HIEGHER SCHOOL OF MANAGEMENT AND DIGITAL ECONOMY
HSMDE

Dissertation submitted in partial fulfillment of the requirements for a Master's degree

Specialty: **Audit and management control.**

THEME:

Integrating sustainability into industrial performance management: Sustainability Balanced Scorecard Solution.

Case of: Lafarge Holcim Algeria

Submitted by

MESSIKH Souad Sarra

Supervised by

Mrs. RABIA Lamia

Maître de conference A

Academic year: 2022/2023

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Acknowledgment

Through this master's dissertation, I would like to express my gratitude to all the people who contributed to the development of this work.

I would like to express my appreciation to my supervisor, Mrs. RABIA, for her motivation, support, and trust in me.

I would like also to thank Lafarge Holcim Algeria for providing me with a valuable internship experience, particularly my supervisor and the staff I worked with.

I am grateful to my school, the Higher School of Management and Digital Economy, for the quality of our studies and for their assistance and support in preparing me for the professional world.

I am deeply grateful to my parents, who have devoted everything to help me succeed in my academic career.

Lastly, I would like to acknowledge and thank myself for overcoming various challenges and becoming the person I am today.

Dedication

I dedicate this work to my loving parents; may they always be proud of me.

To my siblings Selma, Serine et Akram.

To my friends Ibtissem, Nada, Rokia, Takwa, Selma, Lina and Lina, Hadjer and Ilyes.

Abstract

Industrial Performance Management (IPM) is a structured approach that involves monitoring and assessing an industrial organization's performance to identify areas for improvement and implement strategies to increase efficiency, productivity, and profitability while reducing costs and minimizing waste. The ultimate goal of IPM is to enhance the overall viability of the organization, which can be achieved by optimizing operations, improving customer satisfaction, building a reputation for quality and reliability, and implementing sustainable practices and technologies

The Sustainability Balanced Scorecard is a strategic management tool that helps organizations measure and manage their performance by tracking and reporting on key sustainability metrics across three main perspectives: economic, social and environmental.

The relevance of the Sustainability Balanced Scorecard (SBSC) depends on the accurate representation and real reflection of an organization's sustainability strategy through the performance indicators used in the scorecard.

Our research objective was to integrate sustainability into industrial performance management by implementing a Sustainability Balanced Scorecard. To achieve this, we conducted a case study on Lafarge Holcim Algeria, a cement industry company that considers sustainability as a core element of its strategy. We used interviews, surveys, observations, and analysis of internal and external documents to examine the company's sustainability practices.

The research shows that Lafarge Holcim has a multifaceted system for managing its industrial performance, using indicators to measure progress towards its strategic objectives. The company also combines environmental and economic indicators, which is a positive outcome. To improve communication and achieve long-term success, Lafarge Holcim has adopted the Sustainability Balanced Scorecard (SBSC) we proposed for its performance management system.

Key words: Sustainability, industrial performance management, SBSC

Résumé

Le pilotage de la performance industrielle (IPM) est une approche qui permet d'évaluer la performance d'une entreprise industrielle pour identifier les axes d'amélioration. L'objectif est d'accroître l'efficacité, la productivité et la rentabilité tout en réduisant les coûts et le gaspillage. Pour cela, il faut optimiser les opérations, améliorer la satisfaction client, établir une réputation de qualité et de fiabilité, et mettre en place des pratiques et des technologies durables. La pratique durable est donc un élément clé de l'IPM pour assurer la viabilité globale de l'organisation.

Le tableau de bord prospectif de la durabilité est un outil de gestion stratégique qui permet aux organisations de mesurer et de gérer leur performance en utilisant des indicateurs de durabilité économique, sociale et environnementale. La pertinence de cet outil dépend de la précision de la représentation des stratégies de durabilité de l'organisation à travers les indicateurs utilisés dans le tableau de bord. Il est important que ces indicateurs soient choisis de manière pertinente pour mesurer la performance de l'organisation en matière de durabilité.

Notre objectif de recherche était d'intégrer la durabilité dans le pilotage de la performance industrielle en mettant en œuvre un tableau de bord prospectif de la durabilité. Pour ce faire, nous avons étudié le cas de Lafarge Holcim Algérie, une entreprise de l'industrie du ciment qui considère le développement durable comme un élément clé de sa stratégie. Nous avons utilisé des interviews, des enquêtes, des observations et des analyses de documents internes et externes de l'entreprise pour examiner les pratiques de durabilité de l'entreprisse.

La recherche montre que Lafarge Holcim a un système riche en termes de processus et de pratiques, pour gérer sa performance industrielle, en utilisant des indicateurs pour mesurer les progrès vers ses objectifs stratégiques. L'entreprise combine également des indicateurs environnementaux et économiques, ce qui est un résultat positif. Pour améliorer la communication et atteindre un succès à long terme, Lafarge Holcim a adopté le tableau de bords prospectifs de la durabilité (TBPD) que nous avons proposé pour son système de pilotage de la performance.

Mots clés : Durabilité / développement durable, pilotage de performance industrielle, TBPD.

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SBSC Sustainability Balanced Scorecard

BSC Balanced scorecard

TBPD Tableau de bord prospectif de durabilité (french version of SBSC)

IPM Industrial performance management

GRI Global reporting initiative

TBL Trippel bottom line

TEEP Total effective equipment performance

OOE Overall operations effectiveness

OEE Overall equipment effectiveness

CSR Cooperate Social Relations

General Introduction

Despite growing emphasis on corporate sustainability, traditional performance management focuses mainly on economic indicators. Integrating sustainability metrics remains a challenge. Within this context, our research explores an effective management solution: the sustainability balanced scorecard.

Industrial performance management is interesting as a lever for positive change. Current systems often overlook environmental and social performance, implicitly pushing unsustainable practices. Our research aims to develop a framework that holistically assesses all dimensions of sustainability within an organization's strategy and goals.

The purposes of our work are twofold. First, it seeks to demonstrate how measuring and monitoring sustainability indicators can drive more sustainable decision-making and resource allocation within companies. Second, it aims to show that economic, social and environmental success are interrelated, with sustainability-focused performance management strengthening competitiveness, resilience and long-term value creation.

Our overarching theme is “Integrating sustainability into industrial performance management through the sustainability balanced scorecard solution”. Our research examines how companies can embed sustainability goals into their strategy and operations using this well-established management framework, modified to include environmental and social criteria in addition to financial metrics.

Many companies practicing sustainability have proven its viability and profitability. Other companies that fail to adapt and transition consequently face rising costs, risks and challenges related to not acting sustainably. As social value for sustainability increases, businesses are increasingly impacted. Leaders who champion sustainability through their strategies and operations set an example that motivates change within the broader business community.

All of these factors combine such that most companies now recognize sustainability as mission critical for their survival and future success.

General introduction

The Balanced Scorecard known as a performant management tool. Gave us the idea of adding sustainability to the Balanced Scorecard so that management could more effectively promote the long-term survival of companies.

This inspired us to research the topic by reading scholarly articles and looking for Algerian companies that value sustainability alongside economic performance. We were then motivated to know that such a tool exists and that many companies promote sustainability including Lafarge Holcim Algeria, after they launched their green cement.

Starting Our journey of implementing a sustainability balanced scorecard at Lafarge Holcim Algeria.

The central problem statement driving this study is: How does Lafarge Holcim Algeria ensure that its performance management system is aligned with its sustainability goals? To answer this, two secondary questions must also be addressed:

- To what extent do the indicators implemented in the system reflect Lafarge Holcim Algeria 's strategy?
- How are the environmental and sustainability aspects linked to economic success?

Based on the questions raised regarding the focus of our research, it would be worthwhile investigating the following hypotheses:

Principle hypothesis: Lafarge Holcim Algeria has implemented a performance management system that considers environmental and sustainability goals, including the use of a sustainability balanced scorecard.

H1: The indicators implemented in the system fully reflect Lafarge Holcim Algeria 's strategy, as they are specifically designed to measure and track the company's progress towards its sustainability goals and objectives.

H2: Some indicators combine both environmental and economic success, while others can combine social and economic success.

General introduction

Aligned with our objectives, we chose an exploratory, descriptive and analytical study to define our research question and clarify concepts. **Our methodology** includes:

- A literature review of books, articles, websites and prior research forming the study's theoretical foundation.
- A Lafarge Holcim case study through manager interviews to collect strategic information, observations, and document analysis.
- A manager/employee survey to inform our sustainability balanced scorecard's implementation.

The literature review aims to refine our research question and theory. The case study and survey will provide:

- Data- manager interviews.
- Context – observations.
- Documents - internal and external publications.
- Perspectives- survey.

This identifies how Lafarge Holcim Algeria currently measures performance and where a sustainability balanced scorecard could align performance management with sustainability goals.

To properly conduct this study, we developed a **work plan** consisting of three chapters: the first two chapters focus on theoretical presentations while the third chapter is devoted to the case study of Lafarge Holcim Algeria.

Chapter 1: Understanding Industrial Performance. In this chapter, we will explore the concept of performance, its characteristics, and how it differs from other related notions. Additionally, we will delve into the measurement of industrial performance by discussing its usefulness, management indicators, and measurement tools.

Chapter 2: The Sustainability balanced scorecard. This chapter will focus on the Sustainability balanced scorecard (SBSC). In the first section, we will provide fundamentals of the SBSC, including its origin, definitions and functions. The second section will cover the development of a SBSC, starting with its axes, followed by its constitution and evolution.

General introduction

Chapter 3: Empirical Study of Lafarge Holcim Algeria's Sustainability balanced scorecard.

This chapter will present the empirical study of our research, which focuses on the Sustainability balanced scorecard of Lafarge Holcim Algeria. It will be divided into two sections. The first section will provide an overview of the company, including its international and national presence, as well as the process of cement fabrication. The second section will present the strategic objectives, performance indicators, and the SBSC itself.

Finally, as a last step, a general conclusion will be provided at the end of the dissertation. In this context, we will aim to synthesize the key points derived from this study and provide directions for future work in this area.

Chapter I: Performance management

Chapter I: performance management

Introduction

This chapter first addresses the concept of performance: its different definitions, the theories related to it, its sources, its characteristics as well as a distinction of performance with certain close concepts. Then, in a second place, the issue of measuring industrial performance will be discussed: why and how we measure it.

Section 1: Fundamentals of performance management

The drive for performance now sits at the very core of business leaders' strategies, making it imperative to examine its underlying foundations and consequences.

1 Concept

The word "performance" has been in use in the English language since the late 14th century, originally referring to the act of performing or carrying out some activity. It comes from the Old French "performer", meaning to accomplish or achieve [1].

At that time, it referred both to the results obtained by a racehorse and the success achieved in a race. Then, it referred to the results and the athletic feat of an athlete.

The meaning of performance evolved during the 20th century, it indicated in figures the capabilities of a machine and by extension referred to an exceptional yield.

Performance definitions

Performance is a concept that is not easy to grasp, so it is necessary to refer to the definitions given by several authors.

For **DIMITRI WEISS**, "Performance for an employee, for a business leader, and perhaps for a management team, is the overall result, the profit assessed over one or more years, objectively measuring the effectiveness of management"[2].

[1] https://www.etymonline.com/word/performance consulted (the 02 /10/2023 at 7pm)

[2] WEISS, (D) : « *la fonction Ressources Humaines* », les éditions d'organisation, Paris, 1988, p.675.

Chapter I: performance management

In an article relating to the concept of performance, **ANNICK BOURGUIGNON**, at the end of an interpretation of the word performance, questions the possible entries in the field of management. "The meaning given to the word performance(s) in the management literature is largely implicit since it is rarely defined. However, the context generally allows one to associate its use with one and/or the other of the senses listed: the result(s) of the action, the action itself, the success"[3].

According to the same author, who takes up **L. BAIARD**'s analyses, performance is a notion that "contains both the action, its result and possibly its exceptional success"[45].

This conceptualization of performance acknowledges its multidimensional nature. Consequently, performance can be defined in an inclusive manner as the fulfillment of organizational goals, regardless of the type or variety of those goals. This fulfillment can refer either to the result or the outcome itself (in the strict sense), or to the process that leads to that result (in the broad sense).
For **A. KHEMAKHEM**: "The performance of a responsibility center (workshop, service, unit, company, branch, ...) refers to the effectiveness and productivity with which this responsibility center achieved the objectives it had accepted"[6].

According to **M. LEBAS:** "Performance is a construct that leads to divergences between authors, a catch-all word that has received many meanings. Related notions coexist (efficiency, effectiveness) and overlap with performance"[7].

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[3] BOURGUIGNON, (A) : « Peut-on définir la performance ? », in Review ACCOUNTING, n°269, Juillet-Aout 1995. Pp 61-65.

[4] BOURGUIGNON, (A) : « Peut-on définir la performance ? », in Reviewde ACCOUNTING, n°269, Juillet-Aout 1995. Pp 61-65.

[5] Idem.

[6] KHEMAKHEM, (A) : « *La dynamique du contrôle de gestion* », édition DUNOD, 1992, p.311.

[7] LEBAS, (M) : « *Oui, il faut définir la performance* », in review ACCOUNTING N°269, juillet-août, 1995, p.66.

Theories of performance

The polysemic nature of performance has led to the emergence of many perspectives and theories related to it. These can be grouped into three main families:

1.2.1 The classical theory

Classical authors such as David Ricardo, Adam Smith, or John Stuart Mill perceive performance from an economic side based on the principle of additivity.

1.2.2 The neoclassical theory

These theories are based around the concept of shareholder value/owner value - profits for shareholders - placed under the yoke of financial markets, which has imposed a change in the key variables of economic activity, note the authors of a report chaired by D. PLIHON.

This change is reflected in particular by the primordial role given to the rate of return on different categories of capital assets (real assets, shares, bonds).

according to theories based on value creation, performance is defined from a Return/Risk approach and has as its matrix the value-cost pair.

Ph. LORINO offers a synthetic definition of performance within this approach:

"Is performance in the company everything that, and only what, contributes to improving the value-cost pair, that is, to improve net value creation (conversely, is not performance what contributes to reducing cost or increasing value, in isolation, if this does not improve the valuecost balance or the value/cost ratio)"[8].

1.2.3 The cognitive trend

This trend aims to demonstrate the strategic nature of the accumulation of knowledge - a set of superimposed layers essential for overall competitiveness -.

It is under the impetus of economists such as **WE. NONAKA**, **H. TAKEUCHI**, **H. SIMON**, **P.**

[8] LORINO, (Ph) : *« Méthodes et pratiques de la performance »*, Editions d'organisation, 2003, p 36

DRUCKER, **Ph. LORINO** or **J-C. TORONDEAU** that the school of knowledge management has thus developed, whose followers are increasingly numerous. Far from considering human capital as a cost, they see it as a resource to be optimized.

Beyond the differences in approach, one strong idea emerges from the profusion of works and articles dedicated to strategic management, based on the strategy-performance relationship. **Ph. LORINO** emphasizes "Is performance in the company, everything that, and only what, contributes to achieving strategic objectives".[9]

The performance of a division, business unit, subsidiary or group results above all from the choices made by their managers. Between strategic boldness, rigorous cost control and financial rationality, management must skillfully play its part on the keyboard of all paradoxes.

Sources of performance

Company performance can spring from two interrelated sources, the first originating within the company itself while the second is conditioned by the environment in which the company operates.

1.3.1 Internal performance (intrinsic)

Intrinsic performance results from the combination of:

The performance of human resources within the company: It depends on their contribution to value creation and, consequently, to the performance of the organization. Indeed, good human resources practices produce first and foremost direct results on human resources, and subsequently, indirect results on the company.

Technical performance (industrial): effective implementation of investments.

Financial performance: the company's ability to effectively deploy capital and leverage its financial resources.

1.3.2 External (extrinsic) performance

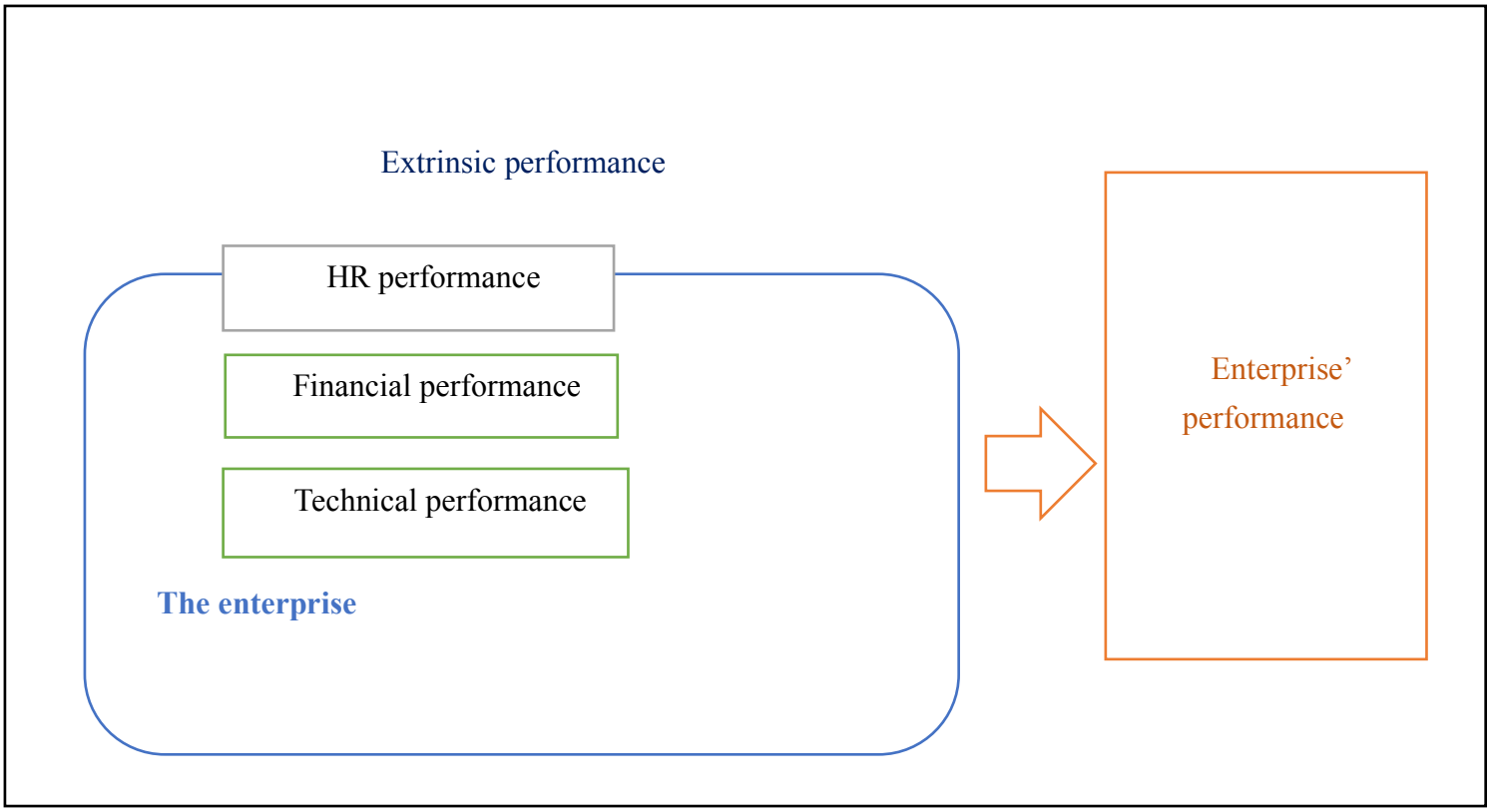
Extrinsic performance depends on factors in the company's external environment. It is shaped by variations and changes in the company's market, industry and regulatory conditions. Such

[9] LORINO, (Ph): Op.cit. P.44.

environmental factors outside the company's control can impact performance, such as reduced barriers to entry into key markets or less stringent government regulations.

The following figure summarizes the sources of obtaining performance.

Figure 1:The sources of performance



Source : Adapted from MARTORY, (B), CROZET, (D) : « *Gestion des ressources humaines : Pilotage social et performances* »,editionDUNOD, 5e Edition, 2002, P.165.

2 Characteristics

Performance brings together a set of characteristics that can be listed in the following points:

Performance is constructed as support for judgments. It is often defined by criteria that conform to the representation that theorists and practitioners make of performance and its measurement;

"It implies a value judgment on the activities, results, products and effects of the organization on its environment. As a social construct, this concept has as many meanings as there are individuals or groups that use it"[10].

Performance therefore remains a matter of perception. For a manager, performance may be reflected in the profitability or competitiveness of his company while for an employee, it will be in the work climate, whereas for a customer, it will be the quality of the services provided.

"Performance has become an even more complex concept to understand because it seems difficult today to score well on all criteria at the same time."[11]

Performance is an evolving concept, the components of performance change over time, with internal evaluation criteria and those defined by the environment modifying. Thus, factors that determine the success of a company during an innovation phase can turn out to be incompatible with those required during a development phase.

"We must admit that there are combinations of human, technical, financial and organizational factors that are effective in a given context and are no longer effective in others; these combinations are multiple and change over time"[12].

Performance is manageable. Taking a comprehensive and systematic view that considers all relevant aspects of performance, not just a narrow or single-dimensional view to performance, many authors propose to managers a framework for understanding the company that includes indicators that complement each other, shed light on each other and are linked to multiple objectives.

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[10] SAULQUIN, (J.Y) : *« Gestion des ressources humaines et performance des services »,* In revue gestion des ressources humaines, n°36, juin 2000, p.20.

[11] MORIN, GUINDON, BOULIANE, « *Mesurer la performance de l'entreprise »*, In encyclopédie de gestion, édition DALLOZ, Paris, 1996, p.66.

[12] GHARBI, (J) : « Pilotage stratégique et émergence du sens : du réel à l'action », In revue gestion des ressources humaines n°35, Mais, 2000, p.37.

"Financial criteria alone complement the first [non-financial] criteria; they are the engine of future success; they provide managers with an indispensable holistic view of performance in several areas simultaneously."[13]

3 Distinction between performance management and other notions

Due to its polysemic nature, performance is generally confused with several other notions such as:

Effectiveness

Many authors have studied the concept of effectiveness, because it is one of the cornerstones of the approach to evaluating the performance of an organization. (Commercial or noncommercial).

Effectiveness can be defined as "the ratio between the results achieved by a system and the intended objectives. Therefore, the closer the results are to characterizing the performance of a system."[14]

Here is a summary of the effectiveness concept according to the following formula presented in the text:

Effectiveness = (Actual results obtained / Intended objectives) * 100

Efficiency

According to **DE BOISLANDELLE**, efficiency "expresses the ratio between the intended objectives and the means engaged to achieve them"[15].

[13] SAULQUIN, (J.Y), Op.cit., p.21.

[14] DE BOISLANDELLE, (H .M) : « Dictionnaire de gestion, vocabulaire, concepts et outils », édition ECONOMICA, Paris, 1998, pp.318-319.

[15] DE BOISLANDELLE, (H.M), Op.cit., p.140.

Efficiency is therefore interested in the quantity of factors used (number of machine hours, number of working hours, costs of intermediate consumption entering into production, etc.) to achieve the objectives set by the organization.

Efficiency = (Results obtained / Means implemented) *

Sustainability

3.2.1 Definition

"The concept of sustainability whose root is based on the Latin word "sustenere" is defined in different ways in the literature. Sustainability is the careful use of resources in agriculture, tourism, architecture, business, and the economy"[16].

So, sustainability was firstly defined as ensuring that development occurs in a way that is responsible and does not deplete natural resources or harm ecosystems.

Sustainability in terms of businesses is to evaluate economic expectations in a balanced way with environmental and social sensitivities. Therefore, businesses are responsible not only to their shareholders or investors but also to all stakeholders and include the concept of sustainability into management policies"[17].

Sustainability means operating in a way that is environmentally and socially responsible, while also remaining profitable and economically viable in the long term.

"Corporate sustainability is often viewed as a cost center, a drag on performance. But our research shows that it is a vital source of innovation, growth, and opportunity." [18]

[16] Shifting Paradigms for Sustainable Development: Implications for Management Theory and Research Thomas N. Gladwin, James J. Kennelly and Tara-Shelomith Krause. 1995, p. 877.

[17] Kıymet Tunca Çalıyurt. New Approaches to CSR, Sustainability and Accountability,Volume WE. 2019, p.47

[18] Harvard Business Review, "The Comprehensive Business Case for Sustainability", 2016

By contrast, integrating sustainability into the core business strategy recognizes that sustainability is not just about compliance or reputation management, but about creating longterm value for all stakeholders. It involves identifying and addressing environmental and social risks and opportunities, and making sustainable practices an integral part of the organization's operations and culture.

3.2.2 Sustainability measurement

"*In the concept of triple bottom line, it is stated that economic sustainability in the short term can bring success but it will not be sufficient in the long run alone. Social and environmental sustainability is also important for long-term success in economic sustainability*"[19].

3.2.2.1 The Triple Bottom Line:

(TBL) is a framework that was developed to help organizations measure and report their sustainability dimensions: economic, environmental, and social. The TBL framework was first introduced by John Elkington in 1994 as a way to shift the focus of organizations from a single bottom line (financial performance) to a more comprehensive and sustainable approach that takes into account the impact of their activities on people, planet, and profit.

The three dimensions of the Triple Bottom Line are often referred to as the "3Ps": People, Planet, and Profit. The economic dimension (Profit) measures the financial performance of the organization, such as revenue, profit margins, and return on investment. The environmental dimension (Planet) measures the impact of the organization's activities on the natural environment, including factors such as greenhouse gas emissions, water and energy consumption, and waste generation. The social dimension (People) measures the impact of the organization's activities on people, including factors such as employee well-being, community engagement, human rights, and diversity and inclusion."[20].

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[19] Besler "What could Entrepreneurship do for Sustainable Development? A Framework for Developing Sustainability Business Models" the University of Lüneburg Working Paper Series in Economics 2009, pp. 1–3.

[20] https://www.wbcsd.org/Sector-Projects/Cement-Sustainability-Initiative/Resources/Triple-Bottom-LineReporting. (02/21/2023 at 9pm).

The following table is the list of indicators of each bottom line of the framework:

Table 1: Triple bottom line framework

The bottom line	Indicators
Profit	Personal income Cost of underemployment Establishment churn Establishment sizes Job growth Employment distribution by sector Percentage of firms in each sector Revenue by sector contributing to gross state product
Planet	Sulfur dioxide concentration Concentration of nitrogen oxides Selected priority pollutants Excessive nutrients Electricity consumption Fossil fuel consumption Solid waste management Hazardous waste management Change in land use/land cover
People	Unemployment rate Female labor force participation rate Median household income Relative poverty Health-adjusted life expectancy

Source : https://www.ibrc.indiana.edu/ibr/2011/spring/article2.html. (2/21/2023. At 11pm)

3.2.2.2 Sustainability reporting:

Organizations can use sustainability reporting frameworks such as the Global Reporting Initiative (GRI) to report on their sustainability performance.

"The GRI is a leading organization in the field of sustainability reporting, providing a framework for companies to report on their sustainability performance. The GRI framework includes a set of guidelines and indicators for reporting on economic, environmental, and social issues, allowing

companies to communicate their sustainability performance in a standardized and transparent way. The GRI framework is widely used by companies across sectors, enabling stakeholders to compare sustainability performance across companies and industries."[21]

3.2.2.3 Sustainability indices:

Sustainability indices are benchmarks (standards or reference points against which other things can be measured or compared) that assess the sustainability performance of companies or funds. These indices reflect the growing interest among investors, stakeholders, and society in general, in understanding the sustainability practices of companies.

In general, sustainability indices are constructed using a set of sustainability metrics or criteria, such as greenhouse gas emissions, energy and water consumption, labor practices, and human rights.

[21] Schramm, C. (2018). Sustainability Accounting and Reporting. Journal of Economic Surveys, 32(2), 335-357.

Section 2: Industrial performance management

Industrial performance results from the technological performance of companies but also from the performance of their production systems.

The issue of measuring industrial performance is one of the major concerns of leaders of modern industrial companies. In this section, we will therefore address the usefulness of measuring industrial performance, the different indicators to take into account and finally, the tools for measuring it.

1 The usefulness of measuring industrial performance:

The concept of performance occupies a central place in control mechanisms.

Traditionally, management controllers base their work on measurements of various factors, whether quantitative or qualitative, in order to assess the performance of their organization.

The concept of industrial performance is multidimensional, as it involves financial, organizational, operational and human concepts.

Improving industrial performance is a major concern in view of today's challenges:

- Reduce production costs.
- Reduce waste and rejects.
- Implement continuous improvement dynamics.
- Reduce production lead times.

Industrial performance today is based on the triptych Quality - Costs - Deadlines.

It is by achieving the best possible combination of these three elements that the company progresses and remains, therefore, competitive in its market.

Measuring industrial performance makes it possible to evaluate the contribution of production plants to the overall performance of the company. This is why measuring it has become essential nowadays for any industrial company.

Industrial performance can be seen from a dynamic angle, indeed, to be high performing is to face some latent problems within production units: lack of flexibility and responsiveness, waste, lack of quality control or inefficiency of equipment.

Two axes should be considered to measure performance:

- Instant performance.
- Potential performance.

1.1 Instant performance

It can be measured using simple tools for example:

- Productivity.
- Profitability.

- Competitiveness.

These metrics must be based on the company's actual results during the given period.

1.2 Potential performance

It includes new products launched - innovations - or new technologies. Performance is not limited to what the company has achieved, but also includes what it plans to do. The industrial performance of a highly innovative company will therefore be higher than that of a less innovative company.
Improving it involves reducing product launch times, making investments more efficiently, or improving processes.
It should be noted that current performance and potential performance cannot be completely dissociated, these 2 notions are intertwined and contribute to improving each other.

Performance is the level of results obtained through the operation of the production plant, it is measured through two concepts: effectiveness which sanctions the level of results achieved compared to objectives and efficiency which measures the result obtained in relation to the resources used and their combination.
The management controller must have relevant tools and indicators allowing him to measure the performance of production lines and industrial equipment.

The difficulty therefore lies in properly responding to the challenge of measurement, which is to identify few, simple, reliable and relevant indicators.

2 Indicators of performance management:

For industrial companies, controlling production processes and flow traceability are two factors that they cannot neglect in order to gain reactivity and visibility on production and inventories. The industrialist must be able to flexibly and quickly adapt to processes to ensure an effective execution of operations.
To ensure control of processes and flows, managers must have decision support tools, which are none other than indicators, because without them it would be impossible for them to:

- Measure performance
- Be reactive in achieving objectives

- Follow the evolution of performance.

To determine the indicators that a process must follow, it is necessary to ask yourself different questions:

- What are the objectives of the process?
- What allows evaluating the performance of the process?
- How is the measurement done?

An indicator is only useful if it is well exploited. It is therefore necessary not to try to follow too many indicators per process. Thus, it is preferable to favor quality over quantity.

The indicators that can be found in an industrial environment are numerous, the main ones are listed in appendix n°1.

In summary, the key points are:

- Controlling processes and traceability are critical for industrial companies to gain agility and visibility.
- Flexibility and reactivity in adapting to processes ensures effective execution
- Managers need decision support tools like indicators to measure performance,

react to objectives and monitor performance evolution.

- Determining relevant process indicators requires clarifying objectives, performance evaluation and measurement methods.

Too many indicators per process should be avoided; a few high-quality indicators are preferred.

Different types of industrial indicators exist, covering aspects like quality, costs, delays, productivity, etc.

The figure below is an extract of them.

Table 2 non-exhaustive list of KPIs for an industrial company

Subject	KPIs	Formula
The return	Rate of return	Current value – initial value / initial value) X 100
	Return on assets	Net income / average value of total assets
Production	volume	∑products manufactured during a specified time frame
	downtime	∑all downtime during a specified time frame
	costs	Direct labor cost + direct material cost + overhead costs
Effectiveness	Overall equipment effectiveness	OEE= Performance (full capacity work time percentage) x quality (units produced as a percentage of all the units started) x availability (actual production time from the scheduled one to operate)
	Overall operations effectiveness	OOE=Performance x quality x availability (actual production time from operations time including maintenance)
	Total effective equipment performance	TEEP= Performance x quality x availability (production time as a percentage of total time if the plant were running for 24 hours a day, 365 days a year.)
Capacity	Capacity utilization	(Total capacity used during a specific time frame / total available production capacity) X 100
Process	Defect density	∑of defective units / total units produced
	First time right	∑good units / total number of units in process
Delivery	On time delivery	On-time units delivered / total delivered units
Cost	Maintenance cost	Total maintenance costs in a specific time frame /∑ of products produced during the same time frame
	Unit cost	Variable costs + fixed costs / total units produced
Employee	Revenue per employee	Total revenue in a given period / (∑of full-time employee equivalents at beginning of period + ∑of fulltime employee equivalents at end of period/2)
	Profit per employee	Net income for a given period / (∑of full-time employee equivalents at beginning of period + ∑ of full-time employee equivalents at end of period/2)
Inventory	Inventory turns	Cost of goods sold (COGS) / average inventory during a specified time frame
Asset	Asset turnover	Net sales / average total asset value

Source:https://www.netsuite.com/portal/resource/articles/erp/manufacturing-kpis-metrics.shtml

(02/24/2023, at 9pm)

3 Tools of measurement of performance management

Several tools allow for the evaluation and measurement of the company's industrial performance management system. These tools can be grouped into three categories:

- **Forecasting tools:** These allow studying future opportunities and avoiding threats. They help predict future performance.
- **Monitoring and control tools:** These determine gaps and corrective actions by comparing results to objectives. They help track performance against targets.
- **Support tools:** These observe performances and provide explanations for them. They provide insights into why certain results were achieved.

3.1 Forecasting tools

The most used and important forecasting tools are the plan and the budget.

3.1.1 The Plan

Planning is organized as a set of forecast information, grouped into action plans. We find:

3.1.1.1 The strategic plan

A strategic plan is a synthetic and confidential document that summarizes in a few pages, in a clear and concise way, the long-term choices (on average 5 to 10 years) of the company. It concerns the vocation of the company, i.e., the business it intends to practice, its overall objective and the strategy it has retained.

3.1.1.2 The operational plan:

Operational plans represent the practical ways of implementing the company's strategy. They translate it by setting up action plans, defining responsibilities and allocating financial, human and technical resources. The operational plan, the horizon of which generally does not exceed three years, is sometimes subdivided into several partial plans: investment plan, financing plan and human resources plan.

3.1.2 The budget

The budget is an essential tool for management control, it breaks down the plan according to an annual horizon and a precise financial accounting schedule.

Budget follow-up, a crucial step following the preparation of the budget, is linked to monthly reporting, it compares the monthly realization and the cumulative value on an annual basis, to the monthly budget and the planned cumulative, in order to determine a percentage of achievement and to determine deviations from forecasts.

Deviations concerning objectives of activities, income, expenses or investments are systematically analyzed to determine the cause and to take corrective measures.

3.2 Monitoring and control tools

Among the monitoring and control tools, we find general accounting, management accounting, financial reporting and scorecards.

3.2.3 General accounting

Accounting is the company's vision organ; it must make it possible to know at any time the company's situation. It accounts for the results of a period (Income Statement) or the asset situation at the end of the period (Balance Sheet).

Accounting allows analyzing operating conditions with a view to reducing or even eliminating facts and losses of the company and improving the various sources of income, providing clear and precise information necessary for management, and complying with legal and tax obligations.

A simple, clear accounting system, which is closest to the company's real situation, is a powerful management tool; it also represents an indicator of good management.

Management accounting

Management accounting is a part of the company's management information system, whose primary role is to assist managers and operational staff in defining relevant objectives and achieving them. To this end, it attempts to model the functioning of the company by identifying the links between its economic resources and the purposes for which they are gathered and consumed.

The main objective of management accounting is to serve as a tool for measuring the company's performance.

3.2.4 Financial reporting

Reporting can be defined as "the common core of economic, financial and management information that links decentralized entities to their coordination center." [22]

Reporting is the process of gathering information from various entities within a company and transmitting it to the financial and general management teams for the purpose of management analysis.

Consisting of accounting and financial indicators, reporting includes measures of revenue, profit, balance sheet items, as well as key financial ratios, typically on a monthly basis.

Reporting provides a summary of the performance of a company's activities, thus enabling centralized monitoring of results, analysis, and coordination of corrective actions.

3.2.5 The dashboard

A dashboard "is a set of indicators, few in number, designed to provide managers with significant information for the management of their activities."[23]

Managing activities is a challenge for companies, and this is done through the use of a dashboard.

Improving results is a concern for any organization, and therefore the objectives of management can be different but complementary:

Optimizing production methods through better monitoring of processes and procedures.

Having reliable information to inform decision-making.

A management dashboard "combines financial and non-financial indicators, limits the number of indicators, and allows for anticipating results by making decisions in a timely manner."[24] The

[22] P.L. BESCOS, P. DOBLER, et Alii : « Le Contrôlé De Gestion Et Management Montchrestien », 4ème édition, Paris, 1997, p364.

[23] Dayan ARMAND : « *Manuel de gestion volume 1 »*, Edition Ellipses, Paris, 1999, p850

[24] Charles HORNGREN, Alnoor BHIMANI et autres : « *contrôle de gestion et gestion budgétaire », Pearson* éducation, 3eme édition. Paris, P102.

dashboard must clearly present the situation of the activity it controls. "When designing the dashboard, the principle of a single glance should always be kept in mind. Decision-makers have no time to waste, and essential information should be perceptible without unnecessary manipulation." [25] It corresponds to an information system that allows for knowing, at all times and as quickly as possible, the essential data to control and measure the company's short-term progress, thus facilitating the exercise of responsibilities.

The figure below represents a comparison between management dashboards and accounting tracking tools.

Table 3 Characteristics of management dashboards compared to accounting tracking tools.

Accounting tracking tools	Management dashboard
Exclusively financial information	Include non-financial or even nonquantifiable data
Exclusively produced internally	Possibility to include external information
Standard content for all managers	Content adapted to different managers
Typically, monthly frequency	Frequency tailored to the managers' action possibilities
High amount of data, detailed and exhaustive tools	Very few data, focused on relevant and important points, allowing for action
Often presented in a dull manner	Concern for attractive and effective presentation
Difficult to evolve	Light and adaptable
Slow in obtaining information	Quick to obtain

Source : Loning (H), Malleret (V) et alii : « *Le contrôle de gestion : organisation, outils et pratiques* », éditions DUNOD, 3eme édition, Paris 2008. P146. Therefore, the dashboard is:

- An instrument created according to the needs of its user.

[25] Alain FERNANDEZ : *les nouveaux tableaux de bord des décideurs,* éditions d'Organisation, Paris, 2000 ; P91

- ✦ A device for synthesizing essential information for quick decision-making in the short term.
- ✦ A revealer of problems that the company may encounter.

3.2.6 The sustainability balanced scorecard

The Sustainability balanced scorecard is a management tool that helps organizations integrate sustainability into their business strategy by identifying, measuring, and managing the economic, social, and environmental impacts of their activities."[26]

A sustainability scorecard is a tool that organizations can use to measure and track their environmental, social, and economic performance over time. It provides a framework for reporting on key sustainability indicators.

> "The SBSC differs from the BSC in its architecture by explicitly recognizing environmental and social objectives and performance measures" [27].

The traditional Balanced Scorecard (BSC) primarily focuses on financial and operational performance measures, such as revenue, profit margins, customer satisfaction, and efficiency. While these measures are important for an organization's success, they do not necessarily reflect the organization's impact on the environment and society. The Sustainable Balanced Scorecard stands apart from by explicitly acknowledging and incorporating performance measures and objectives related to environmental and social factors, in addition to the conventional financial and operational measures.

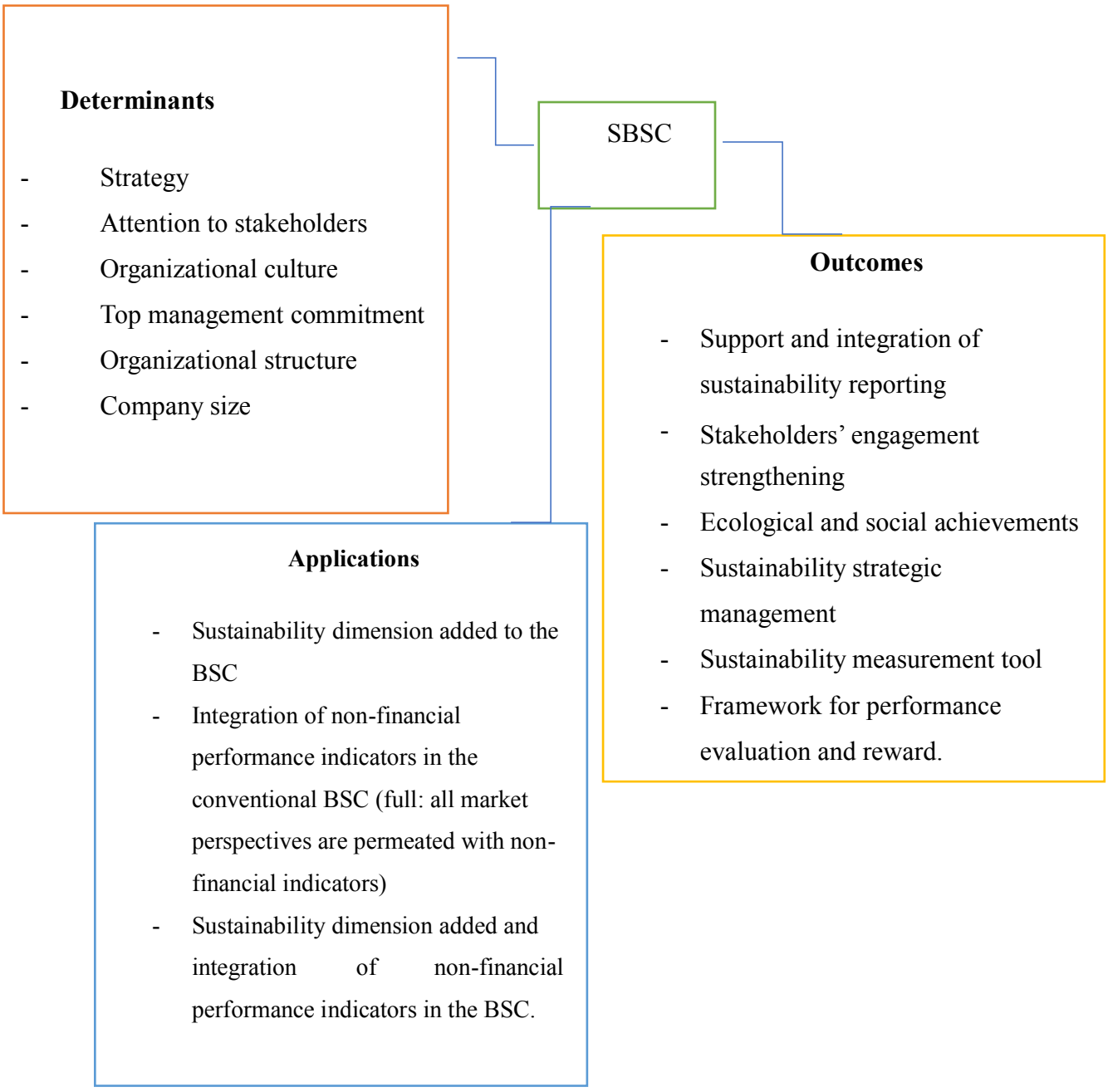
[26] Eccles, R. G., & Serafeim, G. (2013). The Performance Frontierin Socially Responsible Investing. Harvard Business Review, 91(9), 50-60

[27] Figge et al. (2002) Sustainability balanced scorecards and their Architectures: Irrelevant or Misunderstood? Erik G. Hansen and Stefan Schaltegger, Journal of Business Ethics
Vol. 150, No. 4 (July 2018), pp. 937

The figure below illustrates the SBSC use: main determinants, applications and outcomes.

SBSC, sustainability balanced scorecard:

Figure 1.1: The Sustainability balanced scorecard use.



Source: Chiara Mio, Antonio Costantini, Silvia Panfilo, Performance measurement tools for sustainable business: A systematic literature review on the sustainability balanced scorecard use. P.380.

Hence the SBSC is:

- Customized according to the company's structure and strategy

- A tool that provides a concise and synthesized view of relevant data points, allowing the organization to make informed decisions quickly, while also supporting the development of long-term strategic plans and goals.
- A mechanism that allows for evaluating and measuring the company's performance.

3.3 The support tools

In addition to forecasting and tracking tools, support tools are used for the management and measurement of a company's industrial performance. These include:

3.3.1 Benchmarking:

Kearn defines benchmarking as "a continuous process of evaluating a company's products, services, and methods compared to companies recognized as leaders in a given sector." Benchmarking can also be defined as a process of evaluating and improving performance.

There are several families or types of benchmarking, the main ones being:

- **Internal benchmarking:** comparing processes, products, and services within the same company.
- **Competitive benchmarking:** comparing a company to the leaders of its competitors in the industry.
- **Generic benchmarking:** comparing companies in different industries but with similar processes.
- **Functional benchmarking:** comparing a value-generating function common to non-competing companies but belonging to the same industry.

Process benchmarking: highlighting the specificity of the leader's key process in the company's field of activity.

Conclusion

In the context of improvement, new tools have emerged, such as the Sustainable Prospective Dashboard, which gained widespread adoption in America, Europe, and Asia at the end of the last century. This tool, also known as the Sustainability Balanced Scorecard, will be the focus of our second chapter.

Chapter II: Sustainability Balanced Scorecard

The emergence of the SBSC (Sustainability balanced scorecard) can be attributed to the increasing recognition of the significance of sustainability and the environmental and social impacts of business operations. Companies came to the realization that relying solely on financial performance metrics was inadequate in assessing their long-term success, and that they needed to factor in environmental and social considerations to ensure their long-term viability. In this second chapter, we will first discuss general aspects of the balanced scorecard and then shift our focus to its development modalities.

Section 1: Fundamentals of the sustainability balanced scorecard

In this section we will become acquainted with the concept of the balanced scorecard by revisiting its origins, examining some of its definitions, and finally, citing its main functions.

1 The origin of the sustainability balanced scorecard

"The use of the sustainability indicators and qualitative analysis could contribute to the survival and growth of a company in the long term, improving its performance"[28].

Recognizing the positive correlation between sustainability and a company's performance, economists have suggested the use of a sustainability metrics and qualitative analysis to manage the long-term sustainability and growth of a corporation, thereby enhancing its overall performance.

Kaplan and Norton introduced the concept of the SBSC in their 2001 book "The Strategy Focused Organization: How Balanced Scorecard Companies Thrive in the New Business Environment." Since then, the SBSC has been widely adopted by organizations looking to integrate sustainability into their strategic decision-making processes.

[28] Brown, D. Organizational Culture, 2nd ed.; Financial Times/Prentice Hall: Callaghan, Australia, 1998; p. 336.

"*Companies are recognizing that their success is increasingly dependent on their ability to operate in a sustainable manner – that is, to manage their economic, social, and environmental impacts effectively. The sustainability balanced scorecard (SBSC) is a framework that enables*

companies to translate their sustainability strategies into action. The SBSC builds on the traditional balanced scorecard framework, which has gained widespread acceptance as a tool for communicating and implementing strategy. By expanding the framework to include sustainability performance measures, the SBSC provides a comprehensive view of a company's performance that includes economic, social, and environmental dimensions. The SBSC represents a powerful tool for companies looking to integrate sustainability into their strategic decision-making processes and to create long-term value for all stakeholders".[29]

The origins of the Sustainability balanced scorecard can be traced back to the 2000s, when Kaplan and Norton suggested to companies and organizations integrating sustainability metrics into the BSC framework.

"Modifications to the original BSC that explicitly consider environmental and social issues are often referred to as the Sustainability balanced scorecard (SBSC)"[30]

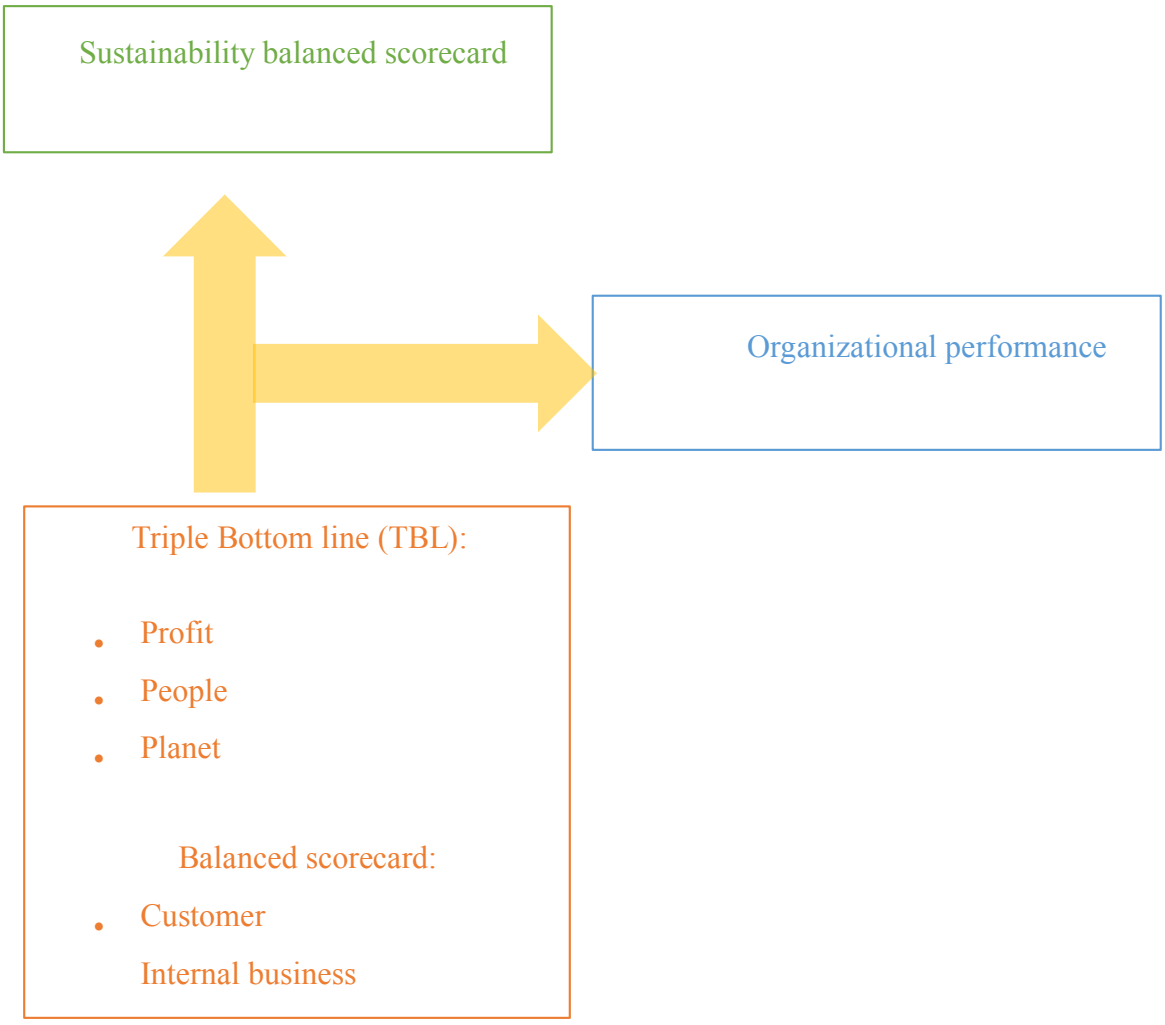
Many organizations have developed their own Sustainability balanced scorecards (SBSC) based on the Balanced Scorecard (BSC) framework. The original BSC framework developed by obert Kaplan and David Norton has been widely adopted by organizations around the world as a tool for aligning their strategic objectives that include sustainability, with their operational activities and measuring their performance.

The following figure represents a conceptual framework of Sustainability balanced scorecard that was conceptualized as the aggregation of the sustainability and BSC:

[29] Kaplan and Norton, "The Strategy-Focused Organization: How Balanced Scorecard Companies Thrive in the New Business Environment.", 2001, p. 154.

[30] Hansen, E.; Schaltegger, S. The sustainability balanced scorecard: A systematic review of architectures. Bus. Ethics 2016, 133, 193–221.

Figure 2 The conceptual framewok of SBSC fron the TBL.



Source: A conceptual framework of sustainability balanced scorecard to enhance the performance of shared service center. Article in Asian Journal of Accounting Perspectives. August 2022. P 75

The framework is expected to provide evidence to support the relationship between SBSC and the performance.

The figure also explains the origin of the sustainability balanced scorecard (SBSC) that can be traced back to the combination of two frameworks - the balanced scorecard (BSC) and the triple bottom line (TBL).

The sustainability balanced scorecard here, comprises of six perspectives including profit (economy), people (social), planet (environment), customer, internal business, and innovation and learning, will be used to manage organizational performance. However, in the conceptual framework illustration, the financial perspective is not shown as it is included in the profit dimension of sustainability.

2 Definitions of the sustainability balanced scorecard

"The SBSC has been used in the manufacturing sector as a tool for measuring and reporting on sustainability performance. By tracking and reporting on sustainability performance indicators across the four perspectives of the SBSC, companies can identify areas for improvement and take action to optimize their sustainability performance"[31].

"The SBSC is a business approach that creates and sustains the long-term value of a company by embracing opportunities and managing risks from three dimensions: the economic, environmental, and social perspective"[32].

"The Sustainability balanced scorecard (SBSC) is a management tool that provides a framework for integrating sustainability into the overall strategic decision-making process of an organization. The SBSC incorporates sustainability performance indicators into the traditional Balanced Scorecard (BSC) framework, which has become widely accepted as a tool for communicating and implementing strategy"[33].

[31] "Sustainability performance measurement and reporting in the manufacturing sector: A literature review" by Sandra Rothenberger, Stefan Schaltegger, and Dorli Harms. 2014 article.

[32] Lo, S.; Sheu, H. Is corporate sustainability a value-increasing strategy for business? Corp. Gov. Int. Rev. 2007, 15, 345–358.

"The Sustainability balanced scorecard is a useful tool for integrating sustainability into internal decision-making processes. It enables companies to track and measure their environmental, social, and economic impacts, and to use this information to make more sustainable business decisions"[33].

Drawing on the previous definitions, we define the Sustainability balanced scorecard as follows:

The Sustainability balanced scorecard is a management tool that combines sustainability performance metrics with the traditional Balanced Scorecard (BSC) framework, which is widely used for strategic communication and implementation. By tracking and scoring the environmental, social, and economic impacts from different perspectives within the SBSC framework, organizations can identify areas for improvement and make sustainable business decisions that steadily create value while managing risks.

The SBSC is a performance measurement and reporting system that integrates sustainability into an organization's overall strategic decision-making process.

3 Functions of the sustainability balanced scorecard

The Sustainability balanced scored card: "*was chosen precisely to reflect the balance sought between short- and long-term goals, financial and non-financial indicators, lagging and leading indicators, and finally, between external and internal performance*"[34]

The SBSC provides a prospective view of the organization's performance, taking into account two types of indicators are systematically defined, in accordance with the needs of responsive management:

- Lagging (result) indicators, to measure the effectiveness of an action taken.
- Leading (process) indicators, to monitor short-term improvements.

[33] Article "*Creating Shared Value*" by Michael E. Porter and Mark R. Kramer (January-February 2011) issue of the Harvard Business Review.

[34] KAPLAN (R.S), NORTON (D.P): «*The Balanced Scorecard: Translating Strategy into Action.* » 1996 edition. P08.

"*The SBSC can be used to guide the development and implementation of a sustainability strategy, as well as to monitor and report on sustainability performance over time. By using the SBSC to align sustainability initiatives with overall business objectives, companies can create long-term value for all stakeholders"*[35].

The Sustainable Balanced Scorecard promotes sustainability by including two types of indicators, environmental and social, for each perspective.

"The SBSC provides a more complete view of a company's performance that includes economic, social, and environmental dimensions. By measuring and tracking sustainability performance indicators across the four perspectives of the SBSC – financial, customer, internal business processes, and learning and growth – companies can identify areas for improvement and take action to optimize their sustainability performance"[36].

The SBSC delivers a balanced view of an organization's performance that takes into account a range of factors, including both financial and non-financial measures, and both short-term and long-term goals. It also considers the needs and interests of both direct and indirect stakeholders, such as customers, employees, suppliers, shareholders, and the broader community.

[35] "Sustainability balanced scorecard: A Tool for Effective Implementation of Sustainability Strategy" by Ahmed Z. Gowayed and Ahmed M. Abdel-Maksoud. 2008 article titled. Op,cit

[36] "Sustainability balanced scorecard: A Tool for Effective Implementation of Sustainability Strategy" by Ahmed Z. Gowayed and Ahmed M. Abdel-Maksoud. 2008 article.Op.cit

The figure below illustrates the functions mentioned above.

Figure 3: The Sustainability balanced scorecard Framework for Dutch SMEs

Source: University of Twente Article: "The use of the Sustainability balanced scorecard Framework for Dutch SMEs as a tool for measuring the performance of their sustainability strategy Author: Shanon Boerrigter."2015.

We conclude that the main functions are the following:

- **Communicating the strategy**

Here are some ways in which the SBSC can communicate strategy:

- **Clear articulation of sustainability vision and mission:** The SBSC can be used to clearly articulate the organization's sustainability vision and mission, and to communicate how these are integrated into the overall organizational strategy.
- **Identification of sustainability objectives and targets:** The SBSC can be used to identify specific sustainability objectives and targets, and to communicate how these are aligned with the organization's overall performance goals.
- **Performance monitoring and reporting:** The SBSC can be used to monitor and report on sustainability performance, and to communicate progress towards achieving sustainability objectives and targets.
- **Stakeholder engagement:** The SBSC can be used to engage stakeholders in the organization's sustainability.

- **Aligning actions with strategic goals**

The Sustainability balanced scorecard (SBSC) can help align actions with strategic goals by providing a framework for identifying and prioritizing sustainability-related actions that support the organization's overall mission and vision. Here are some ways in which the SBSC can support alignment of actions with strategic goals:

- **Linking sustainability objectives to strategic goals:** The SBSC can be used to identify specific sustainability objectives and targets that are aligned with the organization's overall strategic goals. This can help ensure that sustainability-related actions are directly tied to the organization's mission and vision.
- **Prioritizing sustainability-related actions:** The SBSC can be used to prioritize sustainability-related actions based on their potential impact on the organization's strategic goals. This can help ensure that resources are allocated to those actions that are most likely to support the achievement of strategic objectives.
- **Developing action plans:** The SBSC can be used to develop targeted action plans that outline specific steps and timelines for achieving sustainability-related objectives. This

can help ensure that sustainability-related actions are well-organized and well-coordinated, and that progress towards achieving strategic goals is monitored and reported on a regular basis.

- **Monitoring and reporting on sustainability performance:** The SBSC can be used to monitor and report on sustainability performance, and to communicate progress towards achieving sustainability-related objectives and strategic goals. This can help ensure that sustainability-related actions are aligned with strategic goals, and that progress towards achieving those goals is transparently communicated to stakeholders

- **Measuring performance**

The Sustainability balanced scorecard (SBSC) can be used to measure performance by providing a framework for identifying and tracking key performance indicators (KPIs) that are aligned with the organization's sustainability objectives and strategic goals.

Here are some ways in which the SBSC can be used to measure performance:

- **Defining KPIs:** The SBSC can be used to define specific KPIs that are aligned with sustainability-related objectives and strategic goals. These KPIs can be both quantitative and qualitative, and can include measures of financial performance, environmental impact, social impact, and governance.
- **Setting targets:** The SBSC can be used to set specific targets for each KPI, based on the organization's sustainability-related objectives and strategic goals. These targets can be both short-term and long-term, and can be adjusted over time to reflect changes in the organization's priorities and performance.
- **Tracking performance:** The SBSC can be used to track performance against each KPI and target, and to report progress on a regular basis. This can help identify areas where performance is lagging, and where additional action may be needed to improve sustainability outcomes.
- **Analyzing performance:** The SBSC can be used to analyze performance data and identify trends and patterns over time. This can help identify areas where performance is improving, and where sustainability-related actions are having a positive impact on the organization's overall performance.

- **Reporting performance:** The SBSC can be used to report performance data to internal and external stakeholders, including employees, customers, investors, regulators,

and the broader community. This can help increase transparency and accountability in sustainability reporting and management, and can provide stakeholders with a clear and comprehensive view of the organization's sustainability performance.

- **Providing a structure**

The Sustainability balanced scorecard (SBSC) can provide a framework for organizations by defining a set of metrics and targets that are aligned with the organization's sustainability objectives and strategic goals.

- **Feedback**

The company's leaders must ensure that the strategy has been executed as planned, and subsequently review their assumptions to ensure that the theory guiding their actions remains relevant in light of the achievements, observations, and experience gained by the organization. In order to fully understand the functions of the Balanced Scorecard, it's important to note that this tool does not fulfill all the necessary functions for managing a business:

It's not a substitute for a comprehensive sustainability strategy; it's a tool for implementing and monitoring sustainability goals and objectives.

It doesn't replace the need for ongoing stakeholder engagement and communication; it's a complement to these important activities.

It's not a comprehensive sustainability reporting system; it provides a framework for tracking and reporting on sustainability performance, but additional reporting may be necessary to provide a full picture of a company's sustainability impact.

It's not a one-size-fits-all solution; it must be tailored to the specific needs and goals of each organization.

It's not a replacement for sound sustainability management practices; it's a tool to support and enhance these practices.

It's not a guarantee of sustainability success; it requires ongoing commitment and effort to achieve meaningful sustainability outcomes.

Section 2: Elaboration of a sustainability balanced scorecard

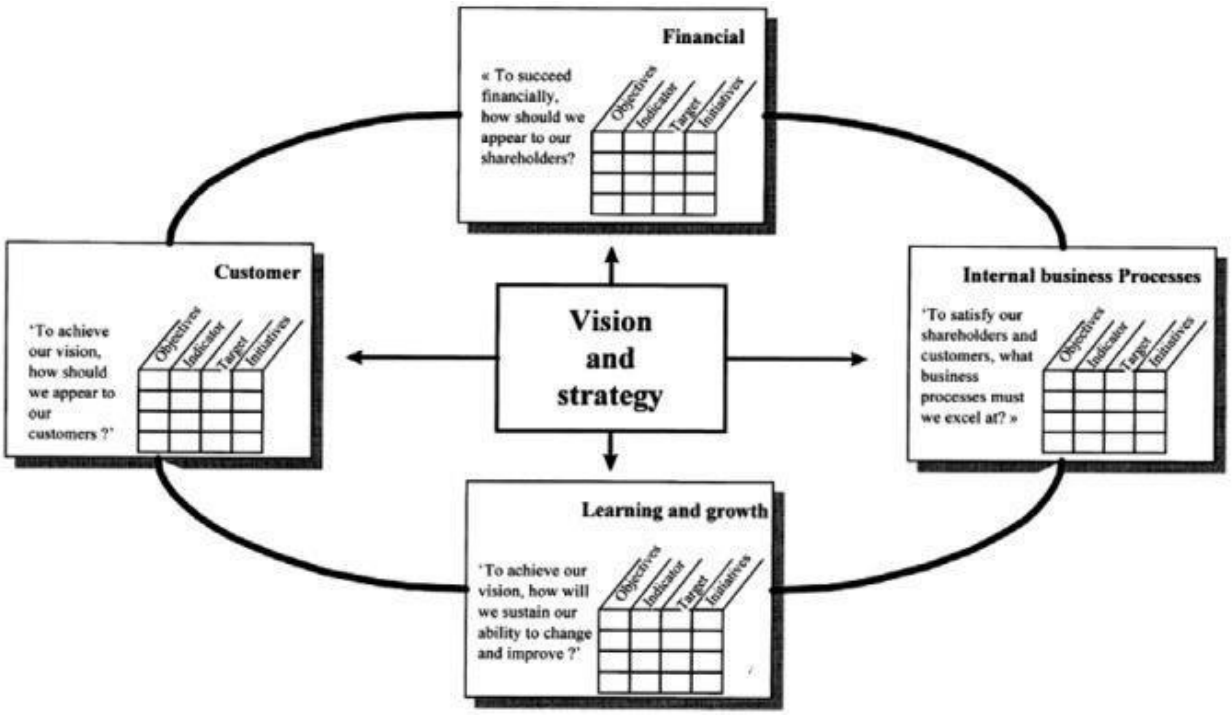
For many years, companies have focused primarily on financial performance as a measure of success, using traditional dashboards to track and report on results. However, in today's rapidly changing business landscape, it's becoming increasingly clear that financial performance is just one aspect of long-term success. To truly thrive and remain competitive over time, companies must consider a broader range of performance indicators, including those related to sustainability, social responsibility, and stakeholder engagement.

In this section, we will introduce the 5 axes that comprise the Sustainability balanced scorecard, discuss the methods for creating such a dashboard, and explore its potential for further development.

1. The axes of the Sustainability balanced scorecard:

As the SBSC is a tool developed to focus on more qualitative aspects and based on the traditional BSC, the following figure illustrates the Balanced Scorecard Framework adapted from Kaplan and Norton (1996):

Figure 4: The 4 perspectives of the Balanced Scorecard



Source: Kaplan (R.S), Norton (D.P): « Using the Balanced Scorecard as a strategic management system », Harvard Business Review, 1996, P 76.

and the figure bellow is a framework for a Sustainability balanced scorecard (SBSC) based on the work of Kaplan and Norton.

In accordance with the diagram, the Balanced Scorecard is composed of 4 perspectives: financial results, customers, internal processes, and organizational learning.

1.1 Sustainable balanced scorecard with 4 perspectives

As introduced in their book "The Strategy-Focused Organization: How Balanced Scorecard Companies Thrive in the New Business Environment" (2001), a sustainability balanced scorecard can be created by adapting the traditional balanced scorecard (BSC) framework. The four perspectives of the traditional BSC (financial, customer, internal processes, and learning and growth) can be modified or expanded to include sustainability-related metrics and goals. **"*Perspective 1: Financial***

Financial performance of sustainable initiatives and investments Cost savings from resource efficiency and waste reduction efforts Revenue from sustainable products and services.

Perspective 2: Customer

Customer satisfaction with sustainable products and services
Customer feedback and engagement with sustainability initiatives
Market share of sustainable products and services ***Perspective 3: Internal Business Processes***

Efficiency of resource use and waste reduction efforts

Development and implementation of sustainable processes and practices

Compliance with environmental regulations and standards

Perspective 4: Learning and Growth

Employee training and development on sustainability issues

Research and development of new sustainable products and services

Development of sustainable partnerships and collaborative initiatives

This framework can be used by organizations to develop a comprehensive view of their sustainability performance, and to integrate sustainability into their strategic decision-making processes. It builds on the traditional Balanced Scorecard framework, which has gained widespread acceptance as a tool for communicating and implementing strategy. By expanding the framework to include sustainability performance measures, the SBSC provides a more complete view of a company's performance that includes economic, social, and environmental dimensions"[37].

Also, **Sandra Rothenberger, Stefan Schaltegger, and Dorli Harms** discussed the use of the four classical perspectives of the BSC to build a sustainability balanced scorecard (SBSC)
Here are a few excerpts from the article:[38]

"*The Sustainability balanced scorecard (SBSC) is a framework for measuring and reporting on sustainability performance that builds on the traditional Balanced Scorecard (BSC) framework.*

[37] Chapter 6: "Managing Strategy in the Face of Uncertainty", and the specific pages where they discuss the SBSC are 154-156.
[38] Sandra Rothenberger, Stefan Schaltegger, and Dorli Harms discussed the use of the four classical perspectives of the BSC to build a sustainability balanced scorecard (SBSC) in their article "Sustainability performance measurement and reporting in the manufacturing sector. A literature review" published in 2014.

The SBSC includes sustainability performance indicators in four perspectives: financial, customer, internal processes, and learning and growth."

"*The financial perspective of the SBSC in the manufacturing sector might include measures of the financial impact of sustainability initiatives, such as cost savings from resource efficiency and waste reduction efforts, and revenue from sustainable products and services*."

"*The customer perspective of the SBSC in the manufacturing sector might include measures of customer attitudes and behaviors related to sustainability, such as customer satisfaction with sustainable products and services, and customer feedback and engagement with sustainability initiatives*."

"*The internal processes perspective of the SBSC in the manufacturing sector might include measures of efficiency, quality, and innovation related to sustainability, as well as measures of compliance with environmental regulations and standards."*

"*The learning and growth perspective of the SBSC in the manufacturing sector might include measures of employee training and development on sustainability issues, research and development of new sustainable products and services, and the development of sustainable partnerships and collaborative initiatives*."

However, it is important to note that there are also other proposed frameworks for building a SBSC, and the specific approach taken may depend on the organization's industry, size, and sustainability goals.

1.2 The sustainability balanced scorecard with 3 perspectives

The Sustainability balanced scorecard framework proposed by Mark McElroy:

"*Economic Dimension: The economic dimension in the SBS framework measures the financial performance of the organization, and includes indicators related to revenue growth, profitability, and risk management. The indicators in this dimension include:*

- *Revenue growth: This indicator measures the extent to which the organization is able to increase its revenue over time, typically as a percentage of the previous year's revenue.*

- *Profitability: This indicator measures the organization's ability to generate profits, typically as a percentage of revenue or investment.*
- *Return on investment: This indicator measures the return on investment for the organization, typically as a percentage of the initial investment.*
- *Financial risk management: This indicator measures the organization's ability to manage financial risks, such as credit or market risks.*
- *Investment in sustainable innovation: This indicator measures the organization's investment in sustainable innovation, such as the development of new products or services that have a positive impact on the environment or society.*

Social Dimension: The social dimension in the SBS framework measures the impact of the organization on society, and includes indicators related to employee well-being, customer satisfaction, and stakeholder engagement. The indicators in this dimension include:

- *Employee satisfaction and well-being: This indicator measures the extent to which employees are satisfied with their work environment, typically through surveys or other forms of feedback.*
- *Customer satisfaction and loyalty: This indicator measures the extent to which customers are satisfied with the organization's products or services, typically through surveys or other forms of feedback.*
- *Stakeholder engagement: This indicator measures the extent to which the organization engages with its stakeholders, such as employees, customers, and communities.*
- *Social responsibility and ethics: This indicator measure the organization's commitment to social responsibility and ethical behavior, such as through the development of codes of conduct or the implementation of socially responsible practices.*

- *Social innovation and entrepreneurship: This indicator measure the organization's investment in social innovation and entrepreneurship, such as through the development of new products or services that have a positive impact on society.*

Environmental Dimension: The environmental dimension in the SBS framework measures the impact of the organization on the environment, and includes indicators related to resource use, pollution, and climate change. The indicators in this dimension include:

- *Energy and water use: These indicators measure the organization's consumption of energy and water, typically as a measure of efficiency or intensity.*
- *Waste reduction and recycling: These indicators measure the extent to which the organization reduces waste and recycles materials, typically as a percentage of total waste generated.*
- *Air and water emissions: These indicators measure the organization's emissions of air and water pollutants, typically as a measure of intensity or compliance with regulations.*
- *Biodiversity and ecosystem management: These indicators measure the organization's impact on biodiversity and ecosystem services, such as through the implementation of conservation practices or the protection of endangered species.*
- *Climate change mitigation and adaptation: These indicators measure the organization's efforts to mitigate climate change, such as through the reduction of greenhouse gas emissions, and its adaptation to the impacts of climate change, such as through the development of resilience strategies*"[39]. -

1.3 The sustainability balanced scorecard with 5 perspectives

While there are no well-known economists who have proposed a five-perspective framework for the sustainability balanced scorecard (SBSC), many companies have adopted a five-axis dashboard and found it to be more relevant and adaptable to their reality.

Environmental Perspective: This perspective focuses on the environmental impact of an organization, including metrics related to resource consumption, waste reduction, pollution, and greenhouse gas emissions. This perspective is important for organizations that want to track and report on their sustainability performance, and demonstrate their commitment to environmental stewardship.

[39] McElroy, M. W. (2001). The sustainability balanced scorecard: Linking sustainability management to business strategy. Sustainable Development, 9(4), 177-190.

Social Perspective: This perspective focuses on the social impact of an organization, including metrics related to community engagement, diversity and inclusion, and social responsibility. This perspective is important for organizations that want to be socially responsible and contribute to the well-being of the communities in which they operate.

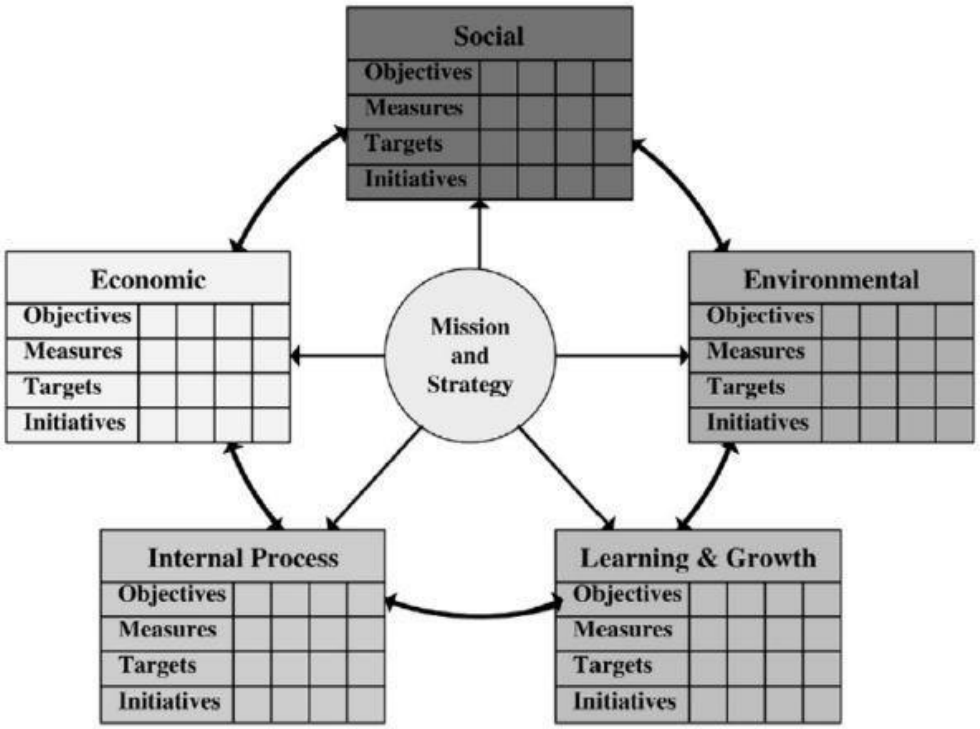
Economic Perspective: This perspective focuses on the financial performance of an organization, including metrics related to revenue growth, profitability, and return on investment. This perspective is important for organizations that want to remain financially sustainable and profitable over the long term.

Learning and Growth Perspective: This perspective focuses on the organization's ability to learn, innovate, and adapt to change, including metrics related to employee training and development, knowledge management, and innovation. This perspective is important for organizations that want to remain competitive and innovative in a rapidly changing business environment.

Internal Processes Perspective: This perspective focuses on the internal processes and operations that drive business performance, including metrics related to efficiency, quality, and continuous improvement. This perspective is important for organizations that want to optimize their internal processes and achieve operational excellence.

Figure above, illustrates the 5 perspectives of the Sustainable Balanced Scorecard

Figure 5: The 5 perspectives of the Sustainable Balanced Scorecard



Source: The general framework of Sustainable BSC adopted from Rabbani et al. (2014).

The economic axis of sustainability is an important aspect of the balanced scorecard framework, which aims to provide a holistic view of a company's performance in a sustainable manner. This axis is composed of three dimensions: organizational, financial, and commercial, which are interrelated and must be carefully balanced in order to achieve sustainable economic performance.

The organizational dimension of the economic axis refers to the internal operations and processes of the company, and how they contribute to its financial and commercial success. This includes aspects such as employee satisfaction, innovation, and productivity, which are critical for the long-term success of the company. According to a study by Berman and Knight, *"Organizational factors*

such as employee engagement and innovation have a significant impact on the financial performance of companies, and are key drivers of sustainable economic growth"[40].

"The financial dimension of the economic axis focuses on the financial performance of the company, including aspects such as profitability, cash flow, and return on investment. This dimension is critical for the sustainability of the company, as it provides the resources needed to invest in the organization and achieve commercial success. According to a study by Kaplan and Norton, financial measures such as revenue growth and return on investment are important indicators of a company's long-term success, and must be carefully balanced with other dimensions of the balanced scorecard framework"[41]

"The commercial dimension of the economic axis refers to the company's relationships with its customers and stakeholders, and how it creates value for them. This includes aspects such as customer satisfaction, brand image, and market share, which are critical for the company's long-term success and sustainability. According to a study by Porter and Kramer, companies that focus on creating shared value for their customers and stakeholders are more likely to achieve sustainable economic growth and competitive advantage. "[42]

In conclusion, the economic axis of sustainability is a critical aspect of the balanced scorecard framework, and its three dimensions - organizational, financial, and commercial - must be carefully balanced in order to achieve sustainable economic performance.

Furthermore, the effectiveness of the balanced scorecard (BSC) does not depend on the number of perspectives used. Instead, it relies on the specific metrics and goals included in each perspective, as

[40] Berman, S. L., & Knight, J. A. (2008). The organizational sustainability journey: Introduction to the special issue. Organization & Environment, 21(4), 367-373.

[41] Kaplan, R. S., & Norton, D. P. (2000). Having trouble with your strategy? Then map it. Harvard Business Review, 78(5), 167-176.

[42] Porter, M. E., & Kramer, M. R. (2011). Creating shared value. Harvard Business Review, 89(1/2), 62-77.

well as the organization's ability to utilize the information gathered through the BSC to inform decision-making and drive improvements.

2 The establishment of a sustainability balanced scorecard framework

"*To implement the SBSC framework, organizations should follow a six-step process:*

- *Define the organization's sustainability strategy and objectives, and identify key stakeholders and their expectations.*
- *Identify the sustainability issues and impacts that are most relevant to the organization, and select the sustainability objectives and measures that are most important.*
- *Develop an implementation plan for the SBSC, including timelines, responsibilities, and resource requirements.*
- *Collect data and establish performance targets for each sustainability objective and measure.*
- *Use the SBSC to monitor and report on sustainability performance, and make adjustments as needed to achieve sustainability goals.*
- *Continuously improve the SBSC framework and sustainability performance over time.*

By following this six-step process, organizations can use the SBSC to effectively measure and manage their sustainability performance, and to achieve their sustainability goals in a systematic and strategic way."[43]

This process can be summarized in three phases:

- The strategic map.
- The sustainable balanced scorecard.

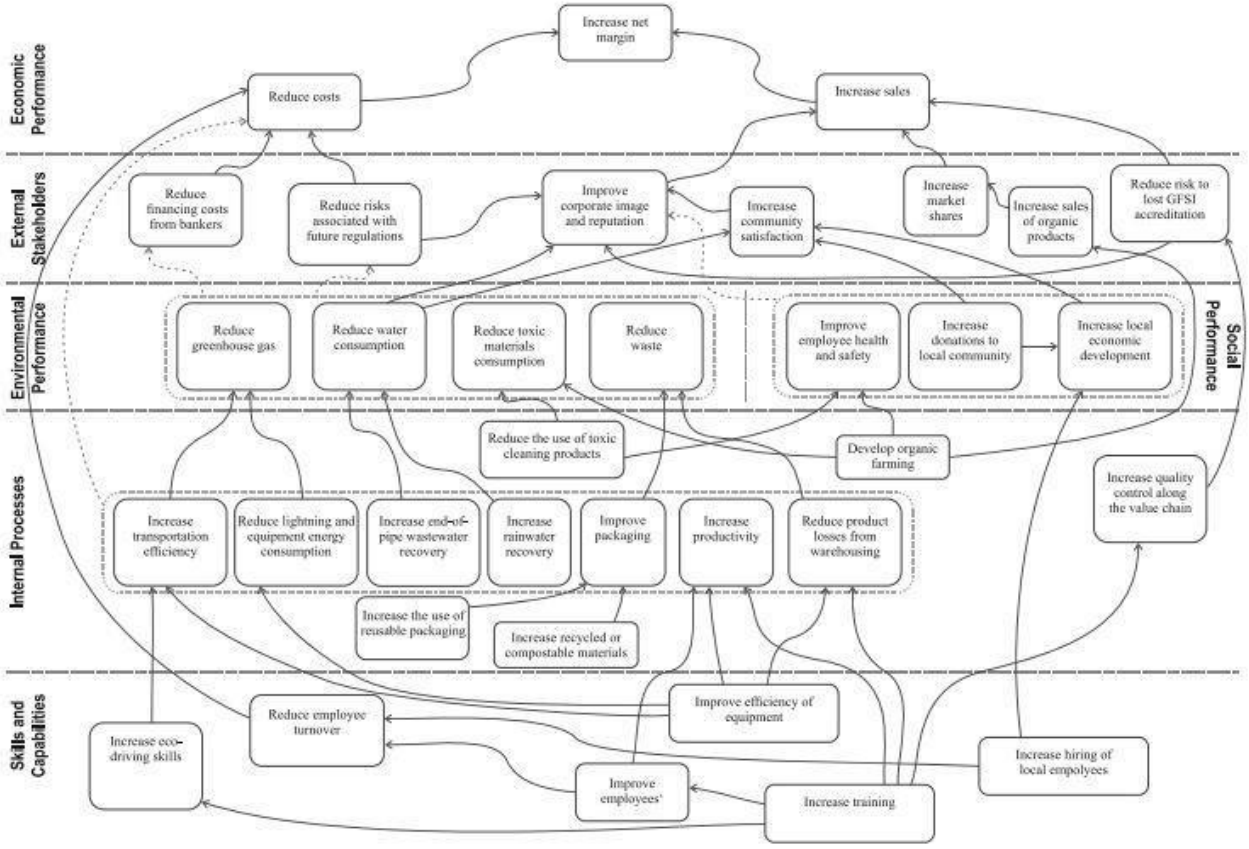
[43] McElroy, M. W., & Lublin, J. S. (2009). The Sustainable Balanced Scorecard: Linking Sustainability Management to Business Strategy. Business Strategy and the Environment, 18(2), 87-102.

- The strategic review and monitoring.

2.1 The strategic map

This involves defining the company's strategy, vision, strategic objectives and lines of action.

Diagram: An example of a sustainability strategy map



Source: Erik G. Hansen and Stefan Schaltegger. Sustainability balanced scorecards and their Architectures: Irrelevant or Misunderstood? 937-952. P941.

Overall, a strategy map serves as a powerful tool for companies to develop and communicate their strategic vision, align organizational goals, and track progress towards achieving their strategic objectives.

2.2 Implementing the sustainable balanced scorecard

this involves operationalizing the strategy by identifying key performance indicators and ensuring that social and environmental issues are integrated and so this second phase aims to:

- Identify the indicators that will be used to evaluate achievements.
- Set performance objectives and the necessary deadlines to achieve them.
- Identify the different action plans.

2.2.1 Indicators identification

The measurement of objectives is based on indicators that must reflect the evolution of a key management factor. For the same factor, several indicators can be considered:

- **Result indicators:** They measure the results of the company (activity level, deadlines, costs, etc.).
- **Means indicators:** They compare the results with the means deployed.
- **Environmental indicators:** They allow the organization to position itself in relation to the environment.

The characteristics of a good indicator can be:

- **Reliability:** Reflect the meaning and importance of the observed phenomenon.
- **Clarity:** Easily understood by users.
- **Lack of bias:** An indicator should not be easily manipulable.
- **Relevance:** An indicator should be associated with a specific goal.
- **Predictability:** Alert on the emergence of a problem.

2.2.2 Setting objectives and deadlines

After identifying the indicators for each axis, it is possible to assign each one an operational objective and a deadline for achieving it. For an objective to be viable, it must be clear, precise, measurable, time-bound, and consistent with the material and human resources of the company.
To identify an operational objective, it is recommended to refer to:

-Previous years' performance

-Benchmarking

-Reference databases.

2.2.3 Identifying the different action plans

Action plans define all the resources necessary to achieve the previously defined operational objectives. Action plans are considered as projects and are characterized by:

- A time horizon
- A budget
- A person responsible for implementation.

2.3 The strategic review and monitoring

This involve regularly monitoring the indicators, identifying gaps against objectives, analyzing the causes and implementing the necessary corrective actions. This allows the strategy to be adjusted continuously.

The success of implementing a balanced scorecard relies on clear communication and periodic evaluation to make necessary corrections.

3 The evolution of the Sustainable Balanced Scorecard:

3.1 Integration of blockchain technology:

Some organizations are exploring the use of blockchain technology to enhance the transparency and traceability of their sustainability performance data. By using blockchain, organizations can provide stakeholders with a secure and immutable record of their sustainability performance, which can enhance accountability and trust.

"*Blockchain technology has been increasingly recognized as a promising solution to promote sustainability accounting and reporting by providing a secure, transparent and traceable method for recording and transmitting information, which can help to enhance accountability, transparency, and trust in sustainability performance data…the use of blockchain technology can also help to promote stakeholder engagement by providing a secure and traceable record of*

sustainability performance data that can be accessed by stakeholders, including investors, customers, and regulators"[44].

"*The case study shows that the use of blockchain technology can help to enhance the accuracy and reliability of sustainability data by providing a secure and tamper-proof record of transactions, which can reduce the risk of data manipulation or fraud*"[45].

3.2 Use of artificial intelligence (AI)

Some organizations are using AI to analyze large amounts of sustainability data and identify patterns and trends. This can help organizations to identify areas where they need to focus their sustainability efforts and make data-driven decisions.

"*One of the key benefits of AI is its ability to learn and adapt over time. By using machine learning algorithms, companies can continually improve their sustainability performance by identifying new opportunities for improvement and testing new solutions*"[46].

3.3 Increased stakeholder engagement

Many organizations are recognizing the importance of engaging with stakeholders in the development and implementation of their sustainability dashboards and scorecards. By involving stakeholders in the process, organizations can ensure that their sustainability performance measures are relevant and meaningful to those who are most affected by their actions.

"*To be effective, sustainable bonuses must be integrated into the company's overall strategy and culture, and must be supported by a strong commitment from top management. This requires a shift in mindset from seeing sustainability as a separate, peripheral issue to seeing it as a core*

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[44] Zhang, L., Liu, J., & Shen, B. (2020). Blockchain-enabled sustainability accounting and reporting: A case study of a Chinese food company. Sustainability, 12(1), 171.

[45] Zhang, L., Liu, J., & Shen, B. (2020). Blockchain-enabled sustainability accounting and reporting: A case study of a Chinese food company. Sustainability, 12(1), 175.

[46] Kiron, D., Palmer, J., Phillips, A. N., & Kruschwitz, N. (2017). AI and sustainability: A win-win opportunity. MIT Sloan Management Review, 58(2), 30.

business objective"[47].

Conclusion

The sustainability balanced scorecard was named after the traditional balanced scorecard framework, which is a strategic management tool that helps organizations to align their objectives with their vision and strategy. The sustainability balanced scorecard builds on this framework by incorporating sustainability metrics and objectives into the scorecard, in addition to traditional financial metrics.

The sustainability balanced scorecard is a strategic management tool that helps organizations to ensure that their performance indicators are shared, developed, and aligned across the three dimensions of sustainability: economic, environmental, and social. While the basic framework of the sustainability balanced scorecard includes these three perspectives, the number of perspectives can vary depending on the strategy of the company.

The development of a balanced scorecard involves three main phases: the creation of a strategic map, the balancing of performance indicators, and the development of a strategic management review.

[47] Kolk, A., & Perego, P. (2014). Sustainable Bonuses: Sign of corporate responsibility or window dressing? Corporate Governance: An International Review, 22(4), 307.

Chapter III: The sustainability balanced scorecard of Lafarge Holcim Algeria

Chapter III: The Sustainability Balanced Scorecard of Lafarge Holcim Algeria

The construction materials sector is seeing a growing emphasis on sustainability, as companies recognize the importance of incorporating sustainability into their business strategies to remain competitive and meet stakeholder expectations. This is being driven by a variety of factors, including the implementation of carbon emissions and other pollution taxes, increasing demand for eco-friendly products from clients, and recognition from the general public and policymakers that high levels of pollution are not sustainable in the long-term. These trends make it clear that sustainability will continue to play a significant role in shaping the future of the construction materials sector, and a balanced scorecard approach can be used to measure both traditional financial metrics and environmental and social metrics for assessing sustainability performance. In this chapter, we will first discuss the Lafarge group globally, followed by Lafarge Algeria and a description of the cement production process. Then, we will measure the industrial performance of Lafarge Holcim Algeria, a subsidiary of the Lafarge Holcim group, using a balanced scorecard approach.

Section 1: Presentation of the Lafarge Holcim Group

The Lafarge Holcim Group is one of the world leaders in the construction materials market. This position was not acquired by chance, but rather the result of several years of experience and hard work.

1 Internationally

LAFARGE HOLCIM is a major player in the construction materials industry and one of the largest cement producers in the world. The group extracts raw materials from the earth to produce a wide range of construction materials, including cement, aggregates, and concrete, that are used in the building of infrastructure and housing projects around the world

1.1 History

- It was in 1833 that *Léon Pavin de Lafarge*took over the operation of limestone quarries owned by his family in *Ardèche.*

- Lafarge Holcim entered the plaster market by acquiring the *Gypse et Plâtres de France* company in 1931, which merged with *Plâtrières du Vaucluse* in 1972 to become *Plâtrière de France.*
- Over the years, Lafarge consolidated its position as the French cement market leader with a market share of 25%.
- It was in 1956 that Lafarge expanded globally and built its first cement plant in *Richmond*, Canada, under the name Lafarge Cement of North America. From there, Lafarge launched its global expansion project.
- In the 1960s, Lafarge further diversified its activities and entered the ready-mix concrete business.
- In the 1990s, LAFARG began conducting research in the field of construction materials and opened its first laboratory in Lyon. Another area of diversification was aggregates. Lafarge entered the aggregates market by acquiring the British company Redland in 1997 and became a leader in the market.
- In the 2000s, the French industrial group continued to expand globally through acquisitions such as Orascom Cement, a leader in the Middle East and the Mediterranean Basin. This acquisition made Lafarge the leader in construction materials in emerging markets.
- In 2011, the industrial group sold its plaster business in Europe.
- In 2014, Lafarge concluded a merger of equals agreement with its Swiss competitor, Holcim. The result of this merger was named " Lafarge Holcim " and was "uniquely positioned in 90 countries and evenly distributed between developed and high growth countries". The merger became effective in the first half of 2015.
- By 2015, following the merger of Lafarge and Holcim, the newly formed company, Lafarge Holcim, became the largest cement producer in the world, with a presence in over 80 countries. The merger was aimed at creating a more globally diversified company, with a broader range of products and services, and generating cost synergies.

In the years since the merger, Lafarge Holcim has continued to focus on sustainability, with a goal of becoming a leader in sustainable construction. The company has launched a number of initiatives aimed at reducing its environmental impact, including a commitment to reduce its

CO2 emissions by 20-25% by 2030, compared to 2018 levels. Lafarge Holcim has also continued to expand its operations through strategic acquisitions and partnerships.

-In 2018, the company announced the acquisition of leading precast concrete company, Tarrant Concrete, and in 2019, it acquired Firestone Building Products, a leading supplier of roofing and building envelope solutions.

In addition to its focus on sustainability and expansion, Lafarge Holcim has also been recognized for its innovative products and services.

-In 2020, the company launched ECO-Pact, a low-carbon concrete product line that reduces CO2 emissions by up to 100%. The product has been well received by customers and industry experts alike, and has won a number of awards for its sustainability and innovation.

Overall, Lafarge Holcim continues to be a major player in the global construction materials market, with a strong focus on sustainability, innovation, and expansion through strategic acquisitions and partnerships. The company remains committed to reducing its environmental impact and leading the way in sustainable construction, while providing high-quality products and services to its customers around the world.

1.2 Group activities

The Lafarge Holcim group has three main activities:

- Cement: Global leader
- Concrete: 4th worldwide
- Aggregates: 2nd worldwide

The Cement activity produces a range of cement, hydraulic binders, and lime for construction, renovation, and public works. In 2020, cement accounted for approximately 50% of Lafarge Holcim's net sales, and the company had over 70,000 employees in more than 70 countries. Lafarge Holcim operates over 200 cement plants and grinding stations worldwide.

Lafarge Holcim offers a diverse range of concrete products, from conventional to ultra-high performance, and is a leader in research and innovation in the concrete industry. The company's concrete solutions are designed to meet the specific needs of construction projects, and are often used in large-scale architectural innovations. In 2020, the Concrete activity accounted for

approximately 17% of Lafarge Holcim's net sales, and the company operated over 1000 concrete plants worldwide, producing over 70 million cubic meters of concrete per year.

Lafarge Holcim leverages its expertise and market knowledge to continue its development. Aggregates, which are essential for the production of concrete, are the most consumed natural substance in the world. In 2020, the Aggregates activity accounted for approximately 14% of Lafarge Holcim 's net sales, and the company operated over 3,000 quarries and sand pits worldwide, producing over 400 million tons of aggregates per year.

1.3 Locations

As of December 31, 2020, the group was present in more than 70 countries:

Figure 7: Lafarge Holcim 2020 Locations Map.

This map of Lafarge's locations includes all factories and commercial offices around the world.

1.4 Values

Several essential values guide the development of the group:

- Integrity
- Ethics
- Courage
- Empathy
- Openness
- Commitment

2 Presentation of Lafarge Holcim Algeria

After having an overview of Lafarge Holcim at the international level, we will now focus on the Lafarge Holcim group in Algeria.

2.1 History:

Lafarge has been present in Algeria for over a decade. The following are the main events that have marked its history over time:

- 2002: LAFARGE-COSIDER partnership (Plaster)
- 2003: Start-up of the *M'sila* plant (1st grey cement line)
- 2005: Start-up of the *M'sila* plant (2nd grey cement line)
- 2007: Acquisition of Orascom Cement operations
- 2007: Construction of the *Oggaz* plant: 1st white cement line and creation of LBA
- 2008: Lafarge acquires Orascom Cement
- 2008: Lafarge acquires 35% of *Meftah*'s capital (with a 10-year management contract)
- 2008*: Oggaz* inaugurates the 2nd grey cement line
- 2010: Launch of a new expanded range of products: *Chamil*, *Matine, Mokaouem, Malaki*.
- 2011: Inauguration of the 5th mill in *M'Sila* to increase production capacity.
- 2013: Inauguration of the 1st laboratory (CDL) in Algeria and Africa dedicated to the development of new products and solutions in the field of construction in Rouïba. - 2013: Inauguration of BATISTORE, the 1st construction materials supermarket in Algeria

- 2015: Lafarge and Holcim merged to form Lafarge Holcim, creating the world's largest cement producer.
- 2016: Lafarge Holcim Algeria became the first construction materials company in Algeria to obtain ISO 9001:2015 and ISO 14001:2015 certification for quality and environmental management systems.
- 2017: the company launched a new range of products, including Agilia Vertical, a self-leveling concrete for vertical applications, and Artevia, a decorative concrete for indoor and outdoor use.
- 2018: Lafarge Holcim Algeria began construction of a new cement plant in Biskra, with a production capacity of 2.7 million tons per year.
- 2019: The company inaugurated a new cement plant in Biskra, equipped with state-of-the-art technology and designed to meet the highest environmental standards. The plant has a production capacity of 2.7 million tons per year.
- 2020: Lafarge Holcim Algeria launched a new range of sustainable concrete solutions, including ECOPact, a low-carbon concrete, and DuraPact, a durable and high performance concrete.
- 2021: The company announced plans to invest in a new waste-to-energy plant in Oggaz, which will use municipal waste as fuel to generate energy for the cement plant. The project is expected to help reduce Lafarge Holcim Algeria 's carbon footprint and contribute to the country's efforts to transition towards a circular economy.
- **2022:** Lafarge Holcim Algeria launched its first eco-friendly product, the CHAMIL™ ECO Planet green cement, under the CHAMIL brand in the past. This green cement offers a 40% reduction in carbon emissions compared to standard cement and is specifically designed for common concrete and masonry work. With CHAMIL™ ECO Planet, high-performance and durable concrete can be formulated without any execution constraints, allowing for the usual construction cycle to be respected. The cement was produced at Lafarge Holcim Algeria's Oggaz factory in Mascara.

  “The first country across the HOLCIM Group to materialize and sign a green credit”, Lafarge Holcim Algeria and Société Générale Algeria signed a responsible financial partnership, marking a first in Algeria and anchoring their commitment to sustainable development. The credit agreement of 1.4 billion DZD with SGA was fully in line with the development plan of the green growth strategy of the Holcim group, which had set itself

the target of reaching more than 40% of financing agreements linked to sustainability objectives by 2025. Through this new financial agreement, Lafarge Holcim Algeria made a civic and responsible contribution to the positive transformations that Algeria was experiencing, in accordance with the guidelines of the Algerian government. The first country across the HOLCIM Group to materialize and sign a green credit was Lafarge Holcim Algeria.

2.2 Entities

LAFARGE is present in Algeria through its 7 entities:

- **LAFARGE Cement M'sila (LCM):** Production of grey cement.
- **LAFARGE Sac (LS):** Manufacture of cement bags.
- **LAFARGE Concrete Algeria (LBA):** Concrete and aggregates. -
  LAFARGE Cement Oggaz (LCO): Production of grey and white cement.
- **LAFARGE Logistics Algeria (LLA):** Transport of cement.
- **Ciment LAFARGE Souakri (Cilas):** the cement plant production.
- **LAFARGE Distribution Algeria (LDA) - Algérienne des Exploitations Minières (AEM)**

Lafarge Algeria manages its entire logistics chain, from production to marketing, including packaging and transport.

Lafarge Algeria has two cement plants, one in M'Sila, 220 km southeast of Algiers, specializing in the production of grey cement, and another in Oggaz, 420 km west of Algiers, in the commune of Sig, specializing in the production of white and grey cement.

A third cement plant Located in Biskra, the cement plant with a capacity of 2.7 million tons per year meets the needs of the cement market in southern Algeria. It is the most recent factory built by LAFARGE HOLCIM.

Lafarge Algeria also has a partnership with the Meftah cement plant (GICA group), which owns 35% of the capital of the cement plant in addition to a management contract, allowing it to have a cement production capacity of more than 8 million tons.

To package the cement it produces, the group has a bag manufacturing plant located in Bordj Bou Arreridj with a workforce of 119 employees.

For its Concrete and Aggregates activity, the group has 22 concrete plants and 3 quarries with capacities of 400 km3 and 1.6 MT. This activity employs a workforce of 777 employees.

The TCA entity has its own fleet of trucks and handles transport. It has more than 185 employees.

1.2.3 Products:

Lafarge Holcim Algeria has several product lines for each of its activities:

- **Cement:**

	**CHAMIL** : Ciment gris pour bétons courants et structurels, déstinés à la construction des maisons individuelles et tous traveaux de maçonnerie.
	**MATINE** : Ciment gris pour béton de haute performance, déstiné à la construction des ouvrages d'art (ponts, viaducs, tunnels..) et préfabrications lourdes.
	**MALAKI** : Ciment blanc pour béton et mortier colorés, déstiné aux ouvrages qui requièrent un rendu esthétique avec des exigences mécaniques.
	**MOHTARIF** : Ciment portland composé, déstiné à la réalisation de batiments civils et industriels (fondations, béton prêt à l'emploi, superstructures et infrastructures).
	**MOKAOUEM** : Ciment gris pour béton, déstiné pour les constructions en millieux agressifs (travaux hydroliques et souterrains, ouvrages massifs, travaux maritimes ...etc)

- **Concrete:**

Ready-mix Concrete (RMC):

Concrete elaborated in a concrete batching plant then transported to construction sites in mixer trucks. It is applied using a conveyor belt or a concrete pump.

- Hydromedia Concrete:

Highly efficient, aesthetic and resistant draining concrete that meets the challenges of sustainable construction. This concrete is the result of a new technology that guarantees a high level of drainability and ease of implementation.

- Artevia Concrete:
- Artevia is a range of decorative concrete for outdoor and indoor use that puts the qualities of concrete at the service of aesthetic, economical, and durable solutions.
- Ultra Concrete:

The Ultra range is designed to meet specific customer requirements and is composed of Ultra fibers, filling Ultra, extruded concrete, accelerated, delayed, fluid, or water-repellent concrete.

The Ultra range has special features, such as resistance to aggressive agents, impermeability, reduced implementation time, and better implementation in extreme situations (high or low temperature, humidity, immersion, difficult access, long distance transport or pumping, high height of formwork, complex shape formwork, dense reinforcement, etc.). - Morpla Concrete

Ready-to-use mortar, delivered in 250-liter bins. It is used for masonry work (bricklaying, rendering, floor screeds, etc.).

- **Plaster:**

Plaster is a simple and authentic material that comes from a natural environment, rock and water. Lafarge, in a joint venture with Cosider, produces:

- Manual construction plaster.
- Molding plaster.
- Plasterboard for interior design.
- Plaster for insulation.
- Plasterboard for exterior use.
- Structures, accessories, and finishing products for plasterboard installation.

- **Aggregates:** Aggregates are fragments of rock with a diameter between 0 and 80 mm. They can be mixed with a binder: cement to make concrete, bitumen to produce asphalt. They fulfill three main functions: support, thanks to their resistance; filling, since they make mixtures more compact, allowing for specific applications such as drainage, waterproofing, or heat storage; and beautification, thanks to their aesthetic qualities.

2.3 Missions:

Lafarge Algeria's mission is to:

- Contribute to Algeria's economic progress:
- Long-term investment in Algeria (€100 million already invested by Lafarge since early 2008).
- Achieve operational excellence of the plants to optimize production and best meet the expanding cement market.
- Promote economic development around sites and activities.
- Contribute to human development and social progress in Algeria:
- Ensure a safe working environment for employees and subcontractors.
- Training and skills development as well as knowledge transfer.
- Contribute to the harmonious development of local communities.

3 Cement manufacturing process

The cement manufacturing process involves several stages:

Step 1: Extraction of raw materials

The raw materials used in cement production are usually clay and limestone, which LAFARGE HOLCIM extracts from the quarries it operates. Rocks extracted from the quarries with explosives are transported by dump trucks to grinding stations.

Step 2: Grinding and storage of raw materials

The mineral rocks from the quarries undergo initial crushing before being ground and reduced to fine powders composed of 80% limestone and 20% clay. This mineral mixture, called raw material, is then stored in the pre-homogenization hall. The raw material will then pass through the grinder for homogenization. The homogeneous mixture obtained is called the "raw meal."

A certain proportion of extracted rocks can be replaced by other materials (slag, fly ash, pozzolana, etc.) whose chemical composition is close to that of limestone and clay. Their use helps to preserve natural resources. **Step 3: Cooking of raw materials**

The raw meal is introduced into a preheating tower at 800°C before entering the vertical rotary kiln that reaches 1450°C. The combustion caused by the heat causes decarbonization, which releases the CO2 contained in the limestone. The result of this operation is in the form of small granules called clinker, which is the basic material necessary for the production of any type of cement.

Step 4: Storage and grinding of cement

After leaving the kiln, the clinker passes through a cooler that cools it abruptly by blowing air, and it is then stored in silos. The clinker will be transformed into cement at the pace of production needs. During the last stage of production, additions such as gypsum or limestone are mixed with the clinker. The mixture is finely ground in the grinder again. Different substitution components, such as fly ash (residues of thermal power plant activity) or slag (from blast furnaces), can also be used in the composition of cement. Their use has the double advantage of reducing the amount of clinker needed (and thus the CO2 emissions associated with the manufacturing process) and creating a wider range of cements with qualities that correspond to specific customer needs.

Step 5: Packaging and transport

The cement is stored in silos before being delivered in bulk in tanker trucks or packaged in 50kilogram bags, 50-kilogram pallets, or large bags of 1.5 or 2 tons to its recipient.

Section2: Elaboration of the sustainability balanced scorecard of Lafarge Holcim Algeria

To collect relevant information that would help affirm or confirm our hypotheses and provide answers to the questions raised, we followed a methodological approach. Firstly, we based Our research on the observation and analysis of real-life events experienced during our internship at Lafarge Holcim. We then conducted an exploratory survey in the form of a series of individual interviews with a group of people involved in the company's strategy, sustainability, and management control. Finally, we launched a survey to confirm the implementation of the strategy and to engage employees in the development of a sustainability balanced scorecard.

Our methodological approach consisted of:

Observation and collection of necessary documentation throughout a month and a half of the internship period.

Semi-directive interviews, which enabled me to collect a maximum amount of data while following a logical framework represented by a structured guide to cover a series of topics. The duration of each interview varied between 60 and 90 minutes.

A survey sent to 25 employees, our target is mainly managers and seniors with more than 2 years of experience; the survey was conducted in two versions in English and French. This survey aimed to confirm the implementation of the company's strategy and to engage employees in the development of a sustainability balanced scorecard.

"We chose this approach because of the nature of the topic, which allows for the collection of more information and the provision of explanations. The goal is to analyze each response given and to verify if certain responses converge based on the theoretical foundation, thus providing answers to the hypotheses formulated at the beginning of this thesis.

In this section, we will describe the study sample and the interview guide. Based on the insights gained from the interviews, we will establish a strategic map that brings together the different objectives of the company. We will then explain the survey and analyze its results to determine the performance indicators comprising the economic, environmental, and social axes. Finally, we will

propose a model of the sustainability balanced scorecard that can be used to evaluate the company's performance.

1 The strategic objectives of Lafarge Holcim Algeria

1.1 Description of the interviews sample

The interviews were conducted using a predefined and structured interview guide. The questions in these interviews were administered to the most involved and best-placed parties to best address the raised issues. The interviewed actors were: Strategy manager and Business planning, Geo-cycle & sustainability manager, Corporate Social Relations manager, Finance and Control Director, Head of management control. This sample was chosen because of its involvement and contribution to the strategy of the company, the sustainability reporting process.

The interview guide is composed of two main axes:

Axis 01: Upstream of industrial performance reporting, which means its production based mainly on the collection, objectives, and strategic goals, and analysis of the information.

Axis 02: Downstream of performance reporting, which means sustainability and industrial performance communication.

Using a set of questions (see Appendice N1) adapted to the specificities of the actors, the interviews were conducted to understand the company's strategy, the sustainability reporting process, and the communication and dissemination of industrial performance reporting and information. The table below presents the main themes addressed and their objectives:

Table 4: Themes and objectives of the interviews

Themes	Objectives
Company strategy	Understand how an industrial company like LAFARGE HOLCIM ALGERIA approach performance management systems and consider environmental and sustainability aspects
Objectives and outcomes	Understand how LAFARGE ALGERIA sets objectives and measures outcomes related to their environmental and sustainability performance
Communication and dissemination	Understand how industrial companies communicate their environmental and sustainability performance to stakeholders
Limits and challenges	Identify the limits and challenges that industrial companies face in implementing a performance management system that considers environmental and sustainability aspects

Source: Developed based on our problem statement objectives.

1.2 The analysis of the data

The analysis of the data consists of extracting and identifying elements of answers from the data collected during the transcription phase. The transcriptions of data obtained during the semi directive interviews conducted with the parties involved in sustainability and performance management process, which lasted between 60 to 90 minutes, were written on summary sheets for each interview.

After completing the transcription phase, we organized and processed the responses by theme (because the chosen administrative mode, which is semi-structured, gives interviewees the freedom to express themselves without following the order of the questions), in order to compare and determine the focus of the answers.

The data analysis was performed manually due to the manageable number of interviews.

- **1st and 2nd theme analysis:** The themes are strongly connected and couldn't be useful to be studied separately.

1.2.1 Economic Objectives: after discussion with the management control director, the economic axis was divided into three approaches during the research in other to get more

detailed answer that can help in the elaboration of the sustainability strategy map and the sustainability balanced scorecard, financial organizational and commercial axes.

1.2.1.1 The financial objectives

- Cost reduction: Improve cost control by the company.
- Achieving operational efficiency.

"Our goal as a sustainable company is to enhance our operational efficiency, optimize our supply chain, and minimize waste and energy consumption to reduce costs, "stated the finances and management control manager.

- Profitability.

"The aim of the organization is to sustain or improve profitability in the long term, which can be accomplished through a combination of revenue growth and cost reduction initiatives." Management control Director.

1.2.1.2 The organizational objectives

Promoting a culture of sustainability.

"*LAFARGE HOLCIM ALGERIA is committed to promoting sustainability throughout its operations by integrating sustainable practices into its values, mission, and vision. The company encourages employees and customers to adopt sustainable practices to create a culture of sustainability. An example of this commitment is the "OFFICE GOES GREEN" initiative, which aims to promote sustainability not only in production sites but also in offices by reducing the use of plastics and paper."* Geo-cycle & Sustainability Manager. - Developing sustainable products & services

"LAFARGE HOLCIM ALGERIA is focused on developing sustainable products that meet the needs and preferences of customers while minimizing environmental impact. As part of this effort, the company plans to launch its first eco-friendly "Green Cement" called CHAMIL, produced at the LAFARGECEMENT OGGAZ plant, by November 2022. The introduction of this product represents the company's commitment to sustainability and underscores its efforts to provide innovative and environmentally responsible solutions to its customers." Strategy and Business plan Manager

- Encouraging employee engagement & participation.

"We provide to our employees trainings, we also offer incentives, and create opportunities for feedback and participation because we want to engage and involve them in our sustainability initiatives." Cooperate social relations Manager.

- Resource efficiency.

"*Our objective is to increase our capacity of production without increasing our resource consumption, we aim to maximize the efficient use of natural resources as energy, water and raw materials*." Strategy and Business planning Manager.

1.2.1.3 The commercial objectives -

Enhancing the brand reputation.

- Client Satisfaction

"*Many consumers today especially in the Europe or abroad generally are concerned about sustainability and are more likely to support companies that demonstrate a commitment to environmental and social responsibility… by prioritizing sustainability LAFARGE HOLCIM ALGERIA can enhance its brand reputation and appeal to wider range of customers*" Strategy and business planning Manager

- Competitive advantage

"*We need to stay competitive since we want to expand our market by exportation... sustainability will provide the competitive advantage in the market place, differentiating ourselves based on sustainability practices which make us more likely to attract and retain customers as well as attract top talent*" Strategy and business planning Manager.

1.2.2 Environmental objectives

The objectives related to this area has been clearly determined by the managers as follows:

"*Our key objectives are to:*

- *Reduce our carbon footprint so we can be exporting CO2-neutral cement by 2050.*
- *Increase our use of renewable energy sources so we preserve soil, air and water*." Geo-cycle and sustainability manager.

"*WE can spill our environmental sustainability objectives as following:*

- *Developing new cement blends that use alternative materials or waste products to replace some of the clinker.*
- *Encouraging suppliers to use more sustainable transportation methods, such as rail or sea transport instead of road transportation.*
- *Implementing recycling and waste reduction programs to minimize the amount of waste generated by the office.*

- *Investing in new biomass technologies that can be used to generate heat and electricity*." Strategy and business planning Manager.

1.2.3 Social objectives

The social objectives of LAFARGE HOLCIM ALGERIA have been defined as follows:

- "*Raise awareness of important social and environmental issues, explain the importance of the company's industry, and provide educational materials and campaigns to schools and communities.*

- *Raise awareness of important health issues, provide support and resources to prevent and treat health issues, and conduct health campaigns and education programs.*

- *Provide technical support and services in areas where institutional capacities are insufficient, and support measures to create sustainable communities by creating job opportunities.*

- *Conduct environmental campaigns, such as cleaning or planting initiatives, through volunteer programs, and support education and infrastructure projects, such as water management infrastructure.*

- *Provide long-term sustainable solutions for infrastructure projects, work in partnership with local authorities and other organizations, and contribute to community infrastructure projects that address issues such as access to clean water, sanitation, and improved schools and roads.*"

3rd theme analysis

Lafarge Holcim Algeria communicates and disseminates its strategy to its stakeholders by sustainability performance reporting.

"*We communicate our environmental and sustainability performance through annual sustainability reports, public disclosures, and stakeholder engagements. We also use social media and our website to disseminate information about our environmental and sustainability performance*." Sustainability and Geo-cycle Manager.

"*…When it comes to sustainability reporting, the organization uses the GRI (Global Reporting Initiative) report. The GRI is a widely recognized standard for sustainability reporting that provides a comprehensive framework for organizations to report on their sustainability efforts. By using the GRI report, the organization can provide more comprehensive and transparent information on its*

sustainability performance to stakeholders." Sustainability and Geo-cycle Manager. See Appendice N6 for the GRI content index.

"We value stakeholder feedback and use it to improve our performance and reporting." Corporate social relations Manager

- Using a set of performance indicators

"*LAFARGE communicates its strategic priorities and goals to internal and external stakeholders, such as employees, investors, customers, and suppliers, by selecting and tracking relevant performance indicators and presenting them in a report.*" Management control director.

- The economic strategy is communicated through the following indicators: turnover rate of employees, production capacity, Earnings Before Interest, Taxes (EBIT), variable cost margin, net sales growth, and market share.

"*For example, turnover rate is an indicator that we use to measure employee engagement, which is important for our internal stakeholders. By tracking turnover rate, we can assess the effectiveness of our employee retention strategies and identify opportunities to improve employee satisfaction, productivity, and loyalty*." CSR Manager

"*We use production capacity as an indicator to ensure resource efficiency, which is crucial for optimizing our operations and minimizing waste*" Strategy Manager

"*If WE were to provide you with two indicators to reflect our financial performance, WE would choose EBIT and variable cost margin. EBIT is a measure of our operating profitability and cash flow generation potential, while variable cost margin provides insight into the profitability of our individual products or services. By monitoring these indicators, we can assess our financial health and efficiency, identify areas for improvement, and make informed decisions to optimize our financial performance.*" Head of Management control.

"*Net sales growth, market share, and variable margin are key indicators of our commercial performance."* Head of management control.

- Lafarge Holcim Algeria uses CO2 reduction, waste recycling, and water withdrawal as key environmental indicators.

- Value sharing is a key social performance indicator that LAFARGE uses.

"*To measure our sustainability performance, we follow a road map that includes several key indicators. These indicators include CO2 reduction for climate and energy, waste recycling for circular economy, water withdrawal for environmental impact, and value sharing for our stakeholders and community. By tracking these indicators, we can assess our progress towards our sustainability goals and identify opportunities to improve our environmental and social impact while creating value for all stakeholders*." Sustainability and Geo-cycle Manager; See Appendice 3

- **4th theme analysis**

The inconsistencies in sustainability reporting practices can lead to inefficiencies in suppliers' data collection processes.

“We have faced limits and challenges in implementing a performance management system that considers environmental and sustainability aspects, such as the difficulty of collecting and analyzing data from our suppliers and the lack of standardization in sustainability reporting.” Sustainability and Geo-cycle Manager.

- Technology cost

“While we are committed to reducing our CO2 emissions and increasing our use of recycled materials and biomass technologies, we recognize that there are limits to the extent that these measures can be implemented. Additionally, while we have made progress in cement quality stabilization through our Eco Planet Green products, further advancements in this area require expensive technology investments. As a strategy manager, our focus is on finding the optimal balance between our sustainability goals and financial constraints, while driving innovation and efficiency across all aspects of our operations.” Strategy manager

1.3 Discussion of the results and suggestion

Based on the previous analysis, analysis of the provided documents, and observation of the workflows, it was observed that:

The strategic goals of Corporate Social Responsibility aim to create value for the company's stakeholders while minimizing its impact on the environment and contributing to the social and economic development of the communities in which it operates.

- LAFARGE HOLCIM is committed to promoting sustainability and reducing the environmental impact of its operations. The company recognizes the importance of sustainable business practices and aims to enhance its brand image and reputation among customers, investors, and other stakeholders by pursuing sustainability goals. Additionally, LAFRGE HOLCIM is focused on remaining competitive in the global marketplace by exporting CO2-neutral cement by 2050. By investing in new technologies and processes that reduce the carbon footprint of its operations, the company can meet its sustainability goals and remain competitive in the global marketplace, which will help to drive long-term growth and profitability.
- **The global strategic goals of LAFARGE HOLCIM ALGERIA are** ○ To expand into new markets or product lines, outperform its competitors and gain a larger market share. ○ To achieve sustainable and profitable growth that creates long-term value for the company's stakeholders ○ To ensure the financial sustainability of the company and create long-term value for its stakeholders.
  ○ To reduce its carbon footprint and improve its environmental sustainability while maintaining or increasing its revenue.

See Appendice N2

Lafarge has developed a comprehensive set of indicators for measuring industrial performance across each sustainability axis. These indicators are tailored to reflect the unique goals and strategies of the company and are closely aligned with its commitment to sustainability. By tracking these indicators, Lafarge is able to monitor its progress towards achieving its

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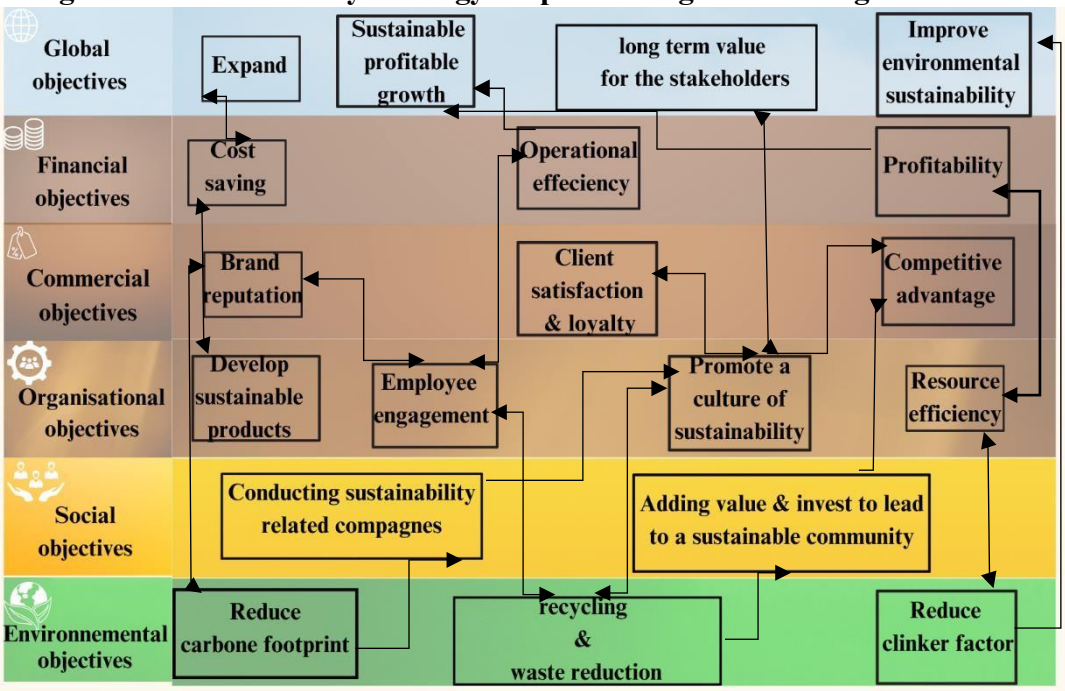
sustainability targets and make informed decisions that enhance its environmental, social, and economic impact. See Appendice N3, N4, N5.

The limits and challenges of implementing a sustainable performance strategy include difficulties in collecting and analyzing data from suppliers due to inconsistencies in sustainability reporting practices, high costs associated with technology investments, and the need to balance sustainability goals with financial constraints.

1.4 Suggestions

- To ensure that sustainability indicators are reported and implemented in a relevant and adaptive way, we suggest using a sustainability balanced scorecard.
- To develop a sustainability balanced scorecard, it is necessary to establish a strategic map that reflects the company's sustainability goals and objectives. This map should include the overall sustainability objectives of the company, as well as specific objectives for each sustainability dimension that has been explored.

Diagram 2: Sustainability Strategy Map of Lafarge Holcim Algeria.



Source: Elaborated based on our interview results.

2 Indicators choice of the SBSC

We conducted a survey for three main reasons:

Firstly, to integrate both top and middle management employees in identifying indicators for SBSC since relying solely on information provided by managers may not be sufficient to effectively manage the performance of teams and departments. The perspectives of seniors and directors are crucial to ensure the relevance of the SBSC. Moreover, we integrated other employees to confirm effective communication of the company strategy across various hierarchical levels.

Secondly, we aimed to assess how environmental and sustainability aspects are linked to economic success, which is a constraint of the global strategy. This also helped us to address our secondary hypothesis.

Finally, we aimed to confirm the existence of the performance management tool and assess whether an SBSC would be necessary. These actions helped us effectively address the overall problem statement of the research.

2.1 The survey samples

- Section 1: Language Choice - This section discusses the use of language in the research.
- Section 2: Demographics - This section reveals the demographics of the company participants, including their age, gender, work position, department and work experience.
- Section 3: Environmental Axis of Sustainability - This section focuses on the environmental aspect of the sustainability balanced scorecard, including the indicators used, strategy communication and implementation, tracking, and the relationship of this axis with the economic one.
- Section 4: Social Axis of Sustainability - This section focuses on the social aspect of the sustainability balanced scorecard, including the indicators used, strategy communication and implementation, tracking, and the relationship of this axis with the economic one.
- Section 5: Economic Axis of Sustainability - This section focuses on the economic aspect of the sustainability balanced scorecard, including the indicators used, strategy communication and implementation, tracking, and the relationship of this axis with the other two (environmental and social).
- Section 6: Sustainability balanced scorecard - This section could discuss the need for a sustainability balanced scorecard.

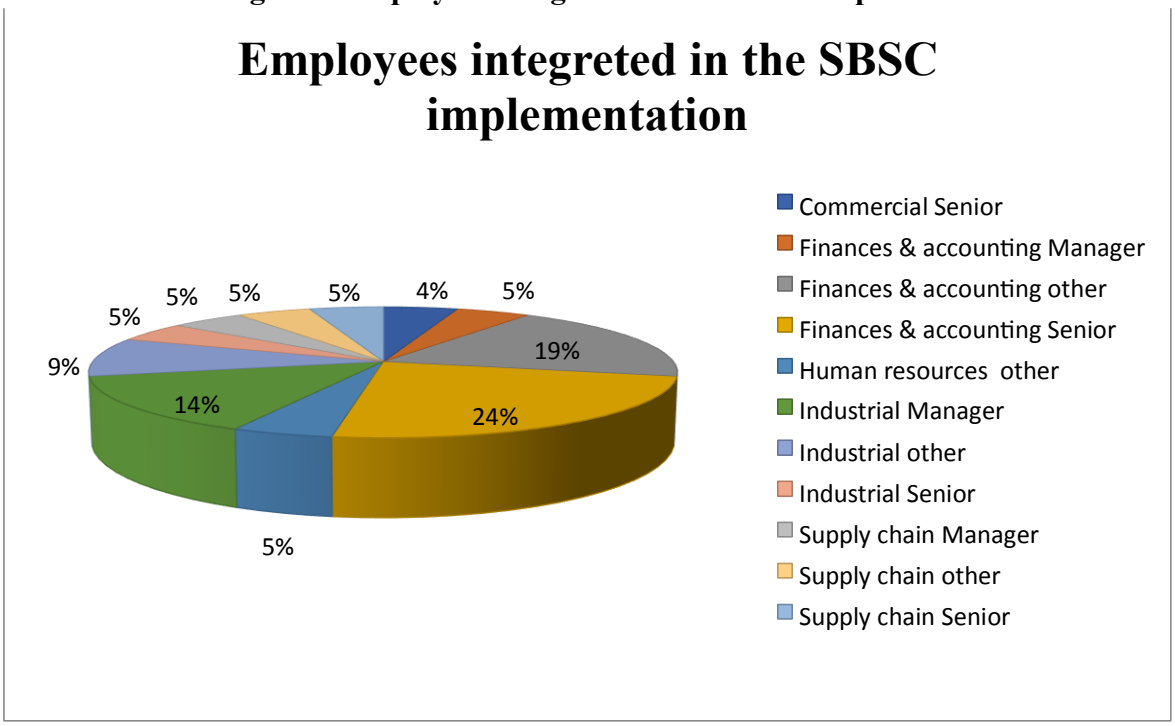
2.2 Analysis of the survey results

After filtering for employees who have two or more years of experience at Lafarge Holcim Algeria we obtained 21 relevant responses for our study, which was deemed sufficient for our sample size.

2.2.1 Analysis of Section 2: Demographic criteria validation

The results confirm and validate our research criteria, as we were able to cover the relevant departments, and the majority of the respondents were managers and senior staff. This ensures that the study's findings are based on the input of knowledgeable and experienced individuals in the organization, who are well-positioned to provide insights on the company's sustainability efforts.

Figure 9 Employees integrated in the SBSC implementation



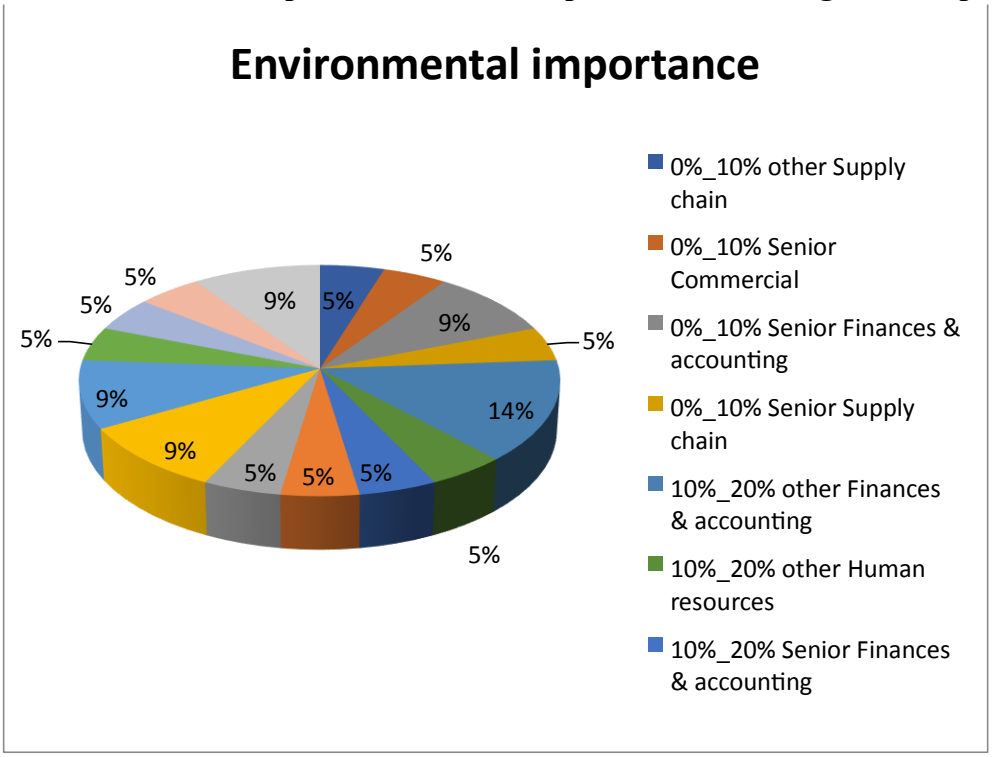
Source: Elaborated using Microsoft Excel, based on the Google form answers.

2.2.2 Analysis of section 3: environmental axis related answers

The study results demonstrated that not all employees perceive environmental sustainability in their departments equally. Managers and senior staff in departments more

closely linked to production sites, such as industrial and supply chain, gave the highest ratings for environmental sustainability. Finance and accounting department employees, as well as other industrial department staff, gave average ratings. However, employees in other departments gave lower ratings for the importance of environmental sustainability. This suggests that there may be a need for increased awareness and education regarding the importance of environmental sustainability across all departments to ensure a consistent and aligned approach to sustainability efforts.

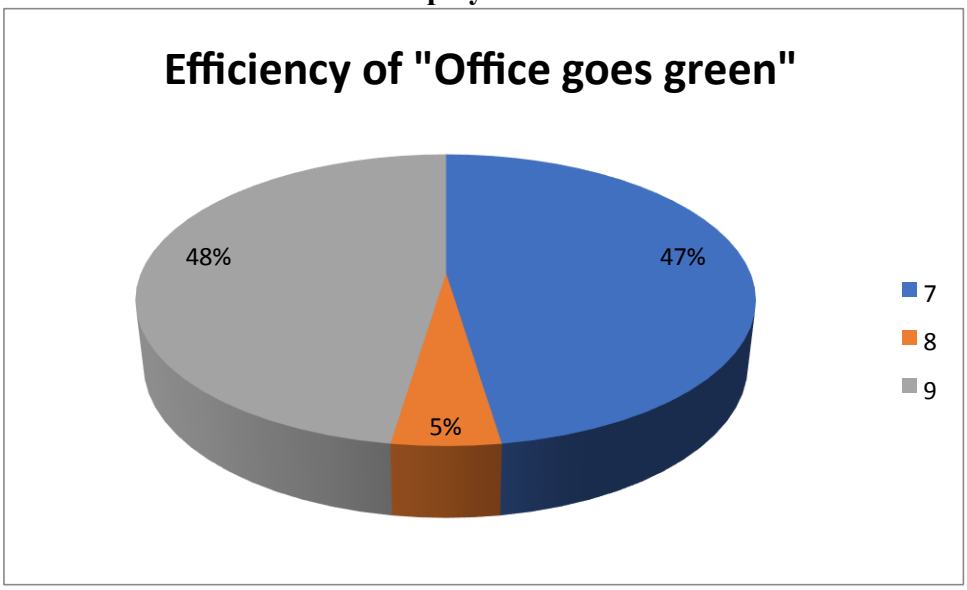
Figure 10: The environmental importance for each department according to its employees



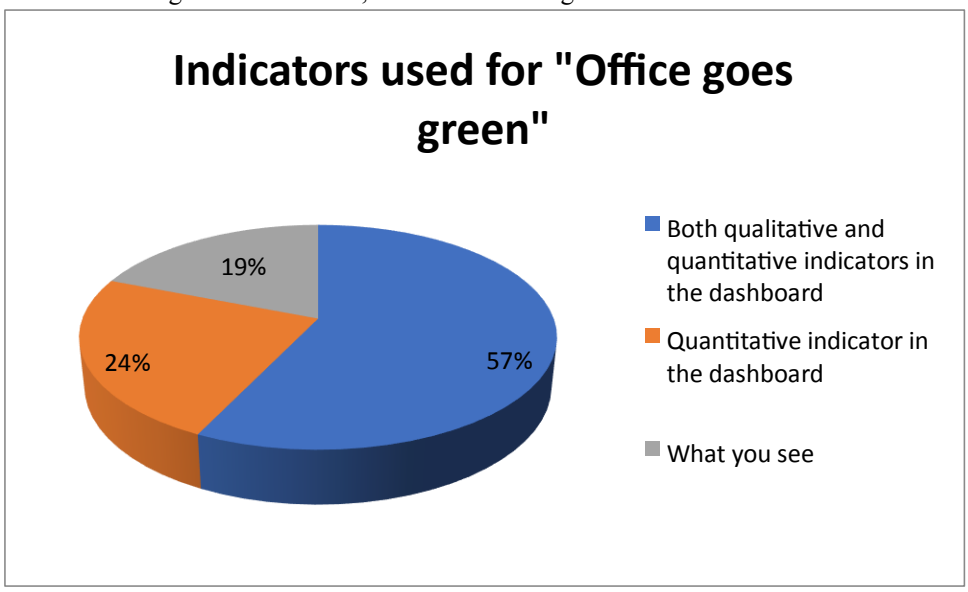
Source: Elaborated using Microsoft Excel, based on the Google form answers

- On the other hand, all employees agreed on the effectiveness of the environmental strategy implemented in the office. In the free answer section, they noted that the absence of plastic use is a notable indicator of the company's commitment to sustainability. This indicates that efforts to promote sustainable practices in the office setting have been successful and have been positively received by employees.

Figure 11 The efficiency of "Office goes green" environmental initiative according to employees.



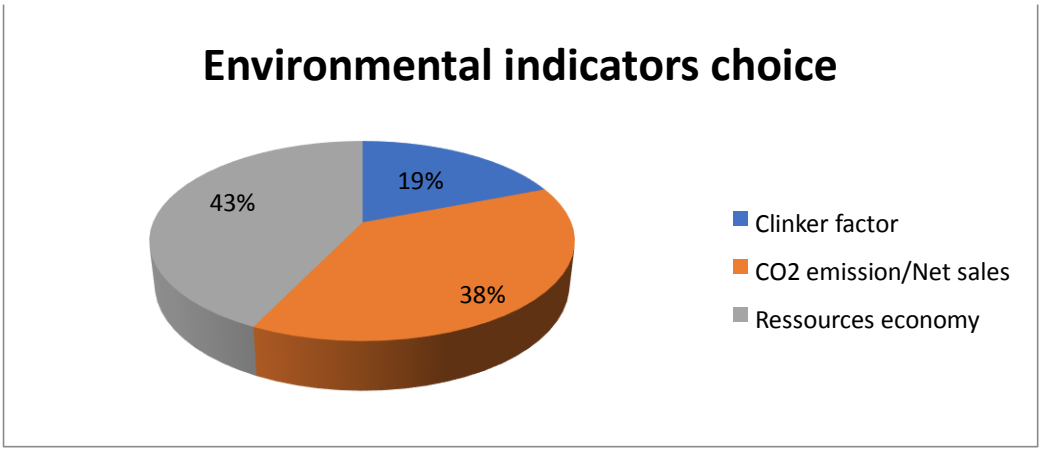
Source: Elaborated using Microsoft Excel, based on the Google form answers



Source: Elaborated using Microsoft Excel, based on the Google form answers

- The selection of indicators was as it follows bellow, with one justification of the clinker factor indicator saying that clinker is the responsible on CO2 high emission and the main polluting product in the cement production.

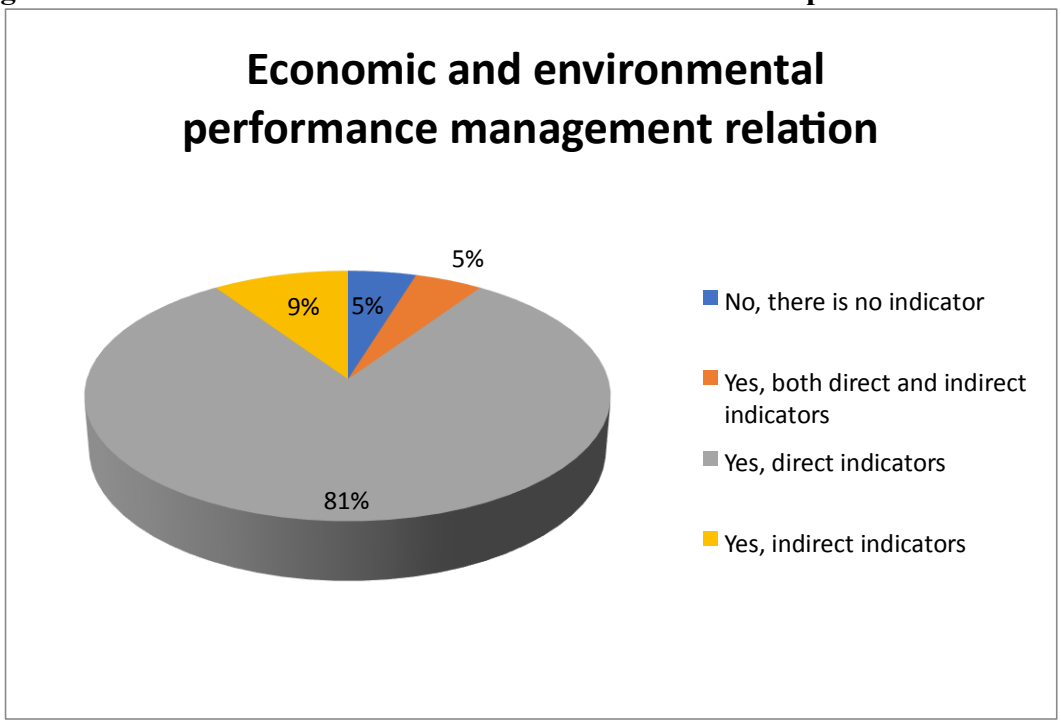
Figure 12 The environmental indicators choice



Source: Elaborated using Microsoft Excel, based on the Google form answers

- The study found that employees perceive a direct link between environmental and economic performance management, as demonstrated by the direct indicators used to measure performance. For example, indicators such as CO2/Net sales, pollution taxes, fuel consumption per kilometer for mobile equipment, and distance traveled, as well as other KPIs in logistics, are directly linked to costs. This suggests that by improving environmental performance, the company can also achieve cost savings.

Figure 13 The relation between environmental and economic performances

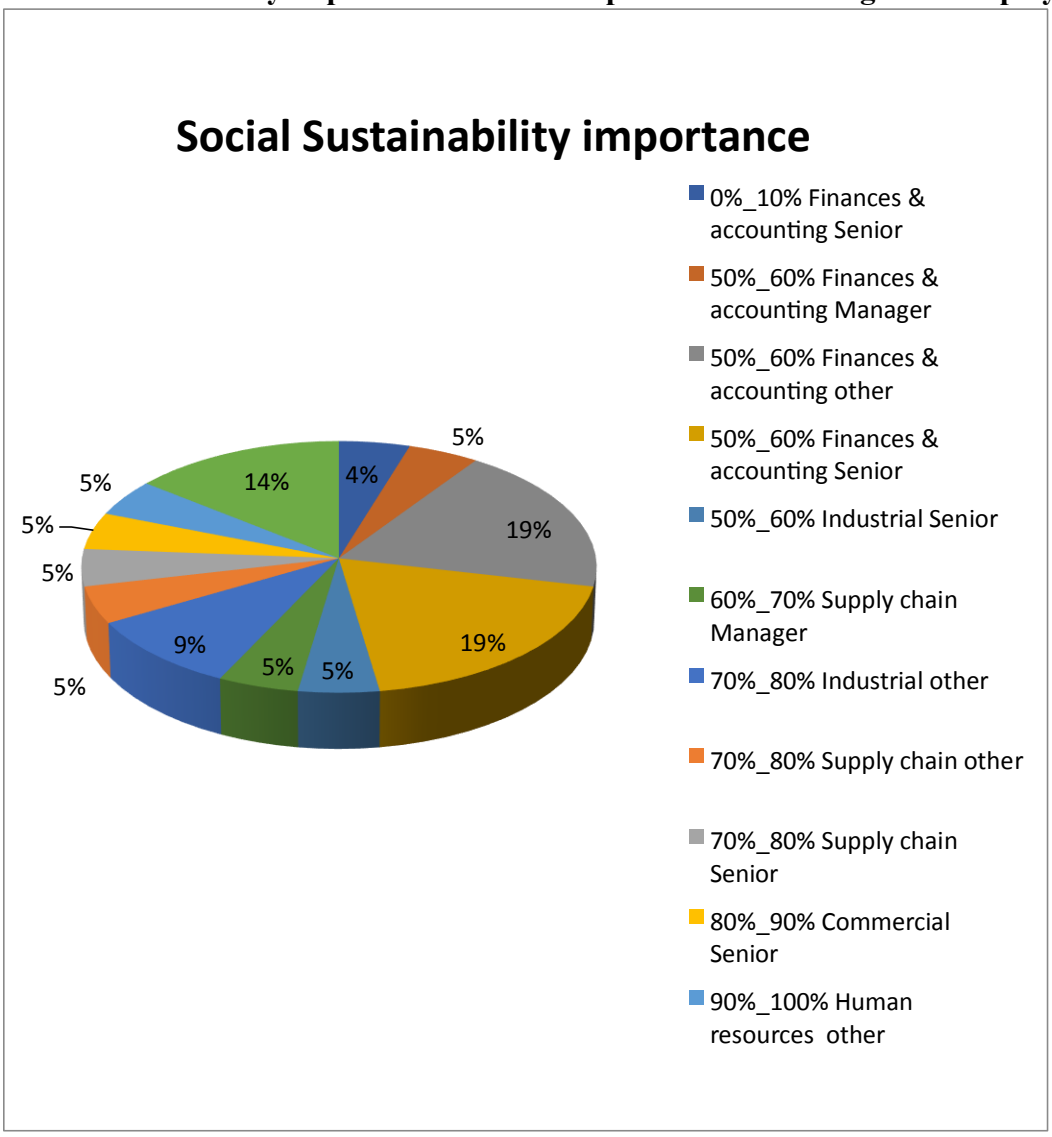


Source: Elaborated using Microsoft Excel, based on the Google form answers

2.2.3 Analysis of Section 4: Social axis related answers

- The study found that employees perceive the importance of social sustainability differently based on their departments' direct relations with internal and external stakeholders. Departments with such relations scored higher in importance, while finance and accounting departments scored only average. Interestingly, no hierarchical difference was observed in the responses, indicating that all levels of employees share similar perceptions of the importance of social sustainability. This suggests that efforts to promote social sustainability should be tailored to the specific needs and concerns of each department, taking into account their unique stakeholder relationships.

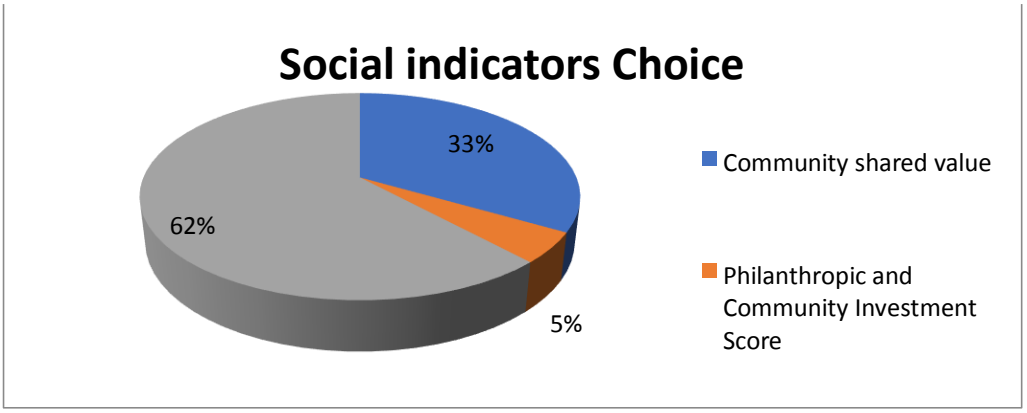
Figure 14: Social sustainability importance for each department according to its employees



Source: Elaborated using Microsoft Excel, based on the Google form answers

- The social indicators selection was as follows:

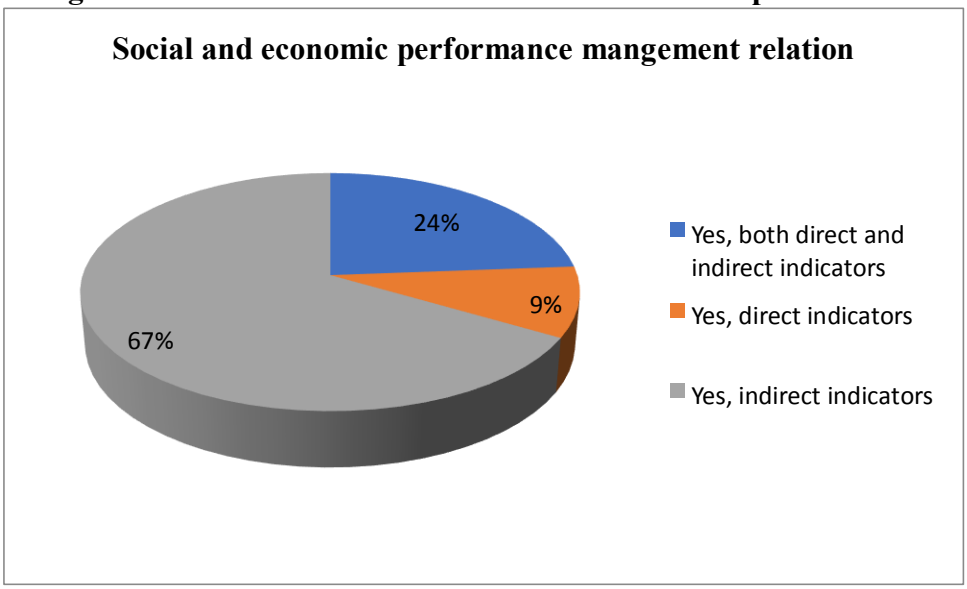
Figure 15 The social indicators choice



Source: Elaborated using Microsoft Excel, based on the Google form answers

- Employees percept that Social and economic performance management are indirectly related

Figure 16 The relation between social and economic performance



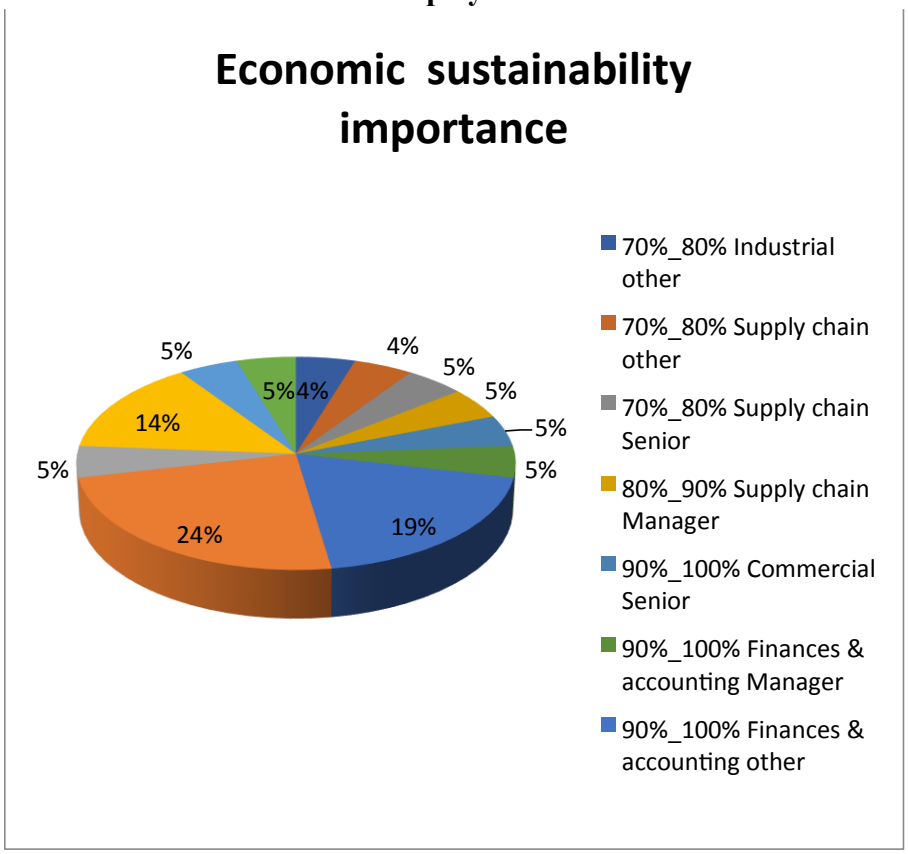
Source: Elaborated using Microsoft Excel, based on the Google form answers

2.2.4 Analysis of Section 5: Economic axis related answers

- all employees agreed on the importance of economic sustainability. This indicates that employees recognize the significance of ensuring the company's long-term financial

stability and success. By prioritizing economic sustainability, the company can achieve its sustainability goals while also ensuring its continued growth and prosperity.

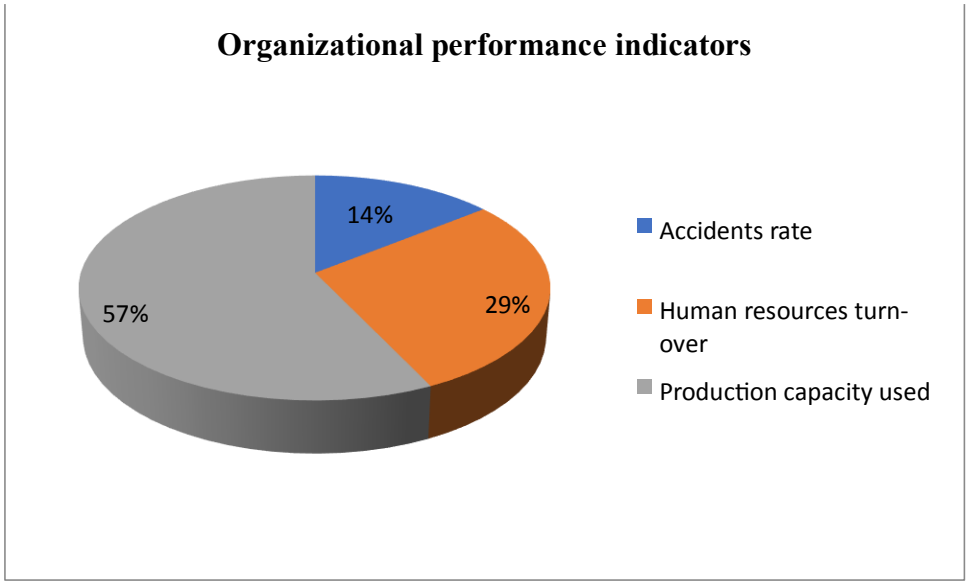
Figure 17 Economic sustainability importance for each department according to its employees.



Source: Elaborated using Microsoft Excel, based on the Google form answers

- The selection of economic indicator was as it follows:

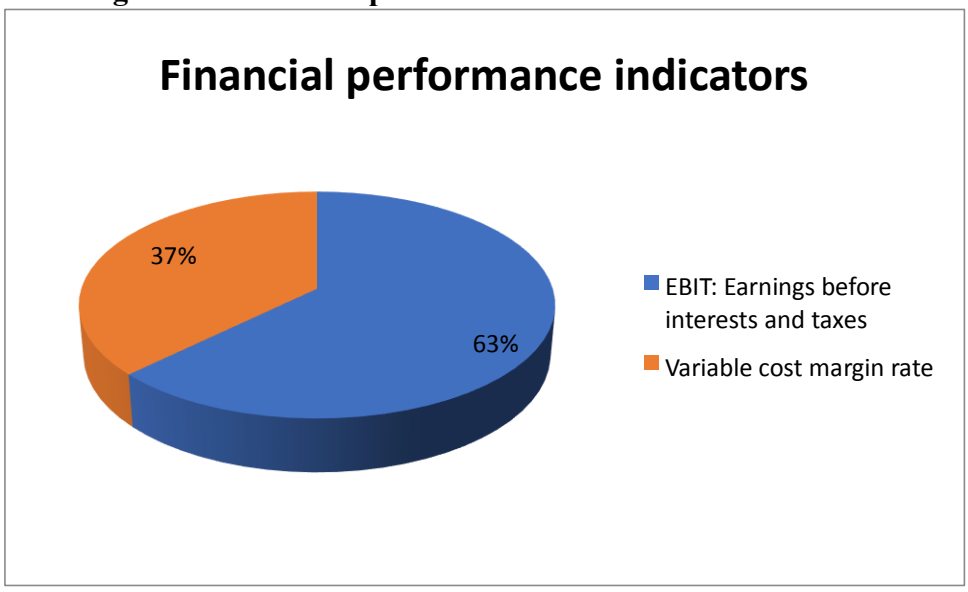
Figure 18: Organizational performance indicators choice



Source: Elaborated using Microsoft Excel, based on the Google form answers

The financial indicators

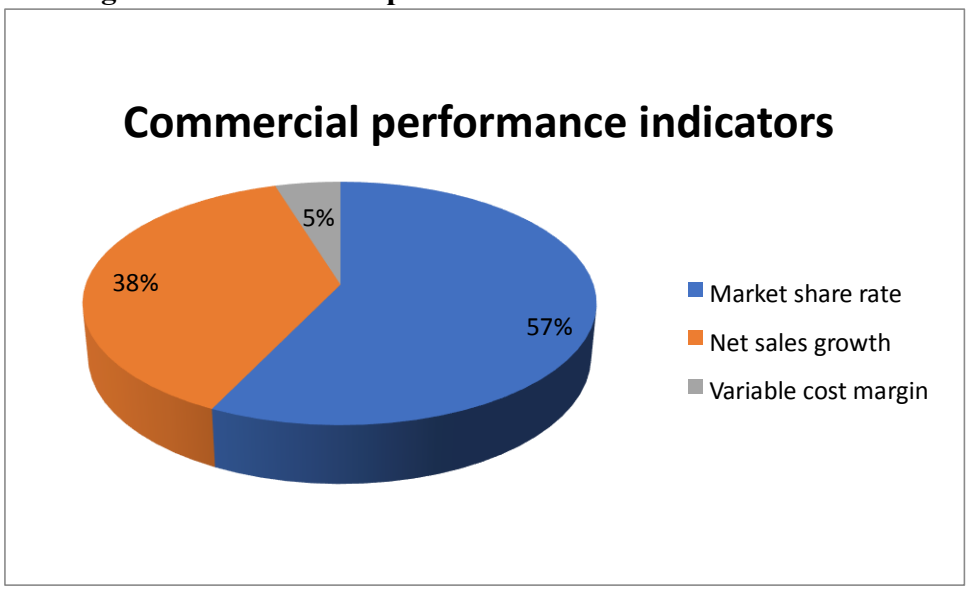
Figure 19*:* Financial performance indicators choice



Source: Elaborated using Microsoft Excel, based on the Google form answers

The commercial indicators

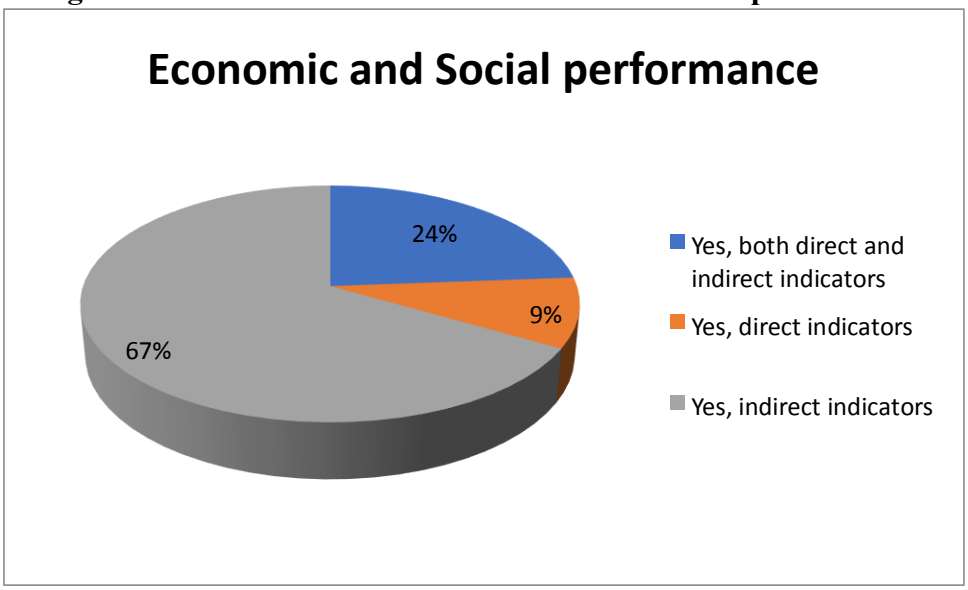
Figure 20 Commercial performance indicators choice



Source: Elaborated using Microsoft Excel, based on the Google form answers

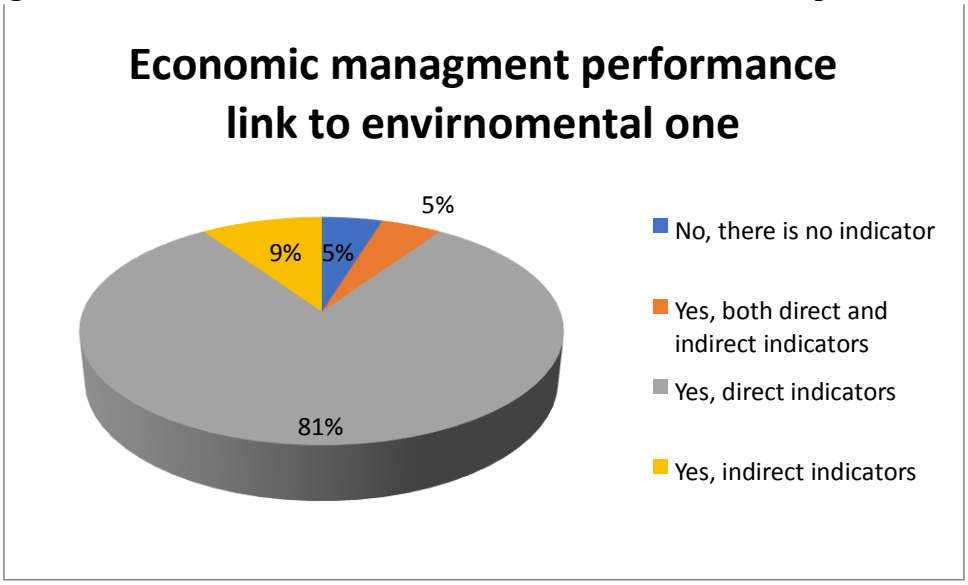
- We found a direct relationship between economic performance management and environmental sustainability, as well as an indirect relationship between economic performance management and social sustainability. By prioritizing environmental sustainability, the company can achieve cost savings and improve economic performance. Similarly, by promoting social sustainability, the company can improve its reputation and stakeholder relations, ultimately contributing to long-term economic sustainability.

Figure 21 The relation between economic and social performance



Source: Elaborated using Microsoft Excel, based on the Google form answers

Figure 22 The relation between environmental and economic performance

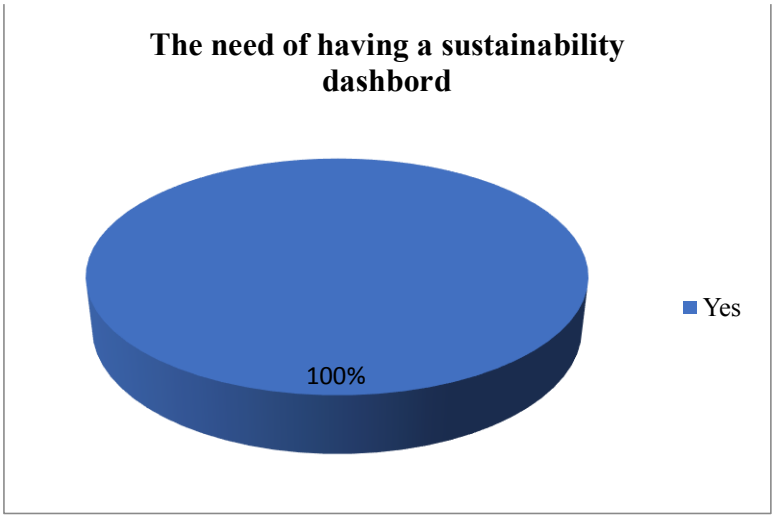


Source: Elaborated using Microsoft Excel, based on the Google form answers

2.2.5 Analysis of section 6: Sustainability balanced scorecard need

- All employees agreed that a sustainability dashboard is necessary to provide a comprehensive overview of the company's sustainability performance.

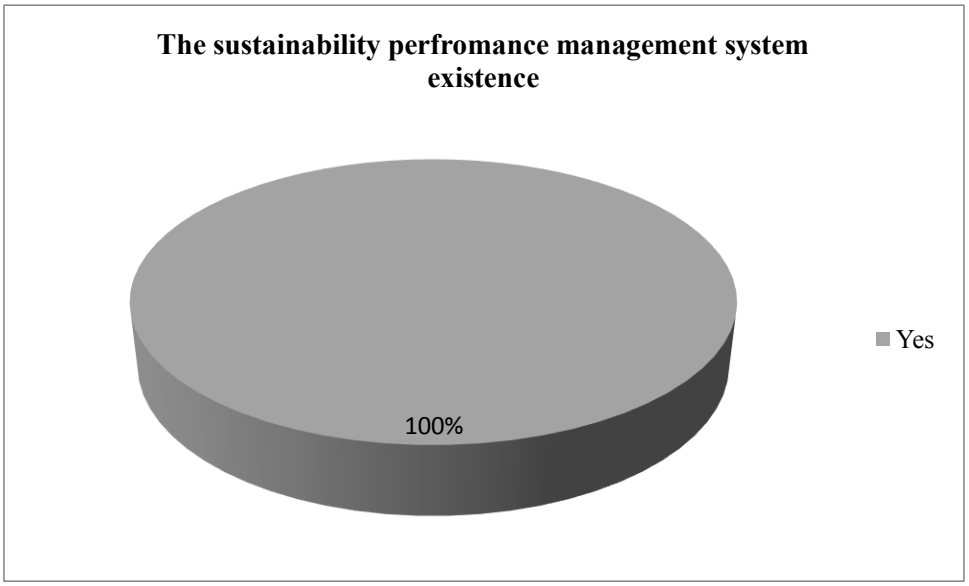
Figure 23 The necessity of having a SBSC for Lafarge Algeria according to its employees



Source: Elaborated using Microsoft Excel, based on the Google form answers

The responders confirmed the existence of a sustainability performance management system, which is supported by the presence of a sustainability department within the organization. This department is currently a sub-department of the industrial division and is responsible for managing sustainability initiatives and monitoring performance in this area.

Figure 24: Employees' confirmation of the sustainability performance management system existence.



Source: Elaborated using Microsoft Excel, based on the Google form answers

2.3 Synthesis

- The environmental sustainability strategy is not effectively communicated across hierarchical positions and departments. While departments in indirect relation with production sites like finances are aware of the green office initiative and its effectiveness, they have not linked it to the overall objective of environmental sustainability. Even office managers have shown that environmental sustainability is a main objective, alongside financial goals.
- While the environmental sustainability strategy faces communication challenges across hierarchical positions and departments, the social and economic sustainability strategies are effectively communicated throughout the organization.
- For each sustainability axis, two indicators were identified as clear and relevant in reflecting the company's strategy (Most of the indicators used in the study were previously mentioned in the first section and were provided to us by the managers). (For the economic axis, there were two indicators identified for each of its dimensions.) - The organization currently has a sustainability department as well as sustainability indicators and reporting in place. However, there is a need for a sustainability performance management system to be implemented.

- Environmental and social performances are interrelated with economic performance, where the former has a direct impact and the latter has an indirect impact. This shows that these three aspects are closely intertwined to each other and play a critical role in the organization's performance.

2.4 Suggestions

After analyzing the questionnaire survey results, we have determined that the implementation of a sustainability balanced scorecard would be the most effective solution to promote and communicate the organization's strategy throughout the entire organization. The indicators agreed upon by the study sample have been presented in the following table and will be put into action within the SBSC. (Note that the formulas were provided by the employees who agreed to participate in an interview to assist with the implementation of the dashboard and approved by the internship supervisor “the management control director”)

Table 5 The Indicators of the SBSC of Lafarge Holcim Algeria and their formula.

The axis	Its indicator	Formula
Environmental	Resources economy	(Total cement produced x Cement clinker factor x Cement conversion factor x Cementitious material factor x Compressive strength factor) / ((Total raw materials consumed - Total waste generated) x Resource utilization factor x Raw material conversion factor) x 100
	CO2 emission/ Net sales (Kilograms of CO2 per thousand dollars of net sales)	Total CO2 emissions / Net sales
Social	Stakeholders' engagement Score	(Number of stakeholder engagement activities / Total number of stakeholders) x (Stakeholder satisfaction score / 10) x (Percentage of stakeholder feedback incorporated into decision-making)
	Community shared value	(Total Economic Value Generated - Economic Value Retained - External Costs - Cost of Capital) / Number of Beneficiaries
Organizational	Human resources turn-over	Employee Turnover Rate = (Number of Employees who Left / Average Number of Employees) x 100
	Capacity of production used	Capacity Utilization = (Actual Cement Production / (Production Capacity x Operating Time)) x 100
Financial	EBIT	EBIT = Net Income + Interest Expense + Tax Expense
	Variable cost margin rate	Variable Cost Margin Rate = (Revenue - Variable Costs) / Revenue x 100%
Commercial	Market shared rate	Market Share Rate = (Company's Sales / Total Market Sales) x 100%
	Net sales growth	(Current Year's Net Sales - Previous Year's Net Sales) / Previous Year's Net Sales x 100%

3 The sustainability balanced scorecard

After developing a strategic map for Lafarge Holcim Algeria and identifying key objectives that align with the company's mission and vision, and all the relevant indicators that can make up its Sustainability dashboard. We have developed a dashboard model to track Lafarge Holcim Algeria 's progress towards achieving its strategic objectives and sustainability targets.

The following is the sustainability balanced scorecard of Lafarge Holcim Algeria :

Table 6 The sustainability balanced scorecard of Lafarge Holcim Algeria.

Axis	Strategic objectives	Indicators	Values	Targets to achieve
Financial	- Cost reduction - Operational efficiency - Profitability	EBIT	X	X
		Variable cost margin rate	X	X
Commercial	- Brand reputation - Client satisfaction - Competitive advantage	Market share rate	X	X
		Net sales growth	X	+3%
Organizational	- Develop sustainable products - Employee engagement - Promote a culture of sustainability - Resource efficiency	Capacity of production used	83,67%	92%
		Human resources turnover	X	X
Environmental	- Reduce carbon footprint - Sustainable supply chain - Recycling & Waste reduction - Reduced clinker factor	CO2 emission/Net sales	X	+10%
		Resources economy	X	X
Social	- Conducting sustainability related campaigns - Adding value and invest to lead to sustainability community	Stakeholders' engagement score	NA	NA
		Value shared with community	X	+5,2%

Not achieved Warning Achieved Not applicable

Conclusion

Lafarge Holcim, a leading company in the cement industry, has been represented in Algeria for decades through its Lafarge Holcim Algeria subsidiary, which operates two cement plants in M'sila and Oggaz. Cement production involves five phases, starting with the extraction of raw materials from quarries, crushing them, and then baking them in a 1,450-degree furnace to produce clinker, the main component of cement and a highly polluting product.

Given the environmental impact of the cement industry, Lafarge Holcim Algeria in alignment with the group's objectives, has set strategic goals:

-Increasing or maintaining financial and environmental sustainability.

- Achieving sustainable and profitable growth, and creating long-term shared value for stakeholders.

To achieve this, the company has invested in green loans, launched a green cement product, made its offices eco-friendly, implemented a sustainability performance management system, established a sustainability department, and engaged in reporting certificates such as the Global Reporting Initiative (GRI) report.

Objectives are distributed across the five axes of the sustainability balanced scorecard (SBSC) and represented on a strategy map to identify the causal relationships between each axis.

For each axis, a certain number of indicators have been identified that reflect the company's strategy and link economic performance directly to environmental performance and indirectly to the social one. The SBSC provides a comprehensive view of the company's performance and avoids confusion between the mission and strategic objectives, and allows communication of the strategy throughout the organization. It is tangible tool for improving performance through:

• High-quality indicators that are clear, relevant and measurable

• Validity confirmed by managers, who find it useful

This ensures the system provides insights to help managers take actions that improve performance.

General conclusion

In the current competitive and uncertain business landscape, companies must integrate sustainability practices into their performance management strategy to ensure long-term success. However, this process can be complex and challenging due to the multiple factors involved, such as environmental impact, social responsibility, and economic viability. To overcome these challenges, companies need a Sustainability balanced scorecard, which is a comprehensive management tool that enables them to measure and manage their sustainability performance effectively. However, developing and implementing this Scorecard requires careful planning, investment, and expertise.

Review of the adopted approach and verification of hypotheses and answers:

The purpose of conducting this research was to study the Sustainability balanced scorecard as a solution for integrating sustainability into industrial performance management.

The first chapter explored the concept of performance, its characteristics, and how it differed from other related notions. Additionally, it delved into the measurement of industrial performance by discussing its usefulness, management indicators, and measurement tools.

The second chapter centered on the Sustainability balanced scorecard (SBSC), which was a management tool used to integrate sustainability into industrial performance. The first section provided general information about the SBSC, including its definitions and functions. The second section covered the development of a SBSC, starting with its axes, followed by its constitution and evolution.

To address our main research question, we devoted the third chapter to Assess current sustainability performance and identify areas of improvement by integrating sustainability into operations.

To achieve this objective, specific goals were necessary, which are as follows:

- To analyze the strategy and determine the strategic objectives and relevant performance indicators of Lafarge Holcim Algeria

- To examine the relationships between economic, environmental and social sustainability axes using their respective indicators and propose new indicators to capture the multidimensional nature of sustainability

- To propose an appropriate Sustainability balanced scorecard for the company.

All of these objectives were achieved through various methods, including observation during the internship period, documentary collection, and semi-directive interviews conducted with parties involved in the strategy and performance management. Additionally, a survey was conducted among employees with at least two years of experience in the company and involved in sustainability and dashboards. The insights gained from these interviews and survey responses provided elements of answers that were useful in confirming or refuting the hypotheses put forward.

The principal hypothesis: "Lafarge Holcim Algeria has implemented a performance management system that considers environmental and sustainability goals, including the use of a sustainability balanced scorecard." The hypothesis is partially confirmed, as it was found that Lafarge has a performance management system that considers sustainability. However, it was not a Sustainability balanced scorecard.

The first hypothesis: "The indicators implemented in the system fully reflect Lafarge Holcim Algeria 's strategy", is confirmed, as they are specifically designed to measure and track the company's progress towards its sustainability goals and objectives.

The second hypothesis: "Some indicators combine both environmental and economic success, while others can combine social and economic success." The hypothesis is partially confirmed, as it was found that there are indicators that combine both environmental and economic success, such as the indicator that combines CO2 emissions to net sales. However, no such indicators were found for the social axis.

Summary of the main findings

Our analysis revealed that Lafarge Holcim Algeria has a strong industrial performance management system that prioritizes sustainability. However, we identified an opportunity for improvement in terms of effectively communicating this strategy. To address this, we recommended and helped implement a Sustainability Balanced Scorecard, which will enable the company to measure and manage its sustainability performance more effectively and align sustainability goals with its overall objectives.

Suggestions

Drawing from our analysis and the results obtained, we suggest the following recommendations:

- Based on our analysis of the data, we recommend the use of both qualitative and quantitative performance indicators to better reflect the company's sustainability strategy. Our research revealed that many possible qualitative indicators were not considered due to limitations in data collection. For example, indicators related to the company's stakeholder engagement.
- AI technology be used not only for testing and developing new cement compositions and assessing project feasibility, but also for addressing data collection issues related to the environment and stakeholders

Limits

- We faced a limit of time to complete the last step of sustainability balanced scorecard which was the evaluation and review.
- Confidentiality of the implementation process and objectives, particularly with regards to data related to corporate social relations.

Perspectives

While this research has provided valuable insights into the sustainability performance management of Lafarge Holcim Algeria , there are areas that could be further explored to enhance the study's findings. To this end, we suggest the following avenues for future research:

- Enhancing the SBSC's ability to accommodate changes using AI technology.
- The Blockchain for data and accounting sustainability.

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Appendices

Appendices

Appendice1: Interviews template

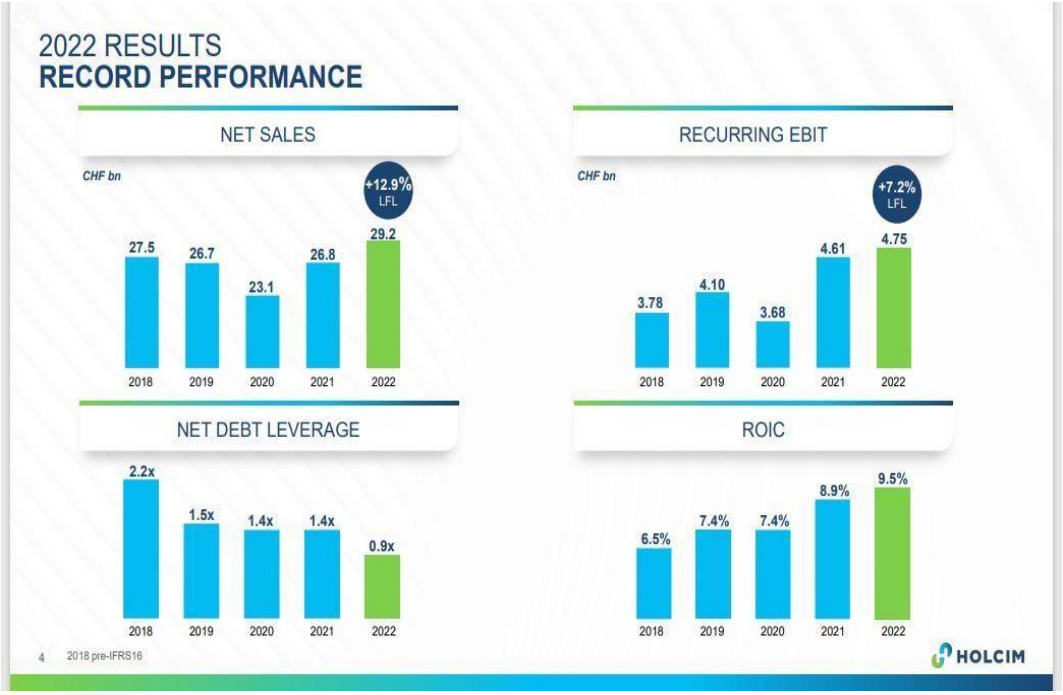
Presentation de la recherche	The aim of the research is to define the strategy of the company, find out the company's performance management and check out if the indicators used reflect the strategy.
Interviewer	Souad Sarra MESSIKH
Theme:	Questions:
Theme 01:	1-How does your company approach performance management systems? 2-Does your company consider environmental and sustainability aspects in its performance management system? 3-What are the company's key objectives and goals related to environmental and sustainability performance?
Theme 02:	1-How does your company set objectives and measure outcomes related to environmental and sustainability performance? 2-What are some of the key outcomes that your company has achieved in terms of environmental and sustainability performance? 3-How do you prioritize your environmental and sustainability objectives?
Theme 03:	1-How do you communicate your environmental and sustainability performance to stakeholders? 2-What channels do you use to disseminate information about your environmental and sustainability performance? 3-How do you respond to stakeholder feedback on your environmental and sustainability performance?

Theme 04:	1-What are some of the limits and challenges that you have faced in implementing a performance management system that considers environmental and sustainability aspects? 2-How have you addressed these limits and challenges?
	3-What are some areas for improvement in your performance management system?

Appendice2: The objectives of Lafarge Holcim Algeria 2023

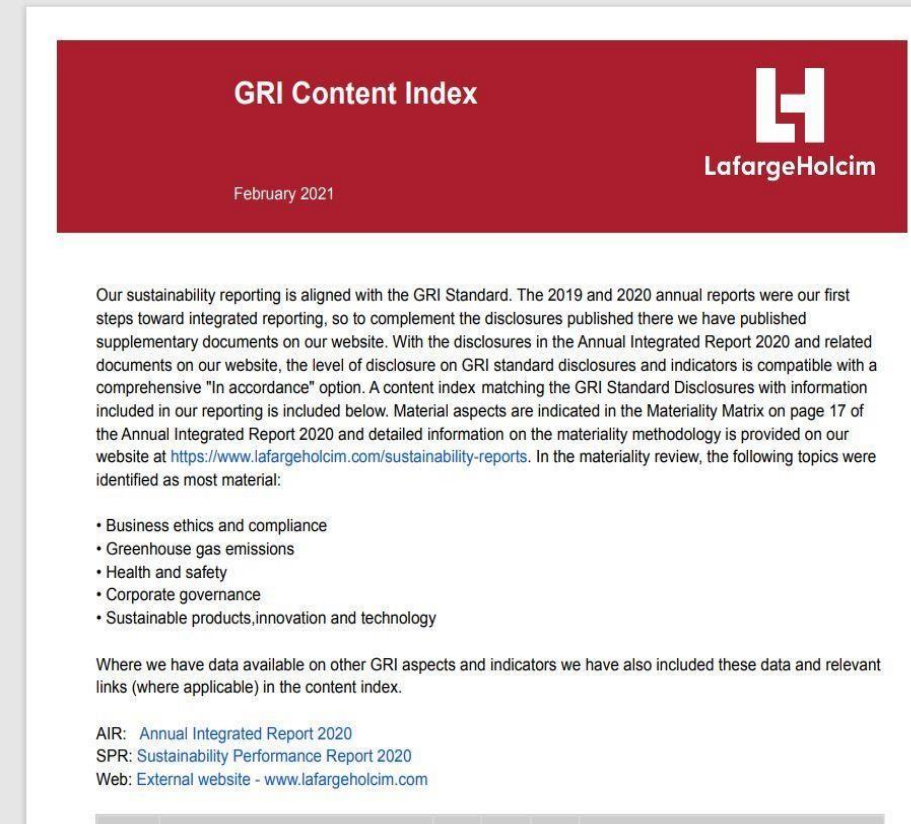
Appendice3: Sustainability Map of 2030

Appendice4: Economic indicators for the 2022 financial report.



Appendice5: Environmental indicators from the climate report 2022

Appendice6: GRI content index



GRI Content Index

February 2021

LafargeHolcim

Our sustainability reporting is aligned with the GRI Standard. The 2019 and 2020 annual reports were our first steps toward integrated reporting, so to complement the disclosures published there we have published supplementary documents on our website. With the disclosures in the Annual Integrated Report 2020 and related documents on our website, the level of disclosure on GRI standard disclosures and indicators is compatible with a comprehensive "In accordance" option. A content index matching the GRI Standard Disclosures with information included in our reporting is included below. Material aspects are indicated in the Materiality Matrix on page 17 of the Annual Integrated Report 2020 and detailed information on the materiality methodology is provided on our website at https://www.lafargeholcim.com/sustainability-reports. In the materiality review, the following topics were identified as most material:

- Business ethics and compliance
- Greenhouse gas emissions
- Health and safety
- Corporate governance
- Sustainable products,innovation and technology

Where we have data available on other GRI aspects and indicators we have also included these data and relevant links (where applicable) in the content index.

AIR: Annual Integrated Report 2020
SPR: Sustainability Performance Report 2020
Web: External website - www.lafargeholcim.com

Appendice7: The survey conducted for the empirical study from google forms

Table of content