintained. High levels of water losses along distribution networks remain a critical problem, significantly reducing the effective availability of the resource and increasing operational costs. Similar shortcomings are observed in wastewater collection and treatment facilities, where infrastructural gaps contribute to environmental degradation and expose the country to infringement procedures at European level. These weaknesses are further exacerbated by the increasing impact of climate change, particularly through more frequent and severe drought episodes. Water scarcity is no longer an exceptional phenomenon but a structural risk that challenges the capacity of the system to ensure continuity of supply, especially in territories already characterised by limited storage capacity and inefficient networks. The report stresses that the Italian water sector has historically suffered from a chronic lack of investment, resulting from regulatory uncertainty, fragmented management structures and long-standing political resistance to tariff adjustments. Although recent regulatory reforms have improved financial stability and investment planning, the accumulated infrastructure deficit remains substantial and requires sustained long-term funding. Fragmentation of service management continues to represent a major obstacle, as the presence of numerous small-scale operators limits economies of scale, reduces technical efficiency and weakens strategic planning capabilities. This fragmentation also complicates the uniform application of regulation and hinders coordinated responses to environmental and operational challenges. Finally, the report draws attention to the high levels of water abstraction for civil uses, which reflect inefficient consumption patterns, network losses and historically low price signals. In this context, the document emphasises the need for a more integrated and resilient approach to water management, combining infrastructure renewal, investment mobilisation, managerial consolidation and demand-side measures to ensure the sustainable use of water resources in the long term.

Water utility companies are responsible for the provision of essential drinking water and wastewater services, operating through complex technical, economic and institutional systems. Their activities encompass the entire water cycle, from abstraction and treatment to distribution and wastewater management, and require capital-intensive infrastructure and long-term planning. While definitions and regulatory approaches differ between the United States and Europe, water services are generally recognised as services of general interest and are subject to strong public oversight. Water utilities face increasing challenges related to ageing

infrastructure, climate change, population growth and rising environmental standards. European water policy, shaped by successive directives and sustainability objectives, has progressively raised quality, environmental and governance requirements. Within this framework, water utilities play a key role in balancing service reliability, affordability and environmental protection, while adapting to evolving regulatory and climate-related pressures. Italy embarked on a process of consolidation and centralisation, guided by a national reform strategy aimed at overcoming fragmentation and ensuring homogeneous service standards across the territory. The Galli Law represented the foundational step of this reform, establishing the Integrated Water Service and introducing large-scale management areas (ATO). The subsequent creation of ARERA further strengthened national coordination by providing a central regulatory authority. This led to a vertically integrated model in which national oversight plays a decisive role in planning, monitoring and harmonising water services across regions.

The following chapter presents the core part of this thesis, focusing on the analysis of Pavia Acque's 2024 Integrated Report. Pavia Acque is the Italian water utility operating in the Province of Pavia. The study is based on a documentary analysis of the company's 2024 Integrated Report, which also includes sustainability-related information. The chapter examines the report from two different perspectives: first, through a direct documentary analysis aimed at identifying and assessing the information disclosed in the report; second, through a qualitative analysis based on an interview conducted with members of the company who were directly involved in the preparation of the sustainability-related content. The chapter concludes with a discussion that brings together the findings from both the documentary analysis and the interview.

Chapter 3
THE CASE OF PAVIA ACQUE S.C.A.R.L.

This chapter examines Pavia Acque's 2024 Integrated Report with the aim of understanding how a local and publicly owned water utility frames sustainability in a context where reporting is still voluntary. The analysis is based on my direct and independent reading of the entire document. I have selected and interpreted the sections that are most relevant for sustainability reporting, focusing on the elements that reveal how environmental, social, and governance issues are translated into operational priorities, managerial choices, and accountability mechanisms. This approach allows the chapter to move beyond a descriptive summary and to highlight what the report signals in terms of organisational maturity, reporting orientation, and alignment with the emerging European framework.

The starting point is that the 2024 document represents a turning point in Pavia Acque's disclosure practice. For the first time, sustainability and financial information are presented within a single reporting output, which implicitly recognises that non-financial impacts are not external to performance, but structurally interconnected with the whole corporate activity. In a regulated public service such as the integrated water service, this shift is particularly meaningful because it strengthens the logic of accountability toward citizens and institutions.

Throughout my analysis, I treated the report as a "transitional" disclosure. It openly acknowledges the relevance of the new European sustainability reporting framework and positions the 2024 disclosure as part of a gradual adaptation process. On the one hand, the report remains rooted in the GRI logic of impact-based accountability and stakeholder-oriented transparency. On the other hand, several choices and themes anticipate the direction of travel promoted by the CSRD, particularly the progressive integration of sustainability into governance, strategy, and long-term investment decisions. For this reason, the chapter does not read the report as a purely voluntary communication product, but as evidence of an internal process through which the organisation is structuring its sustainability knowledge, defining priorities, and formalising an approach that could later support a more standardised reporting model.

My analysis of the report therefore concentrates on the areas where Pavia Acque's sustainability profile becomes most visible and most measurable. These include the management of water resources and infrastructure, the energy intensity of aqueduct and wastewater operations, the

first steps toward renewable self-production, the circular management of sludge, the system of monitoring and controls that supports environmental compliance, and the governance implications of a capital-intensive service that depends on long-term planning and regulatory stability. At the same time, I paid specific attention to the social dimension, which is often underestimated when sustainability is reduced to environmental performance. Pavia Acque operates in a sector that depends on technical expertise, operational coordination, and continuous service provision, an environment in which workforce stability, training, internal organisation, and safety culture are central matters. They are enabling conditions for both service quality and environmental results, and they contribute to defining sustainability as a concrete organisational capacity rather than as an abstract commitment.

To strengthen this document-based analysis, I also enriched the chapter with qualitative evidence gathered through an interview with members of Pavia Acque directly involved in the sustainability reporting process. This interview was not used as a generic confirmation of what the report already states. Instead, it provided an internal perspective on the motives, constraints, and practical work that stand behind disclosure. It helped clarify why the company invests in reporting despite the absence of a legal obligation, how the integrated approach is managed within a consortium structure that includes seven territorial operating companies, and what organisational effort is required to consolidate sustainability information across multiple entities. Most importantly, it revealed that sustainability reporting is perceived internally as a tool for responsibility and communication, rooted in the ethical value of safeguarding water and in the need to make visible the complexity of a service that users often take for granted until disruptions or tariff increases occur.

The report provides the formal representation of Pavia Acque's sustainability profile, while the interview reveals the organisational meaning of that representation and the operational work that makes it possible. Together, they allow a more complete understanding of sustainability reporting as both a disclosure product and a governance practice. This is particularly relevant in light of the company's planned evolution from 2025 onward, when it will adopt the VSME standards and introduce a double materiality analysis. Against this background, the 2024 Integrated Report can be interpreted as a fundamental step: not yet aligned with CSRD requirements but already oriented toward the logic that the Directive promotes.

3.1. The research protocol

My thesis is aimed to show and justify the increasing importance of sustainability reporting over last decades. Sustainability reporting, as a corporate practice, cannot be understood solely through quantitative metrics or compliance indicators. It represents a social and organizational process shaped by regulatory pressures, cultural evolution, ethical considerations, and managerial choices.

The evolution of sustainability reporting reflects a broader transformation in the way societies conceive corporate responsibility. This topic has become a central duty in today's policies. European and national decrees, together with international strategies such as the Green Deal and the Agenda 2030, have progressively embedded sustainability into economic governance. Beyond legal requirements, sustainability has also influenced the mass culture, fostering the idea of environmental and societal safeguarding and becoming a fundamental ethical expectation. It influences corporate strategies, stakeholder relationships, and organizational identity.

Within this framework, the aim of this study is not merely to verify compliance with regulatory provisions. Instead, it seeks to interpret how sustainability reporting is understood, constructed, and embedded within corporate practice. The interpretivist approach allows for the exploration of meanings behind documents, strategic choices, and reporting narratives. It enables the analysis of sustainability reporting not just as a technical document, but as a communicative and organizational tool. Sustainability represents a collective challenge. Individuals, companies, and institutions are expected to contribute to environmental protection and social well-being. However, trust among actors cannot be assumed automatically. Transparency mechanisms are necessary to make commitments visible and verifiable. This thesis examines how such reporting practices contribute to building legitimacy and demonstrating commitment toward sustainable development goals.

The research is based on a combination of academic, regulatory and empirical sources in order to ensure methodological relevance. Academic literature and institutional reports on sustainability reporting, water utilities and the European context were used to provide the theoretical framework and to identify the main analytical dimensions of the study. European directives, guidelines and formal legal documents were consulted as primary normative sources

to define the regulatory environment governing sustainability reporting and to assess the alignment of the case study with current and upcoming requirements.

This thesis adopts a qualitative single case study design, focusing on Pavia Acque as a representative example within the Italian water utility sector. Pavia Acque represents an interesting case because it operates in a sector characterized by strong public relevance and environmental impact, yet it is not formally subject to mandatory CSRD reporting obligations. Despite this, the company has voluntarily developed and integrated sustainability disclosure practices. This characteristic makes the case particularly suitable for exploring whether sustainability reporting is driven solely by regulatory compliance or also by internal strategic and ethical motivations.

Pavia Acque S.c.a r.l. was established in December 2007 on the initiative of the former municipal utilities operating in the Province of Pavia. In 2013 it was transformed into a consortium limited liability company and, in December of the same year, the Provincial Administration entrusted it with the in-house provision of the Integrated Water Service for the entire province for the period 2014–2033. The company is entirely publicly owned; its share capital is fully held by seven former municipal utilities, while the municipalities of the province indirectly participate in its governance through their stakes in those entities. As a consortial structure, Pavia Acque operates through its member companies, which act as Territorial Operating Companies (S.O.T.) responsible for network management, plant maintenance and technical services to users, under specific service agreements and coordinated by a Technical Committee. Acting as the single operator of the Integrated Water Service across all municipalities of the province, Pavia Acque pursues a mission that combines service continuity, infrastructure efficiency and environmental and social sustainability. Its commitment is perfectly reflected in the effort to publicly disclose about its sustainability performances.

The starting point of the research is the analysis of the official documentation produced by Pavia Acque. Through systematic observation of this document, structural changes and thematic priorities were identified. These observations were then used to develop broader reflections on the role of sustainability reporting in contemporary corporate governance.

The core of the research consists of the systematic analysis of the company's 2024 integrated report. The objective was to identify key themes such as governance, environmental performance, stakeholder engagement, materiality assessment, and performance indicators. The documentary analysis contains both qualitative and quantitative aspects. A deep assessment of the company's performance is ground on the technical data disclosed into the

report; the interpratation of strenghts and weaknesses is more attributable to the subjective approach, which is aimed to share my critical point of view.

The documentary analysis was complemented by an informal interview conducted with members of Pavia Acque. The interview provided insight into the organizational efforts, motivations, and strategic considerations underlying the reporting process. It allowed for clarification of internal decision-making mechanisms and the practical challenges associated with sustainability disclosure. The integration of documentary evidence and primary qualitative data strengthens the reliability and interpretative depth of the research. The qualitative case study approach is based on in-depth understanding of organizational processes, contextual interpretation of reporting evolution, exploration of motivations beyond formal compliance and analysis of the interaction between regulation and voluntary disclosure. Furthermore, focusing on official documents ensures that the analysis is based on publicly available and verifiable information, strengthening transparency and academic rigor.

The evolution of sustainability reporting cannot be separated from its broader regulatory and cultural context. Over the last decades, European directives and national decrees have progressively expanded the scope of non-financial disclosure. These regulatory interventions have played a decisive role in fostering sustainability awareness and institutionalizing transparency practices. At the same time, sustainability has evolved into a fundamental societal value. It influences policies, business strategies, and daily behaviors. The increasing demand for transparency reflects the need to verify whether companies concretely act to chase sustainable development goals.

Sustainability reporting thus represents a bridge between corporate action and societal expectations. It is a mechanism through which companies demonstrate accountability and allow stakeholders to evaluate their performance. This thesis positions sustainability reporting as a substantive tool that enhances trust and reinforces collective commitment to sustainable development.

3.2. Results from the documental analysis

In 2024, Pavia Acque has begun to disclose sustainability and financial information within a single reporting document. The adoption of an integrated report represents a relevant step

forward in the company's non-financial disclosure practices. By combining economic and sustainability-related information, the company shows a growing awareness of the need to provide a more comprehensive and transparent disclosure of its activities, even in the absence of a formal regulatory obligation under the CSRD.

Pavia Acque, as a limited liability consortium company and not qualifying as a large undertaking pursuant to Article 3 of Legislative Decree No. 125/2024, does not fall within the scope of entities required to prepare sustainability reporting under the CSRD. Pavia Acque does not fall within the scope of mandatory CSRD application due to its structure, the limited liability consortium company. Indeed, the company would meet two out of the three dimensional thresholds established by the Directive. In particular, during the finacial year 2024, the company has employed 151 direct employees, operating at a local level, reaching €85 million turnover and €331 million balance sheet total. Thus, it exceeded the size criteria, 250 employees, €40 million turnover or €20 million balance sheet total, and it would be subject to the CSRD. However, the Italian law does not oblige consortium companies to sustainability reporting. Moreover, it is neither a listed SME nor part of a consolidated group already subject to CSRD requirements. Nevertheless, the report explicitly acknowledges the relevance of the new European sustainability reporting framework and frames the 2024 disclosure as part of a gradual adaptation process to the new European sustainability reporting practices. This voluntary alignment might be perceived as a preparatory exercise aimed at familiarising the organisation with the evolving regulatory environment and at strengthening internal reporting practices in view of potential future obligations. In this sense, the 2024 report can be interpreted as a transitional document positioned between traditional voluntary sustainability reporting and the more structured requirements introduced by the CSRD. This positioning is explicitly acknowledged within the document itself, where the company recognises sustainability reporting as a process of understanding impacts, defining responses, and reporting transparently to stakeholders, an approach that mirrors the logic codified by the CSRD and the ESRS.

The integration of sustainability information into the core reporting document is a meaningful step for accountability evolution, and it is one of the fundamental principles of the CSRD. This choice implicitly acknowledges that environmental, social and governance issues are not external to business performance, but are increasingly interconnected with operational continuity, regulatory compliance and long-term value creation.

Although the report does not apply the ESRS, it continues to rely on the Global Reporting Initiative standards as its primary reference framework. As clearly stated in the introductory section, the social and environmental information for the year 2024 is reported “with reference to” the GRI standards. This choice reflects both continuity with previous reporting practices and an awareness of the need to maintain a recognised and internationally accepted structure during the transition phase. The report also acknowledges that the changes introduced by the CSRD represent a turning point for sustainability reporting in Europe, requiring a progressive implementation process at national level and within individual organisations. Furthermore, this approach reflects an awareness that the CSRD introduces not only new reporting obligations, but also a new logic of accountability that requires time, organisational learning and data system development.

The Pavia Acque’s Integrated report is conceived as a comprehensive document that allows stakeholders to understand the nature of the company’s activities, the territorial context in which it operates, and the main management areas requiring continuous improvement. For transparency and comparability purposes, the report includes historical data referring to the year 2023. It is also explicitly stated that, given the non-mandatory nature of sustainability reporting for Pavia Acque under the CSRD, the report is not subject to external assurance. This element, while compliant with current law, also marks a clear boundary between voluntary reporting and full ESRS alignment.

The letter to stakeholders, placed at the beginning of the report, highlights the company’s strong commitment to sustainability, innovation and green investment, adopting a comprehensive view that encompasses environmental, social and governance dimensions. Particular emphasis is placed on the protection of water resources and aquatic ecosystems, which are described as essential assets requiring long-term safeguarding. The report frames Pavia Acque’s sustainability strategy as closely aligned with European environmental objectives and the Sustainable Development Goals, linking responsible resource management to the adoption of greener technologies and transparent communication with stakeholders. This opening section is significant because it establishes a value-based interpretation of sustainability that is consistent with the nature of the company. It anticipates several themes that will be developed later in the report, particularly network efficiency, infrastructure resilience and innovation. However, the letter remains largely qualitative and aspirational. It sets the tone but does not yet introduce measurable objectives, targets or explicit performance commitments, which would strengthen the strategic dimension of sustainability from a CSRD perspective.

The growing awareness of water scarcity and the increasing frequency of extreme climate events, such as floods and droughts, emerge as central drivers of the company's sustainability actions. These challenges have prompted Pavia Acque to adopt concrete operational responses, including the installation of smart monitoring devices designed to reduce water losses and improve network efficiency. Such initiatives demonstrate how sustainability considerations are embedded in the company's core operational activities rather than being treated as purely reputational concerns. Climate change, water scarcity and extreme weather events are mentioned as structural challenges rather than episodic risks, reinforcing the idea that sustainability considerations are deeply integrated in the company's operational context.

Following the letter to stakeholders, the document provides a concise overview of the company's history, outlining the key stages of its development since its establishment in 2007. This part defines the institutional structure and operating area. Since the company is the sole manager of the integrated water service in the province, Pavia Acque has the great responsibility to balance sustainable development goals with high-quality services efficiency. The report highlights the public ownership structure and the regulatory framework within which the company operates, particularly the oversight exercised by public authorities and the incentive mechanisms linked to service quality. As the sole manager of the integrated water service in its territory, Pavia Acque operates under close public scrutiny and within a system of incentives and penalties defined by the national regulator. ARERA requires utilities to submit periodic reporting on a wide set of indicators aimed at assessing the technical performance of infrastructure operations, the quality of environmental impacts, and overall water system conditions. The level of these indicators and their evolution over time, whether they improve or deteriorate from one year to another, directly influence the allocation of incentive mechanisms by ARERA, in the form of financial rewards or penalties. This framework is designed to encourage the adoption of tools and practices that support continuous improvement. Performance is evaluated against reference classes ranging from A, representing optimal performance, to D or E, indicating areas in need of improvement. In the 2020–2021 period, for instance, Pavia Acque was awarded performance incentives of approximately €2 million, of which around €1.7 million were linked to the achievement of strong technical results, particularly in the reduction of water losses. Sustainability is considered as inseparable from public service provision, regulatory compliance and territorial governance. The report thus positions sustainability as a matter of accountability toward citizens and local institutions, rather than toward financial markets, underscoring the importance of stakeholder engagement.

The report outlines who the stakeholders of Pavia Acque are, identifying eight different classes. Institutions are the entities of public administration with whom Pavia Acque is connected. Financiers, such as banks, permit to cover investments. Users are the main receivers of the service. Members, the companies and the municipalities that indirectly participate to the activity. Employees and trade unions, suppliers, communities. In this list, to underline its importance, it is included the environment, reminding that it must be valued and safeguarded.

A key conceptual pillar of the sustainability section is the materiality analysis. The company conducted its first structured materiality analysis in 2023, following GRI 3 – Material Topics 2021, with a methodology based on impact identification, severity, and likelihood. Although this analysis is still rooted in the GRI framework, the focus on actual and potential impacts across the value chain strongly anticipates the ESRS concept of double materiality. Despite this, the analysis is not double, focusing only on the impact materiality, i.e the impacts of the firm on environment and society. Financial materiality, that represents the impacts environment and society have on the company, and that is a key point in the CSRD disclosure, is still missing. This is completely normal, as the sustainability report published by Pavia Acque is voluntary and not yet mandatory.

Pavia Acque presents a structured process for identifying material sustainability topics, based on the assessment of impacts, their significance and their relevance to stakeholders. Pavia Acque conducted its materiality analysis through a series of interviews directed to meaningful company's stakeholders. In this way, the positive and negative sides generated by the companies over the value chain emerged, both actual and potential. The report takes into account the existence of both positive and negative impacts, avoiding an excessive celebratory narrative and enhancing the credibility of the disclosure. This is a really important message to stakeholders, as a proof that the company itself is aware to have negative impacts on certain matters and, despite this, shows its transparency deciding to clearly communicate and share the real situation.

There have been found many different material topics, identifying a total of nineteen impacts, both positive and negative. About these, three have been considered non-relevant, thirteen have been considered relevant, and three have been considered very relevant.

Pavia Acque's sustainability impacts emerge primarily from the structural characteristics of the integrated water service: a capital-intensive, energy-intensive activity that directly transforms natural resources and interacts continuously with ecosystems, communities, and public institutions. The materiality analysis conducted by the company confirms this profile,

identifying a wide set of relevant impacts, but concentrating the highest level of relevance on energy use, water resource management, infrastructure reliability, and service quality.

One of the most critical impact remains the use and loss of water resources. In 2024 Pavia Acque abstracted approximately 62.6 million cubic meters of water, while only 45.4 million cubic meters were effectively sold. The gap between abstraction, distribution, and final consumption continues to signal a structurally significant level of non-revenue water. Although the report does not frame this gap explicitly as inefficiency, its magnitude makes water losses a central sustainability issue, not only in environmental terms but also in economic and social ones. Every cubic meter lost translates into unnecessary abstraction from the environment, additional energy consumption for pumping and treatment, and higher system costs that ultimately affect tariffs or investment capacity.

Comparing 2023 and 2024, the volumes injected into the distribution network remain broadly stable, while the volume sold shows only marginal variation. This stability suggests that, despite the initiation of targeted leakage-reduction projects, the system has not yet achieved a structural reduction in losses. From a critical perspective, this implies that sustainability improvements in water conservation are still in a transition phase, heavily dependent on future infrastructure renewal rather than already embedded operational efficiency. The PNRR-funded interventions described in the "*prospective future*" sections therefore represent a necessary condition for reducing one of the company's most material negative impacts.

Energy consumption represents the major environmental impact and is explicitly classified as very relevant in the materiality matrix. In 2024 total electricity consumption exceeded 63 million kWh, with more than half attributable to aqueduct operations and over one third to wastewater treatment. This distribution highlights a structural constraint: even perfect water conservation would not eliminate the energy intensity of the service. However, the year-on-year comparison shows a modest reduction in total energy consumption compared to 2023, particularly in the aqueduct segment. While this reduction may partly reflect efficiency measures, it is also influenced by operational conditions and climatic variability, which limits the extent to which it can be interpreted as a definitive sustainability gain. More significant is the gradual shift toward self-produced renewable energy. In 2024 electricity generated from photovoltaic installations increased compared to previous years, even though it still covers only a limited share of total consumption. This goal has been achieved thanks to the installation of two photovoltaic systems in the water treatment plans of Giussago (56,7 kWp) and Cilavegna (80 kWp). The photovoltaic installations cover the all roof of the company headquarter,

satisfying all the energetic needs and making it a net-zero impact building. To reduce the environmental footprint connected to energy consumption, in particular to decrease dependence from fossil-fuel sources, Pavia Acque has started a project aimed at building and realizing a system of photovoltaic installations which will allow the company to provide its needed energy for a total amount of 20% of its complessive consumption. This project plans the realization of sixteen photovoltaic systems that will be able to provide a complessive energy power of about 11 MW. The sustainability impact of this shift lies less in immediate emission reduction and more in governance: it creates a structural pathway for long-term decarbonisation. Nonetheless, the current scale of renewable self-production remains insufficient to offset the emissions associated with the service as a whole. This is a forward-looking plan, structured as it follows: first, a concession phase in which Pavia Acque is not the owner of these systems yet, but a mere user that will pay for the self-produced energy at about market-price. Then, Pavia Acque will become owner of the installations, thus highly reducing the energy's cost. The major costs will be related to mantain the photovoltaic systems. This plan is supposed to have a double effect; on the one hand, it will reduce the fossil-fuel dependency, while, on the other hand, the decrease in water service costs means lower tariffs prices.

Not only electricity, but also petrol and diesel consumption are responsible of greenhouse gas emissions. Direct emissions (Scope 1) remain relatively limited in the corporate perimeter, even though there is an increase of about 17 tCO2eq between 2023 and 2024. However, Pavia Acque is not the only rensponsible of energy consumption. It must be taken into account also the activity of operative territorial companies. They are controlled or participated societies, part of Water Alliance but separated from Pavia Acque, and they play practical roles and services across the territory. The report shows how the amount of direct emissions produced by these companies has increased during last year, moving from 659 tCO2eq in 2023 to 692 tCO2eq in 2024. It signals that overall direct emission of CO2 is still having negative impacts on environment, highlighting that investments in green technologies are necessary to abandon fossil-fuel sources and to reduce greenhouse gas emissions. Consumption from emissions linked to purchased electricity (Scope 2) dominate the carbon footprint. Between 2023 and 2024, Scope 2 Location based direct emissions show a slight decrease, from 18.403 to 15.857 tCO2eq, while Scope 2 Market based direct emissions have risen from 28.675 to 31.712 tCO2eq. As we can notice from this section, the report presents emissions data across different operational perimeters, which introduces a degree of opacity. From a CSRD-oriented critical

perspective, this fragmentation highlights the need for clearer consolidation boundaries and more explicit linkage between operational decisions, energy sourcing, and emission outcomes. Without this clarity, the risk is that emissions reductions appear incremental and reactive rather than strategically driven.

A particularly relevant positive sustainability impact emerges in relation to circularity within wastewater treatment, specifically concerning the management of sludge, which represents by far the main waste generated by the treatment process. Sludge originates from depuration activities and reaches treatment plants through the sewerage network; although classified as non-hazardous, it constitutes the most significant material output of wastewater treatment in quantitative terms and therefore plays a central role in the environmental footprint of the service. Between 2023 and 2024, Pavia Acque achieved a substantial reduction in sludge production, with non-dangerous sludge decreasing from 13,852 tonnes in 2023 to 12,590 tonnes in 2024. This reduction is mirrored by the overall trend in waste generation, as the total amount of waste fell from 14,499 tonnes in 2023 to 12,612 tonnes in 2024. From a sustainability perspective, this decline cannot be interpreted merely as a statistical fluctuation, but rather as an indication of improved operational efficiency and process optimisation within wastewater treatment activities. The environmental relevance of this result is further reinforced by the destination of the sludge produced. In 2024, all sludge generated was recovered. Recovery took place entirely through agricultural use and compost transformation, confirming a circular management model in which waste is reintroduced into productive cycles instead of being treated as a residual burden. This approach significantly mitigates the environmental impact of wastewater treatment by reducing final disposal, lowering indirect emissions associated with waste handling, and supporting resource efficiency through the valorisation of organic matter. The consistency of recovery pathways in the presence of reduced waste volumes strengthens the interpretation of sludge management as a structural positive impact, rather than a contingent outcome. In materiality terms, this confirms waste management as an area where Pavia Acque is able to generate environmental value while maintaining alignment with regulatory requirements and circular economy principles.

Agricultural reuse and composting depend on factors that lie partially outside the company's direct control. Any tightening of environmental standards, changes in agricultural practices, or erosion of public trust could rapidly turn this positive impact into a material risk. While sludge recovery currently represents one of the strongest sustainability outcomes of the wastewater treatment process, its long-term resilience depends on continuous monitoring, transparency,

and diversification of recovery options. Environmental and social impacts remain closely interconnected in this context. The quality of wastewater treatment directly affects ecosystems, public health, and user confidence. In 2024, the increase in controls and self-monitoring activities compared to 2023 reinforces the reliability of treatment outcomes and reduces the likelihood of environmental incidents. This intensification of monitoring constitutes a tangible positive impact, enhancing accountability toward regulators and users alike. However, it also reveals a predominantly defensive sustainability logic, in which performance is safeguarded through control and compliance rather than through a deeper reduction of systemic weaknesses, such as aging infrastructure or climate-related stress on sewerage networks.

Governance impacts are structurally meaningful elements of Pavia Acque's sustainability profile. Continuous infrastructure improvement is classified as a very relevant positive impact, and the data provided support this classification. Network extensions, increased telecontrol coverage, and targeted investments in leakage reduction and hydrogeological risk mitigation all point toward a governance model that treats sustainability as risk management and system resilience. Compared to 2023, 2024 shows a consolidation of this approach, with more projects moving from planning to implementation. This progression strengthens the credibility of the sustainability strategy, yet it also highlights its capital-intensive nature: long-term impacts depend heavily on sustained public funding and regulatory stability. Infrastructures' improvement have been able even through contributions received by the company, which could have been destined to green and innovative investments. In this list, the main ones are the contributions settled by the Region, that complessively amount for 16,1 million euros. Then, funds from the PNRR (Piano nazionale di Ripresa e Resilienza) through the Ministry of Environment and the Ministry of Transports, for a total amount of 25,5 million euros, and from the FOI (Fondo Opere Inderogabili) for 3,3 million Euros. Furthermore, Pavia Acque is placed in the graduatory list to be assigned with 18 million euros from the PNIISSI (Piano nazionale di interventi infrastrutturali e per la sicurezza del settore idrico). This is a plan born to power and innovate the water infrastructures, increasing their resistence against climate change and reducing the water losses.

The positive impact linked to the development, stability, and well-being of employees further reinforces the idea that sustainability is treated as an internal organisational driver. The emphasis on permanent contracts, continuous training, and work–life balance policies highlights the role of human capital as a fundamental enabler of service quality and operational resilience. In a public utility context, this impact is particularly significant, as it connects social

sustainability directly to the reliability and continuity of a service that is essential for public health and territorial cohesion. From a CSRD perspective, this internal social dimension anticipates future requirements related to workforce disclosure and governance accountability. The report also identifies a positive social and economic impact deriving from the use of local supply chains. By privileging local suppliers, Pavia Acque contributes to the economic stability of the territory and strengthens relational proximity between the utility and its operational ecosystem. This choice reduces logistical complexity and reinforces the company's role as a local development actor. While this impact is framed qualitatively, it aligns with the broader CSRD understanding of value creation beyond financial performance, particularly for entities whose mandate is intrinsically territorial.

In addition, the potential negative impact associated with tariff increases is addressed with a level of balance that reinforces the credibility of the report. Pavia Acque recognises that tariff adjustments may generate social pressure and affect users, particularly vulnerable groups. However, this impact is contextualised as a necessary consequence of sustained infrastructure investment, regulatory obligations, and long-term service quality. The report implicitly frames tariff increases not as a governance failure, but as a trade-off required to fund essential infrastructure and preserve the sustainability of the service over time. This treatment avoids simple narratives and reflects a mature understanding of sustainability as a space of tension between social affordability and long-term environmental and infrastructural responsibility.

From a reporting perspective, the social dimension of sustainability should not be undervalued. The relationship between companies and society represents a core component of corporate activity, as firms do not operate isolated but within a network of human, institutional, and territorial relationships. Companies have the responsibility to disclose not only how they impact the environment, but also how they treat, respect, and engage with the people they work with on a daily basis. This includes employees, collaborators, and, more broadly, the communities in which they operate. Social sustainability reporting therefore becomes an essential tool for making visible the human dimension of organizational activity, highlighting employment practices, working conditions, professional development, and internal equity.

In this respect, the case of Pavia Acque offers a concrete example of how the social dimension of sustainability can be articulated in practice. In 2024, the company employed 151 people, in addition to two trainees, marking a 3.42 percent increase compared to the previous year. All employees operate within the Province of Pavia, which constitutes both the organizational and territorial scope of the company's activities. This strong territorial anchoring reinforces the

social relevance of employment practices, as the company's workforce is fully embedded in the local community it serves.

Employment at Pavia Acque is characterized by a high degree of stability. The predominant form of employment relationship is permanent, accounting for over 96 percent of the workforce. This reflects a deliberate organizational choice aimed at ensuring continuity, competence accumulation, and long-term commitment, all of which are particularly important in a sector that delivers an essential public service. The professional structure of the workforce is largely composed of administrative and technical employees, who represent more than three quarters of total staff, highlighting the central role of operational, managerial, and technical expertise in the provision of water services.

From a demographic perspective, the workforce displays a relatively balanced gender distribution, with men representing just over half of total employees and women accounting for slightly less than half. The age profile is concentrated mainly between 30 and 50 years, indicating a workforce that combines professional maturity with long-term employability. The gradual and consistent increase in personnel over time is closely linked to the growing organizational needs of the company, which has had to strengthen its internal structure in response to increasing operational, regulatory, and technical complexity.

Remuneration policies for non-managerial staff are regulated by the National Collective Labour Agreement, with individual classification determined by job role and responsibilities. In addition to base remuneration, the company has implemented a second-level collective agreement that includes a performance-related bonus system. This system provides financial incentives tied to the achievement of predefined objectives, complemented by an additional discretionary reward mechanism applicable to all employees and likewise linked to company-wide performance targets. These instruments reflect an effort to align individual motivation with organizational goals, reinforcing accountability and shared responsibility.

Continuous training and professional development are described as strategic priorities, both for Pavia Acque and for its territorial operating companies. Ongoing training is considered indispensable for keeping pace with technological, organizational, and regulatory developments, as well as for enhancing employee satisfaction and motivation. In 2024, the company further increased the number of training hours delivered compared to the previous year, rising from 3,419 to 3,971 hours. This growth reflects not only increased investment in internal skills but also the consolidation of a structured system for training planning, design, and delivery.

Training activities involved all professional categories within the company, addressing both role-specific competencies and transversal topics. Particular attention was devoted to areas such as workplace health and safety, data protection, anti-corruption measures, and transparency, which are especially relevant in a public-service-oriented organization. Health and safety training emerged as the most significant area in terms of hours delivered, followed by technical and professional training, underscoring the operational nature of the company's activities and the importance of risk prevention in the water sector.

The management of training follows a dedicated internal procedure through which training needs are identified based on inputs from individual organizational units. This allows for structured annual planning and the use of multiple delivery channels, including specialized external providers, sector-specific institutions, and access to dedicated funding mechanisms. Alongside formal training, Pavia Acque promotes internal professional growth through organizational practices such as horizontal mobility, which enables employees to perform different tasks within their contractual level and, where necessary, to operate in organizational contexts different from their original placement. This approach is supported by targeted training and operational experience, fostering flexibility, knowledge sharing, and skill diversification.

Overall, the social dimension of sustainability reporting at Pavia Acque highlights how sustainability extends beyond environmental protection to encompass employment quality, organizational development, and human capital investment. By documenting these aspects, sustainability reporting contributes to a more comprehensive understanding of corporate responsibility, making visible the social infrastructure that underpins the provision of an essential public service.

3.3.Results from the interview

I had the great possibility to enrich my thesis interviewing few members of Pavia Acque, who are directly involved into the activity of preparation and realization of the sustainability reports. This interview has been really helpful to discover more concretely what stands behind the entire process of sustainability reporting. Personally, I believed that the theme of sustainability was perceived more as an obligation by companies, something that the administrative personnel might adopt primarly to regulatory reasons. Instead, this interview gave me the opportunity to better understand what sustainability disclosing represents to the people working in the

company. In the case of Pavia Acque, the first reason that led to integrate sustainability reporting as an essential practice is the respect and the importance given to the water. The “blue gold”, as defined in the interview, communicates the meaningfulness of water, the most present good on earth, and even the most delicated. The use of water might be regulated and controlled by authorities, it is thus crucial for water utilitiy companies, such as Pavia Acque, to report transparently its activities, the way they are planned and studied in order to not harm the purity of ecosystems and the water integrity. For this reason, despite Pavia Acque is not subject to mandatory sustainability disclosure obligations, nor to the requirements introduced by the European Sustainability Reporting Standards. Nevertheless, the company has chosen to engage voluntarily in sustainability reporting. The decision is a pure ethical commitment, perfectly aligned with the nature of its core activity. Transparency toward stakeholders is described as an absolute priority. The interview emphasizes that sustainability reporting is perceived as a tool for accountability and dialogue rather than as a mere compliance exercise. This stance is particularly relevant in the water utility sector, where the service provided concerns a primary public good and where trust, legitimacy, and social acceptance play a fundamental role. In this sense, sustainability reporting becomes an instrument through which the company can explain its actions, justify its strategic choices, and make visible the efforts required to ensure service continuity, quality, and environmental protection.

The decision to report on sustainability in the absence of a legal obligation is primarily motivated by ethical considerations rather than by immediate practical advantages. The interviewees acknowledge that being prepared for potential future regulatory tightening is strategically advantageous, as it avoids the need to build non-financial reporting systems from zero under time pressure. However, this strategic aspect is explicitly described as secondary to the company’s underlying values. The main driver is respect for water as a primary resource, for the environment in which the company operates, and for the societal role inherent in providing potable water. Sustainability reporting is thus framed as a natural extension of the company’s mission rather than as an externally imposed burden. In my opinion, the behaviour Pavia Acque is showing has a great value in nowadays’ world. It means that the company really believe in the respect of the environment, as its activities could harm water ecosystems if not controlled and realised according to the apposite preventions.

Another main point emerged during the interview is the communicative value of sustainability reporting. The provision of potable water is often perceived by users as a given, with little awareness of the technical, organizational, and administrative effort required to guarantee

service continuity and quality. The sustainability report is seen as an effective means to disclose this hidden work, making visible the contribution of technicians, operators, administrative staff, and organizational structures. From this perspective, the report serves both an informative and a symbolic function, publicly acknowledging the complexity and importance of the service delivered. I absolutely feel the desire of people working for Pavia Acque, who want users to know the whole effort required to carry delicated activities such it is the provision of drinking water and wastewater treatment. Unfortunately, it is true that users only notice the negative aspects of what can happen with the provision of water, such as accidents, issues with the distribution system, or increases in the bills. This last point, for instance, is often viewed negatively by users. The truth is that such increases are closely linked to investment needs aimed at improving infrastructure, service reliability, and quality standards. Sustainability reporting offers a framework to explain these connections, showing how financial requirements, environmental objectives, and service improvements are interdependent rather than isolated decisions.

Talking about tariffs, it has emerged the controlling and monitoring activity ruled by the National Italian Authority, that is ARERA. The relation between Pavia Acque and ARERA is good, collaborative and essential to foster the importance of sustainability in the sector. Prior to the introduction of ARERA's regulatory oversight, individual municipal utilities determined tariffs at the local level. The establishment of a standardized tariff-setting methodology has introduced greater uniformity and transparency but has also imposed clear distinctions between costs that can be efficiently managed and included in tariffs and those that cannot. This regulatory context further reinforces the importance of structured reporting, as it provides a basis for demonstrating efficiency, justifying investments, and explaining tariff dynamics.

Often, sustainability reporting costs are considered obstacles to SMEs, that risk compromising their capability to finance the core activity while reporting adequately about sustainability. During the interview, we did not go deep into details talking about costs, but the financial effort required to adopt sustainability and accounting reporting tools has been described proportional and manageable, even for smaller entities. The investment in reporting systems is not perceived as a limiting factor. However, the interview strongly emphasizes that the organizational impact is at least as significant as the economic one. The mere adoption of software tools is insufficient if personnel are not adequately trained to use, interpret, and integrate the information produced. Sustainability reporting therefore requires a cultural and organizational adaptation, involving learning processes and changes in internal practices.

As stated in the 2024 report, this one has been the first integrated report of Pavia Acque. Previously, sustainability informations were disclosed through a separated document. Integrating sustainability information alongside economic and financial reporting enhances overall coherence and logical consistency. Even if full integration poses challenges, the conceptual alignment between financial performance and sustainability performance is considered essential to provide a comprehensive representation of the company's activities. The interview suggests that separating these dimensions risks fragmenting the narrative of value creation, whereas their integration allows stakeholders to better understand the interconnections between investments, operational choices, environmental impacts, and service quality.

The preparation of an integrated sustainability report is made more complex by the consortium nature of Pavia Acque. The company includes seven territorial operating companies, formerly municipal utilities, which are primarily responsible for ordinary maintenance activities and for the operation of networks and plants within the integrated water service. The sustainability report therefore requires the collection and consolidation of data and information generated by these operational entities. This consolidation, however, is limited to sustainability-related information and does not extend to economic and financial data, which remain outside the scope of integration. The process highlights the organizational complexity inherent in consortial structures and underlines the additional coordination effort required to produce coherent and reliable sustainability disclosures. Indeed, each territorial operative company has a representative in charge of communicate sustainability data and information. Then, Pavia Acque, through its expertised staff, has to unify all this informations under a unique document, consolidating the sustainability disclosure of the seven territorial operative companies plus Pavia Acque itself. The organizational needs required by this practice are significant, making this part the most expensive, in terms of coordination, precision and accountability.

Now, I would like to discuss one of the main point that must be outlined from this interview. We have already seen that sustainability information in 2024 is reported with reference to GRI standards, same way for the previous years. However, from the 2025 sustainability disclosure, there will be an important shift about the regulatory framework used to report. From this year, Pavia Acque will move away from the GRI Standards and adopt the Voluntary Sustainability Reporting Standards for SMEs (VSME). VSME standards are a voluntary reporting tool for small and medium-sized entreprises introduced by the CSRD, supposed to balance transparency and feasibility, allowing organizations to communicate their environmental,

social, and governance performance without excessive reporting burdens. The framework focuses on relevance, clarity, and materiality, encouraging companies to disclose information that genuinely reflects their impacts, risks, and practices. This transition reflects a desire to disclose sustainability informations and avoid excessive redundancy while maintaining a high level of informational quality. The adoption of the VSME framework is accompanied by the introduction of a double materiality analysis, even though such an assessment is not formally required for entities of this size. This choice signals a proactive orientation toward emerging European reporting practices and demonstrates the intention to align with evolving regulatory expectations.

In my view, the introduction of a double materiality analysis represents the most significant step in Pavia Acque's sustainability journey. This approach lies at the very core of the CSRD and marks a conceptual shift in how sustainability is understood and communicated. By adopting a double perspective, double materiality enables organizations to capture not only how sustainability issues affect their financial performance, but also how their activities impact society and the environment. In doing so, it provides a more comprehensive and transparent representation of corporate value creation. This framework is particularly effective in making visible the financial implications of sustainability-related practices, which are often overlooked or insufficiently understood by external stakeholders. Many of the efforts required to ensure sustainable operations remain largely hidden, both in terms of financial resources invested by the company and the continuous commitment of its workforce. Double materiality offers a structured way to bring these efforts to light, connecting operational choices, resource allocation, and long-term resilience. What clearly emerged from the interview is precisely this underlying dimension of sustainability. Through the discussion, it became possible to grasp the depth and precision of the daily work carried out across the entire organization to maintain a high-quality service. The adoption of double materiality therefore does not merely represent a technical reporting upgrade, but rather a powerful interpretative tool capable of acknowledging and communicating the complexity, responsibility, and collective effort that marks Pavia Acque's activities.

3.4. Discussion

Pavia Acque's sustainability impacts in 2024 reflect a utility in transition rather than transformation. The company demonstrates a coherent understanding of its most material impacts and shows incremental improvements in energy efficiency, monitoring, and circular waste management compared to 2023. At the same time, the persistence of high water losses, the limited scale of renewable energy adoption, and the reliance on future investments for major impact reduction reveal structural constraints that cannot be solved in the short term. From a critical perspective, sustainability at Pavia Acque is not yet a state of equilibrium, but a process of gradual alignment between environmental responsibility and social service obligations. Furthermore, This materiality approach aligns well with the logic of impact materiality as defined by European regulation. However, it remains limited to one side of the CSRD double materiality concept. Financial materiality, understood as the effect of sustainability-related risks and opportunities on the company's financial position is not systematically assessed or disclosed. While the report contains several elements that could support such an analysis, including energy costs, regulatory incentives and infrastructure investment needs, these elements are not explicitly framed within a financial materiality logic. As a result, materiality functions primarily as a tool for prioritising reporting content rather than as a strategic instrument for risk management and long-term planning, which represents a key requirement under the CSRD.

While the report highlights environmental improvements, such as efficiency gains, reduced sludge production, and circular waste management practices, these achievements are not always explicitly connected to direct benefits for users. The absence of specific indicators linking environmental performance to outcomes such as service quality and cost stability means that the social effects of sustainability investments are primarily disclosed at a qualitative level. Strengthening the integration between environmental results and their social implications could further enhance the clarity and comprehensiveness of the sustainability narrative, helping to more clearly illustrate how environmental improvements contribute to broader social value.

The 2024 Integrated Report should not be interpreted as a reactive or merely narrative exercise, but rather as the expression of a genuine and structured effort to embed sustainability within Pavia Acque's operational and governance model. The report does not appear to have been

produced in response to immediate regulatory pressure, nor as a symbolic anticipation of the CSRD, but instead reflects a continuity of choices that are closely connected to the company's public-service mission and long-term management of the water resource. The narrative tone that characterises several sections of the document is not a sign of superficiality or lack of substance; rather, it is largely inherent in the use of the GRI framework, which is designed to emphasise impacts, context, and stakeholder accountability, especially for organisations operating at a territorial and community-based level. Within this logic, qualitative explanations and descriptive sections are not a weakness but a normal and expected feature, particularly for a local, fully public utility whose sustainability performance is deeply intertwined with service quality, infrastructure investment, and social outcomes. At the same time, the narrative is consistently supported by operational data, investment figures, governance responsibilities, and materiality-based priorities, indicating that sustainability is not treated as a communication layer detached from core activities. On the contrary, the report conveys the impression of an organisation that is internalising sustainability as a managerial and strategic dimension, even in the absence of a legal obligation.

Although Pavia Acque is not currently subject to the CSRD, its 2024 Integrated Report can be interpreted as a meaningful case through which we can reflect on the rationale, scope, and potential limits of the CSRD itself. Rather than being a purely voluntary or reputational exercise, the report appears to function as an internal governance tool that structures how sustainability is understood, prioritised, and managed within the organisation. This feature is particularly relevant for a public utility operating in a regulated and territorially embedded context, where sustainability is not driven by competitive positioning or investor expectations, but by long-term service continuity, public accountability, and environmental responsibility.

From this perspective, the report can be read as a transitional artefact that links voluntary sustainability reporting and the logic beyond the CSRD. The document does not suggest a reactive response to regulatory pressure, nor does it anticipate compliance. Instead, it reflects a form of organisational maturity in which sustainability reporting is used to make explicit the issues inherent in managing an essential public service. Investment priorities, infrastructure resilience, tariff policies, and social impacts are all discussed within a coherent framework that connects sustainability to operational and governance decisions. This approach aligns closely with the core ambition of the CSRD, which seeks to transform sustainability reporting from a narrative self-celebration into information that is decision-relevant and capable of supporting accountability.

A key element that strengthens this interpretation is the function that reporting appears to play within the organisation. Sustainability disclosure is not treated as an external communication tool detached from management processes, but as a way of organising knowledge about impacts, responsibilities, and long-term objectives. The integration of sustainability themes with governance structures, investment planning, and service quality suggests that reporting is used to support internal reflection and strategic coherence.

Materiality provides another important analytical bridge between the report and the CSRD framework. Pavia Acque's materiality analysis is firmly based on the GRI approach and therefore focuses on impacts generated by the organisation on the environment and society. This emphasis corresponds to what the CSRD defines as impact materiality and demonstrates that this perspective is already internalised. The identification of actual and potential impacts, their prioritisation based on severity and likelihood, and their connection to operational responses indicate a structured understanding of sustainability that goes beyond generic commitments. At the same time, the absence of a financial perspective, centred on sustainability-related financial risks and opportunities, highlights a structural difference rather than a conceptual gap. As a public, in-house utility operating within a regulated framework, Pavia Acque's exposure to market-driven sustainability risks is inherently different from that of listed or capital-market-oriented entities. This observation allows for a more shaped reading of double materiality, suggesting that its practical implementation cannot be entirely detached from the underlying business model and ownership structure.

The case of Pavia Acque also offers an opportunity to reflect on the relationship between sustainability reporting and public responsibility. Unlike many CSRD-covered entities, for which sustainability disclosure is increasingly linked to investor relations, access to capital, and reputational differentiation, Pavia Acque's reporting logic is primarily oriented to legitimacy and accountability toward citizens, municipalities, and territorial institutions. Sustainability is framed as a component of the public mandate rather than as a way for competitive advantage. This distinction is analytically relevant because it reveals how the same reporting concepts, impacts, governance, long-term value, can serve different stakeholder purposes depending on institutional context. In this sense, the report exemplifies a form of sustainability reporting that is partially aligned with the spirit of the CSRD, even if it does not fully adopt its capital-market-oriented architecture.

The narrative tone that characterises parts of the report should therefore not be interpreted as a weakness or as a lack of analytical rigour. Rather, it reflects the adoption of the GRI framework

and the need to contextualise sustainability issues within a specific territorial and service-oriented setting. For a public utility, qualitative explanations play an important role in making complex matters understandable to non-financial stakeholders. While the CSRD and ESRS prioritise standardisation, comparability, and auditability, the Pavia Acque report prioritises transparency and contextual understanding.

This raises an important critical point for the thesis: increased standardisation, while beneficial at the European level, may risk reducing the communicative effectiveness of sustainability reporting for local communities if not carefully balanced with narrative clarity.

The report is explicitly structured with reference to the Global Reporting Initiative Standards, as stated in the introduction. it does not declare itself fully "in accordance with" GRI. This suggests partial application rather than complete adherence to all required disclosures. However, from a structural perspective, alignment with GRI is strong. The report includes a detailed GRI Content Index, which maps disclosures to specific GRI standards and page numbers. This is consistent with GRI's requirement to ensure traceability and ease of consultation for stakeholders. Regarding general disclosures (GRI 2), the report provides comprehensive information about the organization's identity, governance structure, ownership model, and operational perimeter. The section "Chi siamo" describes the company's origin, public ownership structure, and in-house providing model. Governance is clearly presented through the identification of the Board of Directors, the Board of Auditors, and the external audit firm. Ethical governance mechanisms are also well described, including the Code of Conduct, whistleblowing system, privacy regulation, and anti-corruption framework. With respect to material topics (GRI 3), the materiality analysis is analysed in its dedicated section through the identification of nineteen impacts, assessed as positive or negative, actual or potential, and are evaluated based on severity and probability. On the environmental side, the company reports in line with GRI 303 (Water and Effluents), GRI 305 (Emissions), and GRI 306 (Waste). Water withdrawal, discharge management, sludge recovery, Scope 1 and Scope 2 emissions, and waste generation are addressed with quantitative data. The presence of ISO certifications, such as ISO 50001 for energy management and ISO 9001 for quality management, further strengthens the credibility of the environmental management framework. On the social dimension, the report includes disclosures consistent with GRI 403 (Health and Safety), GRI 404 (Training and Education), and GRI 405 (Diversity and Equal Opportunity). It provides data on training hours, health surveillance, occupational safety systems, and workforce composition.

As emerged from the interview, from 2025 on Pavia Acque will follow no more GRI Standards but VSME. The Voluntary Sustainability Reporting Standard for SMEs is designed as a simplified framework compared to ESRS. If we look at VSME principles, Pavia Acque's report appears substantially aligned. The document includes core governance information, including board structure, compliance policies, and risk management processes. Environmental indicators are extensively reported. Water management, sludge recovery, waste handling, and emissions data reflect the environmental core disclosures typically required in a simplified SME sustainability framework. Importantly, VSME does not require full double materiality, taxonomy alignment, or mandatory assurance. Therefore, the main weaknesses identified in the CSRD comparison do not represent critical deficiencies under VSME logic. For these reasons, the report can be considered largely compatible with a VSME-style sustainability reporting framework. Indeed, its level of disclosure often exceeds what would typically be required from a small or medium-sized entity under a simplified voluntary standard.

Making a comparison between what Pavia Acque discloses and what CSRD requires could be seen as useless since the company does not fall under the application field of the Directive. Nevertheless, it is very interesting to see how the report of Pavia Acque shows points of alignment with the last European Directive. A first point of alignment concerns the integration of financial and non-financial information. The integrated report combines economic and sustainability information within a single framework. Second, environmental topics such as water management, emissions, energy efficiency, and waste treatment are quantitatively addressed. This signals compliance to ESRS E1 (Climate Change), E2 (Pollution), and E3 (Water and Marine Resources), at least at a descriptive level. Furthermore, internal control systems and anti-corruption measures are mentioned and well described. These aspects are consistent with ESRS G1 requirements on business conduct and governance transparency. Environmental topics such as water management, emissions, energy efficiency, and waste treatment are quantitatively addressed, through specific sections that include consumption and pollution datas. This corresponds broadly to ESRS E1 (Climate Change), E2 (Pollution), and E3 (Water and Marine Resources) requirements, at least at a descriptive level. The most relevant limitation concerns double materiality. The materiality analysis described in the report represents the outside-in perspective. This is completely normal if we consider the GRI logic. However, considering CSRD requirements, both impact materiality and financial materiality are equally weighted. The report does not explicitly analyze how sustainability risks and opportunities affect the company's financial performance or future cash flows. This absence

indicates incomplete alignment with ESRS 1 and ESRS 2. Furthermore, under ESRS E1, companies must provide detailed transition plans, including timelines, intermediate targets, and consistency with EU climate objectives, something that is not yet included into Pavia Acque's report. CSRD requires companies to assess and disclose sustainability impacts across the entire value chain. Nevertheless, value chain coverage remains limited. Although supplier selection criteria and sustainable procurement principles are described, there is no comprehensive ESG mapping of upstream and downstream impacts. Additionally, sustainability information is not externally assured, as stated at the beginning of the report. Under CSRD, limited assurance by an independent third party becomes mandatory. This represents a clear compliance gap.

Overall, the extent to which the report suggests readiness for a potential future transition toward CSRD compliance is a relevant aspect. Several structural elements already appear to be in place, including governance oversight of sustainability issues, systematic impact identification, and the integration of sustainability considerations into investment and operational decisions. What is currently missing, such as ESRS-aligned metrics, complete double materiality analysis, and external assurance, can be interpreted as a matter of formalisation rather than substance.

The Pavia Acque case allows for a reflection on the conditions under which sustainability reporting becomes meaningful. The report suggests that regulatory obligation alone is not sufficient to generate high-quality sustainability information. Instead, the value of reporting depends on the extent to which sustainability is already embedded in organisational culture, governance, and operational priorities. This analysis suggests that the effectiveness of sustainability reporting lies in its capacity to support informed decision-making, accountability, and legitimacy, objectives that, in the case of Pavia Acque, appear to be pursued independently of formal regulatory obligation.

The next chapter, the final one, presents the conclusions of the study and reflects on the main relationships that emerged from the analysis. In particular, it discusses how company size, institutional role and level of commitments influence the scope and depth of sustainability reporting, as well as the economic burden associated with regulatory compliance and long-term investments. The chapter also examines the link between profitability and sustainability, exploring how financial performance and sustainable strategies interact and potentially reinforce each other. Finally, it outlines future opportunities and strategic perspectives, considering regulatory developments, access to funding, innovation and the evolving expectations of stakeholders.

Chapter 4
THE FUTURE OF SUSTAINABILITY REPORTING

This is the conclusive chapter of the thesis, which is focused on highlighting certain important features of sustainability reporting and how it influences companies' activity. In particular, the chapter addresses the interdependence between the company size, the scope of sustainability commitments, and the economic and organisational burden associated with reporting requirements. Generally, larger companies benefit from greater financial resources and specialised internal functions, reaching economies of scale that allow them to reduce the costs of complex reporting practices. Conversely, small-medium entreprises, especially in the public sector, often face a disproportionate burden when similar reporting expectations are applied, raising concerns about proportionality and effectiveness. This dynamic highlights a cause-effect relationship in which regulatory ambition must be balanced in relation to the organisational capacity. This is meaningful to avoid that sustainability reporting becomes a purely bureaucratic practice, separated from the core reporting activity and without substantive impact.

Within this framework, the chapter also explores the evolving relationship between sustainability and profitability, challenging the traditional assumption that these dimensions are reciprocally in conflict. On the one hand, sustainability initiatives and reporting practices can generate economic benefits through efficiency gains, risk mitigation, improved access to financing, and strengthened stakeholder trust. On the other hand, sustainability commitments may rise significant management costs, increased operational complexity, and short-term financial pressure, particularly in sectors characterised by regulated tariffs or limited pricing flexibility, such as the energy or utility sector.

Finally, the chapter looks ahead to the future evolution of sustainability reporting, considering how regulatory frameworks, technological innovation, and organisational learning are likely to replace the current inefficient practices. The increasing standardisation and assurance of sustainability information may enhance comparability and credibility, but also risks reducing flexibility if applied rigidly. At the same time, digital reporting tools, data integration systems, and evolving stakeholder expectations may lower reporting costs and improve the strategic use of sustainability information in the long-term. In this perspective, sustainability reporting is

expected to evolve from a compliance-driven obligation into a more dynamic governance instrument, capable of supporting decision-making activity and long-term planning.

4.1. Company type, commitments, and economic burden

This paragraph adopts a cause–effect perspective to analyse sustainability reporting through the interaction between company type and size, the level of sustainability commitments undertaken, and the economic and organisational burden generated by reporting requirements. These are three closely connected elements that do not operate independently. Company size and institutional nature of companies heavily impact on the degree of responsibility in sustainability matters; the scope of commitments influences the complexity of data collection and governance processes that firms are required to adopt; the resulting reporting burden affects both financial resources and managerial focus. Thus, understanding sustainability reporting requires analysing how these factors reinforce or constrain one another, particularly in the context of regulatory frameworks such as the CSRD, where uniform and standardized disclosures are required to avoid asymmetric information and to foster the performance comparability across companies.

The expression “company type” refers to distinctive structural and organisational characteristics that define a firm, such as company size, sector, corporate purpose, and degree of internationalisation. These charactheristics heavily influence the quality and the quantity of companies’practices, such as the corporate sustainability reporting. Company type and size strongly influence how sustainability reporting is embedded within the organisation. Usually, large firms tend to organise sustainability reporting through formal structures, like dedicated departments, written policies, reporting systems, and performance indicators. These mechanisms are necessary to coordinate complex organisations with dispersed operations and multiple stakeholder groups. These firms are supposed to produce higher-quality sustainability reports as they have more financial resources. However, on the other side, larger firms face wider data collection and coordination challenges. Furthermore, they are under stronger pressure from global stakeholders and face greater public visibility and scrutiny. In contrast, small firms typically lack formal sustainability reporting departments and codified procedures. It is important to clarify that the absence of formal sustainability reporting structures in small firms does not imply weaker commitments. Indeed, smaller firms frequently demonstrate

strong implicit sustainability commitments, driven by personal ethics and direct accountability to stakeholders. These commitments are not always translated into formal strategies, indicators, or reports; rather, they are communicated in more practical and descriptive ways. The sustainability reporting activity in smaller firms is often embedded in the values of owners or managers, in close relationships with employees and local communities, and in informal routines. It could be meant as a less formal way to disclose, more relational and practice-based rather than procedural. This distinction is crucial for understanding why sustainability performance cannot be assessed only through the presence of formal reporting instruments. (Baumann-Pauly et al, 2013)

It is important to consider how companies operating in environmentally sensitive industries and those with a strong international presence also tend to produce higher-quality reports, reflecting heightened legitimacy concerns and exposure to diverse stakeholder expectations. Companies operating in environmentally or socially sensitive industries, such as energy, mining, chemicals, are expected to disclose higher-quality reports because these are the most influencing sectors in terms of polllution. These firms face higher reputational risk and stronger regulatory pressure as a consequence. Internationalised companies operate under multiple regulatory regimes, being subject to deeper regulations and requirements. (Dilling, 2010)

Another main point to take into account is the distinguishment between qualitative and quantitative disclosure. As I said before, large firms, compared to small-medium companies, can afford higher reporting costs. This opportunity let them disclose higher-quality sustainability reports. In large firms' case, reports can be considered high-quality made if marked by completeness and depth of information, standardized indicators, specific and comparable information. Additionally, good reports should contain performance-oriented analysis, assessing positive and negative impacts through veridicity and scientific proofs. Reports with generic or purely narrative informations suggest lower credibility, especially for larger companies which are supposed to be provided of adequate management systems. Michelon, Pilonato, and Ricceri (2015) focused explicitly on the quality of sustainability disclosure. The authors argued that an increase in the amount of informations reported does not necessarily correspond to an increase in quality and transparency, as many firms engage in symbolic disclosure practices that prioritise form over substance. The authors analysed a large sample of UK firms and developed a structured disclosure quality index that distinguishes between substantive disclosures and symbolic or boilerplate statements. The results indicate that sustainability reporting quality is strongly influenced by corporate governance

characteristics and organisational context. In particular, firms with stronger governance mechanisms, such as more independent boards and effective oversight structures, tend to produce higher-quality disclosures. Conversely, firms operating in contexts with weaker governance or higher reputational risk may increase the volume of disclosure without improving its quality, using sustainability reporting as a strategic tool rather than as a mechanism for accountability.

Sustainability reporting is an expensive practice that requires precise and specific investments. ESG reporting costs refer to all expenses a company incurs to collect, manage, analyze, and disclose information on its environmental, social, and governance performance. These costs are necessary to cover several activities, such as data collection systems, software tools, staff training, consultancy support, and external assurance. These costs are not uniform, they vary significantly depending on factors such as company size, industrial sector, reporting framework adopted. The economic and organisational burden associated with formal sustainability reporting frameworks is unevenly weighed across firm sizes. Large firms can absorb the costs of formalisation more easily because they benefit from economies of scale, specialised staff, and existing administrative infrastructures. Instead, small firms often struggle to introduce formal sustainability reporting tools, such as standardised reporting, external certifications, or detailed performance indicators. These requirements demand time, financial resources, and technical expertise that smaller organisations often cannot afford. This asymmetry leads to say that formal corporate sustainability reporting and reporting frameworks tend to privilege large organisations, not necessarily because they are more sustainable, but because they are structurally better equipped to comply with formalisation requirements. As a result, smaller firms may appear less responsible or less transparent, despite they could be deeply committed to social and environmental objectives. Like small private firms, public utilities and local public companies often operate with strong implicit commitments to social welfare, environmental protection, and territorial responsibility. However, they may face similar structural disadvantages when required to adopt reporting and governance models designed for large companies. When sustainability obligations are translated into uniform, highly formalised reporting requirements, these entities risk being evaluated on their capacity to document sustainability rather than on their actual social and environmental contribution. To be more equally addressed, mandatory and standardised sustainability reporting frameworks should be better settled in relation to size and institutional role. Otherwise, they risk imposing an economic and organisational burden that is disproportionate for smaller or public entities,

potentially harming the very sustainability objectives they seek to promote. (Baumann-Pauly et al, 2013)

A structured understanding of ESG reporting costs typically includes around five main components. First, there are data collection costs. These arise from the need to gather environmental, social, and governance information through internal systems, monitoring tools, and coordinated processes across departments. They often include investments in data-tracking mechanisms and the time dedicated by staff to ensure that the information collected is accurate, complete, and consistent. Second, there are software and technology costs. Many organizations rely on dedicated ESG platforms, data management systems, and reporting software to manage increasing regulatory and stakeholder requirements. These costs may include licenses, customization, and ongoing maintenance. The third component concerns personnel costs. ESG reporting requires the involvement of sustainability managers, analysts, and internal coordinators who oversee data flows and ensure alignment with reporting standards. Even when ESG responsibilities are integrated into existing roles, the allocation of time and expertise represents a significant cost. Fourth, consulting and assurance costs play a relevant role. Companies frequently seek external support to select appropriate reporting frameworks, conduct materiality assessments, design methodologies, and implement robust reporting processes. In addition, independent assurance services are often required to enhance credibility and ensure compliance with regulatory standards. Finally, training and education costs must be considered. Building internal competencies in ESG requirements, data handling, and reporting tools requires structured training programs. These initiatives involve both direct financial outlays and indirect costs related to employee time and organizational adjustment.

The weight of reporting costs is unevenly distributed among companies, particularly penalising the SMEs. To reduce the economic burden, organizations can manage and reduce ESG reporting costs through targeted strategies. Technological investments are useful to make reporting activity an automate practice, improving the quality of data collection. The reliance on external consultants is expensive; for this reason, building internal expertise might be strategical both to reduce the cost and to increase corporate knowledge. It is also important focusing on material ESG issues, avoiding the collection of unnecessary datas. Eventually, approaching to sustainability reporting through a phased-implementation method represents a smart and efficient measure to prepare the firm and to gradually foster the quality of reporting practice. (ESG Sustainability Directory, 2015)

I wanted to bring a study that relates the cost of sustainability practices with the long-term benefits, despite it has been conducted in the US. It is very interesting to see how the implementation of sustainable behaviours can take such advantages, even though the initial costs and efforts could influence firms. Furthermore, the US scenario could be considered similar to the EU scenario in their underlying drivers and objectives. In both contexts, sustainability reporting has evolved in response to growing investor demand for comparable, decision-useful ESG information, increasing awareness of climate and social risks, and the recognition that sustainability issues can materially affect long-term corporate performance (Christensen et al, 2021).

The study conducted by Eccles, Ioannou, and Serafeim in 2014 provides strong empirical evidence on the relationship between corporate sustainability, organisational processes, and long-term performance, offering particularly useful insights for understanding the economic logic of sustainability reporting. They analysed the effects of corporate sustainability on organisational activities and performances, using a sample of 180 US companies. Among the 180 companies investigated, the authors distinguish between high sustainability firms, which adopted environmental and social policies earlier and integrated them into governance structures, and low sustainability firms, which treated sustainability as a secondary and largely symbolic matter. Their longitudinal analysis shows that high sustainability firms face higher short-term costs, linked to investments in governance systems, data collection, monitoring, and stakeholder engagement. However, these initial costs are progressively offset by significant long-term benefits, including superior stock market performance and stronger accounting results. Importantly, the advantages associated with sustainability are not confined to environmental or social outcomes, but extend to broader organisational dimensions such as strategic orientation, employee engagement, and decision-making quality. This study demonstrates how sustainability becomes economically beneficial when it is genuinely embedded in organisational processes rather than adopted superficially, reinforcing the idea that sustainability reporting can contribute to long-term value creation while requiring adequate organisational capacity to absorb its short-term economic burden. (Eccles et al, 2014)

A sustainability-oriented mindset is now widely expected and increasingly embedded in how businesses operate. While companies face different contexts and priorities, they share a common responsibility: contributing to a more sustainable future. This creates a practical challenge, because firms must pursue environmental and social objectives without undermining economic performance. The core task is to integrate sustainability into strategy

and daily decisions so that long-term value, competitiveness, and profitability can reinforce sustainability goals, rather than conflict with them.

The case of Pavia Acque fits well with this logic. The company meets two of the three size criteria that would normally bring an entity into the scope of the CSRD. However, as discussed in Chapter 3, its consortium structure allows it to remain outside the formal obligation. What matters, though, is the strategic choice the company has made: despite the exemption, Pavia Acque has decided to embed a robust sustainability disclosure into its ordinary operations, with the explicit aim of staying aligned with the regulatory direction.

This approach has a clear advantage. When sustainability reporting is introduced progressively, it tends to be both more efficient and less costly than a rapid and compliance-driven implementation. Reporting is not just a matter of "spending money on a report". It requires time to build internal routines: clarifying responsibilities, setting data owners, improving data quality, integrating new software, and making different departments work with shared definitions and timelines. These changes cannot realistically be implemented without creating confusion, inefficiencies, and unreliable outputs. In that sense, time becomes a critical resource. A gradual path allows the organization to learn, adjust, and consolidate practices year after year, turning reporting into a stable managerial process.

Pavia Acque also shows that readiness depends heavily on internal capability. By starting earlier, the company has had time to train and structure its workforce, familiarizing employees with data collection systems and digital tools. This reduces the marginal cost of reporting over time: once processes are in place and people are competent, the yearly effort becomes more predictable and efficient.

Moreover, as the interview highlighted, the economic burden of sustainability reporting is not "one size fits all". Costs scale with organizational complexity. Larger firms typically operate across multiple sites, business lines, and supply chains, and they often face higher stakeholder scrutiny. As a result, they need more sophisticated data infrastructures, stronger internal controls, and more extensive assurance activities, factors that naturally increase costs. Smaller entities, by contrast, usually deal with simpler structures and fewer data streams, which makes it possible to adopt lighter processes and more basic tools while still meeting relevant requirements. In practice, this proportionality makes reporting costs more sustainable: smaller organizations can keep the effort affordable, while larger companies, supported by higher revenues and broader resources, are generally in a position to absorb the higher costs that come with their scale and complexity. Overall, Pavia Acque suggests that anticipating regulatory

trends and investing early in internal capacity can transform sustainability reporting from an external obligation into an operational asset, reducing friction, controlling costs, and improving the quality of information over time.

4.2.Sustainability and profitability: two sides of the same coin

Sustainability and profitability are often presented as if they were two opposing choices. A common assumption is that pursuing sustainability necessarily reduces profit, and this belief still fuels skepticism toward ESG commitments. However, more and more companies are showing that it is possible to follow a sustainable path without weakening financial performance. In many cases, the opposite is true: sustainability can strengthen a company's long-term ability to generate value. Corporate policies aligned with ESG principles tend to be more attractive to sustainability-oriented investors and better positioned to respond to growing regulatory expectations. At the same time, practices such as reusing resources, extending the life cycle of assets, and reducing negative environmental and social impacts can produce economic benefits as well as environmental ones.

This is where an important shift emerges. The traditional idea that new assets are always more valuable than reused or optimized ones is gradually losing force. The ability to use the same asset more than once, to preserve its value over time, and to reduce the need for constant replacement can become a concrete point of connection between profitability and sustainability. On the one hand, this approach lowers costs linked to the purchase of new goods and materials. On the other, it reflects a more responsible use of resources and reduces waste. In this sense, sustainability is not simply a moral or reputational issue; it can also represent a more efficient economic logic.

For this reason, sustainability should not be pursued at the expense of profitability, nor should it be treated as an isolated initiative. It needs to be embedded across corporate policies and integrated into the firm's overall strategic direction. The old idea that companies must choose between profitability and sustainability is no longer convincing in the current business environment. Today, sustainability is a future-oriented requirement. It is becoming a central condition for remaining credible, competitive, and resilient over time. This also explains why stakeholders are giving the issue increasing importance. Investors, customers, regulators, employees, and local communities are paying closer attention to how companies manage

environmental and social impacts, and they increasingly expect to receive clear and reliable information about these activities. This growing demand for transparency helps explain the rising relevance of sustainability reporting.

From the stakeholders' perspective, a company that adopts a sustainable model is often seen as more credible and trustworthy. Sustainability supports long-term profitability because it helps preserve natural resources, reduce environmental and social risks, and strengthen the company's reputation. It also contributes to the development of business models that are more durable over time, not only from a financial point of view but also from a regulatory one. This aspect is particularly important. Over the last decades, regulation has evolved rapidly, and companies have had to adapt to continuous and sometimes far-reaching changes. In such a context, firms that move earlier toward sustainable practices are often in a better position to anticipate new requirements rather than simply react to them.

At the same time, the relationship between sustainability and profitability is not automatically positive, and this balance is not easy to achieve. Adopting sustainability requires investment in green technologies, new processes, employee training, data systems, and broader organizational changes. All of these elements generate costs. Moreover, these costs are often immediate, while the economic returns linked to sustainability are frequently delayed and more difficult to measure in the short term. This creates a structural tension. In the early stages, the transition may weigh on financial performance, while the main benefits tend to emerge gradually. For this reason, sustainability should not be evaluated only through a short-term lens. Its contribution to profitability often becomes clearer over time.

The real challenge for companies, then, is not to choose one objective over the other, but to design strategies that allow profitability and sustainability to reinforce each other. This requires clear and realistic sustainability goals that are aligned with broader business objectives. Such alignment is essential because sustainability cannot be implemented through generic commitments. It must be shaped in relation to the company's size, sector, structure, and operational context. Economic sustainability can be achieved only when environmental and social priorities are translated into coherent organizational efforts, operational choices, and measurable results. This also means that implementation depends heavily on people. Sustainability goals must become part of everyday business practices, and this requires a strong investment in internal capabilities. Employee training is therefore central: without the knowledge and skills needed to apply sustainability principles in practice, even the best

strategic intentions risk remaining formal statements rather than becoming real drivers of long-term value. (Jerab, 2025)

Moving toward sustainability also means adopting concrete practices, such as reducing energy consumption, minimizing waste, and extending product life cycles. These are not abstract ambitions, but operational choices that shape how a company works on a daily basis. When implemented consistently, such practices can generate both reputational and economic benefits. On the reputational side, they help present the company as responsible, credible, and aligned with growing stakeholder expectations. On the economic side, they may improve efficiency, reduce resource-related costs, and strengthen the firm's long-term resilience.

In this context, the decision to integrate sustainability reporting into the core activity of the company represents a particularly significant step in the broader transition process. Sustainability reporting is not simply a formal disclosure exercise. It means providing stakeholders with transparent information about the efforts, investments, processes, and results connected to the company's environmental and social commitments. In recent years, stricter regulations have increasingly required companies to include sustainability reporting within their disclosure practices. At the same time, many firms have chosen to move in this direction even in the absence of a legal obligation. In these cases, sustainability reporting is not driven only by compliance, but also by a sense of responsibility toward society, the environment, and the wider system in which the company operates.

This is precisely one of the key points that emerged from the interview conducted with members of Pavia Acque. The company's high-quality sustainability disclosure is not primarily the result of regulatory pressure. Rather, it reflects a broader sense of respect for the resources the company manages and for the people and communities with whom it interacts. This aspect is especially meaningful because it shows that sustainability reporting can also be the expression of an internal organizational culture, not merely a response to external constraints. When this happens, disclosure tends to be more authentic, more deeply integrated into operations, and more credible in the eyes of stakeholders. The role of employees and corporate culture is thus another important dimension in the relationship between sustainability and profitability. Sustainability initiatives tend to be more effective when they are shared across the entire organization. When employees are actively involved through training, awareness programmes, and participation in problem-solving processes, sustainability becomes part of everyday corporate behaviour rather than an abstract principle. In this sense, internal engagement represents a key factor to the success of sustainability strategies. Employees who

understand the environmental and social goals of the company are more likely to identify inefficiencies, propose improvements, and contribute to innovative solutions. This internal dimension also has relevant implications for profitability. A corporate culture oriented toward sustainability can increase employee motivation and strengthen the sense of purpose within the organization. Workers who perceive their company as responsible and forward-looking often show higher levels of commitment and engagement. Moreover, when sustainability becomes embedded in daily practices, it encourages continuous learning and experimentation. For this reason, sustainability should not be interpreted only as an external communication strategy, but also as an internal management approach capable of improving organizational performance.

Organizational efforts directed toward a more sustainable business model can therefore influence financial performance. This involves not only adopting more sustainable practices in the way companies conduct their operations, but also developing more advanced and transparent systems of sustainability disclosure. In other words, sustainable behaviour and sustainability reporting should progress together. Corporate practices need to be supported by clear and credible disclosure so that stakeholders can understand the company's commitments, efforts, and results. At the same time, the relevance, scope, and effects of sustainability disclosure cannot be considered uniform across all sectors. The impact of sustainability reporting on financial performance varies across industries, since each sector differs in terms of environmental exposure, stakeholder pressure, and regulatory scrutiny. Different sectors generate different types and degrees of environmental and social impact, and this affects both the content and the intensity of sustainability disclosure. Companies operating in industries with stronger environmental externalities, such as manufacturing, energy, mining, or heavy infrastructure, are generally subject to higher public scrutiny and stricter regulatory expectations. As a result, they are often required to provide more detailed reporting and to support more demanding sustainability strategies. In sectors with lower direct environmental impact, the pressure may be less intense, although stakeholder expectations can still be significant, especially with regard to social responsibility, governance quality, and transparency. (Carreira et al, 2025)

The level of sustainability expected from firms, together with the related costs and benefits, also varies according to the broader geopolitical and economic context. A distinction can usefully be drawn between developed markets, such as the European Union, and many emerging markets in Africa, Asia, or other fast-growing regions. In developed markets, companies are generally more likely to derive financial advantages from ESG practices because

they operate within stricter regulatory frameworks, have greater access to financial and technological resources, and tend to embed ethical and sustainability principles more firmly within corporate governance structures. In these contexts, sustainable behavior is increasingly linked to competitiveness, access to capital, and long-term legitimacy.

By contrast, in many emerging markets, companies may face more structural obstacles in adopting sustainability-oriented strategies. Limited financial resources, weaker sustainability cultures, and less demanding regulatory systems can reduce the incentive to invest in ESG practices. In such environments, sustainability may be perceived as a secondary priority compared with immediate growth or survival needs. This creates a critical issue in the broader path toward sustainable development. If the efforts made in some parts of the world are offset by weak commitment elsewhere, the global transition becomes slower and less effective. For this reason, the relationship between profitability and sustainability should also be read at an international level. It is not only a matter of individual business choices, but also of the institutional, cultural, and economic conditions that make those choices more or less feasible.

In conclusion, sustainability and profitability should no longer be framed as competing objectives. In contemporary business, long-term economic success increasingly depends on the ability to generate value in a responsible and resilient way. A firm that knows its own structure, resources, limits, and competitive advantages is better equipped to integrate sustainable practices without undermining financial performance. This is why the idea of sustainable profitability is especially relevant: it does not describe profit as something pursued at any cost, nor sustainability as a purely ethical or reputational concern, but rather as a model in which economic returns are built on more durable foundations. In this perspective, sustainability becomes part of strategic decision-making, innovation, and stakeholder relations, while profitability remains necessary to ensure stability, investment capacity, and growth. Therefore, the most forward-looking business model is the one that combines them in a coherent and balanced way, recognizing that ongoing profitability is increasingly linked to the adoption of sustainable measures. (Suhatmi et al, 2024)

4.3.Future challenges and emerging opportunities

Over the last decade, sustainability reporting has emerged as one of the most advanced and dynamic practices of corporate accountability. Unlike traditional financial accounting, which has been consolidated over a long period of time, sustainability disclosure is a relatively recent field that continues to evolve rapidly through new regulatory frameworks and international directives. The continuous development of regulation reflects the growing importance attributed to environmental, social, and governance issues within corporate governance and public policy. At the same time, this evolving framework generates both challenges and opportunities for companies. In the short term, the implementation of sustainability reporting often requires significant organizational and financial efforts, as firms must adapt their internal structures. This practice requires companies to develop new data collection systems, invest in technologies, and involve specialized professionals capable of managing these processes. However, beyond these initial difficulties, sustainability reporting also opens important opportunities. It can encourage companies to develop a deeper understanding of their own operations, risks, and impacts, while strengthening transparency and communication with stakeholders. In this sense, sustainability reporting should not be seen only as a regulatory obligation, but also as a strategic tool capable of improving internal governance, fostering innovation, and reshaping the relationship between companies and the broader economic and social environment.

The landscape of sustainability reporting, as highlighted in the previous chapters, has undergone a rapid and profound transformation over the last decades. This evolution is not accidental, it is the result of the continuous interaction between technological innovation, regulatory development, and scientific progress. Until roughly twenty years ago, sustainability reporting lacked any form of mandatory regulation, and only a limited number of organizations engaged with these issues on a voluntary basis. In that initial phase, sustainability practices were mainly driven by ethical considerations or individual managerial sensitivity, rather than by structured external pressures. As a consequence, the integration of non-financial disclosure into corporate systems remained slow, fragmented, and largely discretionary. Moreover, sustainability initiatives were often perceived as costly and potentially detrimental to core business activities, both from a financial and an organizational perspective. This perception represented a significant barrier to widespread adoption. (Herzig & Schaltegger, 2011)

The gradual shift toward the current scenario can be explained by a progressive process of awareness, supported by academic research, institutional initiatives, and increasing public attention. A crucial milestone in this path was the publication of the Brundtland Report in 1987, which contributed to framing sustainability as a global and shared responsibility. From that moment onward, sustainability reporting began to expand steadily, moving from a marginal practice to a widely recognized component of corporate behavior. Today, the extremely high reporting rates among the world's largest corporations demonstrate that sustainability disclosure has become a standard element of corporate accountability, reaching a level of relevance that is increasingly comparable to that of financial reporting.

One of the main drivers behind this transformation is the growing pressure exerted by stakeholders. Investors, consumers, regulators, and society are progressively demanding greater transparency and responsibility from companies, particularly in relation to environmental and social impacts. This shift in expectations is closely linked to the increasing urgency of global challenges, most notably climate change, which has intensified concerns about the long-term sustainability of current economic models. In this context, sustainability reporting has emerged as a key instrument to communicate corporate actions, align business strategies with stakeholder expectations, and demonstrate accountability. ESG considerations, in particular, have become central in guiding both corporate decisions and investment strategies, reinforcing the idea that sustainability is no longer peripheral, but embedded in the core of business models. (Ozili, 2022)

At the same time, the role of frameworks, standards, and regulation has been fundamental in shaping this evolution. In its early stages, sustainability reporting lacked the structure and comparability typical of financial reporting, limiting its effectiveness and credibility. The development of internationally recognized standards, such as those introduced by the Global Reporting Initiative, marked a turning point by providing companies with clear guidelines and a common language for disclosure. Although initially voluntary, these frameworks encouraged firms to adopt more systematic and transparent reporting practices, contributing to the diffusion of sustainability concepts across industries. The subsequent introduction of regulatory instruments, such as the Non-Financial Reporting Directive, further accelerated this process by making disclosure mandatory for specific categories of companies and signaling a clear regulatory direction.

This trajectory has reached a new level with the introduction of the Corporate Sustainability Reporting Directive, which represents a decisive step toward the full institutionalization of

sustainability reporting. The CSRD not only expands the scope of mandatory reporting but also enhances the quality, comparability, and reliability of disclosed information. More importantly, it reflects a broader conceptual shift: sustainability is no longer treated as a complementary or secondary dimension, but as an integral part of corporate reporting. This is clearly visible in the increasing adoption of integrated reporting practices, where financial and sustainability information are presented within the same document, as in the case of Pavia Acque. Such integration demonstrates that the two dimensions are now considered interconnected and equally relevant for evaluating corporate performance.

At this stage, it is possible to affirm that sustainability reporting has not yet reached its full maturity. Rather, it is more appropriate to consider the current phase as the initial stage of a broader and long-term evolution. The introduction of mandatory directives, regulatory frameworks, and standardized reporting mechanisms is a relatively recent phenomenon, and its effects are still unfolding. For this reason, the present moment represents a transitional phase, in which the foundations of sustainability reporting are being consolidated, but its future developments are still open and subject to further transformation. What is certain, however, is that these recent regulatory interventions are reshaping the role of sustainability in a structural way, influencing not only reporting practices, but also the broader meaning and importance of sustainability within corporate strategies.

Within this evolving context, sustainability reporting creates a wide range of emerging opportunities. These opportunities are rooted, first of all, in the very nature of sustainability itself. The adoption of sustainable models responds to fundamental and increasingly urgent needs, such as the mitigation of climate change, the preservation of natural ecosystems, and the achievement of long-term development objectives. At the same time, sustainability also involves a social dimension, which concerns the protection of workers, the promotion of fair and equal treatment, and the improvement of overall working conditions. These elements highlight that sustainability is not limited to environmental concerns, but represents a broader commitment toward future generations and society. Sustainability reporting thus assumes a crucial role as a tool of transparency and accountability. Companies are no longer evaluated solely on their financial performance, but also on their ability to communicate clearly and honestly their impact on society and the environment. Stakeholders, both internal and external to the firm, increasingly expect to be informed in a transparent and reliable way. The growing diffusion of integrated reporting practices reflects this change. More and more companies are combining financial and sustainability information within a single report, placing these two

dimensions side by side and recognizing their equal relevance in representing corporate performance. (Baraibar-Diez & Sotorrío, 2018)

Beyond its ethical and communicative implications, sustainability reporting also generates concrete economic and organizational opportunities. One of the most relevant aspects concerns the development of green technologies and sustainable innovation. The increasing attention devoted to sustainability has directed financial resources toward environmentally oriented investments, fostering the growth of new sectors and accelerating technological progress. This dynamic contributes to the creation of a more sustainable economic system, in which innovation is aligned with environmental and social objectives.

At the same time, the expansion of sustainability reporting is reshaping the internal structure of organizations. The integration of sustainability into corporate activities requires new competencies, new roles, and new organizational processes. As a consequence, new professional figures are emerging, specialized in sustainability management, data analysis, reporting standards, and regulatory compliance. Companies are therefore required not only to recruit new talents, but also to invest in the training and upskilling of existing employees. This process contributes to the creation of new employment opportunities and to the transformation of the labour market, reflecting the growing relevance of sustainability within the business environment.

The current phase of sustainability reporting, although still evolving, already demonstrates its potential to generate deep changes. It is not only a matter of compliance with new regulations, but a broader transformation that affects corporate culture, strategic orientation, and economic development. The challenges associated with this transition remain significant, but the emerging opportunities suggest that sustainability reporting will play a central role in shaping the future of business and society.

However, alongside the emerging opportunities, sustainability reporting also presents several critical challenges, particularly with regard to its effective implementation and overall efficiency. One of the main issues concerns the reliability and consistency of sustainability disclosure. Although reporting is intended to enhance transparency, accountability, and corporate compliance, these objectives are not always fully achieved in practice. The effectiveness of sustainability reporting depends not only on the existence of standards and regulations, but also on their uniform application, enforcement, and monitoring. (Lai & Stacchezzini, 2021)

A key challenge lies in the lack of global harmonization. While the European context has made significant progress through directives such as the CSRD, regulatory frameworks remain fragmented at the international level. Different countries adopt different rules, levels of enforcement, and reporting requirements, which undermines comparability and reduces the overall credibility of disclosed information. This asymmetry creates an uneven playing field in which companies operating in more regulated environments are required to invest significant financial and organizational resources to comply with sustainability standards, while others, in less stringent contexts, may avoid such efforts. As a result, the commitment of more compliant firms risks being weakened by the opportunistic behavior of others, generating inefficiencies and raising concerns about fairness. (Paridhi & Arora, 2023)

This issue is closely linked to the role of monitoring and enforcement mechanisms. Effective sustainability reporting requires not only clear standards, but also strong supervisory systems capable of verifying the accuracy and completeness of disclosed information. Without adequate control by competent authorities, there is a risk of superficial compliance or even misleading practices, which can compromise stakeholder trust and reduce the overall effectiveness of the reporting system. Ensuring consistent monitoring across sectors and jurisdictions therefore represents a fundamental challenge for the future development of sustainability reporting.

Another relevant challenge concerns the economic dimension of sustainability adoption. The transition toward sustainable models often requires significant initial investments, including the implementation of new technologies, the development of data management systems, the acquisition of specialized software, and the training or recruitment of qualified personnel. For many companies, especially in the early stages, these costs can be substantial and may be perceived as a burden. However, for sustainability reporting to become truly effective and widely adopted, these costs need to decrease over time, benefiting from economies of scale, technological progress, and greater standardization. In the long term, this transition has the potential to generate not only financial returns, but also broader value in terms of environmental protection, social well-being, and reputational advantages.

The future of sustainability reporting will largely depend on the ability to address these challenges through stronger international cooperation, more effective regulatory enforcement, and the gradual reduction of implementation costs. Only under these conditions will it be possible to fully realize the potential of sustainability reporting as a tool capable of supporting both corporate performance and collective well-being.

In my view, sustainability reporting can be truly effective only when it is genuinely embedded within corporate activity, as observed in the case of Pavia Acque. It should not be approached merely as a regulatory obligation imposed by national or international legislation, but rather as an ethical choice that reflects a deeper responsibility toward society. In this sense, sustainability is not optional, but a universal duty that companies owe both to external stakeholders and to themselves, as part of their long-term existence. At the same time, however, this evolving practice raises several concerns. One of the most relevant risks is that sustainability reporting may become a symbolic or legitimizing tool, rather than a driver of real change, with companies engaging in selective disclosure and emphasizing positive impacts while neglecting negative ones. This opens the door to greenwashing and weakens the credibility of the entire system, making it essential to strengthen assurance mechanisms and ensure a closer alignment between reported information and actual performance. A further risk is that sustainability reporting remains confined to a compliance or communication exercise, without effectively influencing strategic decisions, resource allocation, and long-term planning.

Ultimately, the future of sustainability reporting will depend on its ability to move beyond formal disclosure and become a concrete tool capable of influencing corporate behavior, aligning business practices with societal expectations, and contributing to the development of a more sustainable and resilient economic system.

Conclusion

Sustainability has become one of the most relevant and pressing issues in contemporary society. Among the global challenges faced today, climate change stands out as one of the most complex, urgent, and far-reaching. Its effects are no longer abstract or distant, but increasingly visible in everyday life, affecting ecosystems, economies, and communities across the world. In this context, remaining passive is no longer an option. There is a growing awareness that collective action is necessary, and that both public institutions and private organizations have a responsibility to contribute to a more sustainable future.

This awareness has led to a progressive shift in priorities, where sustainability is no longer perceived as a secondary concern, but as a central element in decision-making processes. Companies, in particular, are being called to play an active role. Their activities generate significant impacts, and therefore they are expected not only to reduce negative externalities, but also to contribute positively to environmental and social outcomes. Sustainability reporting thus represents one of the key tools through which this transformation is taking place.

Sustainability reporting, together with the development of policies, strategies, directives, and corporate commitments, can be interpreted as a concrete response to the challenges posed by climate change and sustainability more generally. It provides a structured way for companies to assess, monitor, and communicate their impacts, making their actions more transparent and accountable. In this sense, it can be seen as a mechanism that pushes organizations towards a more responsible path, encouraging them to integrate sustainability considerations into their business models and strategic decisions.

However, while sustainability reporting is often presented as a positive and necessary step forward, it is also important to approach it with a critical perspective. The mere existence of reporting frameworks does not automatically guarantee meaningful change. There is a risk that sustainability reporting may become a formal exercise, focused more on communication than on actual transformation. In some cases, companies may emphasize positive aspects while omitting critical issues, leading to phenomena such as greenwashing. This highlights the importance of not only expanding reporting practices, but also ensuring their credibility, consistency, and alignment with real performance.

Despite these potential limitations, the evolution of sustainability reporting remains a significant development. It reflects a broader cultural and institutional shift, where transparency

and accountability are increasingly valued. Moreover, it creates a common language through which companies, stakeholders, and regulators can interact, facilitating comparison and assesment evaluation. Therefore, sustainability reporting should be seen as part of a wider process aimed at fostering more sustainable business practices.

The analysis carried out in this thesis has shown how these dynamics unfold in practice, with particular reference to the water utility sector. This sector is inherently linked to sustainability, as it involves the management of a vital and limited resource. Water utilities operate at the intersection of environmental protection, service provision, and social responsibility, making them particularly relevant for examining the integration of sustainability into business operations.

The case of Pavia Acque provides a concrete example of how a local organization can engage with these issues. The adoption of integrated reporting demonstrates a willingness to go beyond minimum requirements and to provide a more comprehensive representation of the company's activities and impacts. The findings suggest that sustainability reporting can support internal processes, improve transparency, and strengthen relationships with stakeholders. At the same time, the case also highlights the challenges associated with implementing such practices, including the need for coordination, data management, and organizational commitment.

A key issue that emerges from the analysis concerns the balance between profitability and sustainability. While these two dimensions are often presented as compatible, their integration is not always straightforward. In sectors such as water utilities, characterized by high infrastructure costs and regulatory constraints, tensions may arise between economic efficiency and environmental or social objectives. This requires companies to adopt a long-term perspective, where sustainability is not seen as a cost, but as an investment in resilience and value creation.

Looking ahead, the role of sustainability reporting is likely to become even more significant. The increasing attention from stakeholders, combined with the evolution of regulatory frameworks, will continue to push companies towards greater transparency and accountability. However, the real challenge will not be limited to complying with new requirements. It will involve ensuring that sustainability is effectively embedded in corporate strategies and daily operations, rather than remaining confined to reporting practices.

In this sense, sustainability reporting should be understood as both a tool and a signal. It is a tool because it provides a structured way to measure and communicate impacts. At the same time, it is a signal of a deeper transformation, indicating that companies are gradually

redefining their role within society. The transition towards more sustainable business models is still ongoing and far from complete, but the direction appears clear.

Ultimately, this thesis suggests that sustainability reporting represents an important step in addressing the challenges of our time. It can guide companies towards a more responsible path, but its effectiveness depends on how it is implemented. The case of Pavia Acque shows that this transition is possible even at a local level, reinforcing the idea that sustainability is not only a global issue, but also a matter of everyday practices and decisions.

In a world increasingly shaped by environmental and social pressures, the ability to move from awareness to action will be crucial. Sustainability reporting can play a role in this process, but the ultimate responsibility lies with the choices that companies and institutions make. The challenge is not only to report sustainability, but to achieve it.

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