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Design and development of a Corporate Performance Management tool in support of ESG planning activities

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Abstract

The purpose of this thesis is to discuss the conception and development of an application designed to handle the Corporate Performance Management activities of high-level planning, target definition, variance analysis, and budget revision, translating them into the ESG context. The goal is to provide support to business activities and allow the structuring of environmental, social, and governance planning processes, aiding the delivery of actionable plans. The landscape in which firms operate in 2023 focuses on sustainability, an increasingly critical issue for stakeholders' appraisal of business performance, which can impact the ease of access to credit, investors' willingness to invest, the amount of risk exposure, and a company's market value. The existence of numerous and widely diverse ESG reporting standards obliges the exploration of alternative approaches for testifying to stakeholders about the sustainability of business operations and the results obtained. Consequently, companies rely on external rating agencies and independent certification bodies, whose attention is focused not only on final values and results but also on corporate ESG strategies that specify objectives to be reached within specific time ranges and on the plans developed to achieve them. The absence of a tool that enables managers to define an ESG strategy by evaluating data in organized dashboards, gather knowledge to develop a sustainability plan, review the targets identified and analyze variances resulted in the discovery of a market need. This work seeks to fill that need.

"Every single social and global issue of our day is a business opportunity in disguise."

Peter Drucker

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List of Abbreviations

TBL Triple Bottom Line

ESG Environmental, Social and Governance

SDGs Sustainable Development Goals

CSR Corporate Social Responsibility

WTI Willingness To Invest

PH Porter Hypotesys

ROA Return On Assets

ROE Return On Equity

ROS Return On Sales

GRI Global Reporting Initiative

CSDDD Corporate Sustainability Due Diligence Directive

CSRD Corporate Sustainability Reporting Directive

NFRD Directive on Non-Financial Reporting

SMEs Small and Medium-sized Enterprises

SEC Securities and Exchange Commission

CSRC China Securities Regulatory Commission

SASB Sustainability Accounting Standards Board

CDP Carbon Disclosure Project

TCFD Task Force on Climate-Related Financial Disclosures

MSCI Morgan Stanley Capital International

ISO International Organization for Standardization

SAI Social Accountability International

EMS Environmental Management System

KPIs Key Performance Indicators

CPM Corporate Performance Management

OLAP Online Analytical Processing

MVP Minimum Viable Product

BARC Business Application Research Center

Chapter 1

Introduction

In 2010, the European Union laid down its recovery strategy in the aftermath of the 2008 financial crisis. The primary objective was smart, sustainable and inclusive growth. At the time, terms such as "sustainability" and "inclusion" had been used in the literature for a few years and world-leading companies were beginning to make them one of the focal points in the development of their strategic plans.
The international scene in which businesses operate today highlights the concept of "sustainable development", but it is not clear to everyone what it means. The universally accepted and adopted definition of **sustainable development** can be found in the Brundtland Report [1], a document dating back to 1987, drafted by the World Commission on Environment and Development (WCED), entitled "Our Common Future":

> *"Sustainable development is the development that meets the needs of the present without compromising the ability of future generations to meet their own needs."*

Sustainability is sometimes misinterpreted as a purely environmental notion, however, as we can see from the above explanation, the context is much broader: sustainability is an ethical principle applicable in several areas that fundamentally relates to people's well-being.

In 1994, the scholar John Elkington coined the term **Triple Bottom Line (TBL)**

[2] to produce an accessible concept for business managers, as he was a fervent believer that sustainability could only be realized via collaboration with business managers. The TBL aimed (and still does aim) to help managers not only think about the earned value but also the socio-economic results of their businesses. The British academic's essential belief was that to get to a more sustainable reality a vital role would have been performed by companies: "Business, much more than governments or NGOs, will be in the driving seat".

The TBL represented three areas in which organizations and their stakeholders should put their actions to the test: the economic-financial context, the environmental scope, and the results on the social framework in which they operate.

The Environmental, Social and Governance (ESG) acronym, today widely spread, was coined ten years later, in 2004. It appeared for the first time in a United Nations report titled "Who Cares Wins" [3]. Its goal was to increase the global consciousness of the importance of environmental (E), social (S), and governance (G) issues. These matters were the heart of Elkington's TBL and that is the reason why, in the literature, the two terms are often paired together. However, the TBL is a notion dedicated to corporate management today less known outside of it. Having said that, they refer to the same scope: sustainability.

Figure 1.1: Sustainability principles

Elkington was also able to brilliantly predict the driving factors of the sustainable revolution: the competition on a market that would increasingly take into account ESG issues; a shift of society's value structure towards humanitarian, social and climate issues; the demand for greater transparency on business practices; the development of life-cycle technology; the creation of business partnerships and the widening of the value chain; the need to generate a long-term dimension to the business for which planning would become essential.
Moreover, in his opinion, the use of various scenarios and what-if analyses would have become in the future a vital instrument for market participants to broaden their temporal perspectives on sustainability.

We are currently in the midst of the sustainable revolution he predicted. On the one hand, new generations' attention is drawn to the topics discussed. On the other hand, the historical time in which we live pushes us to confront environmental challenges such as global warming, pandemics, and climate change. The current war in Ukraine, as well as the international socio-political scenario, compel each of us to follow our conscience and take action, emphasizing the importance

of quality of life and pushing us to denounce and condemn inequalities and injustices.

Aligning with the context in which world leaders operate, in 2015 the UN General Assembly developed 17 international goals to be achieved by 2030 [4]. They are referred to as the Sustainable Development Goals (SDGs) and focus on the link between sustainable development's environmental, social and economic aspects. [5]. For each of these objectives, specific targets and Key Performance Indicators (KPIs) have been identified to measure progress. [6].

The sustainability report provides documented evidence of a company's actions and as such it becomes an important component for evaluating the value provided by a business.
To understand how firms are reacting to the sustainable revolution, the IBM Institute for Business Value interviewed 3000 CEOs from 43 countries and 28 industries in 2022 [7]. 80% of them anticipated that investments in enterprise sustainability will yield business returns and drive growth within the next 5 years. Furthermore, 70% of the CEOs polled indicated that they are actively involved in the creation of a corporate-level ESG strategy, and 48% of them stated that promoting sustainability was one of their organizations' key goals for the next two or three years.
Additionally, in accordance with the Global Sustainability Study 2021 [8], conducted by Simon-Kucher & Partners surveying more than 10200 consumers globally [1], 78% of customers aspire to live a more sustainable life, while 63% of them have made some sort of changes (from modest to significant) to behave more sustainably. Moreover, 50% of global consumers view sustainability as one of the top five purchase criteria and differentiators in the value proposition of firms, and 35% of them claim to be willing to pay more for sustainable products or services. The consulting firm also claims that companies that do not adapt to be sustainable would likely become obsolete in a society that requires sustainable products and services in the long run.
In Dzomonda's studies [9] the researcher asserts that a firm's capacity to strike a balance between commercial operations, environmental regeneration, and social

[1]From 17 countries in the world

fairness predicts not only stronger long-term success among consumers but also easier access to finance. As stated by the academic, an enterprise's environmental stewardship provides a good signal to banks and investors, lowering barriers to external financing. And, in consonance with Dzomonda's theories, investors utilize ESG indicators to evaluate the future worth of their assets in order to avoid reputational damage.
Lingnau et al. further investigated sustainability from the standpoint of a private investor, examining if it may influence an individual's Willingness To Invest (WTI) [10]. The conclusions drawn were that "sustainability influences WTI in a substantial manner".

Finally, ESG strategy and risk management are closely linked: each organization confronts a wide range of ESG challenges, some of which can cause economic or reputational harm. If a company overlooks such concerns, the likelihood of events or conflicts linked to them increases dramatically; hence, sustainability must be included in a "standard" risk management procedure [11]. As the worldwide setting pays growing attention to such risk factors, an effective corporate-level ESG management system has the added goal of decreasing their occurrence [12]. As a result, the corporate disclosure structure should clearly communicate to stakeholders the amount of ESG risk appetite. [13].
However, risk management involves not just mitigating the potential negative consequences of certain occurrences on business operations, but also protecting and generating wealth [14]: it is necessary to be mindful that **sustainability can** also **generate opportunities**, helping a company create value and achieve greater success in the long term [15].

This study seeks to understand the principles of sustainability, the context in which companies must operate in 2023, and the instruments required to support ESG Corporate Performance Management operations. Simultaneously, a case study that fits into the specified framework developed in collaboration with the consulting firm Mediamente Consulting is presented.

Chapter 2

ESG Reporting

Sustainability, as mentioned, is nowadays a matter of primary importance for every company. If, on the one hand, it is necessary to implement policies that take into account the social and environmental impacts of the business activities carried out, on the other, companies need to be accountable for their actions to different stakeholders such as shareholders, customers, employees, and even legislative bodies.
The first way of sharing ESG data to increase transparency is through ESG reporting: the spread of a non-financial statement that allows understanding, at the time of disclosure, the critical issues and the results achieved in the field of sustainability by a company.
The current chapter discusses the regulatory framework and the norms that govern sustainability disclosure, as well as the state of the art in non-financial reporting and the possible benefits that companies may reap from the publication of sustainability reports. Also, other useful tools for transparency are presented.

2.1 Companies and sustainability

The literature focused on the benefits firms can obtain by undertaking a sustainability path is vast. This research aims to draw attention to today's dominating stance, not only academically but also in the field of counseling.

The conclusions drawn are often conflicting when scholars only assess the relationship between the economic result and Corporate Social Responsibility (CSR) initiatives.
Before proceeding with further analyses, it is important to clarify the difference between ESG and CSR: while CSR refers to the qualitative liability of companies for their activities by investigating their social and environmental policies, ESG refers to the measurement of the impacts of business operations according to precise (quantitative) metrics [16]. However, these two acronyms are often used as synonyms or, at least, with similar meanings. Therefore, the studies referred to the outcomes of CSR will also be considered.

As previously stated, when we exclusively consider the impact on a company's operational profits, two opposing perspectives backed by scholars may be discovered.
There is the opinion of Porter and Van der Linde [17], who, concentrating more directly on environmental protection, feel that unsustainable businesses are also the least efficient in terms of waste and expense allocations. As a result, the value of organizations shifting toward higher sustainability is emphasized.
Twenty years later, Ambec et al. [18] produced an extensive analysis of the reasonings backing or disputing the theory that had become known among scholars as the Porter Hypotesys (PH). On one side, they traced numerous articles in favor of the PH. For example, in 2015 Vinayagamoorthi et al. [19] were able to demonstrate a positive correlation between a company's sustainability performances and three financial measures (Return On Assets (ROA), Return On Equity (ROE) e Return On Sales (ROS)), corroborating Zeren's and Koc's [20], Qi's et al. [21] and Dobler's et al. [22] thesis.
On the other side, the main objection to the PH is that the implementation of a CSR strategy aimed at achieving greater corporate sustainability involves higher costs (typically plant modernization or research and development), causes agency problems, and generates an inefficient allocation of resources, an unfavorable condition for an enterprise [23] [24].
Milton Friedman severely critiqued the notion of corporate social responsibility in

1970, believing that social responsibility was something only humans, not corporations, needed to be aware of [25]. He stated that, for a firm, functioning with goals other than profit and incurring additional expenditures to accomplish what would eventually be referred to as "sustainability" would be unreasonable. According to Friedman, managers should operate in line with the objectives set by the board of directors and firm ownership such as the creation of monetary value, not by any environmentally aware policymaker.

However, the same objection might now be a powerful argument in favor of the belief that implementing an ESG strategy for firms is more important than ever, if not required (regardless of the regulatory context that we will analyze later). At least for listed companies, whose ownership coincides with shareholders, nowadays more and more interested in sustainability.

This belief is confirmed by the study conducted by Hussain N. published in 2015 [26], the longest ever carried out, in terms of time duration, on the assessment of the impacts of non-financial reporting on the value of a company. It is based on sustainability reports published by companies belonging to the Global Fortune M-100 group that adopted the Global Reporting Initiative (GRI) G3 standard (the same standard for all) over a period of 5 years at least once (44 in total). The remaining organizations of the group were used as control samples. Using Tobin's q value [27] as an indicator of the market value of a company's equity package, it has been verified that sustainability performance has a considerable beneficial influence on the market value and accounting performance of firms who practice sustainability reporting.

However, not all dimensions of sustainability (economic, social, and environmental) are equally relevant to a company's financial performance. In particular, the economic dimension alone is never able to explain changes in the financial performance of a company, but the social and environmental ones are both positively correlated with the latter. Moreover, according to this study, it can be shown that a more transparent firm undertaking the disclosure of information that carries out positive and/or neutral performance may increase its market value and that publishing a large number of **positive or neutral news about environmental and social performance may result in improved accounting performance that can be**

measured through ROA and ROE.
In 2017 the same hypothesis was supported by Caesaria [28]. The conclusion was that the demonstration of companies' interest in sustainable development (global and local) improves corporate perception and image in the public eye, ultimately leading to improved market performance.

The findings of the aforementioned studies can be justified by the economic and financial theory of the "Market for Lemons", which in turn bases its assumptions on the theory of information asymmetries and the relationship between information flow and capital flow.
The best-known theorists of the **information asymmetries** issue are the Nobel laureates Arkelof, Spence, and Stiglitz. The term "information asymmetry" refers to the particular condition in which "one or more market participants have more accurate information than others." [29]. The problem with this situation, which makes it a market failure, is that it brings out an inefficient use of available resources. It leads, in fact, the operator who has "better" information to opportunistic behavior (the "moral hazard" problem) and the less informed one to be willing to invest less in an offer whose reliability is not verifiable and on which he cannot have sufficient information.
Transposing the matter in the context of the stock market and the definition of the market value of the shares of a listed company, it leads to prices lower than the real value of the shares because of the lack of information available to rational investors. The Market for Lemon's theory [30], formulated by George Arkelof, refers to this issue [31].
Assuming that in a market there are both very good products (peaches) and fewer quality ones (lemons), buyers, unaware of what they might end up with, will only be willing to pay a price that corresponds to the average value of the two types of product. Sellers, however, know what type of product they have (information asymmetry), and will agree to sell solely lemons, leaving the market when they only have products with a higher value (peaches) left. By doing so, however, the price at which buyers will be willing to buy will decrease more and more, leading to the problem of adverse selection (the awareness of the lack of certain information leads

buyers to conduct unfavorable behavior towards sellers).
Many scholars have sought a solution to the problem, recognizing one, for example, in the drafting of optimal contracts that disseminate private business information and mitigate the assessment deviated by the asymmetry [32]. Another possible unravelment of the issue is the emanation of rules that oblige managers to account for internal information useful for the decision-making process of private investors.

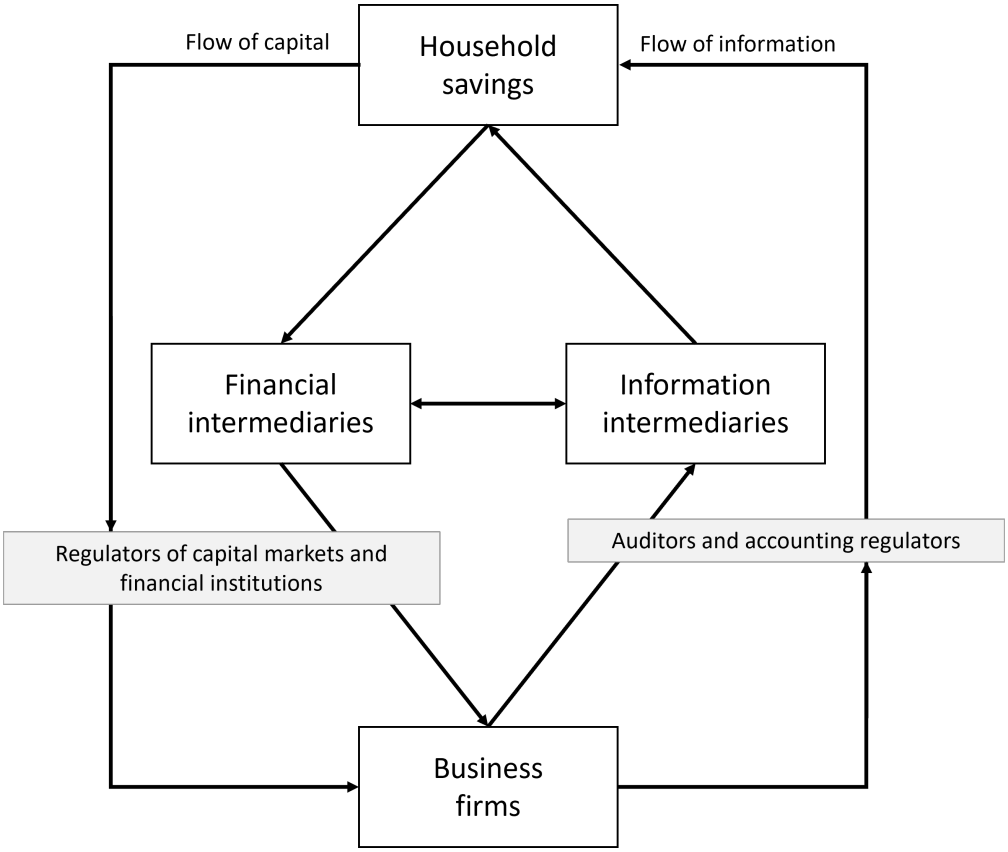


Figure 2.1: Information and investment flow on the capital market, Healy and Palepu [33]

2.2 ESG reporting: benefits, problems and critical issues

It becomes therefore necessary for companies to communicate to stakeholders internal information of public interest for the appraisal of their performances. Nowadays, the **results achieved by organizations are not only evaluated in economic terms but also considering the social and environmental aspects** of a firm's work.
As stated by Daizy and Niladri [34], "Financial reporting alone no longer satisfies the need of stakeholders, customers, and communities because financial reporting discloses the financial aspects of organizations only but for overall performances of the organization non-financial performance should also be disclosed.". In support of the argument on the advantage and necessity of such disclosure, there is also the extension of the theory of legitimization (for which the actions of a generic entity are desirable, appropriate and correct within a social construct of norms, values, beliefs, and definitions) for companies to the ESG context [35].

Before proceeding with further analysis of the dissemination of non-financial statements, we will focus on the meaning of the expression "Corporate Sustainability Reporting", which refers to the diffusion of internal information on a company's environmental, social and economic performance.
This terminology is often used as a synonym for "Social Responsibility Reporting" to identify a report that focuses no longer only on the financial results of a company after its balance sheet closure. In 2004 Slater et al. [36] defined this type of reporting as a structured approach through which companies can testify to the way non-financial factors affect financial ones, while underlining the criticizable trend (still current) to consider the sustainability report as unrelated to the financial statement. According to one of the most important bodies in the ESG scope, the GRI, sustainability reporting consists in "measuring, disseminating and taking responsibility for corporate performance working towards the goal of sustainable development".

2.3 The regulatory context

Like already in 2004 John Elkington predicted [2], at first the disclosure of non-financial reports began with spontaneous initiatives by companies that saw the benefits of transparency and the potential returns that such initiatives could have had.
Nowadays, we know that 90% of S&P global 500 companies voluntarily publish, in self-determined ways, data of an environmental or social nature, even though studies conducted by the Securities and Exchange Commission show that only a third of US public companies report sustainability evidence in their balance sheets [37]. However, especially in the last decade, a push has also come from international governments, which have worked (and are still working) on legislative proposals to force companies to comply with certain requirements for ESG reporting. In particular, this analysis is focused on the European legislative context (in which Mediamente Consulting operates), as well as the American and Chinese ones, as these regions are leaders in the production sector.

2.3.1 The European context

The European Union can be considered a leader in terms of efforts toward the goal of transparency of non-financial data as well as accounting data. Here are the latest actions taken: on 23 February 2022, the European Commission adopted the Corporate Sustainability Due Diligence Directive (CSDDD) [38], while the Corporate Sustainability Reporting Directive (CSRD) was adopted on 28 November 2022 [39]. The CSDDD obliges to the so-called "due diligence" in addressing issues of urgent importance in the current socio-economic context, such as human rights or the impacts of industries on the environment and the ecosystem in which they are embedded. Two types of companies based in the European Union have to fulfill the requirements: those with more than 500 employees and net global revenues exceeding 150 million euros and those with half of the employees but net global revenues of 40 million euros, at least 50% of which coming from defined high-risk

sectors. An important part of the directive is the **obligation for companies to develop plans to reach environmental sustainability**, introducing specific commitments for corporate management to deem the impacts of their businesses not only in the short term but also in the medium-long term. Penalties are also foregone for companies that will not be able to comply with the legislation. Also, companies that are not based in the European Union but with net revenues of more than 150 million euros generated within the EU or with revenues between 40 and 150 million euros produced in the EU whenever at least 50% of it comes from industrial sectors at high risk will be included in the obligations.

The CSRD, instead, starts from a revision of the previous Directive on Non-Financial Reporting (NFRD), adopted in 2014 and only implemented in Italy in 2017, and aims to be a turning point for sustainable finance in the EU. The purpose of the CSRD is to work synergistically with the CSDDD, requiring companies to report on sustainability issues and introducing a large number of transparency and reporting requirements. This, in the hope of the legislators, will contribute to the transition to a more sustainable and inclusive reality within the European economic and financial system. Reporting obligations are directed to all companies with more than 250 employees in the EU and all small and medium-sized companies listed on European markets. The lowering of the thresholds (compared to those identified by the NFRD) is particularly interesting for the Italian operating context, scattered with Small and Medium-sized Enterprises (SMEs) that, in recent years, are showing a greater tendency to list on the stock exchange as a means to raising capital.

In Italy, SMEs employ 80% of workers: a study by Ernst & Young published on 15 November 2021 [40] testifies that 130,000 Italian companies count from 10 to 49 workers and 26,000 have a number of employees included between 50 and 249. The 99% of Italian companies are SMEs, creating 67% of the value added and making up 57% of national exports. In Borsa Italiana, for example, on 31 March 2022, there were 410 listed companies, of which about 79% (326 companies) were SMEs, according to the document released by the company on the same date.

The disclosure required to companies focuses on four macro-areas: environmental impacts, social and employee-related issues, compliance with equality and human rights criteria, and the fight against corruption and money laundering. The reporting

will be carried out through the dissemination of information on the business model used, the company's policies adopted in various scopes, the objectives and results achieved by these policies and a set of metrics to be provided based on the sector to which they belong. For the distribution of such information, companies may adopt the standard they prefer, provided that they do not fail to comply with the disclosure obligations indicated above.
At the same time, to meet the objectives of the European Green Compact adopted on 11 December 2019 [41], - particularly focused on limiting the increase in global warming - European taxonomy has been introduced (EU Regulation 2020/852) [42]. This would make it possible to classify economic activities as environmentally sustainable in relation to their contribution to the achievement of each of the six European environmental objectives, namely: climate change mitigation, climate change adaptation, sustainable use and protection of water resources, transition to a circular economy, reduction of pollution, protection of biodiversity. The aim of such classification would be the reduction of the so-called practices of "greenwashing" operated by enterprises and the determination of the organizations that effectively put in field efforts directed to the attainment of an increase of sustainability.

2.3.2 The US-American context

On 21 March 2022, the US Securities and Exchange Commission (SEC) proposed a set of rules that would require the publication of non-financial statements, with particular attention to the measures taken against climate change, for each company registered within the SEC and for all companies whose shares are traded on the US stock market. The data required in the statements, according to the proposal [43], involves the risks that an enterprise faces related to climate issues and their impacts (likely or actual) on the business operations, in addition to their strategy and their long-term plans, the company's greenhouse gas emissions, and more. If part of the climate risk management strategy includes a transition plan, the proposal would require the disclosure of a description of the plan, its relevant metrics, and the identified objectives. The transparency required for companies would therefore

be more focused on the environmental element of the acronym ESG.
However, it should be noted that this measure is still only taking place in the form of a proposal, which has also been strongly criticized and debated.

2.3.3 The chinese context

The China Securities Regulatory Commission (CSRC), jointly with the Ministry of Ecology and Environment, defines national rules for the release of corporate sustainability information. Transparency requirements have been often defined for local governments, listed companies, and non-governmental institutions. In addition, the CSRC and the stock exchange companies require the publication of ESG, corporate social responsibility CSR, or, in general, sustainability reports.
As reported by research conducted by the law firm Mayer Brown [44], on 28 June 2021, the CSRC published the "Final Amendments" to the disclosure rules and the "Explanations" to their application regarding the dissemination of annual or half-yearly sustainability reports. However, this shows that the focus is mainly on environmental pollution. The four main goals of these standards are:

- focus on the role of companies in environmental protection;
- transparency on the payment by undertakings of penalties arising from environmental protection rules during the period analyzed;
- achieving "carbon neutrality" (balancing greenhouse gas emissions generated and reabsorbed) by encouraging companies to disseminate information on their efforts towards this goal;
- support rural areas by encouraging businesses to take an active part in the fight against poverty.

2.4 The reporting standards

Given the global interest in the themes discussed, several institutional authorities have recognized the necessity for firms to establish criteria for identifying information to be shared and how to do so efficiently. As a result, numerous frameworks for ESG reporting have emerged, to the point where currently it is difficult to identify a global trend of reporting information of interest to stakeholders all in the same way. The first problem is the difficulty involved in identifying commonly adopted rules for the drafting of non-financial statements: the (many) standards are often different from each other not only in the defined metrics for the issues of interest but also in the definition of the interest itself. Some of them focus only on environmental impacts, others on every element of the triple bottom line, while others focus on the economic and financial implications of every issue included in the concept of "sustainability".

In 2014, Daizy e Das [34] indicated the GRI as the most comprehensive framework in use, a globally adopted standard approachable by organizations of all kinds, industries, and sizes. Thanks to the studies carried out by Cairello in 2022 [45], it is possible to argue that the GRI is still one of the most widely used standards, although there has been an increase in the adoption of the Sustainability Accounting Standards Board (SASB) and the Carbon Disclosure Project (CDP) standards at the time of this study. Moreover, reporting often takes place by "mixing" the principles of one standard and the other, given the incompleteness of many of these [46]. In 2020, the SASB announced [47] its willingness to work with the GRI to remedy the complexity resulting from the multiplicity of existing standards and demonstrate the possibility of using both frameworks together.

It has been possible to identify four "reference" standards from the study conducted on S&P 500 companies carried out by the Center for Quality Audit previously mentioned [46]:

2.4.1 GRI (Global Reporting Initiative)

Figure 2.2: Global Reporting Initiative Logo

The GRI defines itself as an independent international organization that aims to help companies to take note of the impact they have on the system in which they operate [48].
As mentioned, this standard is considered the most complete and versatile: it provides a series of Universal Standards as well as more specific standards: Sector Standards, and Topic Standards [49].
The first ones require the disclosure of internal information of the organization, such as the activities carried out, governance policies, management systems, reporting procedures, products, services, stakeholder involvement, and managerial strategy. These are defined as "General Disclosures" and are useful for understanding the size of the organization and its profile and allow us to place it in the context in which it works to better understand its impacts. The Universal Standards also provide a guide for understanding the concept of **"material topic"** for the company and the principle of materiality (ie: relevance). A topic is considered material when it is relevant to the business activities conducted by a firm, meaning that it has to be considered while disclosing information as a consequence of the operations managed by the organization.
The Sector Standards, on the other hand, involve the disclosure of quantitative and/or qualitative data according to the industrial sector in which the company can

be inserted starting from what could be the material topics for it. These suggestions, however, are only a starting point: pondering its peculiar situation, each firm will have to add or remove any topic which isn't relevant to its business activities.
The Topic Standards, finally, provide directives for the dissemination of information previously identified. Reporting principles (relevance, inclusiveness, sustainability context, completeness, balance, comparability, accuracy, timeliness, and reliability) are also identified.
This standard focuses on the impact of a company's activities in the economic, social, and environmental fields and its contribution towards the goal of sustainable development without neglecting one aspect in favor of others. For this reason, after the comparison with the following standards, this study will consider it the most complete, flexible, and adaptable to different business needs.

2.4.2 SASB (Sustainability Accounting Standards Board)

Figure 2.3: Sustainability Accounting Standards Board Logo

It provides specific standards for 77 different industrial sectors and, for each of these, identifies a series of risks and opportunities that could affect a company from an operational and financial point of view and its risk profile. This refers to the relationship between sustainability and risks/opportunities previously addressed [50].
In this case, there is no global guideline applicable to every industry. Therefore, for

a better understanding of the requirements given to firms that choose to adopt this standard, two specific documents containing the requests for companies working in the food distribution sector [51] and in the apparel, shoes, and accessories production sector [52] were analyzed.
Thus, it has been possible to identify the structure of the information required and the directives provided. The standards suggest some "Disclosure topics", which are a set of industry-specific issues that could constitute material information, in conjunction with a discussion of how management could generate or destroy value based on the assessment of such issues.
The "Accounting Metrics" are then identified: that is a set of KPIs that allow us to measure the business performances with regards to the identified issues.
Each metric is followed by a technical protocol (section "Technical protocols") that provides a definition, scope, implementation, and suggested presentation modes for it. Finally, the "Activity metrics" are identified, which can be used to normalize data and facilitate comparison with other companies in the sector.

2.4.3 TCFD (Task Force on Climate-Related Financial Disclosures)

Figure 2.4: Task Force on Climate-related Financial Disclosures Logo

The Task Force on Climate-Related Financial Disclosures (TCFD) was born in 2015, when the Financial Stability Board, the finance ministers of the G20, and the Governors of the Central Bank realized the need to provide companies with the appropriate tool for better and more uniform disclosure of non-financial information after analyzing the state of the art [53]. In the same year, the aforementioned board established the TCFD, founded and still led by Michael R. Bloomberg.

Adopting this framework means following the recommendations provided by the task force, which are the same for all kinds of organizations, designed to solicit useful information for decision-making purposes and aimed at the long term, with a focus on the risks and opportunities associated with a transition to a lower CO2 emissions economy.
One key feature of this framework is that the data required need to be included in the financial reports in monetary terms. This allows us to understand the greater limit of these directives: all information must be reported through financial metrics. In addition, the focus is essentially on reducing emissions and environmental impacts, leaving aside the social factor of sustainability.

2.4.4 CDP (Carbon Disclosure Project)

Figure 2.5: Carbon Disclosure Project Logo

CDP reporting has the advantage of being fast and accessible by any type of company, which is why the project is also mentioned, for example, by the Italian Ministry of Ecological Transition recalling the collaboration of the institution with 525 international investors for the management of 96 trillion dollars assets[54].
The high level of accessibility comes from the modalities of adherence to this standard: the possibility is offered to fill out a survey through the CDP portal from which the necessary information will be generated [55]. Also, they offer the chance to contact web support whenever needed.
The questionnaires provided to companies are three: one for climate change, one for water safety, and one for the preservation of forest areas. After filling out the survey, a score is assigned according to methodologies and metrics specific to each type of questionnaire. The questions included can be generic but also specific to

each sector, to provide insights aimed at high-risk sectors. Again, however, the problem with this standard is its focus on the 'E' aspect of the acronym ESG.

2.5 Consequences of the issues with ESG reporting frameworks: the need for ESG rating

As previously stated, ESG disclosure is a valuable tool for companies as it can reduce the impact of information asymmetries on the market value of their shares.
It remains, however, a great critical factor: we have come to the conclusion that there are many reporting frameworks available, which are distant one from the other in terms of requests, are not unified, have different focuses, and are not always balanced on every aspect of the TBL. The process of evaluation of the conduct of a company is therefore very difficult for stakeholders, as much as the comparison with other organizations, both in the same market sector and not.
As witnessed by Lenora Suki, product manager for sustainable financial solutions at Bloomberg L.P., in a 2020 interview [56], "Right now, information about sustainability is often non-financial and so diffuse and diverse that it's difficult for decision-makers to digest and synthesize into strategic and operational decisions.".

One of the most relevant issues with the disclosure of corporate sustainability information, nowadays, is the absence of a single standard adopted by companies. Thanks also to the absence of a precise regulation that obliges enterprises to the publication of precise data through predefined metrics and modalities, companies can voluntarily divulge what they want and "hide" what they prefer not to communicate. Although there are many initiatives aimed at achieving a global standard and one can recognize the GRI as the predominant one, the path still appears to be long. This requires the presence of an external body that certifies a company's efforts toward greater sustainability.
Thanks to rating agencies, it is possible to attain a single metric, which is necessary

in order to be able to compare the work of different companies based on the information they disseminate.
Also, a study conducted by Deloitte in 2022 [57] highlighted the presence of a positive relationship between the ESG score (obtained through rating agencies) and the economic result: an increase of the score over time has generated a significant improvement in the EV/EBITDA ratio.

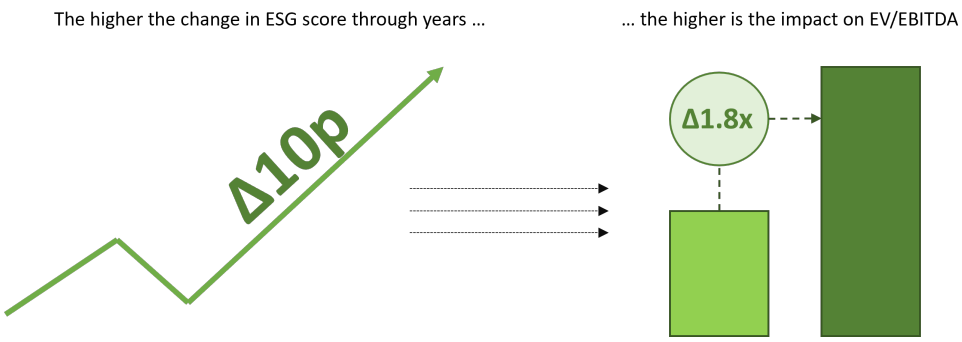


Figure 2.6: Relationship between ESG Score and EV/EBITDA, Deloitte [57]

The research conducted within the scope of this thesis in order to better understand the factors and metrics examined by rating agencies was aimed at determining the market leader.
It should be noted that, unfortunately, as in the case of reporting frameworks, even concerning ESG scores there are many possible options for organizations, and each rating agency has its own scoring methodology.
This partly nullifies the observations on the need for rating caused by stakeholders' difficulty to compare sustainability reports containing non-standardized information, as also the scores obtained would not be unified. However, the assignment of a score by a third party gives the impression of being more impartial and is easier to interpret for stakeholders.
Another study conducted by Deloitte [58] testifies how Morgan Stanley Capital International (MSCI) is the rating agency whose services are most requested by

companies [1]. Therefore, in researching the metrics considered for the assessments, the focus has been on the MSCI methodology.

2.5.1 MSCI

The criteria considered by this organization for the assessment of the sustainability of a company derive from the ESG corporate policies, the programs developed to achieve sustainability goals, and the performance obtained [59].
MSCI determined 35 universal key ESG factors of concern and, starting from an industry-specific analysis, the **material issues** for each firm are identified. These become the basis for the evaluation of the exposure to the pertinent key issue. Each of these could generate, for the business activities, a risk and/or an opportunity.
A material issue gives rise to a (material) risk to the extent that, if an event related to it occurs, a company would necessarily have to face considerable costs associated with it. Similarly, an opportunity is defined as material when it would lead to an increase in revenues or could be exploited for a competitive advantage.
The evaluation of each company belonging to the same market's sustainability starts from a common ground. However, the assessment follows the joint analysis of the sectoral characteristics with the core business of the company and how this can be related to the most important issues for the definition of risks or ESG opportunities for the company. Other key factors considered are, moreover, the geolocation of the operating and productive activities of the analyzed firm, the percentage of production given in outsourcing, and its degree of reliance on contracts with government entities.
Risk exposure is assessed on a decimal scale where '0' corresponds to the absence of risks while '10' equals the maximum level of exposure. Correspondingly for opportunities. Finally, **the company's effort in producing a long-term plan for achieving the sustainability objectives set and the extent to which the path outlined is respected is taken into account**.
The score obtained for each of the key issues is therefore not only derived from the

[1] The results of this study are cited at the end of this text as Appendix A.

exposure to risk/opportunity, but also from the score assigned to the management's ability to control the situation considered and the capabilities to prepare timely sustainability actionable plans.
The goal is an analysis that not only bears in mind the aftermath of the fiscal year at issue for the company [2], but also the **sustainability path** set up by its management, the **deviations** from that and the **long-term objectives** that the company aims to achieve, in accordance with the SDGs.
Firms, at the end of the analysis led by MSCI, acquire an appraisal that goes from AAA (best obtainable value) to CCC (worst judgment). This grade is calculated from the weighted average of the final score achieved for each of the key issues defined, which get then normalized according to the values obtained by other companies operating in the same sector.

2.6 Third party certifications

Another way for organizations to communicate their sustainability is to obtain specific certifications from third parties regarding their compliance with a series of regulations. This practice takes place in many contexts to testify to the adoption of a series of actions to improve and standardize different business and/or operational procedures. An example is the adoption of the ISO 9000 standard, renowned in the field of quality management.
The International Organization for Standardization (ISO), founded in Geneva (Switzerland) in 1947, "with the idea of answering a fundamental question: 'what's the best way of doing this?'" [60], is the best-known body of certifications in this matter.
There are 24498 ISO standards that involve every possible business aspect for companies of any type, sector, and size, and bear the aim of protecting the health of the planet and people in addition to economic gain.

[2] Although there is constant monitoring, MSCI draws up a complete document and its analysis with scores on an annual basis

ISO compliance is achieved when an enterprise respects the organization's guidelines. For such conformity to be recognized it is also necessary to complete a company audit carried out by a certifying body: ISO does not offer such service, which is therefore carried out - for a fee - by third parties.
This is a way **to communicate to stakeholders a certain level of business excellence in the areas for which certification is achieved**. In particular, ISO 14001 and 26000 standards focus on the environmental sustainability and social responsibility of an organization.

Figure 2.7: ISO Certifications Logos

Similarly, Social Accountability International (SAI), a leader in corporate social performance certification, defined the SA 8000 standard at the time of its establishment (1997). In this case too, certification of conformity may be obtained voluntarily through third parties.

Figure 2.8: SA Certification Logo

2.6.1 ISO 14001

This standard indicates the criteria for the development and management of an **Environmental Management System (EMS)**, identifying a framework that allows the company which adopts it to make this system effective [61].
The standard is designed for companies of all types, sizes, and sectors and it is used to ensure internal and external stakeholders that the company's environmental impact is measured and improved.
In particular, the up-to-date version is ISO 14001:2015, a revision made with regard to ISO 14001:2004 to facilitate a greater diffusion of the standard, simplify its language and streamline its adoption. The standard gives an active role to management and its framework is outlined to reduce the negative impacts of business activities, with a focus on risk and opportunity management.
The first clauses define the scope of the standard and the references to better understand it and the terms used in it, while the other sections concern the actual requirements [62]. In total, there are 10 clauses, of which:

- the first three, as mentioned, describe the norm;
- the fourth analyzes the context in which the complying organization operates;
- the fifth defines the requirements regarding the leadership of the EMS of the company and the policy adopted;
- the sixth **focuses on the aspect of planning and control** managed by the organization, following the identification of risks and opportunities and the understanding of how business processes interact with the external environment;
- the seventh concerns the operations in support to the EMS;
- the eighth refers to operational activities and the definition of a response plan to the occurrence of certain environmental emergencies;
- the ninth studies the monitoring and analysis of the performance achieved by the EMS through an internal audit system;

- the tenth indicates the prospects of improvement for the management and treatment of non-conformities.

The advantages that an organization can draw from obtaining such certification are, among others, the reduction of energy consumption, the review of business activities towards greater efficiency, the achievement of insurance policies at more favorable costs, the mitigation of business risks, and the improvement of corporate image.

2.6.2 ISO 26000

The ISO 26000 standard provides guidelines, not requirements; therefore, unlike the previous one, a company cannot achieve a certificate of conformity to it [63]. Its purpose is, after clarifying what is meant by the expression CSR, **helping companies to implement the principles of CSR, identifying best practices, regardless of business activity, size, or geographical location**.
It was defined in 2010 with the help of government agencies, non-profit organizations, industrial companies, consumers, and trade unions from around the world to reach an international consensus. Since then, no changes have been drafted, so we refer to this standard with the expression ISO 2600:2010. The topics addressed in the seven sections of the standard are:

- the scope of use;
- helpful definitions for the terminology used;
- guidelines for understanding social responsibility;
- the core principles of social responsibility;
- a help to recognize the stakeholders;
- a directive for the analysis and study of the key topics of social responsibility;
- a guide for the integration into business activities of the previously identified principles, such as transparency, ethical behavior, respect for human rights

and the environment, community involvement and development into business processes, the ethics of the market, respect for the so-called "rule of law", that is the principle according to which all citizens and organizations operating in a given community must obey the same rules.

2.6.3 SA 8000

The SA8000 standard consists of a set of **rules aimed at the protection of personnel** that falls within the sphere of control and influence of organizations that adopt it through an improvement of working conditions, the promotion of ethical and fair treatment, and the inclusion of international human rights conventions [64].
All employees belonging to every sector and company site are involved in this protection project. The focus here is put on prevention rather than on ex-post action and on "continuous improvement", **defining a framework** (the "Social Responsibility Management System") **within which the organization can manage, plan and monitor the performance** defined through the standard.
The latest version of the standard, internationally recognized, is the one published in 2014 (SA8000:2014) and it is adopted independently by companies that want to stand out for their commitment to sustainable development.
Requirements are defined for child labor, compulsory work, health and safety, freedom of association and the right to collective bargaining, discrimination, disciplinary practices and working time, of remuneration, of the management system [65].
The advantages of obtaining this certification are many, such as the reduction of risks related to safety and health at work, the increase in efficiency, the reduction of costs, the improvement of the company image, and a detailed analysis of the production processes that can lead to their improvement, as well as increasing transparency towards stakeholders. This standard can be fully integrated with ISO standards for quality, environment, CSR, and occupational safety.

Chapter 3

Planning and ESG

A recurring element of the discussion so far conducted, starting from the theories on the future of the triple bottom line developed by Elkington, going through the metrics considered by the agency MSCI [59], reaching the ISO 14001 requirements [61] and the CSDDD ones, is the relationship between ESG and the concept of planning.
In the document "Enter the Triple Bottom Line" [2] previously cited, the British scholar said:

> *"The need to build in a stronger 'long time' dimension to business thinking and planning will become ever-more pressing. The use of scenarios, or alternative visions of the future, is one way in which we can expand our time horizons and spur our creativity."*

Subsequently, many authors addressed the **need to use a long-term approach to sustainability** through the identification of precise achievable objectives and their introduction within a corporate sustainability plan.
Shayan et al. [66], in 2022, stressed that businesses need (and still do not have) a comprehensive framework to develop a balanced and effective strategic approach that will enable them to achieve ESG excellence. They also highlighted how the world in which we live, inhabited by a growing population that is facing increasingly serious climate change, indicates the need of a long-term perspective and the development of a plan to achieve **precise strategic goals**.

Having a plan, however, is not a sufficient prerogative for the researchers: companies have invested in CSR plans for years, but many of these plans have not been systematically defined with a precise and **accurate methodology**, taking into account the impacts that certain decisions could have generated and the levers on which to act.

Already in 2019, Ionica et al. [67] testified to the difficulty of managers in collecting ESG information from large data piles and the **unavailability of specific tools** providing the skills needed to exploit them for decision-making purposes. The suggestion derived from their research was to provide companies with instruments that would not only allow them to understand the value of aggregated indices (such as ESG metrics) but also to strategically plan investments and business activities and identify precise objectives, estimating the deviations from them when actual data becomes available.

We can also cite the studies conducted by Iamandi et al. [68], who analyzed the state of the art among European companies (in 2019) regarding the implementation of ESG initiatives while underlining the unavoidable link between CSR, ESG, and sustainability. The resulting report shows that companies have an absolute need to adopt an approach focused on the specific objectives they want to reach, having limited resources to be allocated to achieve the identified sustainability targets.

From Oprean et al. [69] studies, finally, it appears to be clear that **drafting non-financial statements** is essential for companies to be able to witness to stakeholders the efforts made in environmental, social, and governance areas, but it cannot be an end in itself. The documents that summarize a company's results **can only be the basis** for the decision-making processes and **for the identification of well-defined strategic objectives** and the path to attain them.

The focus, in this case also, is on the need to step away from a vision "limited" to the short term that many companies have because the reality in which they operate is influenced by the past, the present, and the future. They stress that the principle of sustainability is based not only on current benefits but on the long-term sustainability of business operations. This only starts from the previous exploitation of resources but does not stop there, and therefore "**corporate sustainability**"

should integrate environmental and social objectives with financial ones. Starting with non-financial reporting, companies can set goals, analyze results and deviations and implement initiatives to make them more sustainable.

The theme of a long-term approach and the need to identify precise goals at the company level in the ESG field is recurrent in the literature.
It is common sense to ask ourselves, then, what is exactly meant by "planning", "identifying precise objectives", and "analyzing deviations". At a strategic-corporate level, "planning" refers to the set of processes through which a company identifies and defines its objectives and the actions necessary to achieve them, with the result of creating a sort of roadmap to follow.
Generally, the objectives will be measurable by precise KPIs or metrics, so that it is possible to verify the actual (or not) achievements. Planning can take place on different time horizons, but often companies' management identifies medium-long-term target values and then declines them into short-term operational objectives, thus obtaining a greater level of detail. In this way, planning will then give its way to programming.
Finally, there is the notion of "control", through which management can verify how the organization is proceeding toward the objectives previously set and evaluate the deviations from these. 'Variance analysis' (or 'deviations analysis') enables business managers to easily compare and review actual performance versus planned targets to see whether there are any discrepancies (deviations) and why they occur. This process allows the implementation of corrective measures if necessary.
These procedures are part of the broader context of Corporate Performance Management (CPM), which we will focus on in the next chapter.
Returning to the concept of planning, Lewis Carrol, in his famous novel "The Adventures of Alice in Wonderland" [70], said:

"I think I could, if I only knew how to begin."

The words spoken by Alice have been later used as an expedient by many scholars to explain the difficulty experienced by managers in dealing with what is called "corporate planning and management by objectives", witnessed by Haines in the

homonymous publication [71].
Many critiques on the usefulness and effectiveness of strategic planning have been expressed over time. The most renowned in the academic field is certainly the one operated by Mintzberg in 1994 [72], who advocated the uselessness -and the imminent decline- of this practice. He argued that planning (the result of which would be plans generated almost mechanically by the manipulation of numbers) was too often erroneously confused with strategic thinking (made of "visions", interpretation, and managerial acumen). The fallacy of strategic planning was for Mintzberg to be traced in three peculiar traits of it:

- in the formalization of procedures that, especially at the time, could not be supported by advances in science and artificial intelligence;
- in the use of numerical data only, without the interpretation and the "soft-skills" of managers, often guided by more sophisticated, subtle, and subconscious considerations;
- in the impossibility of predicting the future over long periods.

Surely, according to the Canadian scholar's interpretation of the concept of strategic planning, it will never guarantee a company's success. In addition to the necessary clarification on the improvement we have seen in artificial intelligence forecasting in the context of business intelligence, it should be noted that, nowadays, the concept of "strategic planning" is not (and will not be in the course of this analysis) used to indicate procedures of "simple" programming and manipulation of data from standardized business algorithms.
To introduce the meaning with which we refer today to strategic planning, we mention the studies of George et al. [73], who believed that the previously expressed critiques were unfounded. The results of their statistical analyses (based on an econometric technique called regression) suggest that the impact that strategic planning activities have on the performance of both public and private companies is positive and significant. These studies suggest that such initiatives should also be an integral part of the standard procedure in the management of contemporary organizations: the rigorous and formal aspect of the strategic planning process is

crucial to improving business performance.
The three professors stressed, however, that the mere possession of a plan is not enough. Strategic **planning generates a significant result when it is performed starting from the analysis of the environment** outside of the company (market and sector, for example) as well as internally **and when the identification of objectives is based on the results of such research**.
This needs to be the starting point to identify multiple strategies and plans to be implemented and then make the "final decision" in a well-founded and informed manner. This set of procedures (structured, but not standardized) is now incorporated into the concept of corporate "planning".
The strategic planning activities necessary to obtain valuable results mentioned by the scholars are listed in the following graph.

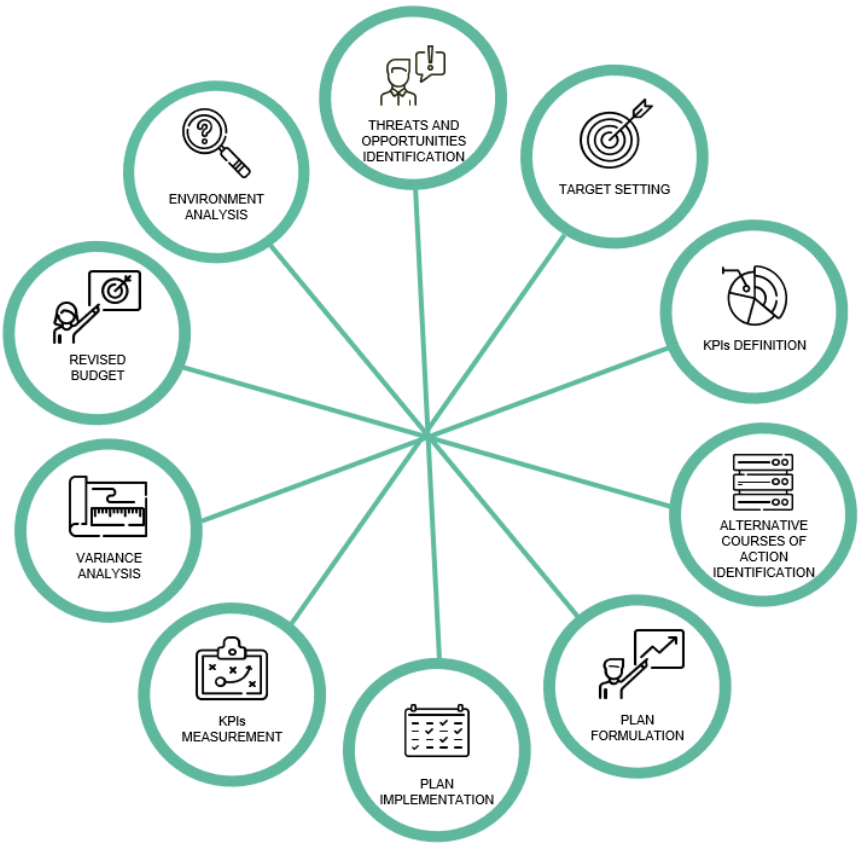


Figure 3.1: Planning Activities

Chapter 4

The case study

This thesis is part of the broader context of an **internship at Mediamente Consulting**, a consulting agency specializing in the management and exploitation of data [74]. Founded as a startup in 2013 and developed within the Incubator of Innovative Enterprises of the Polytechnic of Turin in 2016, it deals with helping medium-sized companies belonging to different industrial sectors: Retail, Food & Beverage, Manufacturing, Fashion, Insurance, Healthcare, E-Commerce, Telco.
Mediamente Consulting belongs to the Sesa S.p.A. group (Italian leader for IT solutions and digital services listed on the Italian stock exchange market) and is part of the Data Science business unit of VarGroup. The company has four operational locations: Milan, Bologna, Empoli, and Turin. It is also divided into five business units, although each area is not tightly separated and, indeed, there is frequent mixing and sharing of knowledge and projects between them. These are Advanced Analytics, Business Intelligence, Data Integration and Management, Technological Infrastructure, and Corporate Performance Management. In particular, the aforementioned internship was as a CPM resource of the Turin office.

4.1 CPM

CPM is a set of knowledge, processes, and methodologies that allow leading back the vision, mission, strategy, and objectives of an organization into its business

activities. These processes result in a continuous cycle between the activities of **Closing** and **Performances Analysis** (definition and analysis of the results of the fiscal year), **Planning** (setting of new objectives and targets - at different levels of detail - for the next periods), and **Scenario Analysis** (through which different possible future scenarios are considered to outline a strategy that can adapt to each of those). Once the path for the achievement of the decided targets has been chosen and when actual data is available, the CPM knowledge allows one to evaluate any deviations, adjusting what was previously planned for the future accordingly. CPM allows monitoring and managing the performance of a business activity, using KPIs to measure it. These KPIs need to be identified according to the objectives previously set.
Another crucial activity is the evaluation of performances finalized to the sharing of the results with stakeholders, which is known as reporting, a time only financial, today necessarily integrated [1].

Two different areas are contained in the CPM scope, so companies like Gartner identify two kinds of it [76]: strategic (relating to the sphere of planning and analytics) and financial (as regards closing activities).
Because the context is broad, companies often use different terms to refer to this same set of tasks: Business Performance Management (BPM), Enterprise Performance Management (EPM), and Financial Performance Management (FPM).
Regardless of the name used, CPM activities are **essential for the success of an organization**: every business aspect must be integrated and considered in the management, analysis, and design of key processes for successful implementation and consistent results.
However, implementing these practices is not easy, not only from the organizational point of view but also, above all, from the economic point of view: they are

[1] The integrated report is a concise communication that illustrates how the strategy, governance, performance and future prospects of an organization allow creating value in the short, medium and long term in the context in which it operates. The integrated financial statements include both economic and financial information (contained in the financial statements) and information on the environmental, and social impacts of the business. [75]

expensive procedures for which it is difficult to find complete knowledge. Very often, therefore, companies rely on third parties such as consulting agencies to get help in this regard. Nevertheless, in this case also, the services are expensive, since they are often designed from scratch for each customer ("ad hoc solutions"). This means that small to medium-sized enterprises generally operate without them, using Excel sheets to gather information and draft balance sheets, but then fail to draw knowledge and define plausible goals, paths to achieve them, and ways to measure their progress.

The CPM team of Mediamente Consulting fits into this context, offering a product composed of different modules: strategic planning, what-if analysis, and closing activities. This solution is accessible for many medium-small businesses, as it has been developed to be universal and applicable in different contexts thanks to the modular structure, which allows organizations to choose what they need, with the possibility of developing ad hoc specific integrations if necessary.

4.2 Mediamente Consulting's ESG solution and IBM Planning Analytics

In recent years, aware of the need for companies to disclose non-financial information and publish a sustainability report, Mediamente Consulting has developed a special module, able to generate dashboards containing graphs, KPIs, and tabular information, as a support for corporate management to gain awareness of the ESG company status and to export this knowledge in the aforementioned integrated financial statements. Moreover, the development of the MVP of the module took place within the thesis journey of a colleague, Simona Cariello, who also set her research in a real case study [45].
Therefore, Mediamente Consulting has been interested in ESG themes for some time and has discussed the topic with companies to design a tool that can help them align with emerging requests from stakeholders.

The solution realized by Mediamente Consulting has been developed with the use of IBM Planning Analytics powered by TM1, a software suite dedicated to CPM solutions and created to facilitate the collaboration between different business actors in planning, budgeting, revision, what-if analysis, balance sheet analysis, and internal reporting activities [77].
The first version of the tool was released in 1983 by Sinper Corporation under the name "TM/1", in which TM would be the acronym for "Table Manager" [78]. Sinper Corporation was then acquired by Applix in 1996, which was later incorporated into Cognos following the 2017 purchase and by IBM shortly after. Applix made TM1 its main product line, becoming the first Online Analytical Processing (OLAP) vendor before the industry took over in 2007. Owned by IBM, TM1 was integrated into the IBM Planning Analytics product, an expanded version containing not only the TM1 Server, essential for data management but also:

- PAW (Planning Analytics Workspace), the main development environment at the front-end and web level;
- PAx, now PAfE (Planning Analytics for Microsoft Excel), main front-end Excel tool;
- TM1 Web & Cube Viewer, legacy web front end;
- TM1 Applications, legacy web front end;
- TM1 Perspectives, legacy Excel front end;
- TM1 Architect, legacy autonomous Windows front-end development environment;
- TM1 Performance Modeler, legacy development environment.

Planning Analytics bases its data structures on those previously developed in TM1 for the management of the same. These are stored in multidimensional OLAP cubes.

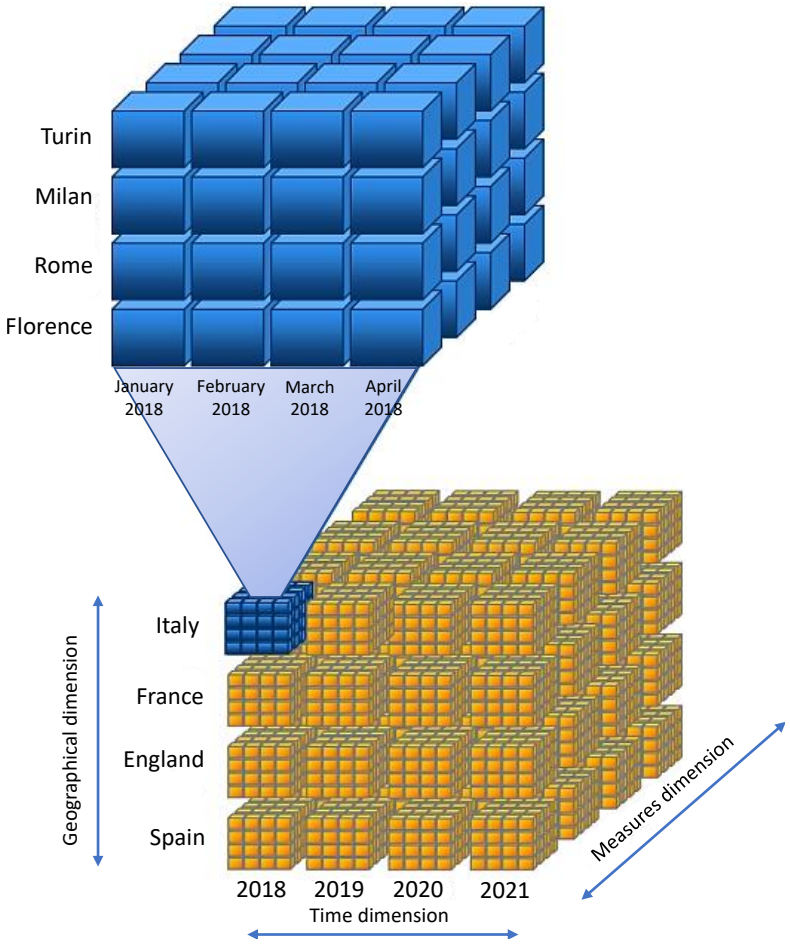


Figure 4.1: Olap Cubes, an example

An OLAP cube is a multidimensional array of data [79], so, regardless of the name "cube", it could have N dimensions, one for each analysis dimension needed by users, such as 'Clients', 'Products', 'Geographical Area', 'Production Plants', 'Year'. Dimensions can be structured with different levels of detail, defined according to users' requirements (at the "leaf" level, or as a "consolidated" aggregate). Hierarchies can also be defined on the dimensions, dividing the data according to the parent-child relational logic.
Cubes are created starting from the dimensions that are inserted in them. These dimensions can be viewed as lists, homogeneous groups according to which organize the data of interest, whose intersections can identify a cube cell.

Cells should then contain a numerical element, which is what business players want to measure (quantity, price, cost, etc.). The sets of information of interest are defined as "measures" and a specific homonymous dimension is dedicated to them. So the actual cell containing the information of interest will be the intersection between multiple dimensions (which will define the scope of the analysis) and the measures dimension.
It is then possible to write rules and calculations to be automatically computed on measures. TM1 also allows automating different procedures thanks to the development of specific code inserted in the so-called "processes".
This instrument lets users extract and integrate data from multiple sources, such as companies' data warehouses, databases, Excel sheets, or other cubes already stored in TM1.

The ESG reporting Minimum Viable Product (MVP) developed by Cairello allows business actors to link information belonging to environmental and social scopes to each other and with financial and operational data, to analyze the ESG company performance and the interdependencies between operational, financial, and sustainability metrics. It is aimed at senior corporate figures such as management control, operational and strategic managers and it is intended to be a support for corporate ESG reporting, collecting data from standardized Excel .csv files.
It permits internal reporting thanks to the use of KPIs selected from the GRI standard requirements. In order to organize data, they are grouped into 8 categories based on different data sources:

- Energy: collects data on the energy produced and consumed by the company ;
- Emissions: concerns greenhouse gas emissions and, in particular, carbon dioxide emissions;
- Fuel: contains data on the different types of fuel used;
- Production: groups the information on the production activity, in case the prototype is used by a production company;
- Waste: concerns the waste produced by the company;

- Water: contains water consumption data;
- Social: collects data on human resources and other social aspects;
- Finance: groups economic and financial data from the income statement and balance sheet documents.

Each data source requires its own cube, which allows the loading of all the needed information (converted thanks to a conversion factor, if needed), into one final cube called 'SUS Sustainability Reporting'. This carries the details then presented to users through a front-end application equipped with reports and intuitive dashboards.

The research that guided the drafting of the current thesis allowed the identification and successful implementation of improvements to this solution, such as the addition of some KPIs required by the GRI standard in the Social and Financial reporting scopes and the design of an English version.

Chapter 5

Overview of the CPM software listed on the market

The current chapter aims to analyze the tools on the market in support of CPM activities, with particular attention to planning, reporting, and performance analysis processes. The purpose of this study is to identify the available features, strengths, and weaknesses of the competing platforms compared to the one currently adopted and offered to customers by Mediamente Consulting's CPM team.
This step is fundamental: the company must **be aware of what is or is not offered on the market**, align with it, **find any gaps, identify emerging trends, and understand whether the choice made in the past is still valid**.
As we know, the solution previously developed for ESG reporting by Mediamente Consulting was realized through the use of IBM Planning Analytics, and the analyses that introduced its design were carried out by only studying the platforms explicitly dedicated to sustainability.
Leaving aside the conclusions drawn from the aforementioned studies, these tools did not allow to go beyond the support to reporting activities. For this reason, identifying a market gap, the analysis was directed towards a wider context, to recognize which tools provided CPM services on the market, to understand if IBM Planning Analytics was still the right one, how it would have been possible to take advantage of its functionalities and bring them in the ESG scope and if any

competitor had already entered the sustainability context.
First, to get an overview of the state-of-the-art, the reports provided by Gartner were analyzed. As anticipated, however, the agency has recently decided to study separately the tools for planning, those for closing and those for analytics (focusing, in particular, on those who work on cloud) [76]. A more "complete" source able to provide a 360-degree analysis is the report published by the Business Application Research Center (BARC) in 2022 [80]. It focuses on integrated planning, reporting, and analysis tools.

5.1 BARC Score

This report assigns a score to vendors starting from the evaluation of software's performances in two areas: the "Portfolio Capabilities" and the "Market Execution". For software suites to be inserted in the report, they must meet two criteria of inclusion: the former requires that planning, budgeting, and reporting are all comprehended in the product offerings and the latter demands that manufacturers have recorded revenues of more than 20 million euros per year with the software analyzed within the European market and at least two other regions between North America, Latin America, and Asia&Pacific.
BARC also highlights the non-discrimination between on-premises and cloud-based software suites, unlike the Gartner framework.
Within the Portfolio Capabilities and the Market Execution multiple factors converge, each of which is entrusted with a different weight for the generation of the final overall score.

5.1.1 Portfolio Capabilities

- Planning and forecasting (weight: high)

  Planning and preparation of a "revised" budget are key activities for business performance and business management. In this case are evaluated the tools directed to the drafting of plans and the analysis of deviations and their

impact on company performance, allowing users to modify the objectives accordingly.

- Ease of use for business users (weight: high)

  It concerns the so-called user-friendliness and user experience of integrated planning and analytics products; for example, graphic design, screen display, development of new content, and the management of different business aspects depending on the departments considered.

- Portfolio evaluation (weight: high)

  It includes the analysis of the portfolio of services offered by each vendor from the perspective of the customer: the functionality of planning, budgeting, forecasting, reporting, analysis, and dashboard creation must be integrated and consistent.

- Ad hoc query and reporting (weight: medium)

  It refers to the satisfaction of the need that many end users have to enjoy an interactive and customizable tool and dashboard generation service.

- Analysis (weight: medium)

  The level of data analysis and the ability to generate new information provided by the product is an important factor for business operators. The performances evaluated here concern data analysis, data integration, and knowledge extraction processes.

- Dashboards (weight: medium)

  This includes the generation of graphic models to visualize the most important KPIs managing to deepen the analysis and get the level of detail desired by users. Such graphical models are not necessarily called by the different

programs with the term "dashboards"; therefore, here are considered also the "scorecards" and the "cockpits".

- Infrastructure evaluation (weight: medium)

  This factor focuses on the infrastructure system that each vendor uses to ensure the proper functioning of their services and the technical models used at the back-end level to manage the large amounts of data available to them. Integration with different data sources and the most commonly used business intelligence platforms, in addition to scalability, technical support, performance optimization techniques, and data processing security guarantee are considered aspects.

- Formatted reporting (weight: low)

  Here is evaluated the management system backing the creation of more or less dynamic reports. This activity may start from a request from users or periodically. These reports, aimed at business players within the company, must be customizable: users need to control where the objects (the graphs previously analyzed) are placed on the screen and choose the formats that best suit them. The emerging trend, apart from this, is the offer of an automatic natural language generation tool, which helps users automatically create a narration for data reporting.

- Advanced and predictive analytics (weight: low)

  This type of data analysis must be carried out in a manner that is not externally conditioned and without any previous hypotheses. The software could offer the use of different patterns to carry on the analysis, such as segmentation, classification or clustering, adopting machine learning techniques, econometrics, neural networks, decision trees, time series and so on. Users need to be well-trained in the conscious use of these methods within the context of trend planning and prediction, but they also need to be able to set their own

predictive algorithms. According to this observation, the performances of the different software are evaluated.

The weights assigned to the different criteria are summarized in the following table.

Portfolio Capabilities Criteria Weights	
Criteria	Weighting
Planning and forecasting	High
Ease of use for business users	High
Portfolio evaluation	High
Ad hoc query and reporting	Medium
Analysis	Medium
Dashboarding	Medium
Infrastructure evaluation	Medium
Formatted reporting	Low
Advanced and predictive analytics	Low

Table 5.1: Portfolio Capabilities Criteria Weights [80]

The Portfolio Capabilities and the related scores assigned to the various software products, weighted as above summarized, constitute the abscissa axis of the final comparative chart, like the following points taken into consideration for the Market Execution, once weighed, will define the position on the ordinate axis.

5.1.2 Market Execution

- Product strategy (weight: high)

  This is characterized as the most important evaluation criterion: manufacturers are examined based on the product development roadmap they have defined, the technical innovation they bring, and the alignment of the company's product portfolio with market trends and demands.

- Customer satisfaction (weight: high)

In this case, the customer satisfaction KPIs obtained from the BARC "The Planning Survey" and "The BI & Analytics Survey" surveys are used to determine a score. This allows us to consider supplier support, programmer support, recommendations, product satisfaction, and value for money. For all manufacturers that provide more than one service, the final mark will be the average customer satisfaction scores for the different products.

- Financials (weight: medium)

  This criterion analyzes the financial status of market companies, from the level of market capitalization, liquidity, EBITDA, and profitability through investments. In the case of private companies or companies without a level of detail in the dissemination of such information by product, estimates shall be used.

- Geographical coverage (weight: medium)

  Suppliers are evaluated based on their presence in international markets, considering the different geographical areas previously identified and the countries in which their business is carried out (in terms of sales, marketing, development, and support functions).

- Ecosystem (weight: medium)

  This criterion focuses on an assessment of the network of partners of the companies analyzed, the hardware or cloud infrastructures they use, the consulting agencies they rely on, and all the factors related to the general context within which they operate.

- Sales Strategy (weight: medium)

  The evaluation of the sales strategy is based on the analysis of the different sales channels used to market their products, through sales teams, distributors, value-added retailers, online channels, the pricing system, the possibility of

purchasing perpetual licenses, and subscriptions to customer support services.

- Organizational strength (weight: medium)

  In this case, the organizational stability of the company, and the consistency of the corporate strategy with the direction defined by the company's leadership are analyzed, also considering the turnover rate and the layoffs.

- Marketing strategy (weight: low)

  The marketing strategy is studied by assigning a score to the level and quality of corporate communication to external stakeholders both for the specific product and for the organization itself, in addition to the presence on traditional media (on paper and through television advertising), on social media and at events, conferences and seminars.

The weights assigned to the criteria are summarized below:

Market Execution Criteria Weights	
Criteria	Weighting
Product strategy	High
Customer satisfaction	High
Financials	Medium
Geographical coverage	Medium
Ecosystem	Medium
Sales strategy	Medium
Organizational strength	Medium
Marketing strategy	Low

Table 5.2: Market Execution Criteria Weights [80]

As anticipated, the score obtained for Market Execution by the evaluated products determines their position on the ordinates axis in the final evaluation chart reported.

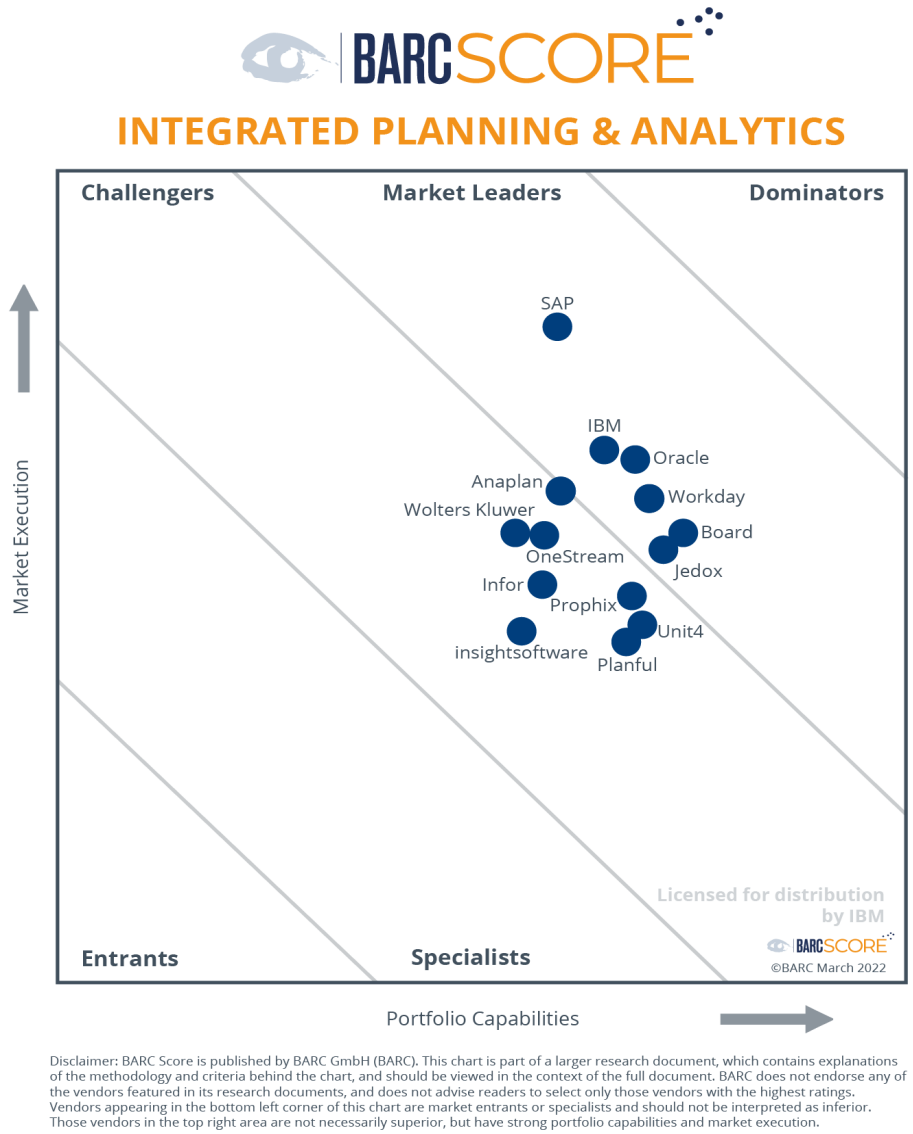


Figure 1: BARC Score Integrated Planning & Analytics (IP&A)

Figure 5.1: 2021 BARC Score for IP&A Software Products [80]

The market leaders thus detected and the software houses identified as major competitors by users verified by Gartner Peer-Insights [81] have become the starting point for the production of more precise research on features and functionalities offered on the market.

5.2 Features on the market

Through the descriptive documentation of the different products, the BARC analyses, and the testimonies of the users cited above precise functionalities to be searched in the suites proposed by vendors have been defined.
In particular, the focus was on checking which and how many CPM activities were supported and managed in the different offers. This type of analysis has been carried out to understand if the use of IBM Planning Analytics was still valid in terms of functionalities, identify which product best met Mediamente Consulting's needs at present, and understand if any competitor had already entered the ESG sector.
The investigation criteria are grouped into six functional macro-categories: closing activities, reporting and performance analysis, planning and forecasting, sustainability and ESG, technical characteristics, and end-user experience. The different features searched belong to one of these categories and are linked to them in the following list, together with an explanatory description.
It is necessary to specify that, for each reported service, the evaluation of a vendor is determined by its presence or absence in the specific product.

5.2.1 Closing activities

- Consolidation: management of the drafting process of consolidated financial statements [1]. The results of the different legal personalities of the group are thus incorporated into a single balance sheet.
- Financial close: the financial close is the process of verifying and adjusting account balances at the end of an accounting cycle [82]. The management of this phase of closing activities coincides with the effective moment in which a company sums up the accounting cycle that just ended and analyzes the course of such period (in financial terms) by drawing up the Balance Sheet and Income Statement.

[1] A financial statement that exposes the financial position and the economic result of a group of companies belonging to a single one, known as the "parent company".

- Transaction matching and account reconciliation: support to the collection, analysis, and verification of correspondences between massive amounts of transactions to identify and resolve potential discrepancies before closing financial books.

5.2.2 Reporting and performance analysis

- Financial reporting: self-service tools that allow different users to transform data and obtain an added value analysis, ensuring consistency of data for annual reports, budget management, and evaluation of operating results.
- Profitability analysis: tool aimed at understanding the ability to generate a profit of the company, its business units, product lines, and accounting markets in which they are inserted.
- Dashboarding and scorecarding: aid in the graphic representation of performances, measured by the most relevant KPIs for business goals.
- Dashboards and graphical layout customizability: possibility to choose, for the end user, the graphical layout of the aforesaid diagrams, the information to visualize and their representation modalities.
- Disclosure management: management of the so-called "last mile of finance", that is the step in which the financial close, the analysis of the variances, and the revised budget are reported to external stakeholders thanks to the possibility of exporting charts and data.
- Compliance regulatory reporting: consistency of the information disclosed with the regulatory requirements and the modalities outlined by legislators.

5.2.3 Planning

- Budget, cash flow and production planning: management of financial and operational planning activities with the possibility to differentiate them based on different functional areas of interest with the desired level of detail.

- Predictive forecasting: presence of a prediction tool based on predictive algorithms.
- CPM forecasting: management of the drafting procedures of a revised budget, in which the necessary corrections are accounted for based on the deviations observed in the portion of the planning period which has already occurred.
- Scenario planning: possibility to develop business plans starting from the identification of different possible scenarios with their estimated impacts and the definition of a strategic solution for each of them; this allows to be effectively reactive to the occurrence of one rather than another scenario.

5.2.4 ESG and sustainability

- ESG reporting: possibility to exploit a non-financial reporting tool that includes social, environmental, and governance aspects.
- Sustainability planning and ESG what-if analysis: presence of a tool that allows the definition of sustainability objectives, the analysis of deviations, and the possibility to carry out a planning scenario in the, ESG context.

5.2.5 Technical features

- Necessity of programming skills to use the tool: a prerequisite for users to have programming skills in order to develop the means to carry on CPM activities previously described with the software.
- Presence of ready-to-use basic modules: in this case, we consider the platforms that provide customers with pre-developed modules (more or less complete and customizable through programming).
- Presence of approval workflows: an approval workflow consists of an automated workflow that includes different tasks, each of which can or must be performed by one or more actors (in this case internal to the company that uses the CPM software). The presence of an approval workflow ensures that there

is a precise and non-modifiable order by which to perform certain actions and, therefore, that users do not "anticipate" their tasks and that only those who can access certain tasks do so, possibly with an administrator user to whom all privileges are granted.

- On cloud: software that users can access via web application, managed by a not on-site server and not installed in the customer's computer machine system.
- On-premises: program installed and managed through local computers owned by the company.
- Works on RAM: all on-premise platforms use RAM storage. This feature is still mentioned as well as the "On-premises" one because this allows us to analyze possible drawbacks. On the one hand, using the RAM helps us obtain a higher speed in the management of certain operations; however, as we all know, RAMs are expensive hardware. Therefore, to ensure the functioning of this type of product in case of operations on a large amount of data a piece of often pricy equipment is needed.
- Possible integration with Word: availability of the opportunity to export graphics and information to Word; as mentioned in the BARC Score, this is often nowadays also linked to the automatic generation of descriptions in natural language.
- Possible integration with PowerPoint: availability of the opportunity to export graphics and information to PowerPoint, similarly to the previous point.
- Possible integration with Excel: possibility to visualize and work on data used and memorized through the software on a better-known framework such as Microsoft Excel, a tool with which many users feel more comfortable, thanks to plug-ins.
- Product modularity: a key factor of a flexible product is its modularity, that is the possibility to choose the tools (modules) needed, creating and customizing the platform to an extent that better aligns with any needs, with the guarantee

of being able to add or remove the standard modules at any time this might be necessary.

5.2.6 End-user experience

- Mobile application: option to access the platform via mobile apps.
- All-in-one decision-making platform: presence of each feature of the software on a single platform, without the need to buy and use different, more or less integrable, ones developed by the same company which will help perform different tasks but are incomplete if taken individually.
- Drag and drop front-end usability: possibility for the end user to work within the platform through simple movements and basic actions to which he is accustomed, such as the "click" on a virtual object on the screen, the dragging and the dropping in the default area of this object, ensuring an intuitive experience and ease of use.

5.2.7 Conclusions of the software selection research

Unfortunately, it is not possible to have a practical first-hand observation of the presence or absence of a certain service in a product without purchasing a license for it. In order to obtain a complete overview, vendors' performance documents and user statements were studied. The results obtained are summarized in the table in Appendix B, in which the symbol "x" represents, at the intersection between software and functionality, the presence of the technical feature in the product offered to the public.
Addressing the analysis of IBM Planning Analytics it is important to remember what was previously explained about the suite. In particular, the fact that it is a "white canvas" capable of handling a large number of features, but only after module and process development by experienced programmers. For this reason, the tool will be assigned an "x" corresponding to the functionalities that can be obtained (and are usually obtained) thanks to the embedded structures and features of the system, not those for which there is a pre-developed module. Mediamente Consulting, for

instance, has developed standard modules for many of these.

The main concern is, in the case analyzed, **the flexibility of the tool**, with the consequent possibility of developing products to offer on the market that best align with the needs of customers in the most universal way possible.
This need becomes even more evident when the ambition is to enter into a field (that of sustainability) in which there is still a market gap where it is necessary to create a solution "from scratch" that can evolve easily over time.
Thanks to the comparative table, **IBM Planning Analytics has been confirmed as the correct tool** with which to continue the improvement and expansion of the ESG solution implemented by Mediamente Consulting with a target definition model and strategic planning through budget and budget review scenarios.
This choice is motivated by the high level of customizability offered by the suite, an essential element to be able to create a new tool not yet on the market [2].

[2] Although an 'x' has been reported in correspondence with the ESG reporting feature and the CCH Tagetik software, the manufacturer only announced the expansion of the platform at the time of this study. It is claimed that this is already part of the offer, however, the extension has been preliminarily developed only for ESG Reporting and not yet for Planning and there is no evidence on actual current use.

Chapter 6

The proposed solution

The studies carried out so far have shown the extreme importance of the use of planning techniques, scenario analysis and budget review for ESG matters. This is supported by the luminary projections of Elkington, the attributes evaluated by sustainability rating businesses, the judgments of consultants and academics, and the statements of CEOs previously cited.
While the previously mentioned IBM research [7] testified to CEOs' interest in sustainability, an article published through the US corporation IBM [83] emphasized the **difficulties of many organizations in implementing sustainable practices due to the absence of tools allowing the organization of the tasks that must be carried out**.
The following processes were identified to make sustainability operational in organizations: **establishing sustainability targets, identifying important KPIs to support ESG objectives, and making sustainability objectives operational**.
It was thus possible to consider the problem as suitable to be addressed in search of a solution.
The current chapter aims to obtain a complete view of the problem and outline the path for the determination of the solution.

6.1 Stakeholder addressal

As said, Mediamente Consulting has dialogued with many business players that have shown in the past to be personally affected by ESG issues, being these central to modern business activities. The figures involved in this conversation held strategic and managerial positions and introduced Mediamente Consulting to corporate ESG managers such as Chief Sustainability Officers. They were interested in the possible expansion of Mediamente Consulting's product portfolio towards sustainability and shared some previous experiences that allowed us to confirm some of the conclusions drawn from the previously described studies, such as the need to turn to ESG rating companies, the attention paid by the latter to the definition of sustainability targets and plans to reach them and the penalty resulting from the lack of corporate efforts in this matter.
The phase of confrontation with stakeholders has been essential for understanding the correct interpretative key of the issues analyzed so far and for the declination of these in different contexts: the organizations contacted belong to many different market sectors. This allowed the problem to be viewed through a wider range of testimonies, with the aim of achieving a more deployable solution.

6.1.1 Sesa S.p.A

Sesa S.p.A., the leader of a group of companies specializing in technological and digital innovation [84], was an extremely interesting interlocutor of this case study. The multiplicity of realities brought together in the group, to which Mediamente Consulting also belongs, has allowed different needs to be taken into account.
In the past, Sesa expressed its interest in the development of an ESG reporting solution, offering to provide data and feedback to Mediamente Consulting and reiterating its willingness to do so in this case as well.
The first comparison with Sesa's Group Sustainability Officer allowed confirming the necessity for businesses to take sustainability into account while strategically planning and the need for a tool designed to help companies in these activities. It was also possible to understand better the ESG planning methodologies of firms: in

this case, the CEO, who has complete knowledge of the business' medium-long term targets, defines a strategic set of sustainability goals that align with them. Then, operating managers decline them into operational goals measured by specific KPIs.

6.2 Solution design

The first step taken for the realization of an MVP was the definition of the perimeter within which the solution should have been inserted. In addition to the aforementioned phase of improvement of the existing ESG reporting solution, the main objective was to create a product that would extend Mediamente Consulting's offer with ESG strategic planning and target definition, KPIs choice, alternative courses of action identification, KPIs measurement, variance analysis, and budget revision. This solution would have allowed managing the first steps of the strategic planning activities previously mentioned (3.1), leaving to future developments the possibility to determine an actionable plan and monitor its implementation and financial implications.
The instrument intended would have allowed to:

- Create new planning scenarios;
- Select the desired KPIs to plan;
- Initialize planning scenarios from desired Actual or Budget data;
- Plan and set annual targets from reference data;
- Compare different Plan scenarios so that users could select the one that best aligns with the company's strategic targets;
- Compare Actual, Plan, Initialization and Reference data;
- Carry out a Revised Budget;
- Create dashboards capable of transmitting the necessary knowledge for decision-making to business managers.

The definition of the **requirement of maximum flexibility and universality**, in order to meet the needs of future users, was critical to the development of the solution.
The first step for implementing an efficient strategic plan is, as mentioned, a study of the environment in which business firms operate in order to identify threats and opportunities and the targets defined by other competitors.
As a result, the integrated sustainability reports of organizations from various market sectors were examined to determine what sustainability targets were set and how these objectives were specified. Moreover, the MSCI requirements, the GRI standards, and the ISO requirements were reviewed in order to identify universal ESG opportunities and threats at present. At the same time, the KPIs suggested to measure progress towards the SDGs were taken into account. This made it possible to define a set of sustainability goals to take into account for the strategic phase of target definition.
The objectives identified were:

- SDG #3: Ensure healthy lives and promote well-being at all ages for all;
- SDG #5: Achieve gender equality and empower all women and girls;
- SDG #8: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all (reduction of the number of injuries);
- SDG #12: Ensure sustainable consumption and production patterns;
- SDG #13: Take urgent action to combat climate change and its impacts (GHG emissions reduction);
- Becoming Net Zero;
- Increasing the use of renewable energy;
- Reduction of electricity consumption;
- Reduction of fossil fuels consumption;

- Reduction of voluntary turnover;
- Reduction of waste volume;
- Reduction in water consumption.

Starting from the macro-categories of the sustainability reporting solution already introduced, the KPIs useful for high-level, strategic ESG planning and target definition that were aligned with the targets tracked were selected. Therefore, the KPIs are in this case a subset of the reporting KPIs.
These are the KPIs that, at first, users will be able to plan. Subsequently, they will be automatically distributed into the lower level KPIs, to align with the reporting metrics and allow for an in-depth, more detailed goal definition that will lead to the design of an actionable plan.
Because the number of planning KPIs is substantially lower than the number of reporting KPIs, the decision was made to assemble them further, while still maintaining the data source scopes, resulting in three groups of indicators: Environmental, Social, and Finance.

The first design necessity was to determine whether the final solution should have allowed target definition through a percentage change with respect to a baseline value or by direct determination of a value in absolute terms, in order to choose and, if necessary, create the most suitable way to manage KPIs at backend level. The election of a single option out of the two would have been dangerous and would have required users to plan with a fixed logic that would not necessarily have been the desired one.
This meant the need to handle the possibility for each metric to be defined according to the methodology preferred by the user.
After analyzing several possible choices to manage this requirement and studying the planning techniques already implemented in Mediamente Consulting's CPM solutions, it was decided that each KPI should have been defined as an absolute value, with the **possibility for users to** choose the baseline scenario required and **plan targets with percentages or absolute values**, memorizing the final target value as a result.

The aim is to provide the possibility of planning through the display of the reference value (initialized from the preferred Actual or Budget scenario), entering the planned absolute value or the desired percentage change, as implemented in paragraph 7.0.3 and in the example below:

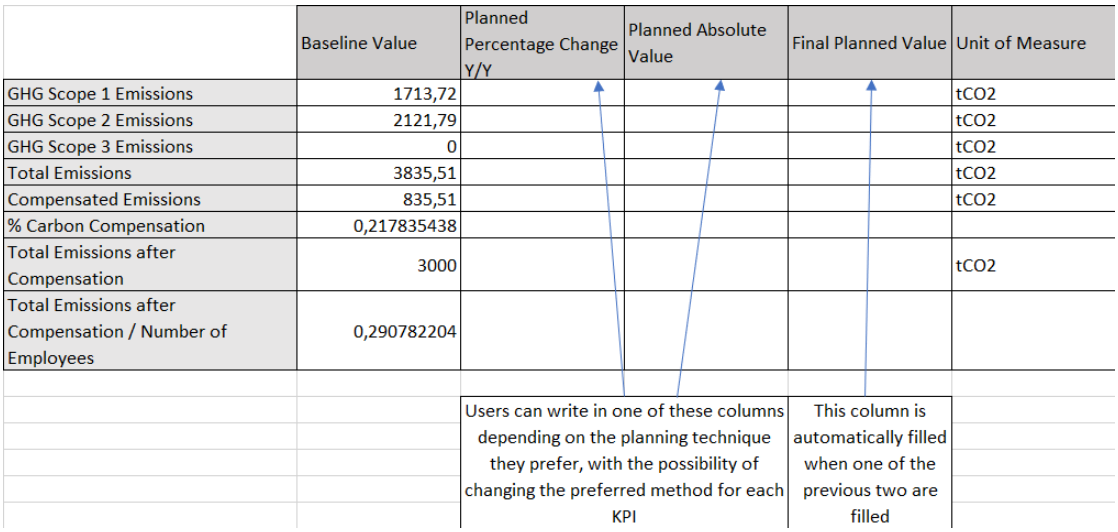


Figure 6.1: Example of the planning methodology designed

The resulting KPIs are presented in Appendix C.

6.3 Realization

After identifying the requirements and the desired characteristics, it was possible to determine the steps needed to implement a prototype of the solution. These are here reported analyzing their purposes, rather than the technical execution aspects, whose specificity and level of detail are beyond the objective of this thesis.

1. Development of the processes for the creation of the KPIs dimension and the related hierarchy starting from the reporting KPIs dimension;
2. Generation of the measures dimension for the current type of analysis;
3. Creation of the Sustainability Planning Cube;

4. Creation of the set-up cube for the storage of the choices made by users about initialization and reference scenarios;
5. Development of the processes for the planning scenario initialization starting from data belonging to a scenario chosen by the user;
6. Generation of dynamic subsets to present users only the KPIs they indicate in the set-up phase;
7. Creation of subsets of the KPIs for the visualization of highlights and for the categorization of indicators into the three new macro-groups introduced (Environmental, Social, and Finance);
8. Development of the rules for the Sustainability Planning Cube to write the Final Target Value starting from the Absolute Planned Value or the % Variation chosen by the user, or, if no choice was made, from the Baseline Value;
9. Development of the processes needed for the memorization of the choices made by users, once confirmed, onto the Sustainability Reporting Cube, to allow the storage in a singular data structure of Actual, Plan, Initialization, Reference and Revised Budget scenarios;
10. Creation of the processes to automatically spread high-level planned values ("consolidated" KPIs in TM1) into lower-level ones ("leaves");
11. Insertion of new rules in the Sustainability Reporting Cube in accordance with the new needs;
12. Creation of the processes for the insertion of values in Reference scenarios, where specified by the user and the initialization of the Revised Budget scenario;
13. Development of the front-end interface, equipped with tables and dashboards for the target definition, the examination of the planning choices made, variance analysis between Actual, Budget, Initialization and Reference scenarios, and the realization of a Revised Budget.

Chapter 7

MVP: Minimum Viable Product

The implementation of the front-end application took place considering, on the one hand, the necessity of guiding users to the correct sequence of planning steps ("workflow") and, on the other, the need to facilitate the extraction of knowledge from summary dashboards.
As previously stated, this prototype is only intended to manage, in its first version, strategic, high-level planning, leaving to future developments the possibility to create timely actionable plans and track their implementation. In this section, we will use the term 'planning' to reference those activities.
The managed planning phases are the ones highlighted in the following graph.

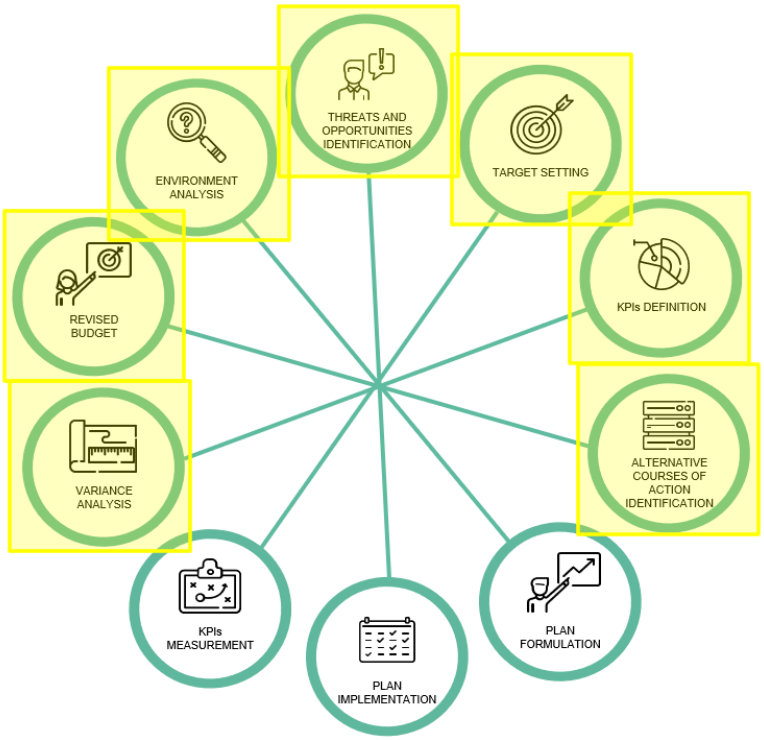


Figure 7.1: Managed Steps

The data used to verify the functioning of the MVP are those provided by Sesa S.p.A., with regard to the initialization of Plan scenarios from Actual evidence. They are fictitious for the remaining part but aligned with the ESG choices and trends presented in the sustainability reports of other global companies studied such as Apple, Campari, and Unicredit.
The steps supported by the tool are listed in the next page as presented to users:

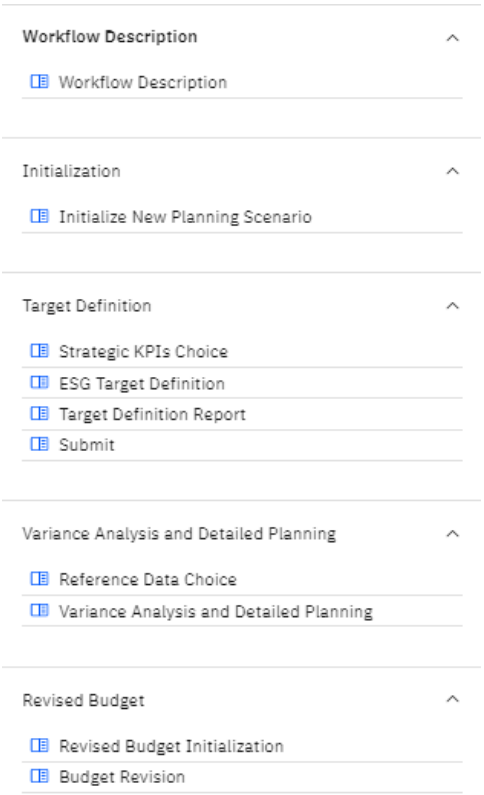


Figure 7.2: Steps supported by the ESG Planning MVP

A workflow explanation chart is also proposed as the first page of the application:

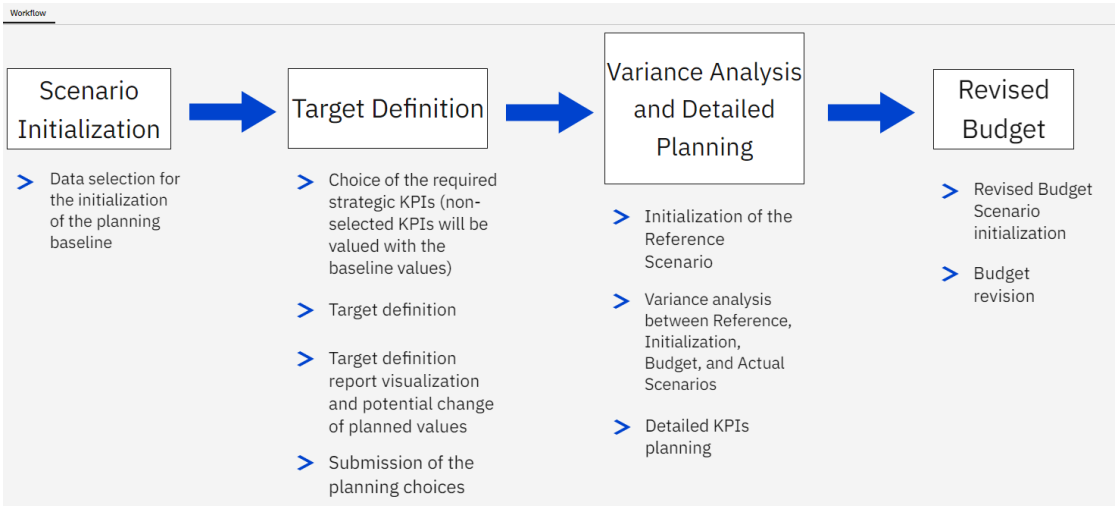


Figure 7.3: Workflow analysis

The following paragraphs carry screenshots of each step, together with an explanatory description of its functionalities.

7.0.1 Initialize New Planning Scenario

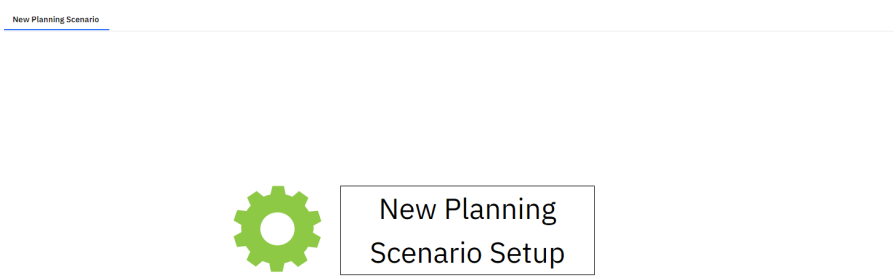
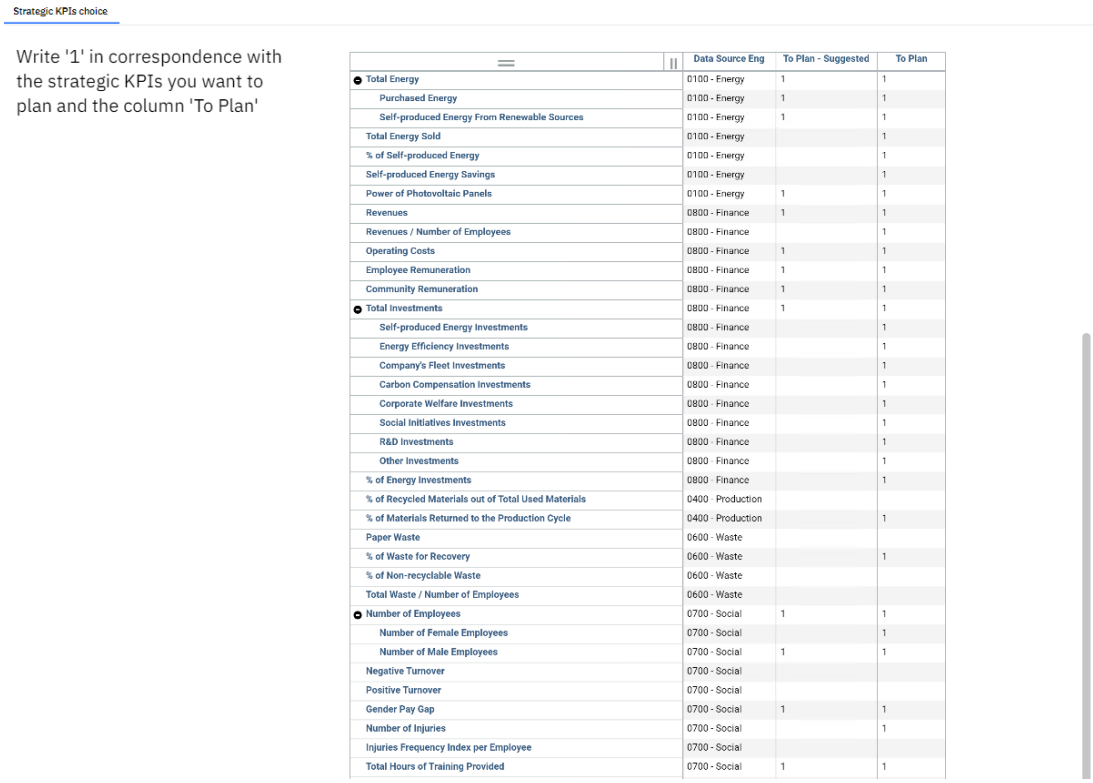


Figure 7.4: Planning Scenario initialization

After clicking on the button 'New Planning Scenario Setup', users are presented with a drop-down menu to select the required planning year to initialize and the reference year to use as a baseline. Actual data from the chosen year will then be copied into the 'Baseline' value of the planning scenario selected.

7.0.2 KPIs Choice

In this phase, users are presented with a table that allows them to choose a subset of the available strategic planning KPIs. They can write '1' in correspondence with the desired KPI and the column 'To Plan' or, to remove it from the subset, they can delete the number. The corresponding data source is displayed for each KPI, and a column named 'To Plan – Suggested' is added to the table to display a recommended basic selection of KPIs. The suggested KPIs selection is also the default initial choice.



	Data Source Eng	To Plan - Suggested	To Plan
Total Energy	0100 - Energy	1	1
Purchased Energy	0100 - Energy	1	1
Self-produced Energy From Renewable Sources	0100 - Energy	1	1
Total Energy Sold	0100 - Energy		1
% of Self-produced Energy	0100 - Energy		1
Self-produced Energy Savings	0100 - Energy		1
Power of Photovoltaic Panels	0100 - Energy	1	1
Revenues	0800 - Finance	1	1
Revenues / Number of Employees	0800 - Finance		1
Operating Costs	0800 - Finance	1	1
Employee Remuneration	0800 - Finance	1	1
Community Remuneration	0800 - Finance	1	1
Total Investments	0800 - Finance	1	1
Self-produced Energy Investments	0800 - Finance		1
Energy Efficiency Investments	0800 - Finance		1
Company's Fleet Investments	0800 - Finance		1
Carbon Compensation Investments	0800 - Finance		1
Corporate Welfare Investments	0800 - Finance		1
Social Initiatives Investments	0800 - Finance		1
R&D Investments	0800 - Finance		1
Other Investments	0800 - Finance		1
% of Energy Investments	0800 - Finance		1
% of Recycled Materials out of Total Used Materials	0400 - Production		
% of Materials Returned to the Production Cycle	0400 - Production		1
Paper Waste	0600 - Waste		
% of Waste for Recovery	0600 - Waste		1
% of Non-recyclable Waste	0600 - Waste		
Total Waste / Number of Employees	0600 - Waste		
Number of Employees	0700 - Social	1	1
Number of Female Employees	0700 - Social		1
Number of Male Employees	0700 - Social	1	1
Negative Turnover	0700 - Social		
Positive Turnover	0700 - Social		
Gender Pay Gap	0700 - Social	1	1
Number of Injuries	0700 - Social		1
Injuries Frequency Index per Employee	0700 - Social		
Total Hours of Training Provided	0700 - Social	1	1

Figure 7.5: Strategic KPIs choice

7.0.3 ESG Target Definition

After selecting the KPIs, users can access the actual Target Definition phase.
Four tabs are available: one for environmental KPIs, one for social ones, one for financial values such as value distribution and investments, plus a summary of all KPIs. The points of interest of these sheets are the tables, which allow entering the desired values in correspondence of the columns 'Planned % Change vs Baseline' or 'Planned Absolute Value'. These columns represent the implementation of the possibility for users to plan targets with absolute values or percentage changes previously introduced (6.1). If users insert a value in both columns for the same KPI, the Planned Absolute Value will prevail, and it will be inserted in the 'Final Planned Value' column. The same column will be initialized with the Baseline value so that it will still be valued whenever a KPI isn't planned.
Summarizing graphs that allow users to visually interpret the variations and the

choices as they are made are presented in the first three tabs.
Filters are inserted at the top-left corner of each page so that users can choose the required scenario (from the ones already initialized) or a subset of KPIs for a "lighter" visualization, such as only the ones concerning Emissions within the Environmental page.
Similar filters will also be inserted in the following sets of dashboards.

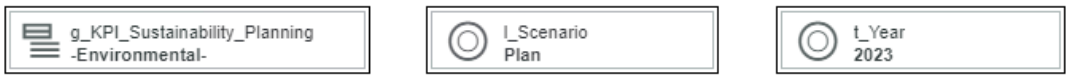
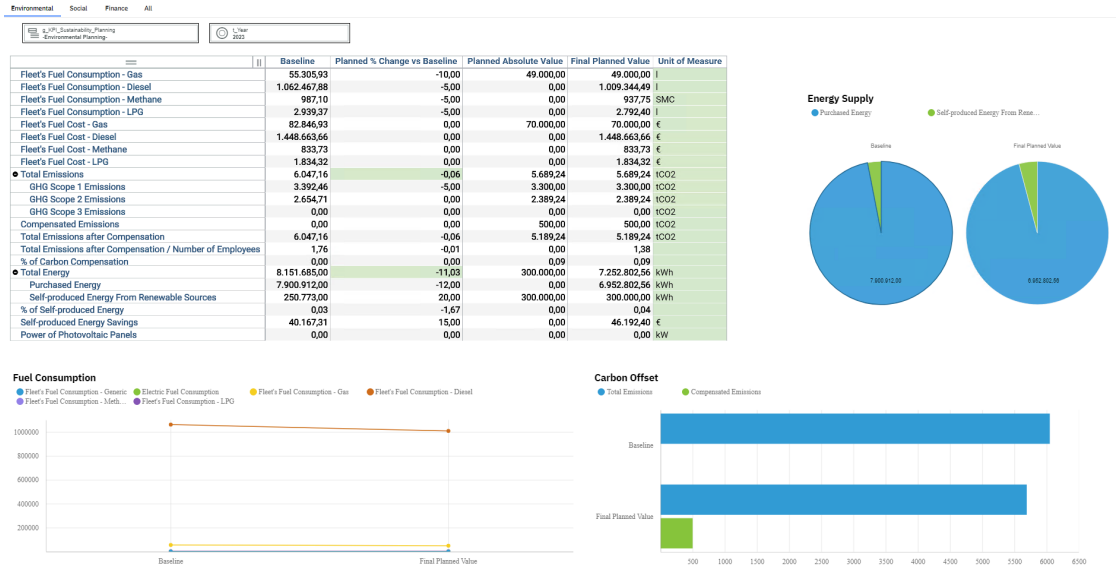
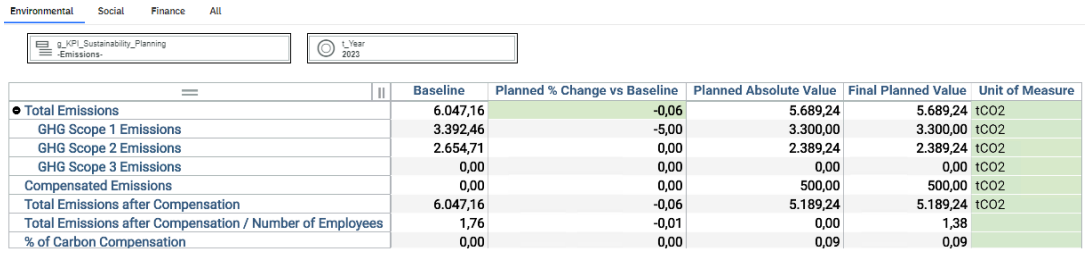


Figure 7.6: Filters - an example



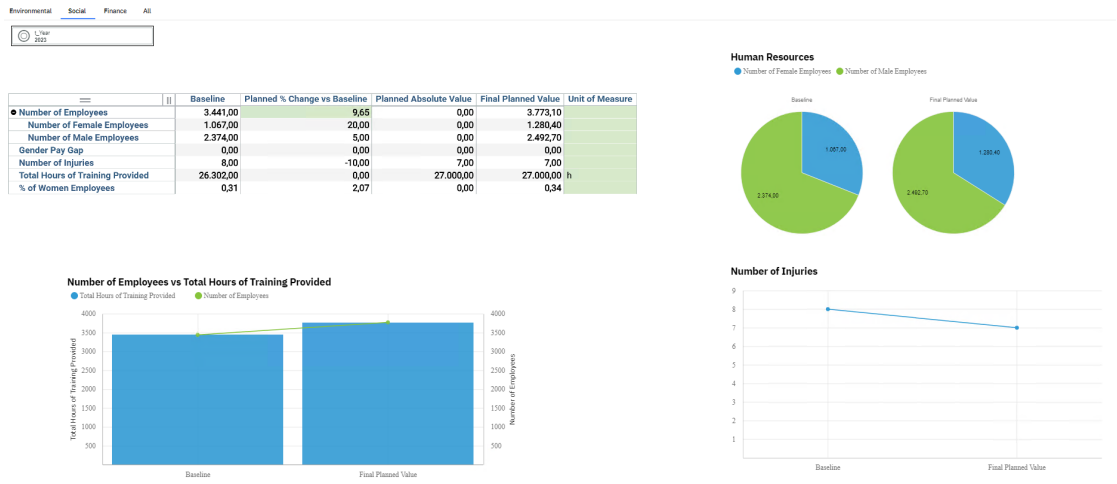
	Baseline	Planned % Change vs Baseline	Planned Absolute Value	Final Planned Value	Unit of Measure
Fleet's Fuel Consumption - Gas	55.305,93	-10,00	49.000,00	49.000,00	l
Fleet's Fuel Consumption - Diesel	1.062.467,88	-5,00	0,00	1.009.344,49	l
Fleet's Fuel Consumption - Methane	987,10	-5,00	0,00	937,75	SMC
Fleet's Fuel Consumption - LPG	2.939,37	-5,00	0,00	2.792,40	l
Fleet's Fuel Cost - Gas	82.846,93	0,00	70.000,00	70.000,00	€
Fleet's Fuel Cost - Diesel	1.448.663,66	0,00	0,00	1.448.663,66	€
Fleet's Fuel Cost - Methane	833,73	0,00	0,00	833,73	€
Fleet's Fuel Cost - LPG	1.834,32	0,00	0,00	1.834,32	€
Total Emissions	6.047,16	-0,06	5.689,24	5.689,24	tCO2
GHG Scope 1 Emissions	3.392,46	-5,00	3.300,00	3.300,00	tCO2
GHG Scope 2 Emissions	2.654,71	0,00	2.389,24	2.389,24	tCO2
GHG Scope 3 Emissions	0,00	0,00	0,00	0,00	tCO2
Compensated Emissions	0,00	0,00	500,00	500,00	tCO2
Total Emissions after Compensation	6.047,16	-0,06	5.189,24	5.189,24	tCO2
Total Emissions after Compensation / Number of Employees	1,76	-0,01	0,00	1,38	
% of Carbon Compensation	0,00	0,00	0,09	0,09	
Total Energy	8.151.685,00	-11,03	300.000,00	7.252.802,56	kWh
Purchased Energy	7.900.912,00	-12,00	0,00	6.952.802,56	kWh
Self-produced Energy From Renewable Sources	250.773,00	20,00	300.000,00	300.000,00	kWh
% of Self-produced Energy	0,03	-1,67	0,00	0,04	
Self-produced Energy Savings	40.167,31	15,00	0,00	46.192,40	€
Power of Photovoltaic Panels	0,00	0,00	0,00	0,00	kW

Figure 7.7: ESG Target Definition - Environmental



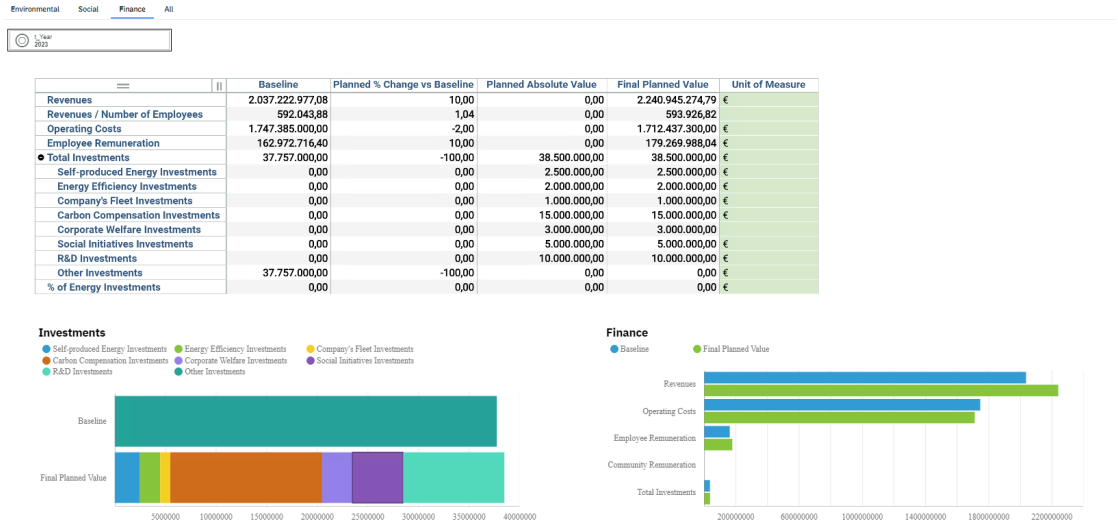
	Baseline	Planned % Change vs Baseline	Planned Absolute Value	Final Planned Value	Unit of Measure
Total Emissions	6.047,16	-0,06	5.689,24	5.689,24	tCO2
GHG Scope 1 Emissions	3.392,46	-5,00	3.300,00	3.300,00	tCO2
GHG Scope 2 Emissions	2.654,71	0,00	2.389,24	2.389,24	tCO2
GHG Scope 3 Emissions	0,00	0,00	0,00	0,00	tCO2
Compensated Emissions	0,00	0,00	500,00	500,00	tCO2
Total Emissions after Compensation	6.047,16	-0,06	5.189,24	5.189,24	tCO2
Total Emissions after Compensation / Number of Employees	1,76	-0,01	0,00	1,38	
% of Carbon Compensation	0,00	0,00	0,09	0,09	

Figure 7.8: Environmental table when a KPIs subset is chosen - Emissions



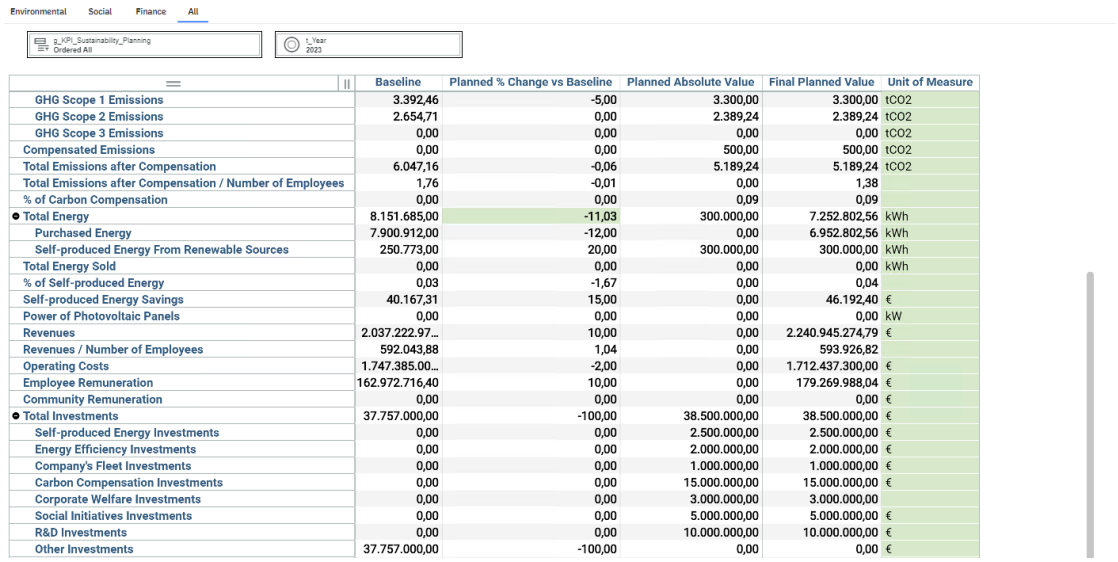
	Baseline	Planned % Change vs Baseline	Planned Absolute Value	Final Planned Value	Unit of Measure
Number of Employees	3.441,00	9,65	0,00	3.773,10	
Number of Female Employees	1.067,00	20,00	0,00	1.280,40	
Number of Male Employees	2.374,00	5,00	0,00	2.492,70	
Gender Pay Gap	0,00	0,00	0,00	0,00	
Number of Injuries	8,00	-10,00	7,00	7,00	
Total Hours of Training Provided	26.302,00	0,00	27.000,00	27.000,00	h
% of Women Employees	0,31	2,07	0,00	0,34	

Figure 7.9: ESG Target Definition - Social



	Baseline	Planned % Change vs Baseline	Planned Absolute Value	Final Planned Value	Unit of Measure
Revenues	2.037.222.977,08	10,00	0,00	2.240.945.274,79	€
Revenues / Number of Employees	592.043,88	1,04	0,00	593.926,82	
Operating Costs	1.747.385.000,00	-2,00	0,00	1.712.437.300,00	€
Employee Remuneration	162.972.716,40	10,00	0,00	179.269.988,04	€
Total Investments	37.757.000,00	-100,00	38.500.000,00	38.500.000,00	€
Self-produced Energy Investments	0,00	0,00	2.500.000,00	2.500.000,00	€
Energy Efficiency Investments	0,00	0,00	2.000.000,00	2.000.000,00	€
Company's Fleet Investments	0,00	0,00	1.000.000,00	1.000.000,00	€
Carbon Compensation Investments	0,00	0,00	15.000.000,00	15.000.000,00	€
Corporate Welfare Investments	0,00	0,00	3.000.000,00	3.000.000,00	
Social Initiatives Investments	0,00	0,00	5.000.000,00	5.000.000,00	€
R&D Investments	0,00	0,00	10.000.000,00	10.000.000,00	€
Other Investments	37.757.000,00	-100,00	0,00	0,00	€
% of Energy Investments	0,00	0,00	0,00	0,00	€

Figure 7.10: ESG Target Definition - Finance



	Baseline	Planned % Change vs Baseline	Planned Absolute Value	Final Planned Value	Unit of Measure
GHG Scope 1 Emissions	3.392,46	-5,00	3.300,00	3.300,00	tCO2
GHG Scope 2 Emissions	2.654,71	0,00	2.389,24	2.389,24	tCO2
GHG Scope 3 Emissions	0,00	0,00	0,00	0,00	tCO2
Compensated Emissions	0,00	0,00	500,00	500,00	tCO2
Total Emissions after Compensation	6.047,16	-0,06	5.189,24	5.189,24	tCO2
Total Emissions after Compensation / Number of Employees	1,76	-0,01	0,00	1,38	
% of Carbon Compensation	0,00	0,00	0,09	0,09	
Total Energy	8.151.685,00	-11,03	300.000,00	7.252.802,56	kWh
Purchased Energy	7.900.912,00	-12,00	0,00	6.952.802,56	kWh
Self-produced Energy From Renewable Sources	250.773,00	20,00	300.000,00	300.000,00	kWh
Total Energy Sold	0,00	0,00	0,00	0,00	kWh
% of Self-produced Energy	0,03	-1,67	0,00	0,04	
Self-produced Energy Savings	40.167,31	15,00	0,00	46.192,40	€
Power of Photovoltaic Panels	0,00	0,00	0,00	0,00	kW
Revenues	2.037.222.97...	10,00	0,00	2.240.945.274,79	€
Revenues / Number of Employees	592.043,88	1,04	0,00	593.926,82	
Operating Costs	1.747.385.00...	-2,00	0,00	1.712.437.300,00	€
Employee Remuneration	162.972.716,40	10,00	0,00	179.269.988,04	€
Community Remuneration	0,00	0,00	0,00	0,00	€
Total Investments	37.757.000,00	-100,00	38.500.000,00	38.500.000,00	€
Self-produced Energy Investments	0,00	0,00	2.500.000,00	2.500.000,00	€
Energy Efficiency Investments	0,00	0,00	2.000.000,00	2.000.000,00	€
Company's Fleet Investments	0,00	0,00	1.000.000,00	1.000.000,00	€
Carbon Compensation Investments	0,00	0,00	15.000.000,00	15.000.000,00	€
Corporate Welfare Investments	0,00	0,00	3.000.000,00	3.000.000,00	
Social Initiatives Investments	0,00	0,00	5.000.000,00	5.000.000,00	€
R&D Investments	0,00	0,00	10.000.000,00	10.000.000,00	€
Other Investments	37.757.000,00	-100,00	0,00	0,00	€

Figure 7.11: ESG Target Definition - All

7.0.4 Target Definition Report

After defining strategic targets, users can view a section dedicated to summarizing and analyzing the choices made, to gain a greater understanding of the targets defined, verify that they are in line with the long-term objectives, and analyze the

variance between Baseline and Plan.
In this case, data are presented in three different ways:

- A series of KPIs that allow acquiring immediate awareness of the most important data; in particular, for each KPI, the planned target value and the percentage change calculated between Baseline and Final Planned Value (the target) are shown;
- Graphs that allow a faster investigation of information (thanks to the marked impact of visual components) and correlate different scopes of analysis;
- Tables containing the measures of interest for each KPI of the dashboard that allow for a more detailed examination.

This dashboard contains four sheets: the first one allows users to obtain a concise analysis of the corporate sustainability objectives, while each of the last three focus on a particular area of KPIs.

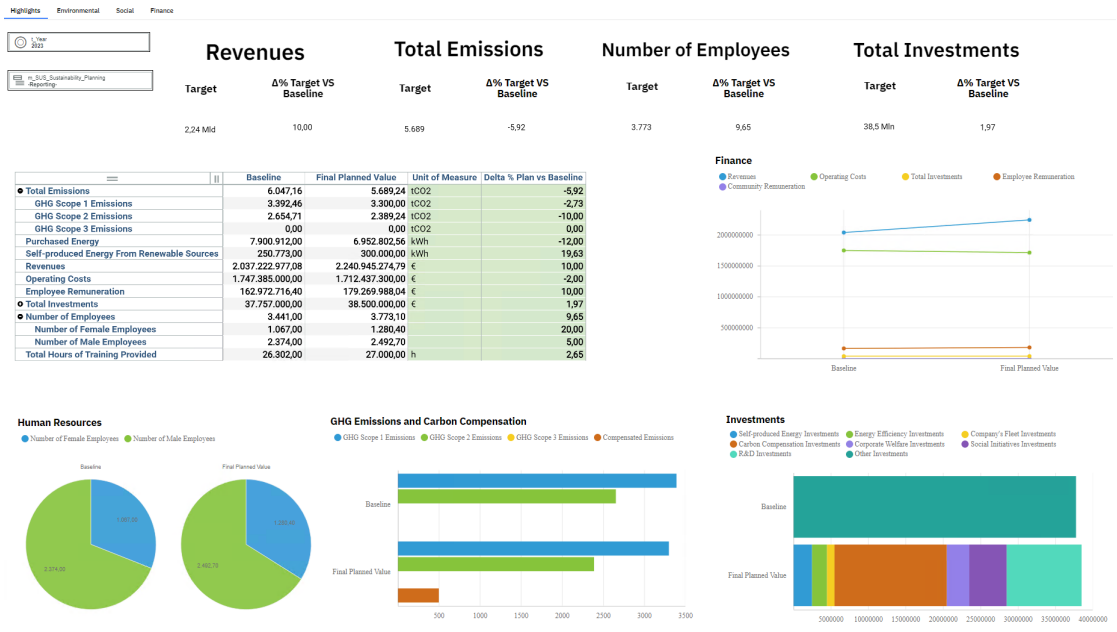
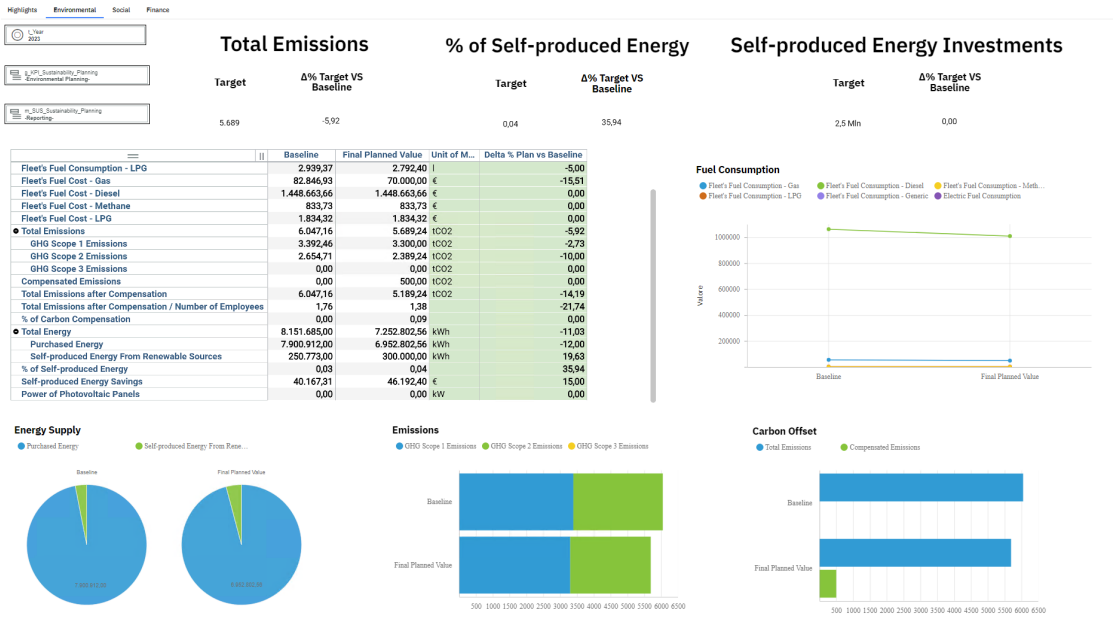
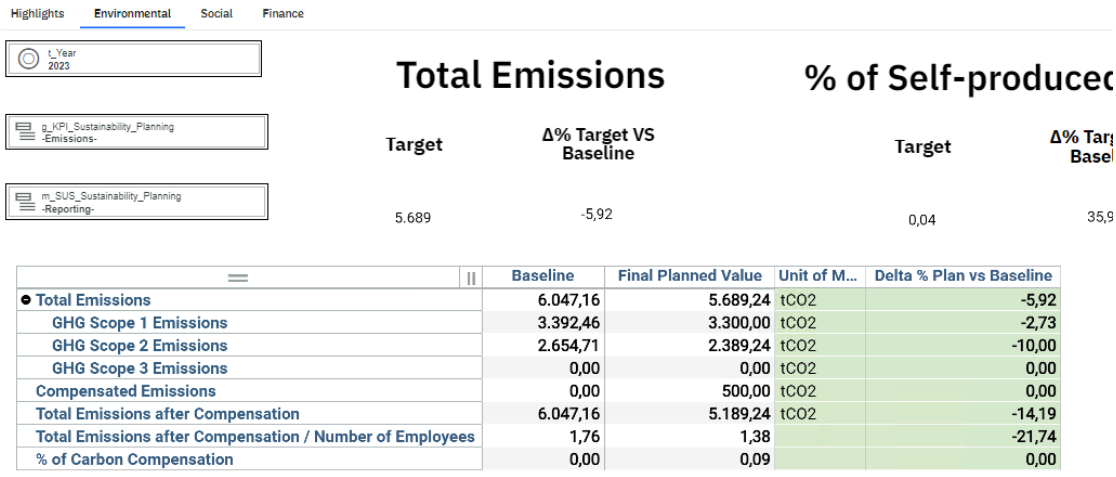


Figure 7.12: ESG Targets Report - Highlights



	Baseline	Final Planned Value	Unit of M...	Delta % Plan vs Baseline
Fleet's Fuel Consumption - LPG	2.939,37	2.792,40	l	-5,00
Fleet's Fuel Cost - Gas	82.846,93	70.000,00	€	-15,51
Fleet's Fuel Cost - Diesel	1.448.663,66	1.448.663,66	€	0,00
Fleet's Fuel Cost - Methane	833,73	833,73	€	0,00
Fleet's Fuel Cost - LPG	1.834,32	1.834,32	€	0,00
Total Emissions	6.047,16	5.689,24	tCO2	-5,92
GHG Scope 1 Emissions	3.392,46	3.300,00	tCO2	-2,73
GHG Scope 2 Emissions	2.654,71	2.389,24	tCO2	-10,00
GHG Scope 3 Emissions	0,00	0,00	tCO2	0,00
Compensated Emissions	0,00	500,00	tCO2	0,00
Total Emissions after Compensation	6.047,16	5.189,24	tCO2	-14,19
Total Emissions after Compensation / Number of Employees	1,76	1,38		-21,74
% of Carbon Compensation	0,00	0,09		0,00
Total Energy	8.151.685,00	7.252.802,56	kWh	-11,03
Purchased Energy	7.900.912,00	6.952.802,56	kWh	-12,00
Self-produced Energy From Renewable Sources	250.773,00	300.000,00	kWh	19,63
% of Self-produced Energy	0,03	0,04		35,94
Self-produced Energy Savings	40.167,31	46.192,40	€	15,00
Power of Photovoltaic Panels	0,00	0,00	kW	0,00

Figure 7.13: ESG Targets Report - Environmental



	Baseline	Final Planned Value	Unit of M...	Delta % Plan vs Baseline
Total Emissions	6.047,16	5.689,24	tCO2	-5,92
GHG Scope 1 Emissions	3.392,46	3.300,00	tCO2	-2,73
GHG Scope 2 Emissions	2.654,71	2.389,24	tCO2	-10,00
GHG Scope 3 Emissions	0,00	0,00	tCO2	0,00
Compensated Emissions	0,00	500,00	tCO2	0,00
Total Emissions after Compensation	6.047,16	5.189,24	tCO2	-14,19
Total Emissions after Compensation / Number of Employees	1,76	1,38		-21,74
% of Carbon Compensation	0,00	0,09		0,00

Figure 7.14: ESG Targets Report table when a KPIs subset is chosen - Emissions

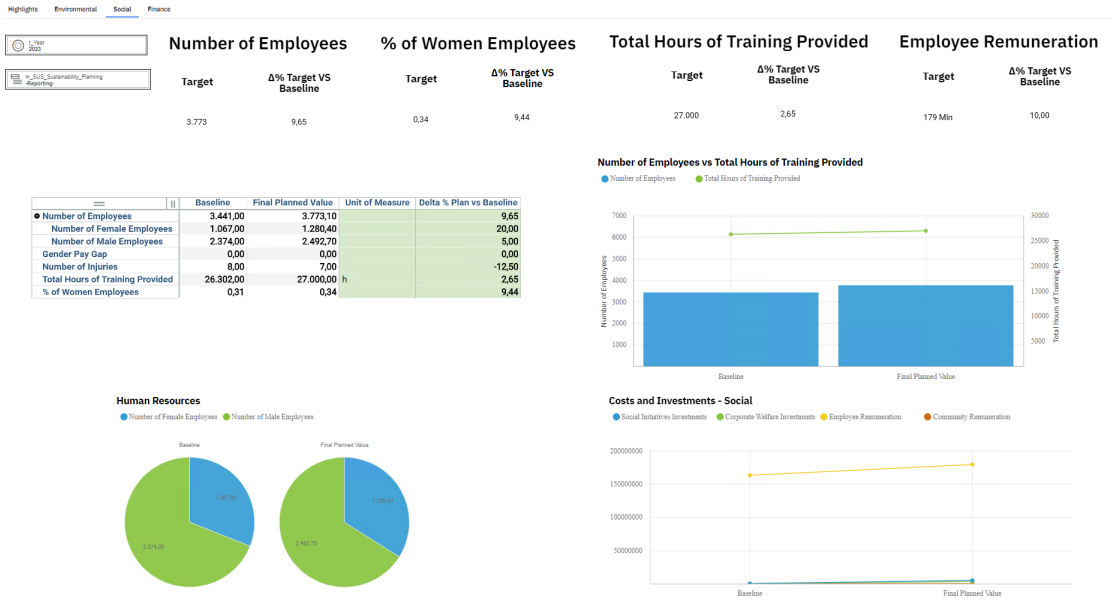


Figure 7.15: ESG Targets Report - Social

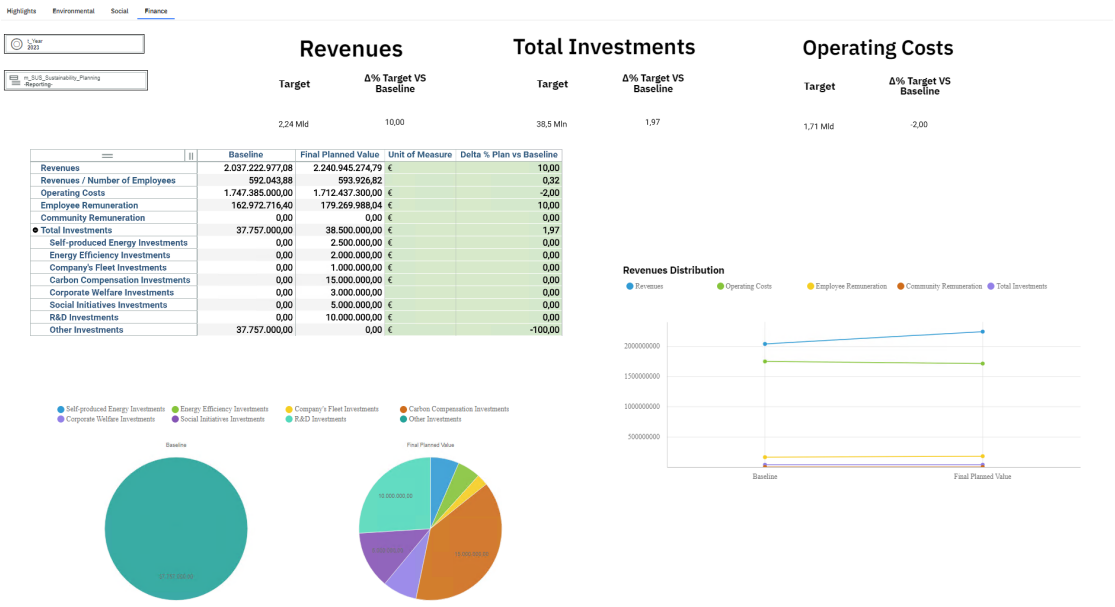
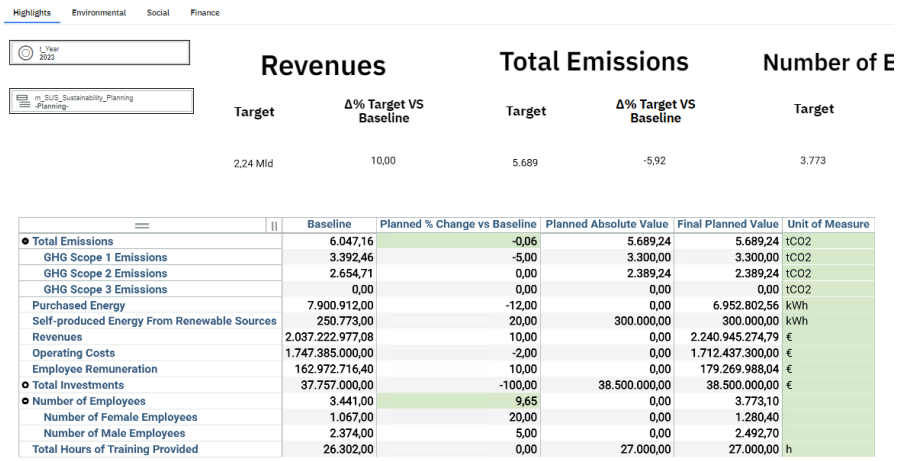


Figure 7.16: ESG Targets Report - Finance

If following this analysis any value needs to be modified, it is possible for users to do that within the same page, without having to go back to any previous step by

selecting '-Planning-' instead of '-Reporting-' through the filters:



	Baseline	Planned % Change vs Baseline	Planned Absolute Value	Final Planned Value	Unit of Measure
Total Emissions	6.047,16	-0,06	5.689,24	5.689,24	tCO2
GHG Scope 1 Emissions	3.392,46	-5,00	3.300,00	3.300,00	tCO2
GHG Scope 2 Emissions	2.654,71	0,00	2.389,24	2.389,24	tCO2
GHG Scope 3 Emissions	0,00	0,00	0,00	0,00	tCO2
Purchased Energy	7.900.912,00	-12,00	0,00	6.952.802,56	kWh
Self-produced Energy From Renewable Sources	250.773,00	20,00	300.000,00	300.000,00	kWh
Revenues	2.037.222.977,08	10,00	0,00	2.240.945.274,79	€
Operating Costs	1.747.385.000,00	-2,00	0,00	1.712.437.300,00	€
Employee Remuneration	162.972.716,40	10,00	0,00	179.269.988,04	€
Total Investments	37.757.000,00	-100,00	38.500.000,00	38.500.000,00	€
Number of Employees	3.441,00	9,65	0,00	3.773,10	
Number of Female Employees	1.067,00	20,00	0,00	1.280,40	
Number of Male Employees	2.374,00	5,00	0,00	2.492,70	
Total Hours of Training Provided	26.302,00	0,00	27.000,00	27.000,00	h

Figure 7.17: ESG Target Definition through the Target Report - an example

7.0.5 Submit

At this stage, after analyzing and reviewing the choices made, users can confirm them and access the next phase of Variance Analysis by loading data in a single cube containing Actual, Budget, Reference, and Initialization scenarios.
By submitting the strategic target, aggregate-level, KPIs, they will be automatically spread into more detailed, leaf-level, ones for the next steps.

Figure 7.18: Strategic ESG choices submission

7.0.6 Reference data choice

Through this page, users can load data into a reference scenario (to use them in the Variance Analysis phase) by selecting it from a drop-down menu.

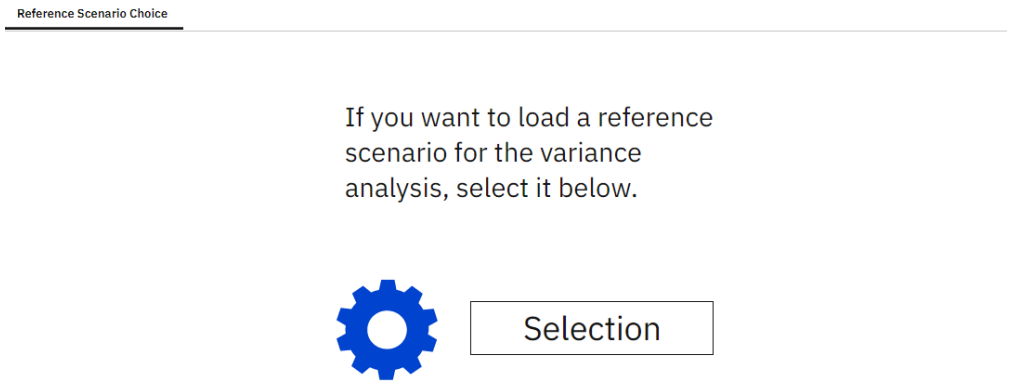
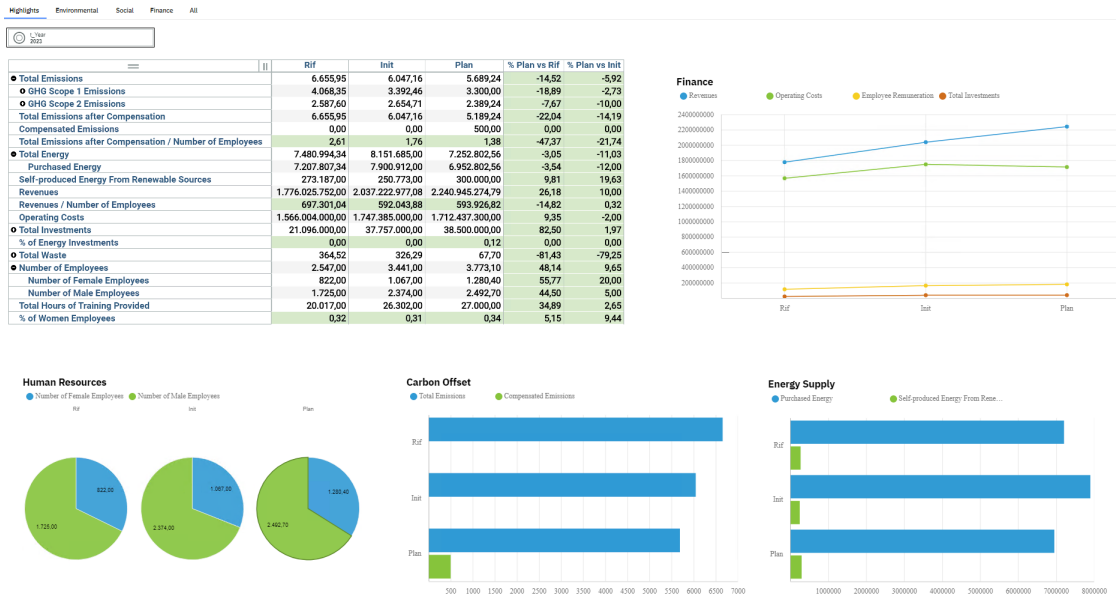


Figure 7.19: Reference data selection

7.0.7 Variance Analysis

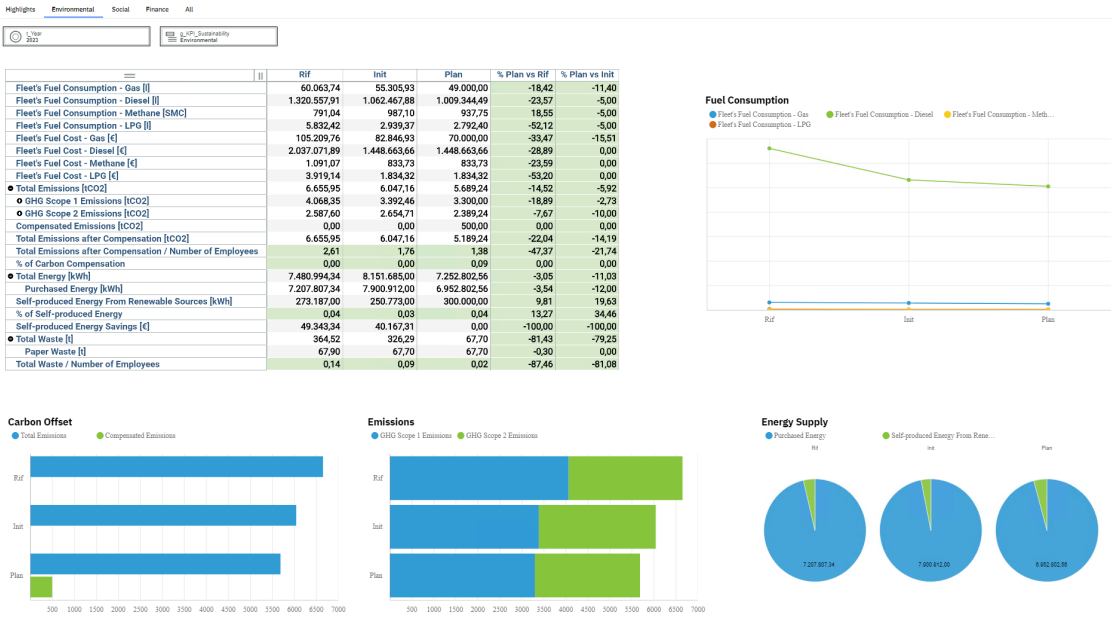
Variance Analysis indicates the "study of deviations of actual behavior versus forecasted or planned behavior in budgeting or management accounting" [85].
This step is essential to compare target and budgeted data with actual data (when available) and, in doing so, to understand what did not go as expected and why.
Also, it is possible to set side by side, for the same year, Plan, Reference, and Initialization scenarios to analyze further differences. This phase also permits understanding whether any changes need to be implemented before creating an operational plan, changing target values, and defining objectives at a higher level of detail.
Data is, in this case, presented within tables and graphs. The former offer numerical information, analyzed with percentages to understand exact variations between scenario types, while the latter display data visually, which helps users appreciate trends in a more immediate way.
Five tabs are inserted within this page. The first one presents highlights of the Variance Analysis with the most relevant sustainability strategic KPIs. The following three examine in a thorough manner the metrics of each macro-category. All of these tabs contain tables and graphs with the purposes previously analyzed.

Finally, the last tab contains a table summarizing each metric with its variance analysis numerically.
In this phase, the values previously inserted for the targets are spread into more detailed KPIs for an in-depth analysis but can still be modified.



	Rif	Init	Plan	% Plan vs Rif	% Plan vs Init
Total Emissions	6.655,95	6.047,16	5.689,24	-14,52	-5,92
GHG Scope 1 Emissions	4.068,35	3.392,46	3.300,00	-18,89	-2,73
GHG Scope 2 Emissions	2.587,60	2.654,71	2.389,24	-7,67	-10,00
Total Emissions after Compensation	6.655,95	6.047,16	5.189,24	-22,04	-14,19
Compensated Emissions	0,00	0,00	500,00	0,00	0,00
Total Emissions after Compensation / Number of Employees	2,61	1,76	1,38	-47,37	-21,74
Total Energy	7.480.994,34	8.151.685,00	7.252.802,56	-3,05	-11,03
Purchased Energy	7.207.807,34	7.900.912,00	6.952.802,56	-3,54	-12,00
Self-produced Energy From Renewable Sources	273.187,00	250.773,00	300.000,00	9,81	19,63
Revenues	1.776.025.752,00	2.037.222.977,08	2.240.945.274,79	26,18	10,00
Revenues / Number of Employees	697.301,04	592.043,88	593.926,82	-14,82	0,32
Operating Costs	1.566.004.000,00	1.747.385.000,00	1.712.437.300,00	9,35	-2,00
Total Investments	21.096.000,00	37.757.000,00	38.500.000,00	82,50	1,97
% of Energy Investments	0,00	0,00	0,12	0,00	0,00
Total Waste	364,52	326,29	67,70	-81,43	-79,25
Number of Employees	2.547,00	3.441,00	3.773,10	48,14	9,65
Number of Female Employees	822,00	1.067,00	1.280,40	55,77	20,00
Number of Male Employees	1.725,00	2.374,00	2.492,70	44,50	5,00
Total Hours of Training Provided	20.017,00	26.302,00	27.000,00	34,89	2,65
% of Women Employees	0,32	0,31	0,34	5,15	9,44

Figure 7.20: Variance Analysis - Highlights

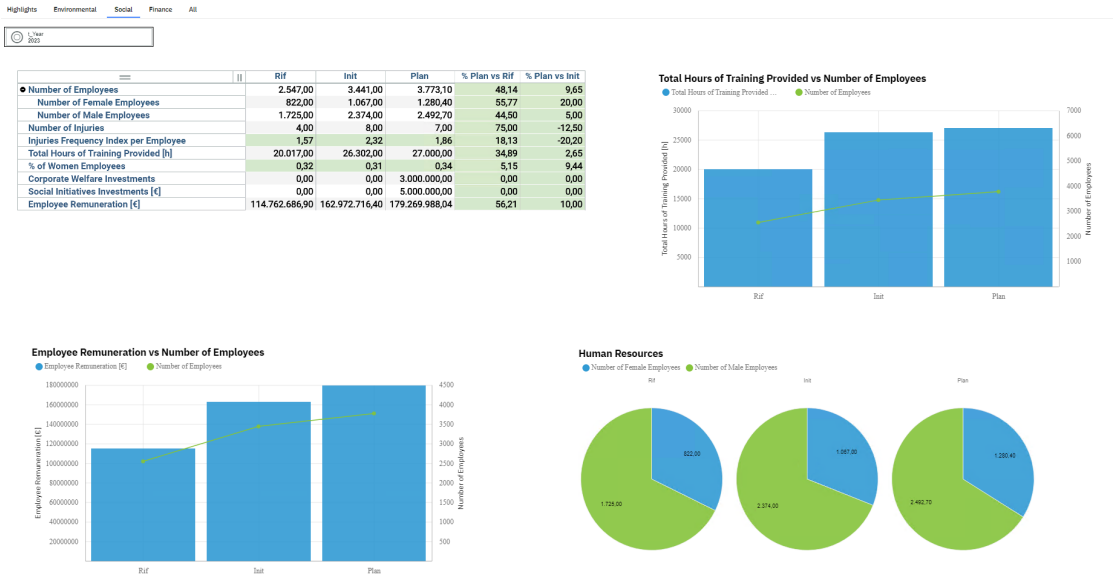


	Rif	Init	Plan	% Plan vs Rif	% Plan vs Init
Fleet's Fuel Consumption - Gas [l]	60.063,74	55.305,93	49.000,00	-18,42	-11,40
Fleet's Fuel Consumption - Diesel [l]	1.320.557,91	1.062.467,88	1.009.344,49	-23,57	-5,00
Fleet's Fuel Consumption - Methane [SMC]	791,04	987,10	937,75	18,55	-5,00
Fleet's Fuel Consumption - LPG [l]	5.832,42	2.939,37	2.792,40	-52,12	-5,00
Fleet's Fuel Cost - Gas [€]	105.209,76	82.846,93	70.000,00	-33,47	-15,51
Fleet's Fuel Cost - Diesel [€]	2.037.071,89	1.448.663,66	1.448.663,66	-28,89	0,00
Fleet's Fuel Cost - Methane [€]	1.091,07	833,73	833,73	-23,59	0,00
Fleet's Fuel Cost - LPG [€]	3.919,14	1.834,32	1.834,32	-53,20	0,00
Total Emissions [tCO2]	6.655,95	6.047,16	5.689,24	-14,52	-5,92
GHG Scope 1 Emissions [tCO2]	4.068,35	3.392,46	3.300,00	-18,89	-2,73
GHG Scope 2 Emissions [tCO2]	2.587,60	2.654,71	2.389,24	-7,67	-10,00
Compensated Emissions [tCO2]	0,00	0,00	500,00	0,00	0,00
Total Emissions after Compensation [tCO2]	6.655,95	6.047,16	5.189,24	-22,04	-14,19
Total Emissions after Compensation / Number of Employees	2,61	1,76	1,38	-47,37	-21,74
% of Carbon Compensation	0,00	0,00	0,09	0,00	0,00
Total Energy [kWh]	7.480.994,34	8.151.685,00	7.252.802,56	-3,05	-11,03
Purchased Energy [kWh]	7.207.807,34	7.900.912,00	6.952.802,56	-3,54	-12,00
Self-produced Energy From Renewable Sources [kWh]	273.187,00	250.773,00	300.000,00	9,81	19,63
% of Self-produced Energy	0,04	0,03	0,04	13,27	34,46
Self-produced Energy Savings [€]	49.343,34	40.167,31	0,00	-100,00	-100,00
Total Waste [t]	364,52	326,29	67,70	-81,43	-79,25
Paper Waste [t]	67,90	67,70	67,70	-0,30	0,00
Total Waste / Number of Employees	0,14	0,09	0,02	-87,46	-81,08

Figure 7.21: Variance Analysis - Environmental

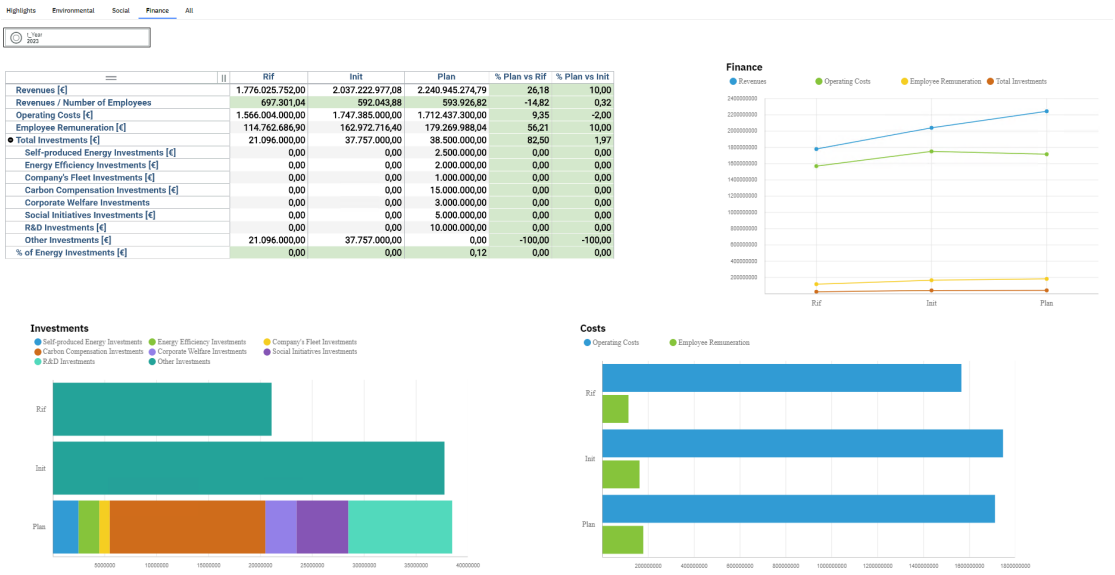
	Rif	Init	Plan	% Plan vs Rif	% Plan vs Init
Total Emissions [tCO2]	6.655,95	6.047,16	5.689,24	-14,52	-5,92
GHG Scope 1 Emissions [tCO2]	4.068,35	3.392,46	3.300,00	-18,89	-2,73
Emission from Natural Gas Consumption [tCO2]	367,31	396,82	386,01	5,09	-2,73
Emissions from Electrical Generator's Fuel Consumption [...	7,51	8,80	8,56	13,95	-2,73
Total Emissions from Fleet's Fuel Consumption [tCO2]	3.693,53	2.986,84	2.905,44	-21,34	-2,73
Emissions from Fleet's Fuel Consumption - Gas [tCO2]	141,45	130,25	126,70	-10,43	-2,73
Emissions from Fleet's Fuel Consumption - Diesel [tCO2]	3.541,41	2.849,27	2.771,62	-21,74	-2,73
Emissions from Fleet's Fuel Consumption - Methane [t...	1,56	2,73	2,66	69,97	-2,73
Emissions from Fleet's Fuel Consumption - LPG [tCO2]	9,11	4,59	4,46	-50,98	-2,73
GHG Scope 2 Emissions [tCO2]	2.587,60	2.654,71	2.389,24	-7,67	-10,00
Purchased Energy Emissions [tCO2]	2.587,60	2.654,71	2.389,24	-7,67	-10,00
Compensated Emissions [tCO2]	0,00	0,00	500,00	0,00	0,00
Total Emissions after Compensation [tCO2]	6.655,95	6.047,16	5.189,24	-22,04	-14,19
Avoided Emissions from Self-produced Renewable Energy [tC...	98,07	84,26	0,00	-100,00	-100,00
Total Emissions after Compensation / Number of Employees	2,61	1,76	1,38	-47,37	-21,74
% of Carbon Compensation	0,00	0,00	0,09	0,00	0,00

Figure 7.22: Variance Analysis when a KPI subset is chosen - Emissions



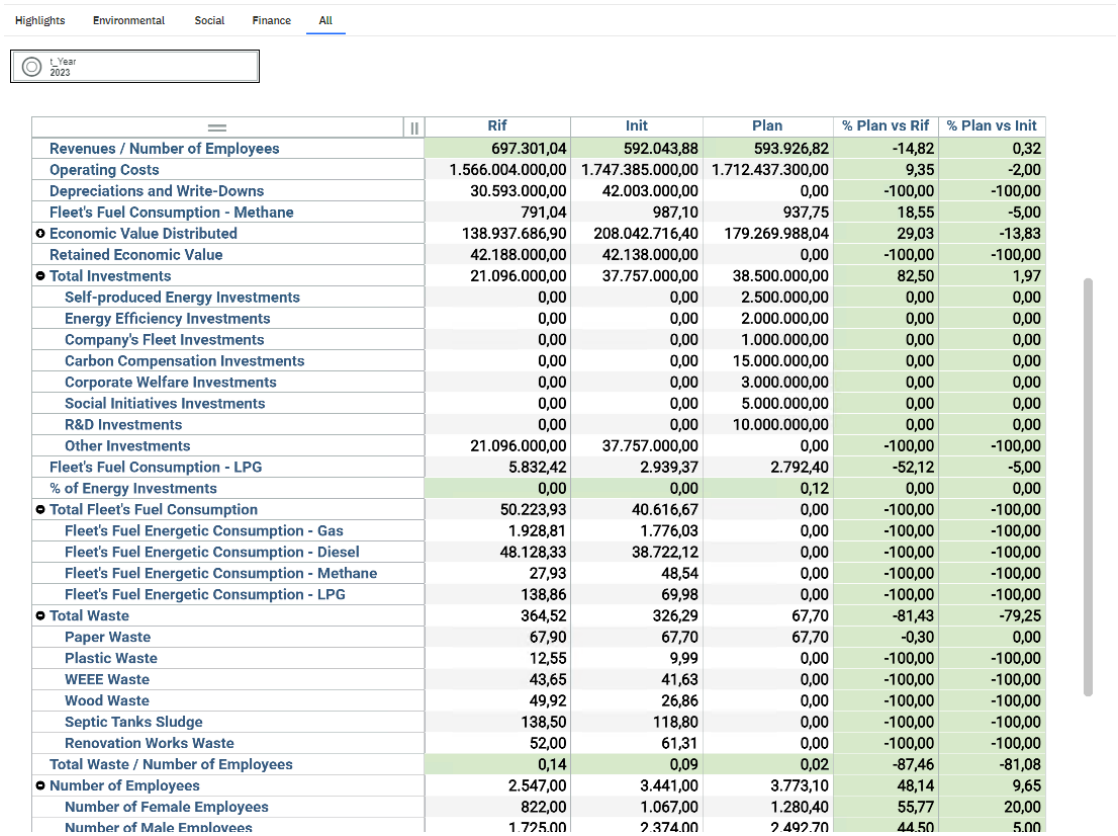
	Rif	Init	Plan	% Plan vs Rif	% Plan vs Init
Number of Employees	2.547,00	3.441,00	3.773,10	48,14	9,65
Number of Female Employees	822,00	1.067,00	1.280,40	55,77	20,00
Number of Male Employees	1.725,00	2.374,00	2.492,70	44,50	5,00
Number of Injuries	4,00	8,00	7,00	75,00	-12,50
Injuries Frequency Index per Employee	1,57	2,32	1,86	18,13	-20,20
Total Hours of Training Provided [h]	20.017,00	26.302,00	27.000,00	34,89	2,65
% of Women Employees	0,32	0,31	0,34	5,15	9,44
Corporate Welfare Investments	0,00	0,00	3.000.000,00	0,00	0,00
Social Initiatives Investments [€]	0,00	0,00	5.000.000,00	0,00	0,00
Employee Remuneration [€]	114.762.686,90	162.972.716,40	179.269.988,04	56,21	10,00

Figure 7.23: Variance Analysis - Social



	Rif	Init	Plan	% Plan vs Rif	% Plan vs Init
Revenues [€]	1.776.025.752,00	2.037.222.977,08	2.240.945.274,79	26,18	10,00
Revenues / Number of Employees	697.301,04	592.043,88	593.926,82	-14,82	0,32
Operating Costs [€]	1.566.004.000,00	1.747.385.000,00	1.712.437.300,00	9,35	-2,00
Employee Remuneration [€]	114.762.686,90	162.972.716,40	179.269.988,04	56,21	10,00
Total Investments [€]	21.096.000,00	37.757.000,00	38.500.000,00	82,50	1,97
Self-produced Energy Investments [€]	0,00	0,00	2.500.000,00	0,00	0,00
Energy Efficiency Investments [€]	0,00	0,00	2.000.000,00	0,00	0,00
Company's Fleet Investments [€]	0,00	0,00	1.000.000,00	0,00	0,00
Carbon Compensation Investments [€]	0,00	0,00	15.000.000,00	0,00	0,00
Corporate Welfare Investments	0,00	0,00	3.000.000,00	0,00	0,00
Social Initiatives Investments [€]	0,00	0,00	5.000.000,00	0,00	0,00
R&D Investments [€]	0,00	0,00	10.000.000,00	0,00	0,00
Other Investments [€]	21.096.000,00	37.757.000,00	0,00	-100,00	-100,00
% of Energy Investments [€]	0,00	0,00	0,12	0,00	0,00

Figure 7.24: Variance Analysis - Finance



	Rif	Init	Plan	% Plan vs Rif	% Plan vs Init
Revenues / Number of Employees	697.301,04	592.043,88	593.926,82	-14,82	0,32
Operating Costs	1.566.004.000,00	1.747.385.000,00	1.712.437.300,00	9,35	-2,00
Depreciations and Write-Downs	30.593.000,00	42.003.000,00	0,00	-100,00	-100,00
Fleet's Fuel Consumption - Methane	791,04	987,10	937,75	18,55	-5,00
⊕ Economic Value Distributed	138.937.686,90	208.042.716,40	179.269.988,04	29,03	-13,83
Retained Economic Value	42.188.000,00	42.138.000,00	0,00	-100,00	-100,00
⊖ Total Investments	21.096.000,00	37.757.000,00	38.500.000,00	82,50	1,97
Self-produced Energy Investments	0,00	0,00	2.500.000,00	0,00	0,00
Energy Efficiency Investments	0,00	0,00	2.000.000,00	0,00	0,00
Company's Fleet Investments	0,00	0,00	1.000.000,00	0,00	0,00
Carbon Compensation Investments	0,00	0,00	15.000.000,00	0,00	0,00
Corporate Welfare Investments	0,00	0,00	3.000.000,00	0,00	0,00
Social Initiatives Investments	0,00	0,00	5.000.000,00	0,00	0,00
R&D Investments	0,00	0,00	10.000.000,00	0,00	0,00
Other Investments	21.096.000,00	37.757.000,00	0,00	-100,00	-100,00
Fleet's Fuel Consumption - LPG	5.832,42	2.939,37	2.792,40	-52,12	-5,00
% of Energy Investments	0,00	0,00	0,12	0,00	0,00
⊖ Total Fleet's Fuel Consumption	50.223,93	40.616,67	0,00	-100,00	-100,00
Fleet's Fuel Energetic Consumption - Gas	1.928,81	1.776,03	0,00	-100,00	-100,00
Fleet's Fuel Energetic Consumption - Diesel	48.128,33	38.722,12	0,00	-100,00	-100,00
Fleet's Fuel Energetic Consumption - Methane	27,93	48,54	0,00	-100,00	-100,00
Fleet's Fuel Energetic Consumption - LPG	138,86	69,98	0,00	-100,00	-100,00
⊖ Total Waste	364,52	326,29	67,70	-81,43	-79,25
Paper Waste	67,90	67,70	67,70	-0,30	0,00
Plastic Waste	12,55	9,99	0,00	-100,00	-100,00
WEEE Waste	43,65	41,63	0,00	-100,00	-100,00
Wood Waste	49,92	26,86	0,00	-100,00	-100,00
Septic Tanks Sludge	138,50	118,80	0,00	-100,00	-100,00
Renovation Works Waste	52,00	61,31	0,00	-100,00	-100,00
Total Waste / Number of Employees	0,14	0,09	0,02	-87,46	-81,08
⊖ Number of Employees	2.547,00	3.441,00	3.773,10	48,14	9,65
Number of Female Employees	822,00	1.067,00	1.280,40	55,77	20,00
Number of Male Employees	1.725,00	2.374,00	2.492,70	44,50	5,00

Figure 7.25: Variance Analysis - All

7.0.8 Budget Revision

Another important feature is the possibility, during the year for which ESG targets have already been defined, to modify the choices previously made in order to meet new needs or to align with external or internal changes.
It is necessary that this capability does not require users to go back and plan again through the Target Definition or the Variance Analysis page. That is because, frequently, just a few KPIs need a review and managers often need to trace all the past strategic decisions, while still adapting them to the newly faced challenges or developments. Having to directly modify and confirm the previously memorized Budget decisions would imply the loss of that information.
For this reason, a step dedicated to the redaction of a Revised Budget has been developed, where the revised scenario values have been initialized with the submitted

planned target values, but they can be modified by users when needed, while still being able to compare them together.

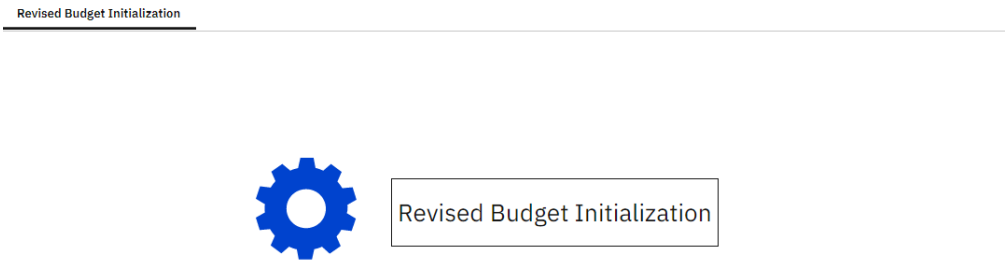


Figure 7.26: Revised Budget Initialization

Data are presented in tables containing Budget and Revised Budget values, and Percentages Deltas between them.
In this case also, visual graphs help users understand better what the choices made signify.

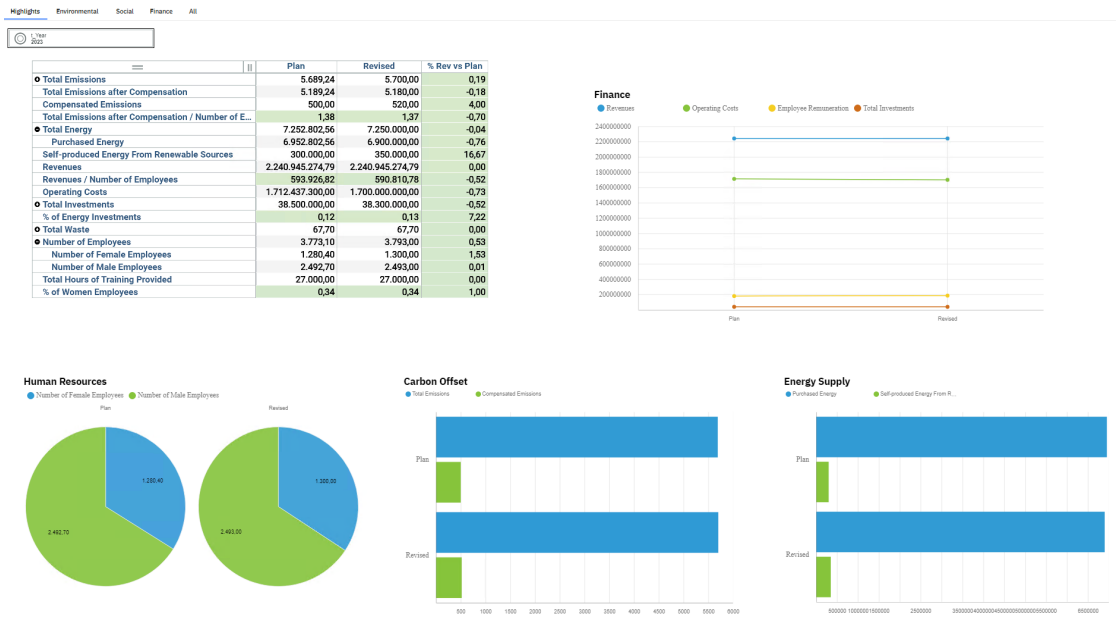


Figure 7.27: Revised Budget - Highlights

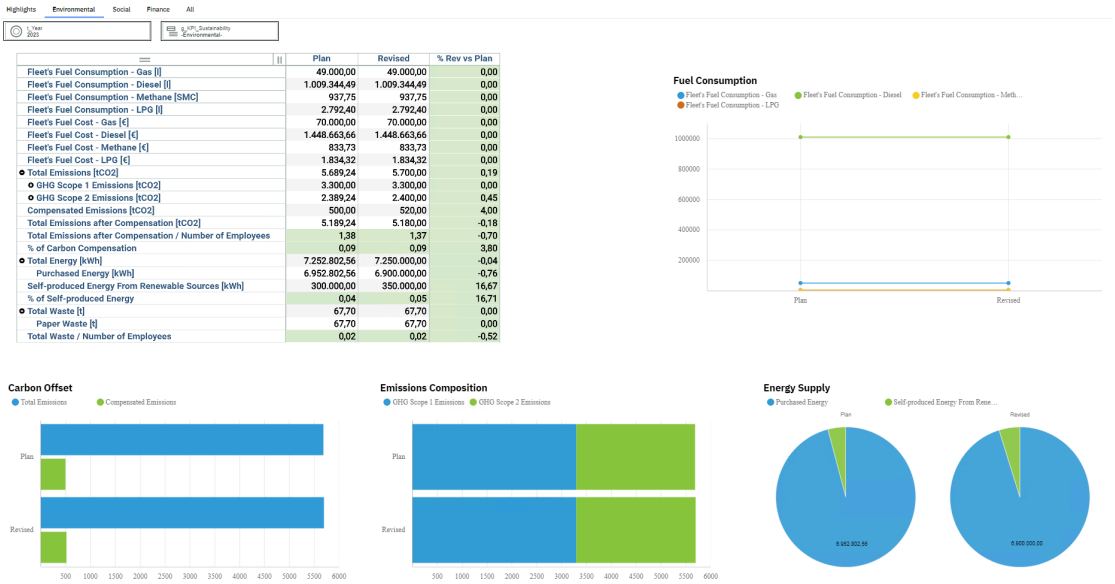
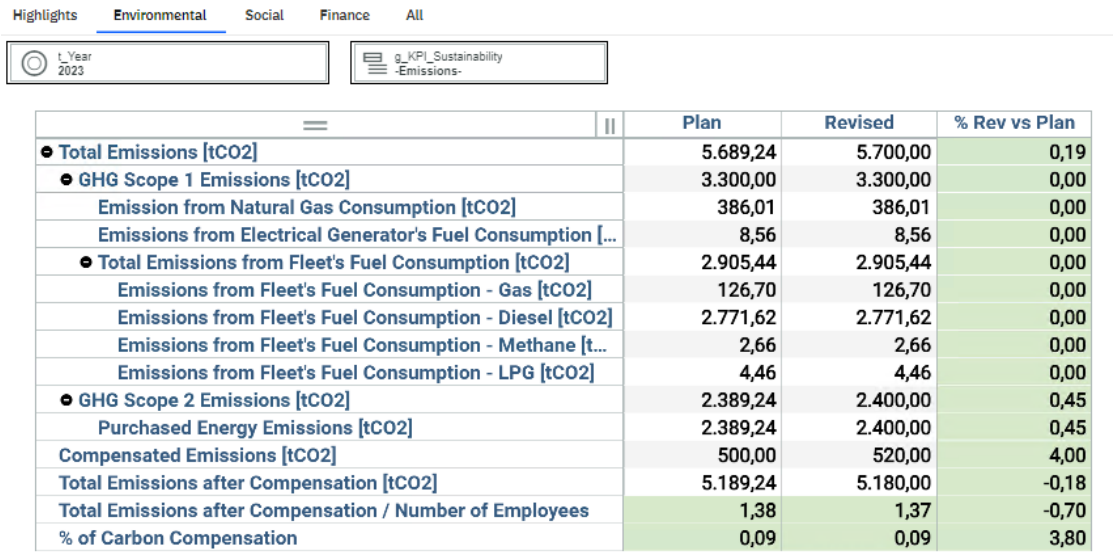


Figure 7.28: Revised Budget - Environmental

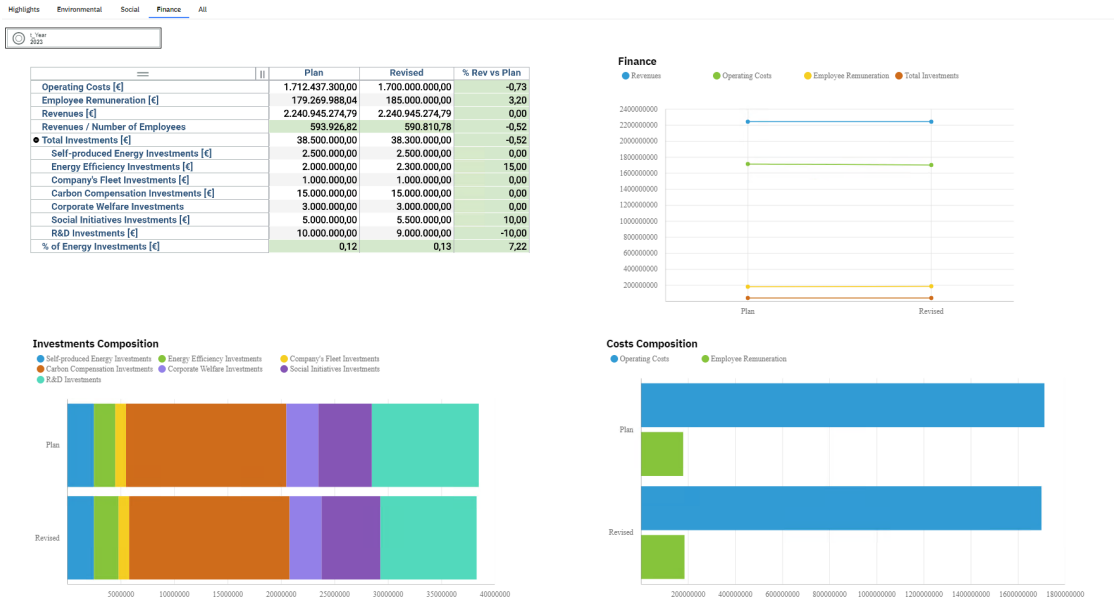


	Plan	Revised	% Rev vs Plan
Total Emissions [tCO2]	5.689,24	5.700,00	0,19
GHG Scope 1 Emissions [tCO2]	3.300,00	3.300,00	0,00
Emission from Natural Gas Consumption [tCO2]	386,01	386,01	0,00
Emissions from Electrical Generator's Fuel Consumption [...	8,56	8,56	0,00
Total Emissions from Fleet's Fuel Consumption [tCO2]	2.905,44	2.905,44	0,00
Emissions from Fleet's Fuel Consumption - Gas [tCO2]	126,70	126,70	0,00
Emissions from Fleet's Fuel Consumption - Diesel [tCO2]	2.771,62	2.771,62	0,00
Emissions from Fleet's Fuel Consumption - Methane [t...	2,66	2,66	0,00
Emissions from Fleet's Fuel Consumption - LPG [tCO2]	4,46	4,46	0,00
GHG Scope 2 Emissions [tCO2]	2.389,24	2.400,00	0,45
Purchased Energy Emissions [tCO2]	2.389,24	2.400,00	0,45
Compensated Emissions [tCO2]	500,00	520,00	4,00
Total Emissions after Compensation [tCO2]	5.189,24	5.180,00	-0,18
Total Emissions after Compensation / Number of Employees	1,38	1,37	-0,70
% of Carbon Compensation	0,09	0,09	3,80

Figure 7.29: Revised Budget Environmental table when a KPIs subset is chosen - Emissions

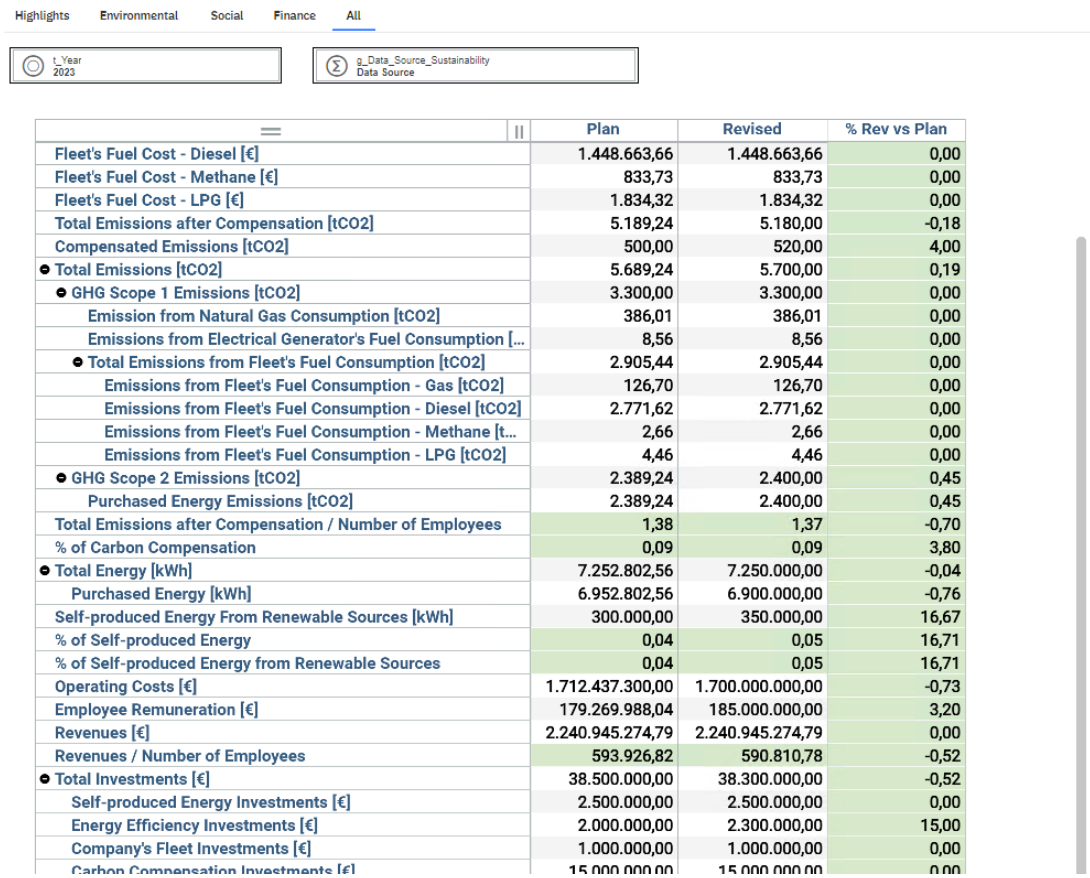
	Plan	Revised	% Rev vs Plan
Number of Employees	3.773,10	3.793,00	0,53
Number of Female Employees	1.280,40	1.300,00	1,53
Number of Male Employees	2.492,70	2.493,00	0,01
Number of Injuries	7,00	7,00	0,00
Injuries Frequency Index per Employee	1,86	1,85	-0,52
Total Hours of Training Provided [h]	27.000,00	27.000,00	0,00
% of Women Employees	0,34	0,34	1,00
Corporate Welfare Investments	3.000.000,00	3.000.000,00	0,00
Social Initiatives Investments [€]	5.000.000,00	5.500.000,00	10,00
Employee Remuneration [€]	179.269.988,04	185.000.000,00	3,20

Figure 7.30: Revised Budget - Social



	Plan	Revised	% Rev vs Plan
Operating Costs [€]	1.712.437.300,00	1.700.000.000,00	-0,73
Employee Remuneration [€]	179.269.988,04	185.000.000,00	3,20
Revenues [€]	2.240.945.274,79	2.240.945.274,79	0,00
Revenues / Number of Employees	593.926,82	590.810,78	-0,52
Total Investments [€]	38.500.000,00	38.300.000,00	-0,52
Self-produced Energy Investments [€]	2.500.000,00	2.500.000,00	0,00
Energy Efficiency Investments [€]	2.000.000,00	2.300.000,00	15,00
Company's Fleet Investments [€]	1.000.000,00	1.000.000,00	0,00
Carbon Compensation Investments [€]	15.000.000,00	15.000.000,00	0,00
Corporate Welfare Investments	3.000.000,00	3.000.000,00	0,00
Social Initiatives Investments [€]	5.000.000,00	5.500.000,00	10,00
R&D Investments [€]	10.000.000,00	9.000.000,00	-10,00
% of Energy Investments [€]	0,12	0,13	7,22

Figure 7.31: Revised Budget - Finance



	Plan	Revised	% Rev vs Plan
Fleet's Fuel Cost - Diesel [€]	1.448.663,66	1.448.663,66	0,00
Fleet's Fuel Cost - Methane [€]	833,73	833,73	0,00
Fleet's Fuel Cost - LPG [€]	1.834,32	1.834,32	0,00
Total Emissions after Compensation [tCO2]	5.189,24	5.180,00	-0,18
Compensated Emissions [tCO2]	500,00	520,00	4,00
⊖ Total Emissions [tCO2]	5.689,24	5.700,00	0,19
⊖ GHG Scope 1 Emissions [tCO2]	3.300,00	3.300,00	0,00
Emission from Natural Gas Consumption [tCO2]	386,01	386,01	0,00
Emissions from Electrical Generator's Fuel Consumption [...	8,56	8,56	0,00
⊖ Total Emissions from Fleet's Fuel Consumption [tCO2]	2.905,44	2.905,44	0,00
Emissions from Fleet's Fuel Consumption - Gas [tCO2]	126,70	126,70	0,00
Emissions from Fleet's Fuel Consumption - Diesel [tCO2]	2.771,62	2.771,62	0,00
Emissions from Fleet's Fuel Consumption - Methane [t...	2,66	2,66	0,00
Emissions from Fleet's Fuel Consumption - LPG [tCO2]	4,46	4,46	0,00
⊖ GHG Scope 2 Emissions [tCO2]	2.389,24	2.400,00	0,45
Purchased Energy Emissions [tCO2]	2.389,24	2.400,00	0,45
Total Emissions after Compensation / Number of Employees	1,38	1,37	-0,70
% of Carbon Compensation	0,09	0,09	3,80
⊖ Total Energy [kWh]	7.252.802,56	7.250.000,00	-0,04
Purchased Energy [kWh]	6.952.802,56	6.900.000,00	-0,76
Self-produced Energy From Renewable Sources [kWh]	300.000,00	350.000,00	16,67
% of Self-produced Energy	0,04	0,05	16,71
% of Self-produced Energy from Renewable Sources	0,04	0,05	16,71
Operating Costs [€]	1.712.437.300,00	1.700.000.000,00	-0,73
Employee Remuneration [€]	179.269.988,04	185.000.000,00	3,20
Revenues [€]	2.240.945.274,79	2.240.945.274,79	0,00
Revenues / Number of Employees	593.926,82	590.810,78	-0,52
⊖ Total Investments [€]	38.500.000,00	38.300.000,00	-0,52
Self-produced Energy Investments [€]	2.500.000,00	2.500.000,00	0,00
Energy Efficiency Investments [€]	2.000.000,00	2.300.000,00	15,00
Company's Fleet Investments [€]	1.000.000,00	1.000.000,00	0,00
Carbon Compensation Investments [€]	15.000.000,00	15.000.000,00	0,00

Figure 7.32: Revised Budget - All

Chapter 8

Feedback from Sesa S.p.A.

Following the realization of the prototype, a meeting with the Group Sustainability Officer at Sesa S.p.A. was organized in order to present the developed solution and obtain feedback.
Such a discussion has allowed understanding if the interpretation of the market requirement previously carried out was correct and if the implementation of the customer requirements in the MVP had been executed with success. After an initial presentation of the workflow realized to be followed by users through the use of the platform, a practical demonstration of its usage was performed.

The feedback collected was positive, especially with regard to the implementation of a workflow-driven process. It reaffirmed the dexterity of the ESG target and plan definition activities in the company and the lack of a well-defined structure of tasks to be carried out in. Routing users to a precise sequence was therefore welcomed in a positive way and seen as a feature with great potential, to which value was added since the identified steps were the ones actually performed within the group.
The high-level planning KPIs defined following the market analysis and the literature study were also aligned with the reality of a structured and complex company such as Sesa S.p.A..
The Group Sustainability Officer also stated a high interest in the possibility of planning both with percentage variations and absolute values, visualizing baseline

values and the impacts of the planning choices on the final planned value.
Another appreciated distinctive element was the graphic display of data within the dashboards, which confirmed the effectiveness and impact of this kind of representation.
Finally, the possibility to monitor trends in different scenarios over distinct time horizons, such as Actual, Plan, Reference, Initialization, and Revised Budget, was highly valued.

Chapter 9

Conclusions

The aim of the last chapter is the analysis of the results achieved within the scope of this thesis. Finally, possible next steps for this project are outlined.

9.0.1 Achievements

First of all, the necessity for business firms to define sustainability targets and plan accordingly has been demonstrated, as well as the absence on the market of an ESG planning tool for companies. This allowed for assessing the presence of a market gap and the possibility for Mediamente Consulting to exploit it.
Drafting an extensive software selection in order to understand if IBM Planning Analytics was still the best software choice to develop a solution led to the decision to continue with its utilization.
The solution created for companies has been successfully implemented and the MVP proposed grants the possibility for business players to create planning scenarios, choose baseline values to initialize them, define high-level targets, wane them into more detailed KPIs, analyze variances between different scenarios and draft a Revised Budget.
It is also possible to review planning choices in different steps of the workflow that has been developed to structure planning procedures while visualizing information through different data representation modes.

The essential goal of high flexibility has been reached, with the creation of an intuitive platform equipped with customizable charts.
The dialogue with Sesa S.p.A. and the possibility to test the MVP in a real case study helped to confirm the correct functioning of the platform.

9.0.2 Next Steps

The ever-growing importance of sustainability allows for the definition of future steps to take following the current studies and work. The main moves identified are:

- Extension of the tool with features to manage the definition of a timely actionable plan starting from the planned target values and the monitoring of its implementation;
- Management of different external data sources (besides Excel .csv files), such as data warehouses or databases.
- Continuous update of KPIs according to the GRI standards;
- Definition of a modular ready-to-market solution, consisting of the reporting module and the planning module.

Appendix A

ESG Rating Agencies' features

	Bloomberg ESG Disclosure Score	S&P Global Ratings ESG Evaluation	CDP	FTSE Russel's ESG Ratings	ISS Governance Quality Score	MSCI
SCOPE	All firms, regions and sectors.	All firms, regions and sectors.	All firms, regions and sectors.	All firms, regions and sectors.	All firms, regions and sectors.	All firms, regions and sectors.
AREA	E,S,G	E,S,G	Measures involvement in the minimising of climate changes and transparency.	E,S,G	Identifies risks related to corporate governance based on the management structure shareholder rights, remuneration, and audit.	Measures corporate performance using environmental ratios, as well as those regarding weapons and social issues
DATA SOURCES	Data provided by companies; external ESG providers.	Sectoral questionnaire.	Sectoral questionnaire focusing on climate changes, forest and water protection.	Publicly available data only.	Data provided by companies; media; NGOs.	Data provided by companies; databases (governmental, scientific, NGOs); news and media.
SHARE	Firms may request updates at any moment.	Companies fill out the questionnaire.	Companies are asked for feedback.	Companies are asked to verify the data.	Companies are asked for feedback and additional data.	Companies are asked to verify the data.
NUMBER OF COMPANIES	11.500	7.300	2.000	4.000	5.000	13.500
UPDATE	Daily.	Annual report.	Annual report.	Daily.	Once a year.	Continuous monitoring, a detailed analysis once a year.

Figure A.1: Summary of Deloitte's findings - ESG Rating Agencies [58]

Appendix B

Software selection findings

	Feature	CCH Tagetik	Anaplan	IBM Planning Analytics	Board	Oracle EPM Cloud + Oracle Hyperion Planning + Oracle Analytics Cloud + Oracle Analytics Server + Oracle Analytics for Applications	SAP Business Planning and Consolidation + SAP 4/HANA + SAP Analytics Cloud + SAP BusinessObjects BI	Workday Adaptive Insights	Jedox
Closing activities	Consolidation	x	x	x	x		x	x	x
	Financial close	x	x	x	x	x	x	x	x
	Transaction matching and account reconciliation	x			x		x		
Reporting and performance analysis	Financial reporting	x	x	x	x	x	x	x	x
	Profitability analysis	x	x	x	x	x	x	x	x
	Dashboarding and scorecarding			x	x	x	x	x	x
	Dashboards and graphical layout customizability	x		x	x	x		x	x
	Disclosure management	x	x	x	x	x	x	x	x
	Compliance regulatory reporting	x	x	x	x	x	x		x

Figure B.1: Features offered by the software analyzed - 1

	Feature	CCH Tagetik	Anaplan	IBM Planning Analytics	Board	Oracle EPM Cloud + Oracle Hyperion Planning + Oracle Analytics Cloud + Oracle Analytics Server + Oracle Analytics for Applications	SAP Business Planning and Consolidation + SAP 4/HANA + SAP Analytics Cloud + SAP BusinessObjects BI	Workday Adaptive Insights	Jedox
Planning	Budget, cash flow and production planning	x	x	x	x	x	x	x	x
	Predictive Forecasting	x	x	x	x	x	x	x	x
	CPM forecasting	x	x	x	x	x	x	x	x
	Scenario planning	x	x	x	x	x	x	x	x
ESG and sustainability	ESG reporting	x		x					
	Sustainability planning and ESG what-if analysis	x							
Technical features	Necessity of programming skills to use the tool	x		x					
	Presence of ready-to-use basic modules	x	x		x	x	x	x	x
	Presence of approval workflows	x	x	x	x	x	x		x
	On cloud	x	x	x	x	x		x	x
	On-premises	x		x	x	x			x
	Works on RAM			x					
	Possible integration with Word	x	x			x			
	Possible integration with PowerPoint	x	x	x		x			
	Possible integration with Excel	x	x	x	x	x	x		x
	Product Modularity	x	x	x					
End-user experience	Mobile application		x			x			x
	All-in-one decision-making platform	x	x	x	x				x
	Drag and drop front-end usability		x	x	x	x		x	

Figure B.2: Features offered by the software analyzed - 2

Appendix C

Strategic Planning KPIs

Scope	Code	KPI
Emission	EM_0001	Total Emissions after Compensation
Emission	EM_0002	Compensated Emissions
Emission	EM_0003	Total Emissions
Emission	EM_0004	GHG Scope 1 Emissions
Emission	EM_0005	GHG Scope 2 Emissions
Emission	EM_0006	GHG Scope 3 Emissions
Emission	EM_0025	Total Emissions after Compensation / Number of Employees
Emission	EM_0029	% of Carbon Compensation
Energy	EN_0001	Total Energy
Energy	EN_0002	Purchased Energy
Energy	EN_0004	Self-produced Energy From Renewable Sources
Energy	EN_0022	Total Energy Sold
Energy	EN_0028	% of Self-produced Energy
Energy	EN_0029	Savings from Self-produced Energy
Energy	EN_0033	Power of Photovoltaic Panels
Finance	FI_0006	Operating Costs
Finance	FI_0009	Employee Remuneration
Finance	FI_0013	Community Remuneration
Finance	FI_0015	Revenues
Finance	FI_0016	Revenues / Number of Employees
Finance	FI_0017	Total Investments
Finance	FI_0018	Self-produced Energy Investments

Figure C.1: Strategic Planning KPIs list - 1

Finance	FI_0019	Energy Efficiency Investments
Finance	FI_0020	% of Energy Investments
Finance	FI_0021	Company's Fleet Investments
Finance	FI_0022	Carbon Compensation Investments
Finance	FI_0023	Corporate Welfare Investments
Finance	FI_0024	Social Initiatives Investments
Finance	FI_0025	R&D Investments
Finance	FI_0026	Other Investments
Fuel	CA_0001	Fleet's Fuel Consumption - Gas
Fuel	CA_0002	Fleet's Fuel Consumption - Diesel
Fuel	CA_0003	Fleet's Fuel Consumption - Methane
Fuel	CA_0004	Fleet's Fuel Consumption - LPG
Fuel	CA_0010	Fleet's Fuel Cost - Gas
Fuel	CA_0011	Fleet's Fuel Cost - Diesel
Fuel	CA_0012	Fleet's Fuel Cost - Methane
Fuel	CA_0013	Fleet's Fuel Cost - LPG
Fuel	CA_0018	Fleet's Fuel Consumption - Generic
Fuel	CA_0020	Fleet's Fuel Cost - Generic
Fuel	CA_0026	Electric Fuel Consumption
Fuel	CA_0028	Electric Fuel Cost
Production	PR_0005	% of Recycled Materials out of Total Used Materials
Production	PR_0014	% of Materials Returned to the Production Cycle
Social	SO_0001	Number of Employees
Social	SO_0002	Number of Female Employees
Social	SO_0003	Number of Male Employees
Social	SO_0007	Negative Turnover
Social	SO_0008	Positive Turnover
Social	SO_0013	Gender Pay Gap
Social	SO_0015	Number of Injuries
Social	SO_0017	Injuries Frequency Index per Employee
Social	SO_0018	Total Hours of Training Provided
Social	SO_0042	% Dipendenti Donne
Waste	RI_0001	Total Waste

Figure C.2: Strategic Planning KPIs list - 2

Waste	RI_0010	% of Waste for Recovery
Waste	RI_0012	% of Non-recyclable Waste
Waste	RI_0013	Total Waste / Number of Employees
Water	AC_0007	% of Recycling of Industrial Waters

Figure C.3: Strategic Planning KPIs list - 3

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