



Politecnico di Torino

Master of Science Program in

Territorial, Urban, Environmental and Landscape Planning

Curriculum: Planning for the Global Urban Agenda

Master Thesis

**ESG Framework for Private Construction Companies: Methods and Guidelines for
Assessing Social Dimensions**

Supervisor:

Prof. Sara Torabi Moghaddam

Co Supervisor:

Daniela Santana Tovar

Candidate

Elnaz Amaniparchekouhi

Academic year :2022-2025

S

E

G

EEE
EEE
EEE
EEE
EEE
EEE
EEE
EEE
EEE
EEE
EEE
EEE
EEE
EEE
EEE
EEE
EEE

SSSSSSSSSS
SSSSSSSSSS
SSSSSSSSSS
SSSSSSSSSS
SSSSSSSSSS
SSSSSSSSSS
SSSSSSSSSS
SSSSSSSSSS
SSSSSSSSSS
SSSSSSSSSS
SSSSSSSSSS
SSSSSSSSSS
SSSSSSSSSS
SSSSSSSSSS
SSSSSSSSSS
SSSSSSSSSS

GGG
GGG
GGG
GGG
GGG
GGG
GGG
GGG
GGG
GGG
GGG
GGG
GGG
GGG
GGG
GGG
GGG

WHO CARES WINS

?



Abstract

The evolution of Environmental, Social, and Governance (ESG) considerations from the socially responsible investing (SRI) practices of the 19th century to a globally recognized framework has significantly influenced corporate and investment strategies. ESG factors are pivotal in promoting sustainable development by integrating environmental conservation, social equity, and effective governance into corporate decision-making. This study examines methods and guidelines for assessing ESG indicators, focusing specifically on the social dimension in construction companies. It identifies gaps in standardized assessment tools and proposes strategies to integrate ESG principles effectively into the industry. Anchored by frameworks such as the New Urban Agenda and UN Sustainable Development Goals, the research emphasizes the growing importance of urban sustainability and the need for corporate evaluations that balance environmental, social, and economic considerations. Using LEED for Cities and Communities (Version 4.1) and GRESB as primary assessment tools, the study employs bibliometric and meta-analytic methodologies to analyze, compare, and integrate social indicators. The systematic approach includes indicator selection, classification, filtering, and integration, culminating in a refined template of 23 relevant indicators—13 of which are overlapping—tailored for construction and real estate applications. The findings underscore the critical role of stakeholder engagement in achieving social sustainability and highlight the complementary roles of LEED and GRESB in assessing ESG dimensions. By addressing the challenges posed by varying assessment methodologies and emphasizing social components, this research enhances the effectiveness of ESG assessments and contributes to advancing sustainability and societal development in urban and construction contexts

Key words: ESG, GRESB, LEED, social sustainability, assessment methodologies, decision making, urban sustainability, construction companies, sustainability assessment tools

Author's Declaration

I hereby declare that I am the sole author of this thesis. This document represents an accurate and complete version of the final work, including any required revisions as approved by my examiners. I acknowledge that this thesis may be made publicly accessible in electronic format.

Acknowledgments

I extend my heartfelt gratitude to my supervisor, Professor Sara Torabi Moghaddam of the Polytechnic University of Turin, Italy, for her exceptional guidance, support, and boundless energy throughout my master's program and the completion of this thesis. Her expertise and insights have been invaluable in deepening my understanding of decision-making in urban planning.

I am also profoundly grateful to my family, especially my sister Elmira, and my friends for their steadfast support and unwavering belief in me. Their encouragement has been a constant source of inspiration and motivation throughout my academic journey.

Additionally, I would like to acknowledge the use of AI tools, specifically ChatGPT, to assist with paraphrasing, editing for readability, and grammar checks to ensure clarity and accuracy of the text.

Contents

Abstract	iii
Author's Declaration	iv
Acknowledgments.....	v
List of Tables.....	vii
List of Figures	viii
List of Abbreviations.....	ix
CHAPTER 1: INTRODUCTION.....	1
1.1 Background.....	2
1.2 Problem Statement.....	4
1.3 Objectives	7
1.4 Research questions.....	7
1.5 Thesis structure.....	8
CHAPTER2: LITERATURE REVIEW	10
2.1 ESG Assessment.....	13
2.1.1 Assessment Tools.....	15
2.1.2 Assessment tools differences	27
2.2 What are ESG challenges	28
2.3 The impact of S(social) in ESG.....	31
CHAPTER3: METHODOLOGY	33
CHAPTER4: RESULTS.....	39
4.1 indicator analysis (identification & initial comparison)	40
4.2 initial indicator selection	48
4.3 Indicator Classification and filtering.....	58
4.4 integration and final selection.....	60
4.5 Indicator Template.....	63
4.6 Indicators' Description	64
CHAPTER5: COCLUSION	112
Terminology.....	115
Bibliography	122

List of Tables

Table 1- categories of LEED rating system certifications [35]	18
Table 2-LEED for cities and communities' categories V4.1 and their points [36].....	20
Table 3-The Real Estate Assessment components and their overall score [45].....	23
Table 4- different levels of WELL Certifications [51].....	26
Table 5-Table of General steps and specification of the procedure done in social indicator selection procedure.	38
Table 6- Comparison between LEED for Cities and LEED for Communities Version 4.1. Gray highlights indicate identical indicators and similarities, while light pink highlights denote differences in measurement points or variations in indicators [36]& [89].....	41
Table 7- Management and development components with social measure names highlighted in light pink [45]	44
Table 8-Management and performance components with social measure names highlighted in light pink. [45]	46
Table 9- initial Indicator classification and filtering based on comparison between LEED& GRESB , Source: Author.....	51
Table 10- relationship between LEED for cities indicators and thesis objectives (source: author)	54
Table 11-relationship between GRESB indicators and thesis objectives (source: author)	56
Table 12-final selection (source: author)	61
Table 13-Final Template Displaying Detailed Information on the Selected Indicators (source-the author).....	63

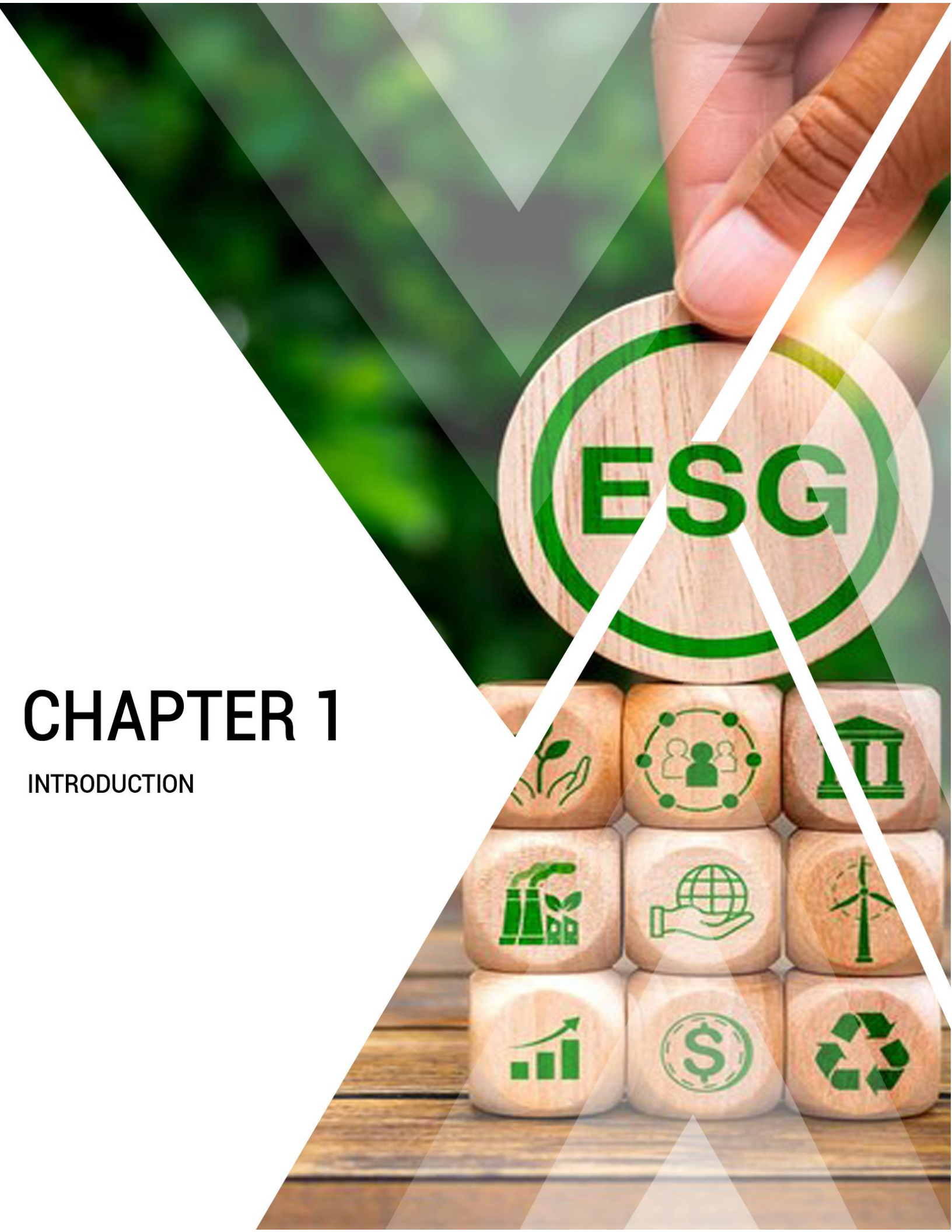
List of Figures

Figure 1-Schematic overview of the research design structure and thesis outline.....	9
Figure 2-The 10 most frequently used NSA tools [21]	16
Figure 3- levels of LEED certification [35]	19
Figure 4- timeline of GRI's history [88].....	21
Figure 5 -easy-to-use modular set of GRI Standards [42].....	22
Figure 6- The BREEAM ratings range [48].....	24
Figure 7- Schematic overview of methodological flowchart and theoretical frameworks.	35
Figure 8- Graphical flowchart of Social Indicator selection procedure.	36
Figure 9-Bar graph illustrating criteria weighting for LEED for Cities alongside categories, measure names, and available points for each measure (Numbers indicate available points, with "R" denoting required measures). [36].....	42
Figure 10 -GRESB Social indicators within the three components [45]	47
Figure 11- LEED for cities Sankey diagram and corresponding indicators in GRESB, Source: The author.	49
Figure 12- LEED for cities Sankey diagram and corresponding indicators in GRESB, filtering indicators, Source: The author	52
Figure 13- alignment between LEED for Cities and GRESB indicators, overlaped indicators from GRESB connected to their related indicator in LEED for Cities , interior connection between GRESB indicators(Each category is shown with different color)and LEED indicators' relevance to the objectives.....	59
Figure 14-Stakeholder Impact and Indicator Redundancy in LEED and GRESB Assessment Tools (source: the author)	60
Figure 15- indicator coding (source: the author).....	61

List of Abbreviations

SRI	Socially responsible investing
NGO	non-governmental organization
ESG	Environment, Social, Government
UN	United Nations
UNEP	the United Nations Environment Program
PRI	Principles for Responsible Investment
AUM	Assets Under Management
CEO	Chief Executive Officer
CSR	Corporate Social Responsibility
KPI	Key Performance Indicator
LEED-ND	Leadership in Energy and Environmental Design for Neighborhood Development
LEED	Leadership in Energy and Environmental Design
BREEAM	Building Research Establishment Environmental Assessment Method
CASBEEUD	Comprehensive Assessment System for Built Environment Efficiency
NSA	Neighborhood Sustainability Assessment
KLD	Kinder, Lydenberg, Domini & Co
BSA	Building Sustainability Assessment
USGBC	The United States Green Building Council

BRE	Building Research Establishment
GRI	Global Reporting Initiative
ICT	Information and communication technologies
PRI	Principles for Responsible Investment
EJ	Environmental Justice
GTI	the Green Township Index
ASGE	the Assessment Standard for Green Eco-districts
OHS	occupational health and safety
H&S	Health and safety
SASB	Sustainability Accounting Standards Board



CHAPTER 1

INTRODUCTION

1.1 Background

The integration of social considerations as a constraint in investment decision-making has been present since the 19th century, particularly among faith-based organizations. These considerations gained prominence through historical events, such as the Vietnam War, and social movements addressing issues like civil rights, environmental protection, and women's rights, gradually influencing the investment strategies of politically engaged individuals. In the following decades, socially responsible investing (SRI) initiatives specifically focused on investments in apartheid-era South Africa and countries involved in the arms trade, such as Sudan. This focus led to the establishment of entities like the Ethical Investment Research Services Ltd. (EIRIS6) in London, which was created to provide impartial research to churches, charities, and non-governmental organizations (NGOs), enabling them to make informed and ethical investment choices. [1]. During the 2000s and as evolution of socially responsible investment practice the concept of ESG showed itself by focusing on excluding industries or investment portfolio sectors. By integration of environmental, social and governance aspects through multiple investment decision-makings' dimensions ESG represents a broader framework. The term "ESG" was first introduced in 2005 through a pivotal study titled "Who Cares Wins" [2]. ESG refers to the way companies address key societal principles. It mostly applied within capital markets, and serves to define and assess corporate practices across three core areas: environmental performance, social engagement, and governance strategies [3].

In recent years, environmental, social, and governance (ESG) considerations have experienced increased global significance and awareness among all stakeholders, including consumers, communities, industries, investors, and governments. This growing importance is emphasized by the significant risks linked to environmental issues in global risk assessments [4]. In the early 1990s, fewer than 20 companies disclosed Environmental, Social, and Governance (ESG) data. However, by 2016, the number of companies producing sustainability or integrated reports had risen sharply to nearly 9,000. During the same period, investor interest in ESG data grew significantly.

The launch of the UN Principles for Responsible Investment in 2006 was a key milestone, with signatories pledging to include ESG considerations in their investment and ownership policies. By 2016, approximately 1,400 signatories had adopted these principles, collectively managing assets valued at around \$60 trillion [5].

ESG has developed into a fundamental goal for achieving sustainability [6]. ESG factors support sustainable development by aiming to create a balance between humanity and the environment. They represent sustainable development by combining economic growth, environmental protection, and social equity. ESG has become a crucial standard for evaluating businesses holistically and serves as a key driver of environmentally conscious finance. Recognized for its societal importance, ESG has also become a key competitive strategy, influenced corporate decisions and helped organizations build positive reputations [7].

The components of ESG are:

- The E in ESG, Environmental factors encompass the energy consumption of a company, its waste production, resource demands, and its effects on living organisms. Importantly, this also includes carbon emissions and the contribution to climate change. Every company uses resources and energy, thus affecting and being affected by the environment. [8] This dimension is vital for a company's financial stability. Investors assess environmental opportunities, such as the adoption of renewable energy, to gain a competitive advantage. However, the significant cost of green technology presents a challenge for smaller companies seeking to adopt sustainable practices [9].
- The S in ESG, Social factors relate to the relationships a company forms and the reputation it creates with individuals and institutions in the communities where it operates. This includes labor relations and initiatives focused on diversity and inclusion. Every company operates within a diverse and inclusive societal context.
- The G in ESG, Governance pertains to the internal framework of policies, regulations, and procedures that a company implements to manage its

operations, ensure effective decision-making, comply with legal obligations, and address the interests of external stakeholders. As a legal entity, governance is fundamental to every company. [8]

Authorities are developing classifications to define which corporate actions are deemed "sustainable" and are categorizing funds according to their incorporation of ESG principles. Academic institutions are rapidly introducing ESG-related courses, establishing ESG-focused centers, and training faculty members to become experts in ESG issues. Media outlets are publishing specialized newsletters focused on ESG, while consumers are increasingly taking a company's ESG impact into account when making purchasing decisions [10].

1.2 Problem Statement

In 2013, the United Nations Global Compact conducted a survey of 1,000 chief executive officers (CEOs) globally. Almost 93% of the participants identified environmental, social, and governance (ESG) issues as essential to the success of their businesses. Companies often perceive ESG-related risks as unlikely, as they may not face direct events such as accidents, lawsuits, or government interventions resulting from poor ESG practices in their day-to-day operations. However, addressing these risks is crucial to avoid negative long-term outcomes. According to Moody's, 33% of private sector issuers consider ESG risk an important factor in credit evaluations. While the rise of ESG ratings may appear superficial, it marks a significant step towards promoting socially responsible business practices. [11]

The emerging generation of investors places greater emphasis on sustainability, reflecting heightened awareness of environmental, social, and governance (ESG) issues. These investors prioritize extra-financial objectives and value corporate social responsibility (CSR), which entails the voluntary incorporation of social and environmental considerations into business practices and stakeholder engagement. Investor sentiment plays a key role in shaping corporate CSR efforts, with increased attention to ESG risks resulting in stronger corporate commitments to sustainability [12]

while the priorities of investors in driving CSR are undeniable, it is important to consider that the real estate sector plays a significant role in global greenhouse gas emissions, waste generation, and the consumption of water and energy [4] It is broad in scope, encompassing a range of owner strategies, tenants, and circumstances that directly influence the sustainability performance of their businesses [13]. Importantly, the real estate sector has recognized the challenges of ESG and is actively working towards creating a more environmentally sustainable future. It is one of the industries capable of making a significant impact in the ESG space. At the level of real estate asset owners, the sector has integrated various ESG aspects, with companies and funds producing specialized reports on their ESG performance in addition to traditional financial performance metrics [4].

While the real estate sector plays a crucial role in addressing global ESG challenges, society's growing awareness of environmental issues is driving customers to demand reduced environmental impact and enhanced real estate performance. Achieving these goals requires a sustainable approach to construction processes and the manufacture of building materials [14] Civil construction companies are pivotal in implementing these practices as they play a pivotal role in global development by transforming urban landscapes, supporting livelihoods, and contributing to economic growth through job creation and resource utilization [15].

Construction and real estate activities have the potential to deliver environmental, social, and economic benefits to society [14]. The successful implementation of ESG actions demonstrates corporate social responsibility (CSR) while aligning organizations with global efforts to create a more equitable, healthier, and environmentally sustainable future. This alignment is instrumental in advancing the United Nations' Sustainable Development Goals (SDGs), including poverty eradication, gender equality, and climate action [16]

Clementino & Perkins highlight a gap in the existing research on Environmental, Social, and Governance (ESG) ratings, particularly in the way they explore corporate social responsibility (CSR) performance. While much of the literature has focused on analyzing

the statistical correlation between ESG metrics and financial performance, there has been less attention paid to the reactions of companies to being rated [15], and research indicates that the correlation of scores pertaining to the social dimension, which includes issues such as labor and workplace rights, tends to be generally lower across various rating agencies compared to the environmental dimension. Depending on the pair of agencies evaluated, this correlation can even be negligible or negative [17]. The reasons behind these reactions, and how ESG ratings can contribute to significant improvements in firms' sustainability performance. This gap in understanding presents a critical opportunity to investigate how ESG ratings can drive more meaningful and impactful sustainability outcomes for companies [18]. A bibliometric analysis of 488 publications on Environmental, Social, and Governance (ESG) practices and innovation in civil construction from 2017 to 2022 indicates that only 4% of the topics focused on social and environmental regulations in the sector [15].

Despite the increasing recognition of ESG factors in the construction industry, there is a need to explore and compare the various assessment tools available for evaluating ESG performance among construction companies. This involves examining their differences and understanding their relationship with sustainability. Such an investigation is crucial for identifying effective strategies to improve ESG practices within the sector, particularly given the absence of standardized assessment tools and comprehensive frameworks for evaluating the social aspects of ESG performance in private construction companies. This research is essential for aligning the industry with broader societal expectations, promoting long-term environmental and social benefits, and enhancing the industry's ability to integrate ESG principles into its operations, which could influence sustainability and long-term success.

The absence of internal organizational integration results in internal pressures and demands from employees. Ensuring favorable working conditions and employee well-being is essential for fostering engagement. Additionally, social factors such as community involvement and the promotion of human rights significantly influence environmental performance [16].

Researchers primarily investigate the factors shaping corporate ESG construction, its connection to corporate operations, and its economic outcomes. As green development gains prominence, ESG construction has grown significantly, representing a company's sustainability efforts and dedication to corporate social responsibility (CSR) [19].

ESG rating and information provider agencies, also known as CSR ratings, social ratings, sustainability ratings, or SRI ratings agencies, have emerged in response to the demands of socially responsible investors who seek social and environmental information about companies in order to invest in more sustainable organizations. [20].

Through the enhancement of CSR via ESG construction and the strengthening of governance capabilities, companies can improve their resource utilization efficiency and boost their anticipated output rates. [19]

1.3 Objectives

As objectives these three items will be considered:

- 1- Objective N1: Identify and define methods for assessing ESG indicators.
- 2- Objective N2: Develop guidelines for assessing the social components of the ESG framework in construction companies.

1.4 Research questions

Research questions related [objective N1](#)

- What are the methods for assessing ESG indicators, and how can these indicators be evaluated?

Research questions related [objective N2](#)

- How can appropriate ESG guidelines be developed for construction companies?
- Are construction companies capable of implementing and utilizing the proposed ESG guidelines in urban environments?

- Are the selected ESG indicators directly relevant and applicable to individual construction projects for the assessment and enhancement of ESG and sustainability?

Research questions related to both objectives [N1](#) and [N2](#):

- What are the strategies for implementing the ESG framework within construction companies?

1.5 Thesis structure

This research will overview and assess the current cities and communities and real state rating tools used in different countries in terms of their characteristics in assessing ESG framework and analyze the relationship between various social indicators. [Figure 1](#) provides an overview of the research design framework and the thesis outline. The thesis is divided into five chapters:

Chapter1: introduction

This chapter provides the background and primary introduction about Environment social and government, defines the problem statement, outlines the research questions and objectives, and presents the structure of the thesis.

Chapter 2: Literature Review

This chapter examines the literature on ESG assessment, investigates various tools, addresses challenges, compares different methods, and explains the emphasis on the social dimension.

Chapter 3: Methodology

This chapter represents the methodology part of the research and describes the research design and starts with the comparison of two assessment tools namely GRESB and LEED, data collection methods, data analysis techniques and justifies the chosen

methods. This analysis utilizes GRESB and LEED for existing cities and communities V4.1 tools to identify a set of social indicators that are both common to and relevant for both assessment frameworks.

Chapter 4: Results

This chapter presents the results of indicator selections and discusses the findings of the research, which presents a list of social indicators and a final comparison of the existing social indicators and contains a proposal for the new social indicator template.

Chapter 5: Conclusion

This chapter summarizes the findings, draws conclusions, discusses limitations and offers final thoughts.

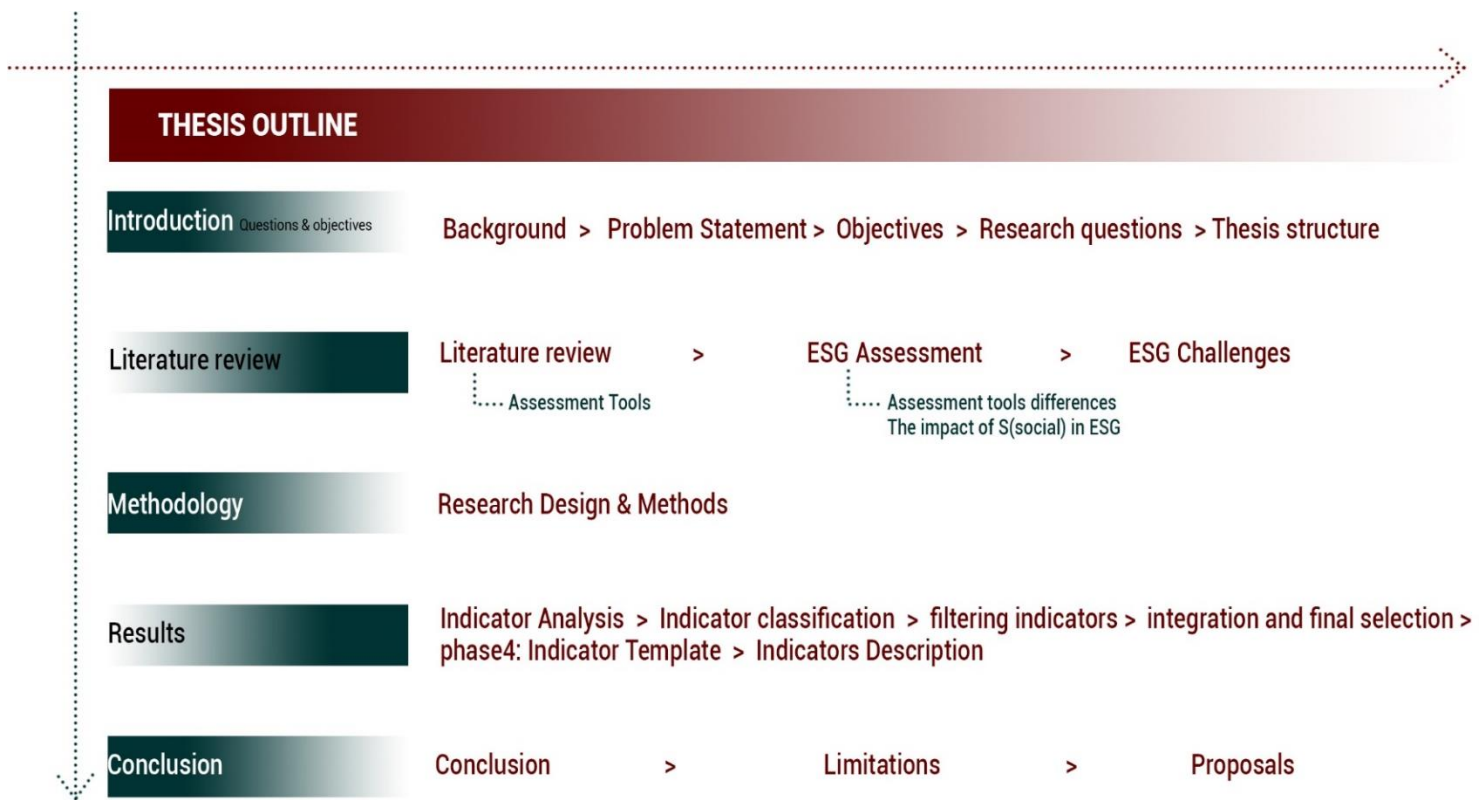


Figure 1-Schematic overview of the research design structure and thesis outline

In conclusion, definitions and additional explanations are provided to enhance clarity and understanding, particularly regarding the measures and phrases discussed in the terminology section.

CHAPTER 2

LITERATURE REVIEW



The introduction of international frameworks, such as the New Urban Agenda and the United Nations Sustainable Development Goals, has significantly accelerated urban sustainability initiatives in recent years. These initiatives operate across various scales, including buildings, blocks, neighborhoods, and entire cities. Acknowledging the rapid trends of urbanization and the critical role cities play in advancing sustainability, the 21st century is often described as the "urban century." Over the past two decades, numerous cities worldwide have undertaken a variety of initiatives to foster sustainability [21]. In today's business environment, evaluating a company's sustainable development has become a critical focus of business analytics. This assessment offers a comprehensive overview of environmental responsibility, social responsibility, and managerial efficiency, serving as a foundation for informed long-term business decisions. It aligns with the interests of key stakeholders, including management, company owners, and investors [22].

Corporate sustainability necessitates balancing the present environmental, social, and economic needs of a firm's stakeholders with their future requirements. The evaluation of corporate sustainability is gaining prominence as the financial market increasingly focuses on this issue [20]. Developing a reliable method for evaluating ESG performance, which accounts for the impact of more complex factors, is essential for success not only in decision-making but also in corporate management, enabling comparisons, enhancing competitiveness, and other related outcomes [23].

European sovereign wealth funds and pension funds from countries such as the UK, Sweden, and France are increasingly requiring companies to disclose ESG-related information. Additionally, there has been a rapid shift of capital toward the ESG sector in recent years. According to the UN PRI, assets under management (AUM) in the ESG domain grew significantly, rising from \$6 trillion in 2006 to \$104 trillion by 2020 [6]. As recent discussions within the European Union regarding the inclusion of gas and nuclear energy investments in the bloc's taxonomy for sustainable activities indicate, the global ESG market is projected to reach a value of \$53 trillion by 2025, accounting for one-third of all assets under management [24].

Given the growing importance of ESG, a substantial body of literature has explored its implications across various sectors, including the construction industry. In this thesis, previous research on ESG performance and its impact on construction companies will be discussed, focusing on bibliometric and meta-analytic studies. Previous research has been conducted on ESG, including studies such as , Khan (2022) used bibliometric analysis and meta-analysis to explore ESG performance's effect on overall business performance. Similarly, Senadheera et al. (2022) employed quantitative bibliometric techniques to investigate future research trajectories in ESG. Galletta et al. (2022) conducted bibliometric research within the banking sector, while Gao et al. (2021) provided a thorough review of ESG research, analyzing 690 articles from the Scopus database. Li et al. (2021) utilized CiteSpace to evaluate ESG literature from leading international journals, contributing to the understanding of ESG's collaborative research landscape [7]. Further, earlier studies such as Kocmanová and Dočekalová's (2012) examination of economic performance metrics related to ESG indicators [23]

Sahut and Pasquini-Descomps' (2015) study on the impact of ESG scores on market performance provide valuable insights into ESG's influence on corporate and market dynamics. [25]

Similarly, Gillan et al. (2010) explored the correlation between ESG performance and operational effectiveness, compensation strategies, and institutional investor behavior, offering insights into the reasons behind stronger ESG policies in firms. [26]

These studies highlight the significance of ESG across various sectors and emphasize the need for a deeper understanding of how ESG frameworks can be implemented within the context of construction companies

2.1 ESG Assessment

Environmental, Social, and Governance (ESG) has become a central area of focus for policymakers across the globe [27]. Investors are often considered a secondary priority [28] and there has been substantial growth in SRI over the past decade [20]. The growing number of investors in the financial market has brought about significant changes in the dynamic between companies and asset managers. To attract resources, companies have adapted to meet the diverse demands of the modern investor [29].

In recent decades, stakeholder pressure has driven companies to reduce their environmental impact, prioritize workforce value, diversify partnerships, and maintain profitability. For investors, balancing risk and return remains critical in decision-making. Presently, over \$30 trillion in assets are managed by hedge and mutual funds with ESG-focused strategies, encompassing half of Europe's investment market and about 30% of the American market [29].

The ESG concept emerged as a framework for companies to demonstrate commitment to environmental, social, and governance matters, aligning with stakeholder demands [29]. There is increasing focus on ESG and the incorporation of ESG criteria into organizations, activities, and projects [30] and more than 100 organizations are currently gathering data, analyzing, and rating or ranking company ESG performance. These organizations include both for-profit and non-profit entities, with some specializing in specific areas such as climate or human rights, while others address the full spectrum of issues encompassed by ESG [31]. Some assessments rely solely on non-financial information, while others incorporate both financial and non-financial data to evaluate long-term value and sustainability [20]. Depending on the subject matter and geographical focus, data vendors collect the ESG information required for ratings periodically (typically annually) and through various methods. In some cases, aggregate data sources and sustainability indices may be considered more credible by investors than the rankings provided by the data vendors themselves, despite being based on the same metrics [31]. ESG rating agencies evaluate businesses and assess corporate sustainability performance using their own research methodologies. This expertise has

positioned ESG rating agencies as a crucial reference for companies, financial markets, and academia in corporate sustainability assessments. As a result, the sustainability rating market has expanded significantly over the past decade, reflecting their growing influence. This has led to these agencies being studied not only as economic entities but also as social actors, with the ability to impact the behavior of other societal actors [20].

ESG rating agencies utilize distinct methodologies to evaluate ESG engagement, relying primarily on publicly available sources such as company reports and websites. However, the specific information sources vary by agency. For instance, ISS-Oekom and Bloomberg engage directly with companies, while Thomson Reuters incorporates stock market data. RobecoSAM adopts a unique approach by inviting major listed companies to complete questionnaires that address both provided and missing information. The number of ESG criteria assessed also differs significantly, with MSCI evaluating 37 and FTSE Russell assessing 300. Some agencies tailor their metrics to the specific industry of the company; for example, ECPI merges the social and governance dimensions, while RobecoSAM replaces governance with an economic dimension that includes corporate governance. Most agencies adjust ratings to account for industry-specific factors, but few disclose the weights assigned to these factors transparently. Consequently, rating discrepancies often stem from variations in the components considered and their respective weightings [32].

This section explores various ESG assessment tools, focusing on how different organizations measure and evaluate ESG performance

2.1.1 Assessment Tools

The evaluation of sustainable development at the enterprise level internationally relies on various environmental, social, and corporate governance (ESG) indicators, which capture changes in a company's development over a specified period. In recent years, investment managers have emphasized the importance of ESG indicators as measures of the long-term performance of companies in which they allocate financial resources. While investors often favor proprietary approaches and models for company evaluation, many are increasingly incorporating ESG performance indicators, including key performance indicators (KPIs), into their decision-making processes as follows:

- Environmental: Key environmental considerations include climate change (greenhouse gas emissions), environmental management systems and compliance, efficiency in resource use (waste, water, energy), and other environmental concerns such as toxic substances and biodiversity.
- Social: Key social considerations encompass workplace health and safety (H&S), human capital management, and stakeholder management, including securing a license to operate.
- Corporate Governance: Key governance factors include board effectiveness and corporate conduct, such as addressing issues of bribery and corruption [23].

Over the past two decades, there has been growing interest in the development and implementation of Neighborhood Sustainability Assessment (NSA) tools globally. NSA is part of a broader urban sustainability movement that began in the early 1990s with the United Nations' Agenda 21, emphasizing the importance of local efforts in achieving global sustainability. Since then, various tools, indicators, and rating systems have been created to track sustainability progress and guide urban development. Common approaches to urban sustainability assessment include ecological footprint analysis and the use of quantitative metrics to develop sustainability indices. NSA tools represent the latest generation of these tools, offering a more suitable method for addressing social interactions and providing context-sensitive results compared to city-centered

assessments. Many NSA tools are extensions of Building Sustainability Assessment (BSA) tools, developed by organizations like the United States Green Building Council (USGBC) and the Building Research Establishment (BRE) in the late 2000s. These tools emerged to address the need for broader sustainability assessments beyond the building scale. Some NSA tools, such as the EcoDistricts Protocol, are specifically focused on neighborhoods. These tools not only improve citizens' understanding of development plans but also encourage more informed decisions about where to live and work. Prior to the early 2000s, sustainability assessments were mainly building-focused, neglecting the cumulative impact of buildings and their interactions with other urban systems. The development of NSA tools successfully expanded assessment efforts beyond the building level, promoting stakeholder participation and integrated approaches to urban planning, covering aspects like energy, water, and waste. Tools like CASMUD have also considered interactions between indicators. Furthermore, to enhance usability, NSA tools are being developed to be more user-friendly, with guidelines and examples that make them accessible to a wider range of stakeholders, improving local awareness and enabling both formal certification and self-assessment practices. [21].

[Figure 2](#) presents the 10 most used NSA tools, based on a comparative analysis of 40 NSA assessment tools from 18 countries. These are, namely, LEED Neighborhood Development (LEED-ND), Building Research Establishment Environmental Assessment Method for Communities

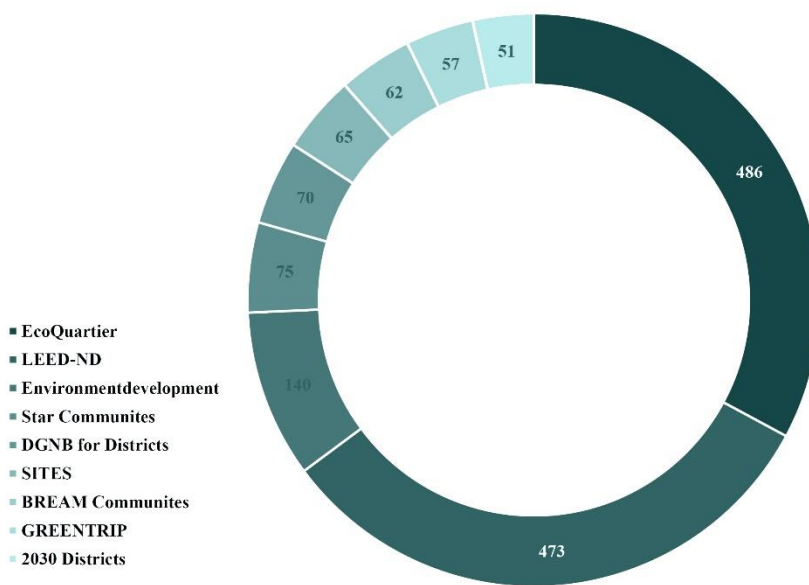


Figure 2-The 10 most frequently used NSA tools [21]

(BREEAM Communities), and Comprehensive Assessment System for Building Environmental Efficiency for Urban Development (CASBEE-UD) have been particularly influential, serving as pioneers and guiding the development of other Neighborhood Sustainability Assessment (NSA) tools, especially in developing countries. The use of NSA tools is especially recommended when local authorities have limited capacity to evaluate the sustainability performance of development proposals. In such cases, these tools can help authorities make more informed decisions. [21].

LEED-ND, as mentioned earlier, is a specialized framework developed under the broader umbrella of the Leadership in Energy and Environmental Design (LEED). LEED is considered one of the most widely adopted initiatives for assessing the sustainable performance of buildings and communities. [33]. The rating system was developed by the U.S. Green Building Council (USGBC) for national application. The pilot was introduced in 2007, with the official rating system following a few years later in 2010 [34]. Green building has quickly gained recognition for its role in promoting sustainable development [33]. LEED is the most widely recognized green building rating system globally. LEED certification [Table1](#) offers a framework for creating healthy, energy-efficient, and cost-effective green buildings that deliver benefits in terms of environmental, social, and governance factors [35] Over the past 25 years, multiple versions of LEED have steadily advanced the global green building market, resulting in over 194,000 registered and certified projects and more than 28 billion square feet of space worldwide [36]. To obtain LEED certification([Figure3](#)), a project earns points by meeting prerequisites and credits related to carbon, energy, water, waste, transportation, materials, health, and indoor environmental quality [35].

Table 1- categories of LEED rating system certifications [35]

LEED rating system	Description
Building Design and Construction (BD+C)	This applies to new construction or significant renovations, encompassing New Construction and Core & Shell, as well as applications for Schools, Retail, Hospitality, Data Centers, Warehouses & Distribution Centers, and Healthcare.
Interior Design and Construction (ID+C)	This applies to fully completed interior fit-out projects, including Commercial Interiors, as well as applications for Retail and Hospitality.
Building Operations and Maintenance (O+M)	This category applies to existing buildings undergoing improvement or minimal construction. It includes Existing Buildings, as well as applications for Schools, Retail, Hospitality, Data Centers, and Warehouses & Distribution Centers
Neighborhood Development (ND)	This category applies to new land development or redevelopment projects that include residential, nonresidential, or mixed uses. It encompasses projects at any stage of the development process, from conceptual planning to construction, and includes both planned and built projects.
Homes	This category is applicable to single-family homes, low-rise multi-family buildings (one to three stories), and mid-rise multi-family buildings (four or more stories). It includes Homes, Multifamily Lowrise, and Multifamily Midrise. Residential buildings exceeding four stories may also pursue LEED BD+C certification.
Cities	This category applies to entire cities or specific districts within a city. LEED for Cities projects enable the measurement and management of various aspects such as water consumption, energy use, waste, transportation, and the overall human experience within the city

LEED ND was recently developed by the USGBC to address the interaction between buildings and their surrounding infrastructure. LEED ND includes a set of assessment categories, such as smart location and linkage, neighborhood pattern and design, green infrastructure and buildings, innovation, and regional priority credits [33].

Also LEED ND employs a four-scale rating system to assess the certified area [34] Information on the performance of certified projects, including their geographical location, certification levels (ranging from Certified to Platinum), certification date, and credit allocation, documented in an Excel spreadsheet [33]. As outlined in [Table 1](#), LEED for Cities and LEED for Communities offer

cities and communities a globally standardized approach to evaluating and reporting performance, while facilitating the creation of responsible, sustainable, and targeted plans addressing factors that enhance quality of life([Table2](#)) [37]. Aligned with other LEED rating systems, LEED for Cities enables cities and communities to prioritize focus areas that are most significant to key stakeholders by earning credits and points, while also setting foundational achievements through prerequisites. [38].



Platinum
80+points earned



Gold
60-70 points earned



Certified
40-49 points earned



Silver
5 0-59 points earned

Figure 3- levels of LEED certification [35]

Table 2-LEED for cities and communities' categories V4.1 and their points [36]

Category	Points	Total points
Integrative Process	5	
Natural Process	9	
Transportation and Land Use	15	
Water Efficiency	11	
Energy and Green House Gas Emission	30	110
Material and Resources	10	
Quality of Life	20	
Innovation	6	
Regional Priority	4	

LEED for Cities and Communities incorporates advanced performance metrics from the successful LEED for Cities pilot program, established standards from the STAR Community Rating System, and scalable components of key GBCI green energy and infrastructure rating systems, including PEER, TRUE, SITES, and RELi. Additionally, it supports broader objectives, data tracking, and benchmarking initiatives, such as the United Nations Sustainable Development Goals. Furthermore, the LEED for Cities and Communities program can serve as a complement to the LEED-ND rating system. [39].

1997([Figure4](#)) the United Nations Environment Program (UNEP) established the Global Reporting Initiative (GRI), marking the creation of the first comprehensive framework for sustainability reporting [30]. Global standards widely recognize the GRI standards, with 96% of the world's 250 largest companies reporting on their sustainability efforts, and approximately 75% of these companies utilizing the GRI standard [40]. The purpose of

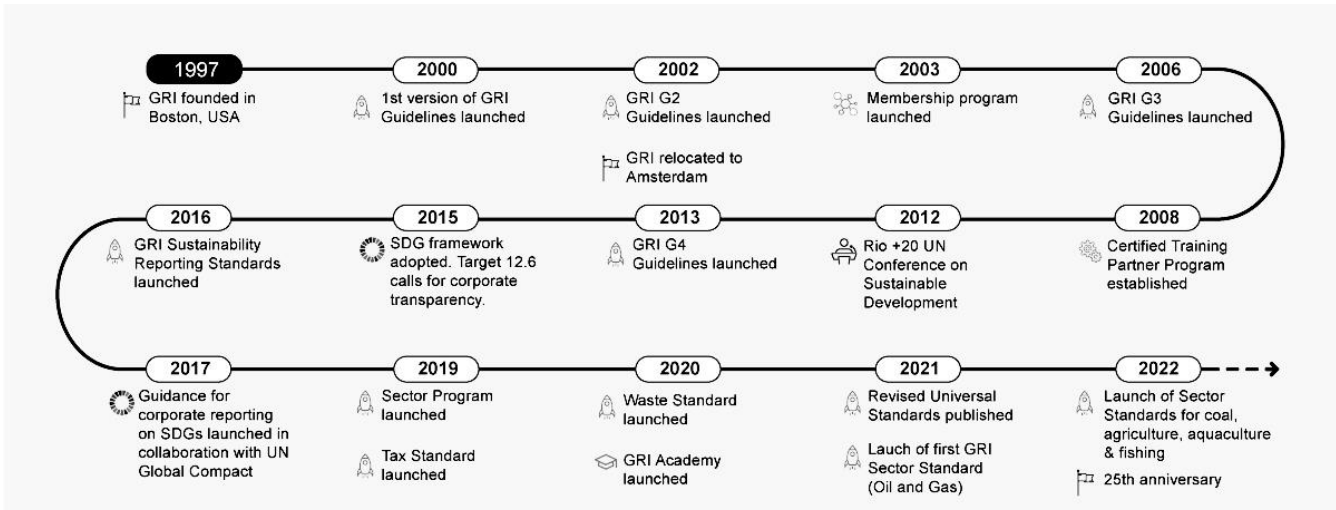


Figure 4- timeline of GRI's history [88]

sustainability reporting in accordance with the GRI Standards is to ensure transparency regarding an organization's contributions or intended contributions to sustainable development [41].

GRI establishes drivers for reporting and defines key indicators to monitor the operations of companies [13]. The GRI Standards constitute a modular framework comprising interconnected standards. [42]. GRI defines materiality as an externality, considering material aspects to be those that represent the organization's most significant economic, environmental, and social impacts [1]. The GRI Standards can be utilized by any organization, regardless of its size, type, geographic location, or level of reporting experience, to disclose information about its impacts on the economy, the environment, and society, including effects on human rights [41]. Beyond companies, the Standards hold significant relevance for various stakeholders, including investors, policymakers, capital markets, and civil society. The GRI Standards, designed as a user-friendly modular system ([Figure5](#)) , offer a comprehensive view of an organization's material

topics, their associated impacts, and management strategies. [43]. The GRI is unique as the only reporting framework that provides detailed recommendations for preparing non-financial reports, along with a thorough guide for their implementation [13]. The GRI Standards are designed as a system of interconnected standards, categorized into three series([Figure5](#)) : GRI Universal Standards, GRI Sector Standards, and GRI Topic Standards [41].

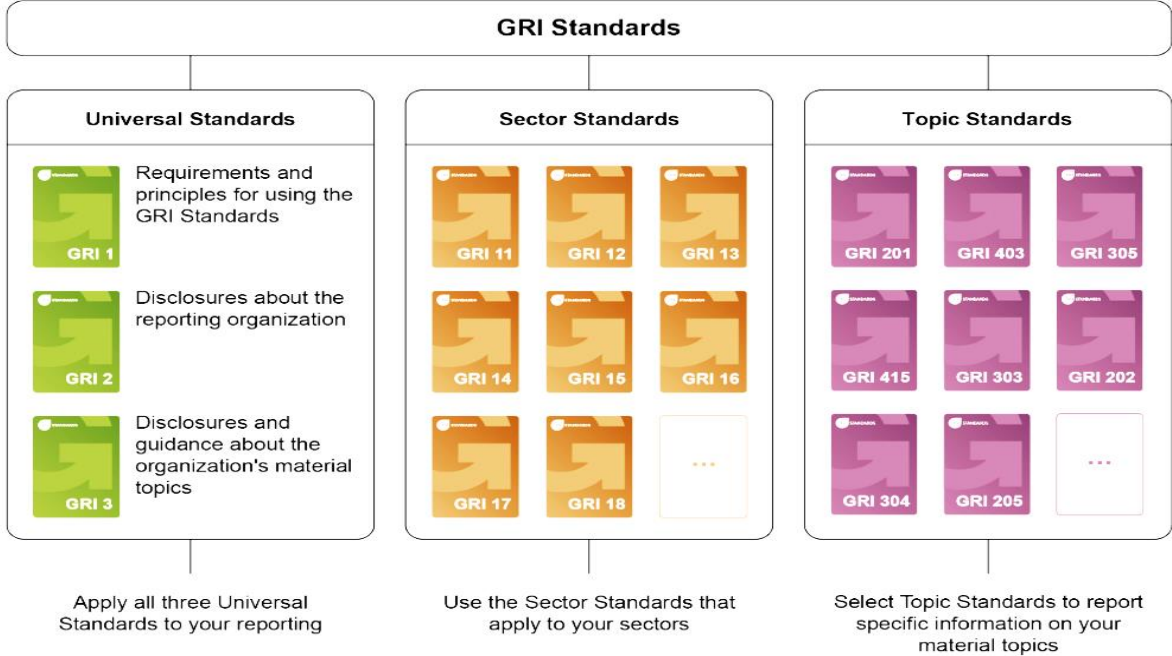


Figure 5 -easy-to-use modular set of GRI Standards [42]

The real estate sector is extensive, encompassing diverse ownership strategies, tenant profiles, and circumstances that directly influence the sustainability performance of businesses within the industry [13]. The Global Real Estate Sustainability Benchmark (GRESB) has played a crucial role in embedding the significance of ESG issues within the global real estate industry. [4].

The investor-driven initiative was first introduced in the Netherlands in 2009 to address the limitations of existing, widely recognized sustainability and ESG benchmarking tools, which were not well-suited to the distinctive characteristics of real assets. GRESB, a non-profit organization, facilitates a platform and process for voluntary ESG disclosures across various dimensions related to real estate and infrastructure funds and firms. This disclosed information is used by GRESB to generate standardized, validated datasets and benchmarks. Serving as a voluntary ESG performance reporting framework for real assets, GRESB provides the capital markets with consistent and validated data. Its industry-specific measurement tools focus on the built environment, evaluating fund- and firm-level performance for commercial real estate and, since 2017, infrastructure assets. The GRESB Assessments are designed to be adaptive and undergo regular updates to maintain the relevance and materiality of their content [44]. The Real Estate Assessment produces two benchmarks: the GRESB Real Estate Standing Investments Benchmark and the GRESB Development Benchmark, offering comprehensive scores for ESG performance [45]([Table3](#)). GRESB scores are awarded on a scale ranging from zero to five stars [44],with the maximum overall score of 100 corresponds to a total of 100 points. [45]. GRESB places greater emphasis on the Environmental (E) component within its ESG metric. It delivers both absolute and relative performance measures, incorporating key metrics such as greenhouse gas emissions and peer group rankings. This data facilitates engagement with essential stakeholders, showcasing strengths to external audiences while identifying relative weaknesses for operational teams. The GRESB Rating serves as a high-level, comprehensive metric for investors to assess the ESG performance of real asset investments [46].

Component	E	S	G
Management	0%	35%	65%
Performance	89%	11%	0%
Development	73%	21%	6%

Table 3-The Real Estate Assessment components and their overall score [45]

Building Research Establishment's Environmental Assessment Method (BREEAM), the first building certification system created by BRE, was launched in 1990 as an environmental assessment tool for new office developments in the UK. The BREEAM Platform is an intuitive, user-friendly digital tool designed to transform the process of capturing and verifying environmental assessments. This platform will offer lifecycle assessments and certifications across all types of built environment assets, aiming to positively influence the future of the built environment, related investments, and their environmental impact [47]. A BREEAM certified rating reflects the performance of a project and its stakeholders, assessed according to the BREEAM standard and its benchmarks. This rating allows for comparison between projects and provides assurance regarding the performance, quality, and value of the asset. The BREEAM ratings range ([Figure6](#)) from Acceptable (available only for the In-Use scheme) to Pass, Good, Very Good, Excellent, and Outstanding, with the rating represented by a series of stars on the BREEAM certificate [48]

BREEAM rating		% score
Outstanding	★★★★★	≥85
Excellent	☆★★★★	≥70
Very good	☆☆★★★★	≥55
Good	☆☆☆★★	≥45
Pass	☆☆☆☆★	≥30
Unclassified	☆☆☆☆☆	<30

Figure 6- The BREEAM ratings range [48]

National assessment tools also exist within the public sector, one example being the ITACA Protocol. The ITACA Protocol, a building sustainability assessment tool, is endorsed by ITACA (Institute for Procurement Transparency and Environmental Compatibility) and represents the Italian adaptation of the SBTool (Sustainable Building Tool) [49] and was developed in the early 2000s in response to the need of regional governments to establish effective tools to support territorial policies aimed at promoting environmental sustainability in the construction sector. The tool is based on several key principles, including the:

- Identification of environmental criteria to measure the building's environmental performance.
- Definition of reference performance (benchmark) for comparison with the building's performance.
- Assignment of a score based on the comparison with the benchmark.
- Weighting of criteria to determine their relative importance.
- Generation of a final synthetic score to reflect the improvement in overall performance compared to the standard level [50].

There are other tools that focus on human health and well-being. The impact of buildings on human health and well-being has become increasingly evident and significant [51]. The International WELL Building Institute (IWBI) is the global leader in promoting health and well-being within buildings, organizations, and communities. IWBI supports this mission through the WELL Building Standard, a collection of evidence-based strategies for buildings and organizations that, when applied, can enhance human health and well-being [52]. The WELL Building Standard™ version 2 (WELL v2™) encompasses a set of strategies—supported by the latest scientific research—designed to improve human health through design interventions, operational protocols, and policies, while fostering a culture of health and well-being. Building on the foundation of the original WELL Building Standard (WELL v1), WELL v2 incorporates insights from a diverse community of WELL users, practitioners, public health experts, and building scientists worldwide. Certification represents the highest standard of health achievement across all 10 concepts of the WELL Building Standard. To attain certification ([Table 4](#)), projects must meet all preconditions and earn a specified number of points to achieve various levels of WELL Certification. Projects are limited to a maximum of 12 points for each concept, with a total cap of 100 points across the ten concepts. Additionally, projects have the opportunity to earn up to ten extra points in the Innovation concept. Should a project exceed 12 points in any given concept, as long as the maximum allowable points in the Innovation concept have not yet been reached [51].

Table 4- different levels of WELL Certifications [51]

Total achieved	points	WELL Certification		WELL Core Certification	
		Minimum points per concept	Level of certification	Minimum points per concept	Level of certification
40 pts	0		WELL Bronze	0	WELL Core Bronze
50 pts	1		WELL Silver	0	WELL Core Silver
60 pts	2		WELL Gold	0	WELL Core Gold
80 pts	3		WELL Platinum	0	WELL Core Platinum

Sustainalytics has developed another widely utilized rating system that primarily focuses on providing solutions to enhance institutional investors' understanding and application of ESG concepts. This rating ranges from 0 to 100 and can be translated into five categories reflecting the severity of ESG risk that may influence a company's enterprise value, with higher ratings indicating greater risk. Notably, the Sustainalytics methodology incorporates three distinct blocks of analysis: first, an evaluation of corporate governance; second, an assessment of material ESG factors relevant to the specific industry; and third, the weighting of idiosyncratic events [40].

While Sustainalytics provides a comprehensive ESG risk rating system for institutional investors, another assessment tool, WiredScore, addresses the growing importance of digital connectivity and smart technologies in the real estate sector, highlighting the diverse range of factors influencing sustainability and business performance.

Established in 2013 with the endorsement of Mayor Bloomberg and support from industry leaders, WiredScore aims to enhance global building connectivity, promoting collaboration, innovation, and dynamism. As a leader in building technology, WiredScore evaluates and improves digital connectivity and smart technology in residential and commercial properties, providing transparency on digital infrastructure and certifying future readiness [53].

2.1.2 Assessment tools differences

The provision of measurable indicators for assessing sustainability is often considered a normative concept [21]. Although it is inherently qualitative, a quantitative approach is also essential for a comprehensive evaluation. This information serves as a link between relevant parties and companies, playing a crucial role in enabling investors to make socially responsible decisions [40]. Quantifiable indicators facilitate a better understanding of the sustainability performance of neighborhoods, which can lead to improved communication with stakeholders. For example, the use of LEED-ND and BREEAM Communities in Lisbon, Portugal demonstrates how such indicators can help identify differences between desirable and undesirable sustainability outcomes, as well as inform decision-makers about the progress toward achieving targets. However, some argue that quantitative indicators used in NSA tools are not appropriate for assessing aspects like happiness, quality of life, sense of place, and aesthetics, which are inherently qualitative. Among the recently developed tools, the Green Township Index (GTI) and the Assessment Standard for Green Eco-districts (ASGE) are noted for effectively addressing multiple sustainability dimensions in a balanced way. Despite these advancements, many tools continue to focus primarily on environmental aspects. [21] , for instance BREEAM, LEED and CASBEE [13], and additional focus on the socio-economic and institutional dimensions is required [21].

LEED-ND offers a prescriptive framework for developing new neighborhoods, presenting strategies that can foster more efficient, sustainable, and well-connected communities. In contrast, LEED for Cities and Communities provides a performance-based certification to assess local progress. A neighborhood project that has achieved LEED-ND certification can register to monitor its advancement through LEED for Cities and Communities by submitting plans and measured data from the neighborhood [39].

CASBEE primarily assesses the enhancement of indoor and outdoor environmental quality, along with the reduction of environmental impacts such as energy use,

resources, and materials. BREEAM and LEED specifically emphasize design features related to energy demand, low carbon emissions, materials, land use, and transportation. HQE is unique in awarding more credit points to health and well-being aspects than to the core environmental protection areas. Additionally, LEED incorporates regional priority criteria, encouraging stakeholders to earn credits based on region-specific environmental, social equity, and public health priorities [13]. A key advantage of NSA tools is their ability to generate co-benefits related to resilience, health, and climate change adaptation and mitigation. For example, energy-efficient design strategies that enhance both indoor and outdoor thermal comfort while reducing energy demand (such as passive building and urban design techniques, smart metering systems, etc.) offer co-benefits for health as well as climate change mitigation. Additionally, these strategies can improve resilience to various stressors, including extreme heat events and energy disruptions [21]. LEED, BREEAM, and WELL offer measurable sustainability ratings and/or certifications for projects or assets [30].

2.2 What are ESG challenges

While ESG evaluations are still in their early stages in industries like automotive, banking, and aviation, there is a notable lack of quantitative methods for assessing the balance of these indicators in logistics companies [29].

The need for clear, standardized ESG framework for mandatory reporting showed itself. Recent years have seen a surge in responsible investment interest, with the number of signatories to the PRI sustainability code exceeding 3,000 by 2018—a fifteen-fold increase since 2008, with Europe accounting for over half. Growing societal and investor emphasis on ESG issues has prompted companies to align with these principles, recognizing them as vital for capital attraction. Mandatory ESG reporting is anticipated in the near future, reflecting its demonstrated ability to generate above-average market profits. Investor engagement and regulatory advancements are further driving companies to innovate and prioritize ESG, solidifying its prominence in the investment

agenda [29]. Non-investor stakeholders also play a significant role in shaping financial policy and corporate valuation. In recent years, there has been an increasing emphasis on the influence of these stakeholders and the importance of ESG issues [28].

ESG criteria have been incorporated into the investment decision-making process [54]. Assessments of a company's ESG performance may vary across different vendors, depending on the measurements and weights used. This has led to a complex ecosystem of ESG metrics, data sources, and ratings, which require proper contextualization for accurate interpretation and effective use in analysis and investment decision-making [1].

Companies have responded to stakeholder demands by broadening their business activities within ESG domains. For instance, Netflix has committed to establishing a creative development fund of approximately \$20 million over the next five years to enhance its business diversity. Clorox has implemented a strategy to reduce its use of virgin plastic by 50% by 2030 in response to investor requests. ExxonMobil Inc., one of the largest global petroleum companies, has applied the ESG framework to develop new business ventures. This includes a partnership with the U.S. government to develop carbon capture and storage technology and investments in biomass technology to reduce greenhouse gas emissions. [54].

ESG asserts that a company's success is reliant on its environmental, social, and governance practices. Strong ESG performance contributes to business success, whereas insufficient disclosure in ESG reports can negatively impact a company's reputation. Investors consider ESG scores when making long-term decisions [9]. Currently, there are numerous standards for disclosing sustainable development information in corporate reporting, along with several hundred rating systems used to assess a company's commitment to the green economy, social responsibility, and corporate governance. This situation highlights the lack of a reliable foundation for ESG assessments, as various ESG reporting standards, each with its own limitations, a wide range of ESG indicators, and unclear approaches to developing ESG ratings, result in subjective evaluations of a company's activities. [22].

The construction industry has increasingly focused on integrating ESG strategies to improve their ESG scores. For instance, Samsung Construction and Engineering Corporation has committed to ceasing investment in coal-related projects after completing ongoing ones and expanding into eco-friendly initiatives. Similarly, Hyundai Construction Company is investing in smart safety technologies and renewable energy projects, such as hydrogen fuel and tidal power generation, to enhance sustainability. However, there is significant debate regarding the impact of ESG adoption on the performance and profitability of construction companies. Some argue that adopting ESG practices, such as reducing carbon emissions or construction waste and sharing profits with communities, may negatively affect financial performance. Furthermore, project managers often resist emphasizing ESG responsibilities, viewing them as non-beneficial to business success. To address these concerns, construction firms are encouraged to focus on collaborative ESG activities—such as reducing carbon emissions and managing workforce safety—while balancing both financial and non-financial factors in their operations to enhance business reputation and sustainability [54]. SASB (2017) identifies material ESG issues for value-driven investment at the industry level based on their relevance to each firm's financial performance [1]. According to SASB, companies in engineering and construction services have significant materiality issues on ecological impacts in the environment dimension, product quality & safety in the social capital dimension, employee health & safety in the human capital dimension, product design & lifecycle management in the business model & innovation dimension, and business ethics in leadership & governance dimension [54].

ESG-focused developers seek sustainability certifications, such as LEED, WELL, BREEAM, and NABERS, to enhance the value of their assets. A meta-analysis by Dalton and Fuerst of 42 studies conducted between 2008 and 2016 found that green building certifications resulted in a rent premium of 6% and a sales premium of 7.6%. Other research indicated that spaces certified by WELL or Fitwel, which emphasize health and wellbeing, could command rents 4.4% to 7% higher per square foot compared to nearby, non-certified, and non-registered properties. For real estate assets, a high ESG rating

positively impacts cash flows by increasing rents and occupancy levels, reducing operating costs (such as insurance premiums) and capital costs (including repairs and restorations), and supporting future demand while slowing asset depreciation. [30].

In recent years, ESG rating agencies have not only incorporated new criteria into their assessment models to address emerging global challenges but have also witnessed rapid changes in these criteria, further complicating the evaluation process. [32]. The current context necessitates that companies contribute to sustainable development by adopting corporate strategies that incorporate sustainable practices into their operations, with the objective of attaining corporate sustainability [20].

Nevertheless, the significance of investors should not be underestimated, as they provide the capital necessary for the creation, growth, and innovation of companies [28]. Additionally, the effectiveness of an ESG capital asset pricing framework in promoting environmentally sustainable activities and investments by companies cannot be overlooked [55].

2.3 The impact of S(social) in ESG

ESG investing focuses on nonfinancial factors related to social governance and environmental considerations, drawing significant attention from investors. This form of investment functions as social capital, fostering social income through environmental responsibility. It contributes to enhancing green capital accumulation, promoting sustainable growth, and increasing the adoption of green energy across various economic sectors. Additionally, ESG investment supports the advancement of green literacy, further reinforcing its role in driving sustainable development [55].

The social dynamics of measurement operate bidirectionally. According to the constructionist perspective, our personal traits, socialization processes, beliefs, interactions, and circumstances influence the nature of the measures we develop. Conversely, the reactivity axiom asserts that these measures, once established, subsequently shape the world around us. Rankings illustrate this concept well; when

highly visible, the criteria used for ranking organizations or individuals inevitably impact their subsequent actions and decisions [1].

Companies must identify key ESG indicators while also selecting relevant supplementary indicators tailored to significant aspects. These indicators can be informed by internal and external audits, which serve as the foundation for proposing additional measures [23] The socially sustainable dimension holds a secondary role within their assessment framework [13].

Occupational health and safety (OHS) is a critical aspect of social performance, necessitating the creation of workplace conditions that ensure safety for employees, customers, and surrounding environments. Corporate Social Responsibility (CSR) emphasizes the social dimensions of sustainable development, incorporating elements such as leadership accountability, reporting, development, diversity, training, labor relations, product safety, responsible marketing, human rights, social investments, and transparency. Key CSR concerns also include employees' rights, engagement with municipalities, supplier relations, consumer education, and anti-corruption measures. The corporate focus on social aspects is closely tied to human resource management. ESG performance indicators help companies track progress toward strategic sustainability goals, offering both quantitative and qualitative feedback within their corporate strategies. The approach to managing environmental, social, and governance issues remains consistent across these domains. [23].

The success and livability of a city or community are fundamentally tied to ensuring a high quality of life and improved living standards for its residents. Achieving this requires equitable consideration of the needs of all individuals, regardless of their gender, ethnicity, socio-cultural background, or economic status [38].

CHAPTER 3

METHODOLOGY



To achieve the research objectives and address the research questions, an academically rigorous set of methods was employed, including desktop research and comparative analysis. This section investigates two assessment tools, LEED and GRESB, to identify the social aspects of ESG assessment. The aim is to select effective sustainable assessment indicators based on social aspects applicable for construction companies in their ESG assessments. The selection procedure involves the following actions ([Figure8](#) and [Table5](#)). The methodology comprises the following phases ([Figure7](#)):

phase 1: indicator analysis (identification & initial comparison)

identification and initial comparison between assessment tools:

- Literature review
- Investigation and comparison between different versions of LEED for existing Cities and existing Communities (version 4.1),
- Identify social indicators in LEED for cities (version 4.1)
- Analyze and identify social indicators in GRESB

Phase 2: indicator analysis (initial indicator selection)

- Analysis and comparison between social indicators in LEED for Cities (Version 4.1) and GRESB social indicators.
- LEED for cities internal comparison:
 1. comparison between LEED social indicators
 2. identify indicators with overlapping intent and benchmarks and their connections
- GRESB internal comparison GRESB:
 1. comparison between GRESB social indicators
 2. identify indicators with overlapping intent and benchmarks and their connections

Note: LEED for cities or simply LEED refers to LEED for cities and communities. While LEED version 4.1 is the latest version for the future analysis this version is considered

Phase 3: Indicator Classification and filtering

- indicator selection from both assessment tools and justify choices.
- final selection

phase 4: indicator template

- propose a well-justified and updated template for selected indicators.

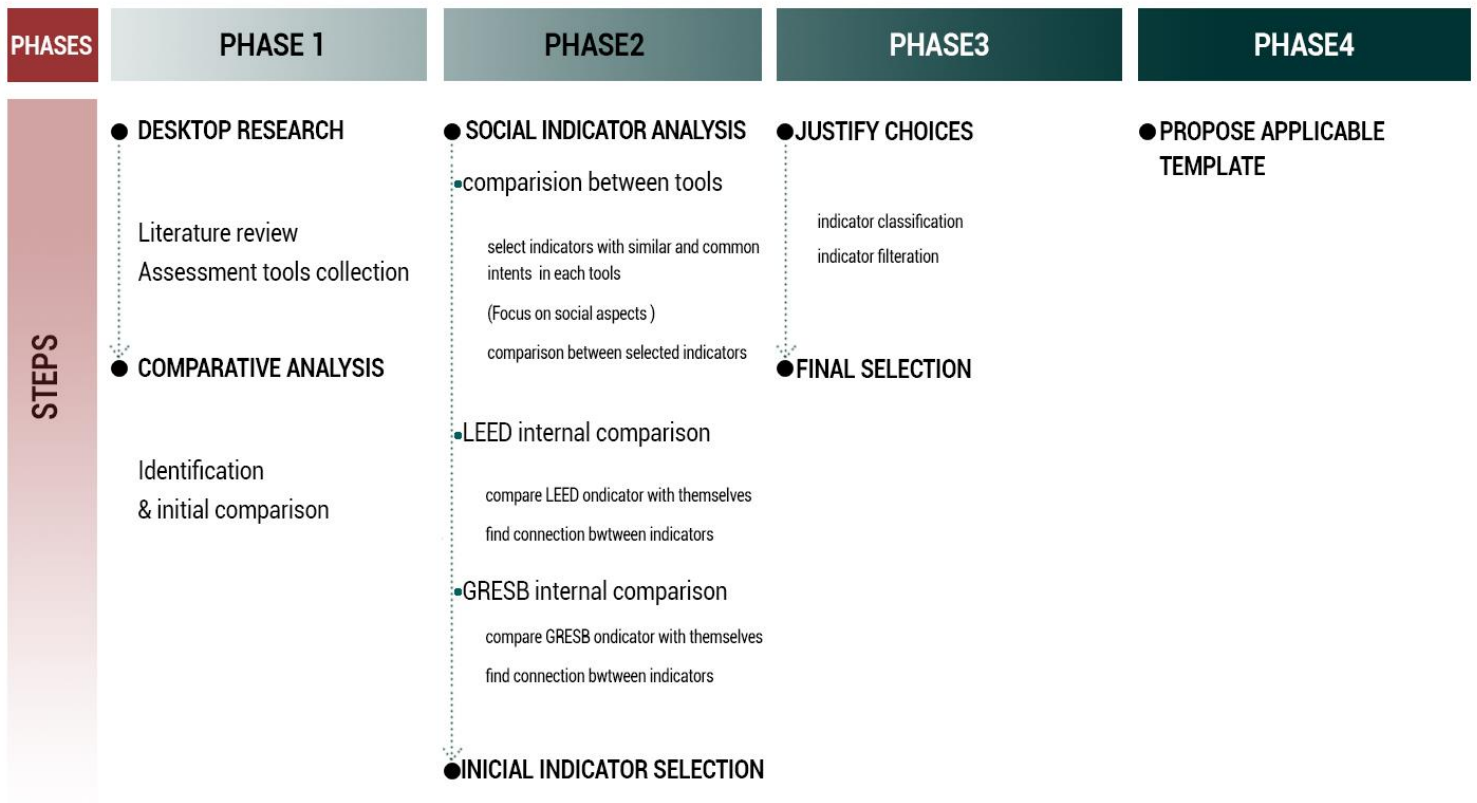


Figure 7- Schematic overview of methodological flowchart and theoretical frameworks.

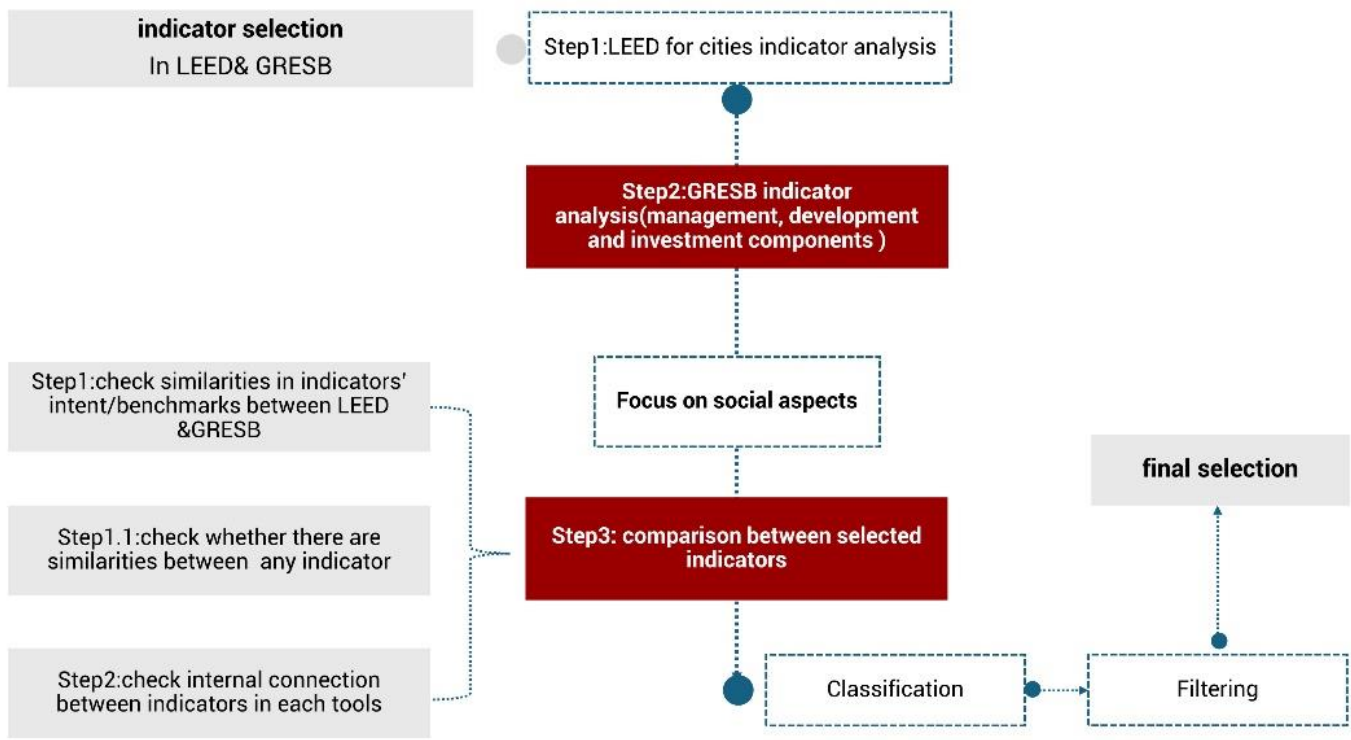


Figure 8- Graphical flowchart of Social Indicator selection procedure.

Phase	Action	Document	Steps	Output
Phase 1	Identification and initial comparison	<ul style="list-style-type: none"> - GRESB real estate assessment and reference guide structure - LEED V4.1 cities and communities: existing cities - LEED V4.1 cities and communities: existing communities 	<p>Step1: identifying all categories and indicators in LEED for existing cities and existing communities V4.1</p> <p>Step2: comparison between LEED for existing cities and existing communities V4.1</p> <p>Step3: select social indicator in LEED for cities V4.1</p> <p>Step4: analyze GRESB components, categories and indicators</p> <p>Step5: select social indicators in GRESB of all components and categories</p>	List of social indicators in LEED & GRESB
phase 2	First indicator selection	Phase 1 out put	<p>Step1: LEED social indicator analysis (categories, indicators, points and weights)</p> <p>Step2: GRESB social indicator analysis (management, development and investment components) (categories, indicators, points and weights)</p> <p>Step3: Identify and select indicators that are similar or related to one another across both tools</p>	Internal and external connection between Indicators
Phase3	1.Classification	Phases 1&2 out puts	<p>Step1: select similar indicators from GRESB related to LEED indicators and vice versa</p> <p>Step2: Grouping selected indicators within the same domain.</p> <p>Step3: identify overlapped LEED indicators within the same category of GRESB components/categories and vice versa (considering benchmarks and indicators intent)</p>	classified indicators

2.Filtering indicators	Phase3.1 output	<p>Step1: Check the connection between indicators and thesis objectives (LEED & GRESB individually)</p> <p>Step2: comparison between selected indicators (Similarities based on intent and benchmarks in each tool separately. -internal comparison)</p> <p>Step3: Remove indicators that don't align with thesis objectives & classify subcategories.</p>	Indicators' relation (internal, external, with thesis objectives)
3.final selection	Phase3.2 output	<p>Step1: select indicators with direct/partial relation with thesis objectives</p> <p>Step2: Select the most relevant indicator as the main and the overlapped as sub indicator</p> <p>Step3: identify code for selected indicator</p>	Table of final selected indicators with identical codes
Phase4	Justified/Updated template	Phase 3 out put	<p>Step1: well-justified and updated template with explanation about selected indicators(individually)</p> <p>updated templates for final selected indicators</p>

Table 5-Table of General steps and specification of the procedure done in social indicator selection procedure.

CHAPTER 4

RESULTS



4.1 indicator analysis (identification & initial comparison)

This chapter presents the findings obtained from applying the methodology to a comparative analysis of two assessment tools: LEED for Cities and Communities, and GRESB. The comparison is conducted at both the city and community scale as well as the real estate scale, with a particular focus on social aspects within urban environments. Therefore, only the indicators related to quality of life and social dimensions are considered. As previously mentioned, LEED and GRESB are two of the most recognized and advanced tools for measuring sustainability, particularly in the context of their respective evaluation scales.

As previously outlined, the methodological framework is divided into four phases. Phases 1 and 2 involve the analysis of indicators and interpretation of results from the selected sustainability assessment tools, LEED and GRESB, with a focus on social aspects. The outcome of this initial phase is a list of indicators that are either common to or related between the two tools. Each tool employs a different categorization system, and their indicators are defined differently. Consequently, the analysis considers not only the name of each indicator but also the overarching intent of the category, including the submittal options/benchmarks, requirements, and the intended measures associated with each indicator.

LEED has been selected for comparison as it represents the most recent version. Although LEED for Cities and LEED for Communities differ in the allocation of points for their indicators and exhibit some variations in specific indicators, the primary categories and the total measurement points for both systems remain consistent. In this thesis, LEED for Cities version 4.1 is used as the primary reference ([Table6](#)).

Category	Total Measure Points	Measure Name / existing cities	Measure Type	Points Available	Measure Name / existing Communities	Measure Type	Points Available
		EXISTING CITIES			EXISTING COMMUNITIES		
Integrative Process	5	Integrative Planning and Leadership	Credit	1	Integrative Planning and Leadership	Credit	1
		Green Building Policy and Incentives	Credit	4	Green Building Policy and Incentives	Credit	4
Natural Systems & Ecology	9	Ecosystem Assessment	Prerequisite	Required	Ecosystem Assessment	Prerequisite	Required
		Green Spaces	Credit	2	Green Spaces	Credit	2
		Natural Resources Conservation and Restoration	Credit	2	Natural Resources Conservation and Restoration	Credit	2
		Light Pollution Reduction	Credit	1	Light Pollution Reduction	Credit	1
		Resilience Planning	Credit	4	Resilience Planning	Credit	4
Transportation & Land Use	15	Transportation Performance	Prerequisite	6	Transportation Performance	Prerequisite	6
		Compact, Mixed Use and Transit Oriented Development	Credit	3	Compact, Mixed Use and Transit Oriented Development	Credit	2
		Safe, Multimodal Accessibility	Credit	2	Access to Quality Transit	Credit	1
		Clean Transportation	Credit	1	Alternative Fuel Vehicles	Credit	2
		Mobility Management	Credit	2	Smart Mobility and Transportation Policy	Credit	2
		Priority Sites	Credit	1	High-Priority Site	Credit	2
Water Efficiency	11	Water Access and Quality	Prerequisite	Required	Water Access and Quality	Prerequisite	Required
		Water Performance	Prerequisite	6	Water Performance	Prerequisite	6
		Integrated Water Management	Credit	1	Integrated Water Management	Credit	1
		Stormwater Management	Credit	2	Stormwater Management	Credit	2
		Smart Water Systems	Credit	2	Smart Water Systems	Credit	2
Energy & Greenhouse Gas Emissions	30	Power Access, Reliability and Resiliency	Prerequisite	Required	Power Access, Reliability and Resiliency	Prerequisite	Required
		Energy and Greenhouse Gas Emissions Performance	Prerequisite	14	Energy and Greenhouse Gas Emissions Performance	Prerequisite	18
		Energy Efficiency	Credit	4	Energy Efficiency	Credit	4
		Renewable Energy	Credit	6	Renewable Energy	Credit	6
		Net Zero Carbon & Climate Action	Credit	4			
		Grid Harmonization	Credit	2	Grid Harmonization	Credit	2
Materials & Resources	10	Solid Waste Management	Prerequisite	Required	Solid Waste Management	Prerequisite	Required
		Waste Performance	Prerequisite	4	Waste Performance	Prerequisite	5
		Special Waste Streams Management	Credit	1	Special Waste Streams Management	Credit	1
		Responsible Procurement	Credit	1	Responsible Sourcing for Infrastructure	Credit	2
		Material Recovery	Credit	3			
		Smart Waste Management Systems	Credit	1	Smart Waste Management Systems	Credit	2
Quality of Life	20	Demographic & Social Equity Assessment	Prerequisite	Required	Demographic Assessment	Prerequisite	Required
		Quality of Life Performance	Prerequisite	6	Quality of Life Performance	Prerequisite	6
		Social Services & Infrastructure	Credit	3	Trend Improvements	Credit	4
		Economic Growth & Opportunity	Credit	3	Distributional Equity	Credit	4
		Environmental Justice	Credit	1	Environmental Justice	Credit	1
		Housing and Transportation Affordability	Credit	2	Housing and Transportation Affordability	Credit	2
		Public Health	Credit	3			
		Educational Opportunity & Attainment	Credit	1	Civic and Community Engagement	Credit	2
		Civil and Human Rights	Credit	1	Civil and Human Rights	Credit	1
		Innovation	Credit	6	Innovation	Credit	6
Regional Priority	Credit	4	Regional Priority	Credit	4		
total	110						

Table 6- Comparison between LEED for Cities and LEED for Communities Version 4.1. Gray highlights indicate identical indicators and similarities, while light pink highlights denote differences in measurement points or variations in indicators [36] & [89].

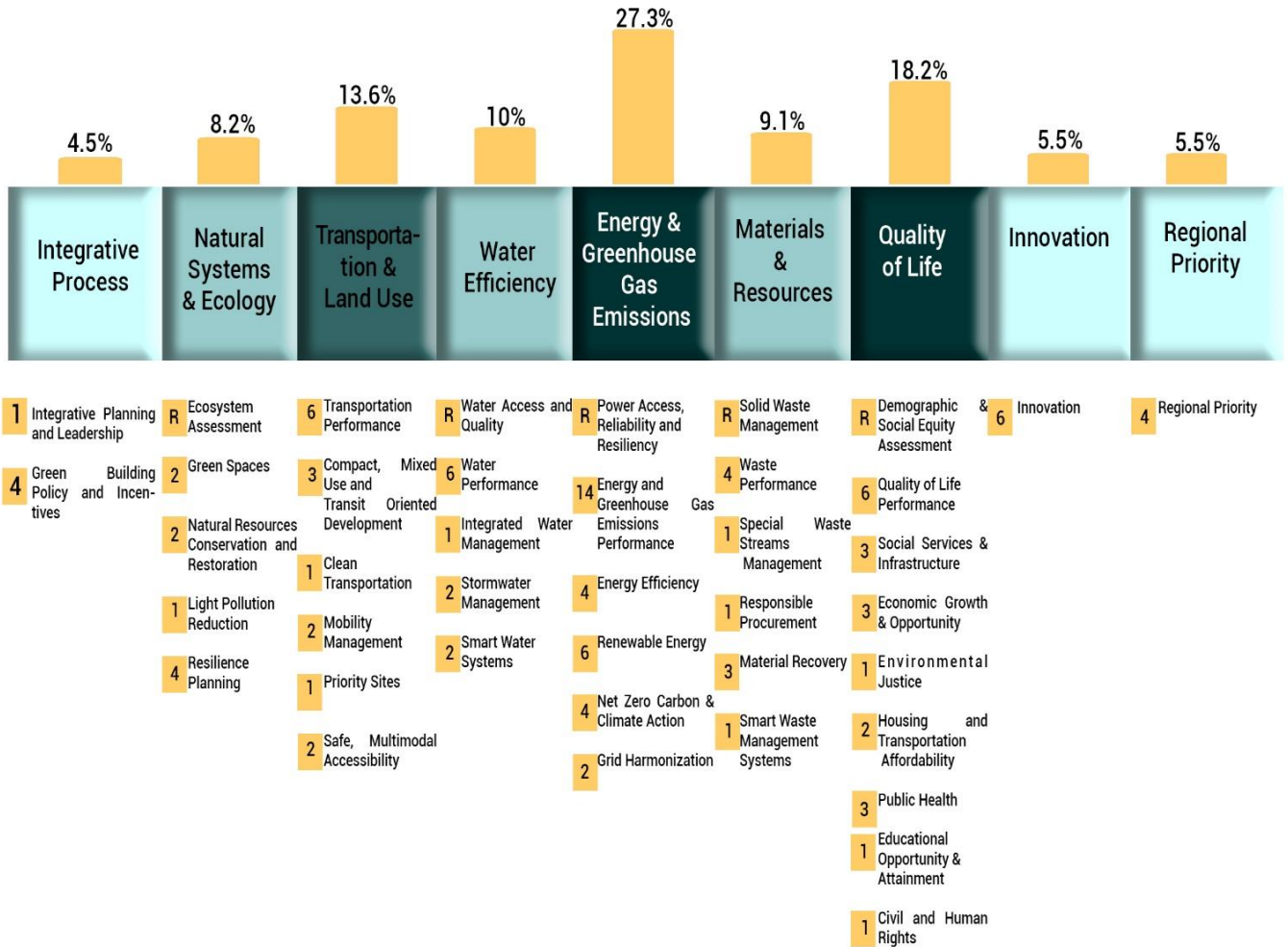


Figure 9-Bar graph illustrating criteria weighting for LEED for Cities alongside categories, measure names, and available points for each measure (Numbers indicate available points, with "R" denoting required measures). [36]

The LEED for Cities assessment tool encompasses nine categories ([Figure9](#)), containing a total of 41 indicators for measurement. Indicators related to social aspects are also distributed across nine categories, with a combined total of 20 points.

As previously mentioned, The Real Estate Standing Investments Benchmark consists of participants completing both the Management and Performance Components and the Development Benchmark consists of participants completing both the Management and Development Components:

- “The Management Component - Evaluates the organization's strategic and leadership practices, policies and procedures, risk management framework, and

stakeholder engagement strategies, based on data gathered at the organizational level. ([Table7](#)).

- The Performance Component - Assesses the performance of the entity's asset portfolio, based on data collected at the asset portfolio level. This approach is applicable to any real estate company or fund managing operational assets. ([Table7](#) and [Table8](#)).
- The Development Component - valuates the entity's initiatives to address ESG-related issues throughout the processes of building design, construction, and renovation. This component is applicable to entities engaged in new construction activities—including building design, site selection, and construction—and/or major renovation projects, encompassing both ongoing and completed projects within the reporting year [45]([Table7](#)).

	Category	points	%component	% overall Score	Total Measure Points	Measure Name / existing cities	
GRESB Real Estate Assessment							
ENTITY AND REPORTING CHARACTERISTICS	Entity Characteristics					Reporting entity Nature of ownership Entity commencement date	
	Reporting Characteristics					Reporting period Reporting currency Economic size (Gross Asset Value) Floor area metrics Property type and Geography Nature of entity's business	
MANAGEMENT Total 30 points	Leadership	7	23%	7%	ESG leadership commitments	ESG leadership commitments	
					ESG Decision Making	ESG objectives Individual responsible for ESG, climate-related and/or DEI objectives ESG taskforce / committee ESG, climate-related and/or Diversity, Equity, and Inclusion (DEI) senior decision maker Personnel ESG performance targets	
	Policies	4.5	15%	5%		Policies on environmental issues Policies on social issues Policies on governance issues	
						ESG reporting ESG incident monitoring ESG incident occurrences	
						Environmental Management System (EMS) Process to implement governance policies Social risk assessments Governance risk assessments ESG due diligence for new acquisitions Resilience of strategy to climate-related risks (climate resilience) Transition risk identification Transition risk impact assessment Physical risk identification Physical risk impact assessment	
	Stakeholder Engagement	10	33%	10%	Employees	Employee training and development Employee satisfaction monitoring Employee engagement program Employee health & well-being program Employee health & well-being measures Employee safety indicators Diversity, Equity and Inclusion (DEI)	
					Suppliers	Supply chain engagement program Monitoring property/asset managers Monitoring external suppliers/service providers Stakeholder grievance process	
	DEVELOPMENT Total 70 points	Reporting Characteristics					Composition of the entity's development projects portfolio during the reporting year
		ESG Requirements	12	17%	12%		ESG strategy during development Site selection requirements Site design and development requirements
		Materials	6	9%	6%		Materials selection requirements Life-cycle assessments Embodied carbon
							Green building standard requirements Green building certification
		Building Certifications	13	19%	13%		Energy efficiency requirements On-site renewable energy and low carbon technologies Net-zero carbon design and standards
Water		5	7%	5%		Water conservation strategy	
Waste		5	7%	5%		Waste management strategy	
Stakeholder Engagement		15	21%	15%	Health, Safety and Well-being	Health and well-being of occupants On-site safety during construction Safety metrics at construction site	
	Supply Chain				Contractor ESG requirements Contractor monitoring methods		
	Community Impact and Engagement				Community engagement program Community impact assessment Community impact monitoring		

Table 7- Management and development components with social measure names highlighted in light pink [45]

GRESB includes a total of 92 measurements across three components and 25 categories. Of these, only 27 measures pertain to social aspects. The "Entity and Reporting Characteristics" component does not contain social indicators according to the GRESB Real Estate Standard and Reference Guide, it is included in the [Table7](#) and [Table8](#) because it was part of the GRESB assessment tool, and it is reporting the characteristic aspects of the company.

	Category	points	%component	% overall Score	Total Measure Points	Measure Name / existing cities
GRESB Real Estate Assessment						
ENTITY AND REPORTING CHARACTERISTICS	Entity Characteristics					Reporting entity Nature of ownership Entity commencement date Reporting period Reporting currency Economic size (Gross Asset Value) Floor area metrics Property type and Geography Nature of entity's business
	Reporting Characteristics					ESG leadership commitments ESG objectives Individual responsible for ESG, climate-related and/or DEI objectives ESG taskforce / committee ESG, climate-related and/or Diversity, Equity, and Inclusion (DEI) senior decision maker Personnel ESG performance targets
MANAGEMENT Total 30 points	Leadership	7	23%	7%	ESG leadership commitments ESG Decision Making	ESG objectives Individual responsible for ESG, climate-related and/or DEI objectives ESG taskforce / committee ESG, climate-related and/or Diversity, Equity, and Inclusion (DEI) senior decision maker Personnel ESG performance targets
	Policies	4.5	15%	5%		Policies on environmental issues Policies on social issues Policies on governance issues
	Reporting	3.75	13%	4%		ESG reporting ESG incident monitoring ESG incident occurrences
	Risk Management	4.75	16%	5%		Environmental Management System (EMS) Process to implement governance policies Social risk assessments Governance risk assessments ESG due diligence for new acquisitions Resilience of strategy to climate-related risks (climate resilience) Transition risk identification Transition risk impact assessment Physical risk identification Physical risk impact assessment
	Stakeholder Engagement	10	33%	10%	Employees Suppliers	Employee training and development Employee satisfaction monitoring Employee engagement program Employee health & well-being program Employee health & well-being measures Employee safety indicators Diversity, Equity and Inclusion (DEI) Supply chain engagement program Monitoring property/asset managers Monitoring external suppliers/service providers Stakeholder grievance process
	Reporting Characteristics					Composition of the entity's standing investments
	Risk Assessment	9	13%	9%	Risk Assessment Efficiency Measures	Risk assessments performed on standing investments portfolio Technical building assessments Energy efficiency measures Water efficiency measures Waste management measures
	Targets	2	3%	2%		Portfolio improvement targets Net Zero Targets
	Tenants & Community	14	20%	14%	Tenants/Occupiers Community	Tenant engagement program Tenant satisfaction survey Program to improve tenant satisfaction Fit-out & refurbishment program for tenants on ESG ESG-specific requirements in lease contracts (green leases) Tenant health & well-being program Tenant health & well-being measures Community engagement program Monitoring impact on community
	Energy	14	20%	14%		Energy consumption
GHG	7	10%	7%		GHG emissions	
Water	7	9.50%	7%		Water use	
Waste	4	5.50%	4%		Waste management	
Data Monitoring & Review	5.5	8%	6%		External review of energy data External review of GHG data External review of water data External review of waste data	
Building Certifications	10.5	15%	11%		Building certifications at the time of design/construction and for interior Operational building certifications	
Energy ratings						

Table 8-Management and performance components with social measure names highlighted in light pink. [45]

In the initial analysis, it appears that GRESB methodology indicators could be utilized as measures for LEED indicators. Therefore, following the collection of assessment tools, the indicator analysis and result interpretation in Phase One, Phase Two begins. This phase commences with the selection of social indicators from both assessment tools. ([Figure9](#) and [Figure10](#))

In this thesis, all GRESB social indicators within the three components are considered.



Figure 10 -GRESB Social indicators within the three components [45]

4.2 initial indicator selection

Following the selection of social indicators in Phase 2 for both LEED for Cities and GRESB, indicators with similar or common intents were identified and chosen for further analysis and comparison. For the purpose of comparison, the social indicators from both assessment tools were first identified and then categorized based on their similarities into corresponding categories. For example, the "Demographic & Social Equity Assessment" indicator in LEED for Cities is not associated with any factors in GRESB. Furthermore, certain measures within GRESB were found to have similar or related intents with other LEED indicators, allowing for their use in comparisons and subsequent analyses. The initial connections between the indicators from these two assessment tools are illustrated in the Sankey diagram shown in [Figure 11](#).

Before proceeding further in this thesis, we have previously analyzed and compared all indicators from both assessment tools. Subsequently, focusing on social aspects, the indicators from GRESB and LEED for Cities were classified according to GRESB categories. This approach was adopted because LEES categories are broader and more general compared to GRESB categories, while GRESB, as a real state assessment tool, indicators are more in detail ([Table9](#)).

The subsequent step in the process of final indicator selection involves the filtering of indicators. In this phase, LEED indicators that exhibit minimal or no relationship with the GRESB indicators will be excluded from further consideration. In this phase, benchmarks and the specific requirements of the indicators are also considered to achieve more accurate results([Figure12](#)).

Certain indicators within GRESB categories are similar; therefore, they will be utilized only once to avoid redundancy in their category. In the process of filtering indicators, it is important to note that certain indicators within the GRESB categories exhibit similarities. Some GRESB indicators have overlapped with LEED for Cities indicators. To prevent redundancy, these indicators will be utilized only once. As previously stated, the elements considered for identifying and comparing these similarities include category intent, indicator name, benchmarks, and indicator intent. To facilitate a more detailed comparison and to enhance the understanding of each indicator within GRESB, an explanation of any relevant terminology will also be provided.

Table 9- initial Indicator classification and filtering based on comparison between LEED& GRESB , Source: Author

LEED for Cities indicators	GRESB indicators
Demographic & Social Equity Assessment	
Quality of Life Performance	Social risk assessments Employee training Employee satisfaction survey Employee health & well-being program Employee health & well-being measures Employee safety indicators Health and well-being On-site safety Safety metrics Fit-out & refurbishment program for tenants on ESG
Social Services & Infrastructure	Tenant health & well-being program Community engagement program Tenant engagement program Tenant satisfaction survey Program to improve tenant satisfaction
Economic Growth & Opportunity	Community impact assessment Supply chain engagement program Monitoring impact on community
Environmental Justice	Monitoring impact on community On-site safety during construction Safety metrics Supply chain engagement program
Housing and Transportation Affordability	Fit-out & refurbishment program for tenants on ESG Tenant health & well-being measures
Public Health	Employee health & well-being program Health and well-being Tenant health & well-being program Tenant health & well-being measures On-site safety during construction Safety metrics
Educational Opportunity & Attainment	Employee training
Civil and Human Rights	Diversity, Equity and Inclusion (DEI) Stakeholder grievance process Contractor ESG requirements Social risk assessments Employee satisfaction survey Tenant satisfaction survey Monitoring impact on community On-site safety during construction Fit-out & refurbishment program for tenants on ESG

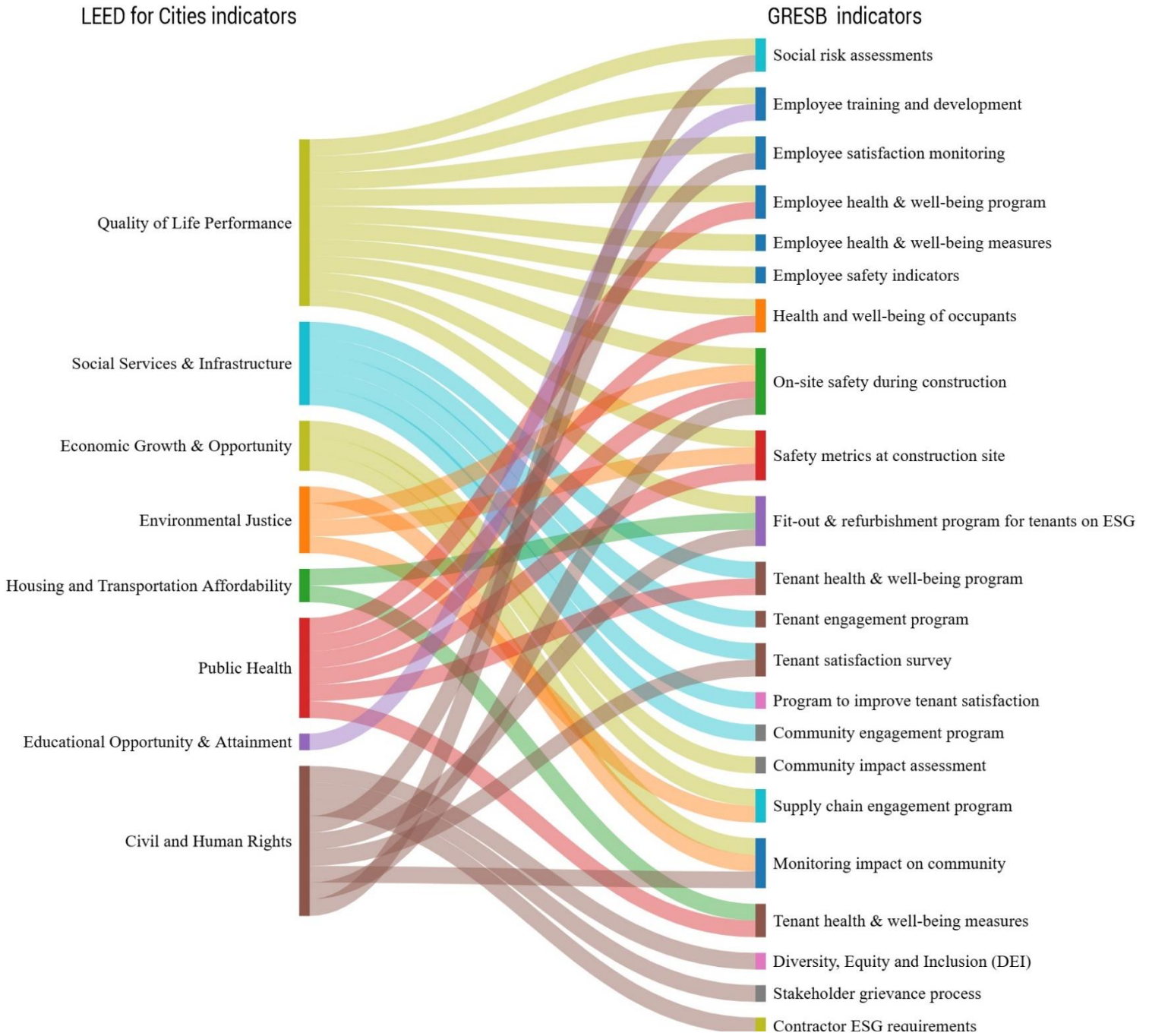


Figure 12- LEED for cities Sankey diagram and corresponding indicators in GRESB, filtering indicators, Source: The author

LEED and GRESB indicators have different types of relationships with thesis objectives which are categorized as:

- limited relevant: the indicator has relationship with thesis objectives , but this connection is not that strong. All benchmarks do not have connection with thesis objectives.
- partially relevant: the indicator has relationship with the thesis objectives. The connection is stronger than indicators with limited relevant. Most of the benchmarks have a relationship with thesis objectives.
- Directly Relevant: the indicator and all its benchmarks are related to the thesis objectives.
- indirect relevant: the indicator has an indirect relationship with the thesis objectives. It does not have a direct impact on the objectives but the result of it might have impacts on the objectives.
- not relevant: the indicator does not have any relationship with thesis objectives

It is necessary to mention that each benchmark in LEED and GRESB has individual effect in evaluation. As a result, each benchmark can influence the degree of relevance between the thesis objectives and the indicator, with the overall connection used to assess the general relevance to the objectives([Table10](#) and [Table11](#)).

Table 10- relationship between LEED for cities indicators and thesis objectives (source: author)

Indicator	Relevance	Applicability in construction companies
Demographic & Social Equity Assessment	Limited	<ol style="list-style-type: none"> 1- indirect applicability in construction companies 2- more suitable for bigger projects (e.g., community planning, mixed use developments) rather than smaller one 3- usable for decision making toward social cohesion, displacement and social equity 4- useful for improvement in ESG performance of construction companies (for projects impact on local communities)
Quality of Life Performance	Limited	<ol style="list-style-type: none"> 1- educational metrics are not under construction companies' control, unless for educational projects or workforce development 2- equitability metrics in residential or impact of company in affordability and their social impact can be relevant 3- contribution of construction companies regarding prosperity metrics related to economy and job opportunities with company policy (hiring local workforce, fair wages) 4- high relevance in health and safety metrics related to construction activities and their impacts (air pollution...). 5- Violent crime rate depends on type and location of the project
Social Services & Infrastructure	Partial	<ol style="list-style-type: none"> 1- Shows Community impact in construction steps 2- Shows stakeholder alignment with local needs in ESG 3- Identifying vulnerable people concerns related to social services and infrastructures 4- mostly related to projects related to public space and their management 5- use of public engagement as a key recommendation in ESG guidelines for construction companies 6- involving communities in decision making by using ongoing engagement techniques, such as high-tech and high touch 7- community involvement shows transparency with communities 8- more related to urban management
Economic Growth & Opportunity	Direct	<ol style="list-style-type: none"> 1- recommendations related to workforce and hiring 2- local workforce readiness improvement 3- diversity and inclusivity in hiring 4- contribution to economic equity in operational sites with local hiring, job training....
Environmental Justice	Direct	<ol style="list-style-type: none"> 1- increasing EJ by construction companies: decreasing environmental risks (environmental pollution during and after construction) 2- EJ assessment before starting the project 3- Stakeholder collaboration in considering EJ creates agreement for communities related to EJ 4- Considering EJ in projects might have positive impacts on vulnerable communities
Housing and Transportation Affordability	Indirect	<ol style="list-style-type: none"> 1- Effect the transportation cost (e.g., housing development near to transit) 2- Use housing policies toward affordability and avoid displacement 3- Collaboration with local government or the development authority regarding their affordable housing

Public Health		Partial	<ul style="list-style-type: none"> 1- Positive effect on influence health outcomes (e.g., health risk factors, accessibility to healthcare, decrease connection with harmful materials) 2- Collaboration between construction companies and local government to combine policies related to public health with their project 3- Reduce noise and air pollution
Educational Attainment	Opportunity &	Direct	<ul style="list-style-type: none"> 1- Qualitative data helps assessment in both companies and cities 2- Includes equal education which is the critical component related to ESG and social sustainability 3- Considering post-secondary educated and their abilities as an alignment with employee's development 4- Accessible skilled workers 5- Positive impact on the community with supporting local education 6- Shows the external effects of the construction companies in broader social equity
Civil and Human Rights		Direct	<ul style="list-style-type: none"> 1- Clear civil and human right measurement 2- -strengthens the impact on society and sustainability with integration between policy, civil and human right and monitoring their frameworks

Most of GRESB indicators have a direct relationship with the thesis objectives ([Table11](#)), also some of them overlap with each other mainly because these indicators evaluate the same intent in different construction steps and components. For instance, GRESB indicator, community engagement program, repeated twice ([Table7](#) and [Table8](#)) in both performance and development components. As a result of which, while it belongs to two different components and two different steps of construction phase, it is considered twice but in final template it will be considered once because all information related to this indicator is the same.

Table 11-relationship between GRESB indicators and thesis objectives (source: author)

Indicator	Relevance	Applicability in construction companies
Employee satisfaction survey	Direct	<ol style="list-style-type: none"> 1- Help assess specific concerns and understand critical issues in companies 2- Retention improvement rates general productivity and career development 3- Translatable results into practical improvements for workforce
Employee engagement program	Direct	<ol style="list-style-type: none"> 1- Shows ways of employee satisfaction survey implementation in the company 2- Employees' enhancement, development and satisfaction
Tenant satisfaction survey	Direct	<ol style="list-style-type: none"> 1- Help assess specific concerns and understand critical issues in entities 2- Translatable results into practical tenant satisfaction improvements 3- Helps companies toward tenant survey and relationship improvement guidelines 4- Property management improvement
Program to improve tenant satisfaction	Direct	<ol style="list-style-type: none"> 1- Shows ways of tenant satisfaction survey implementation in the entity 2- Helps to create structured approach toward tenant satisfaction improvement
Monitoring impact on community	Direct	<ol style="list-style-type: none"> 1- Offers monitoring and management of construction companies social and environmental impact on the local community
Community impact assessment	Direct	<ol style="list-style-type: none"> 1- Helps to create guideline to minimize negative impacts of development projects 2- Considering socio-economic impacts of the projects on community 3- Alignment with ESG principles (promoting sustainability, quality of life improvement)
Community impact monitoring	Direct	<ol style="list-style-type: none"> 1- Monitoring of reduce and manage development impacts on local community 2- Alignment with ESG principles (e.g., project distribution such as noise or traffic) 3- Stakeholder and impacted group identification for implementing practices in ESG
On-site safety	Direct	<ol style="list-style-type: none"> 1- It defines clear and essential benchmarks for safety evaluation 2- Usable for in-site safety performance during construction 3- Creating guideline for on-site safety (implementation and improvement)
Employee health & well-being program	Direct	<ol style="list-style-type: none"> 1- Measurable and structured benchmark approach for employee health productivity (need assessment, goal setting, action, monitoring) 2- Creating guideline for employee health and well-being considering ESG principles
Employee health & well-being measures	Direct	<ol style="list-style-type: none"> 1- Create actionable guideline in construction companies to add measures related to employees' physical and mental health issues (air quality, physical activity...) 2- Check whether these guidelines are implemented and effective or not, to make an efficient workplace environment
Employee safety indicators	Direct	<ol style="list-style-type: none"> 1- To create usable, measure, systematic guideline for safety monitoring and evaluation in workplace to improve performance related to health and safety in company

Tenant health & well-being program	Partial	<ol style="list-style-type: none"> 1- More applicable for real estate or property sectors (focus on end users-tenants and their health and well-being), not suitable for projects without tenants or users with direct interaction with completed project 2- For construction companies as contractor this indicator is useless
Tenant health & well-being measures	Partial	<ol style="list-style-type: none"> 1- More applicable for real estate or property sectors 2- Helps create guideline for construction companies involved in projects related and suitable for tenants and urban regeneration 3- For construction companies as contractor this indicator is useless 4- Create actionable guideline in construction companies to add measures related to tenants' physical and mental health issues (air quality, physical activity...) 5- Check whether these guidelines are implemented and effective or not (for companies with tenants)
Health and well-being	Direct	<ol style="list-style-type: none"> 1- Has detailed approach for evaluating health and well-being in ESG framework for construction companies 2- Directly related to development projects 3- Usable for all types of projects 4- Helps create guideline with Focuses on construction industry specially companies who design and construct buildings (focusing on sustainable construction and design for occupant)
Employee training	Direct	<ol style="list-style-type: none"> 1- Create guideline to assess sustainable practices and ESG 2- Strategies for ESG principles and practicing them
Diversity, Equity, and Inclusion (DEI)	Direct	<ol style="list-style-type: none"> 1- Effective results with creating ESG assessment: <ul style="list-style-type: none"> - social dimensions consideration - company's social responsibility evaluation - improvement in governance and employee diversity - supports inclusive workforce
Stakeholder grievance process	Direct	<ol style="list-style-type: none"> 1- adding grievance mechanism into companies' ESG management framework 2- having measurable factors related to companies' responsibility and stakeholder engagement 3- using practical factors related to grievance (e.g., transparency, anonymity)
Supply chain engagement program	Partial	<ol style="list-style-type: none"> 1- the indicator just applicable to evaluate supply chain risks 2- providing guideline related to ESG implementation in supply chain engagement
Monitoring property/asset managers	Direct	<ol style="list-style-type: none"> 1- using its benchmarks to create strong ESG assessment methods 2- ensure ESG practices are implemented in both internal and external asset/property
Monitoring external suppliers/service providers	Partial	<ol style="list-style-type: none"> 1- using its benchmarks to compliance with ESG guideline 2- ensure ESG practices are implemented by external suppliers and service providers
Tenant engagement program	Limited	<ol style="list-style-type: none"> 1- mostly related to tenants' interaction, relation and awareness 2- indirectly related to ESG assessment in construction companies while the priority are tenants
Fit-out & refurbishment program for tenants on ESG	Partial	<ol style="list-style-type: none"> 1- usable for ESG assessment on tenants, especially for sustainable buildings and renovation projects, considering its benchmarks 2- only applicable on tenant fit-out and refurbishment

Community engagement program	Partial	<ol style="list-style-type: none"> 1- considering relevant materials in projects which effect local communities (e.g., public spaces, local employment) 2- create the guideline to assess ESG and community engagement
Safety metrics	Direct	<ol style="list-style-type: none"> 1- helps to make guideline, considering: <ul style="list-style-type: none"> - what safety metrics are - how to measure and monitor safety metrics - who to report safety metrics 2- have measurable safety metrics
Contractor ESG requirements	Direct	<ol style="list-style-type: none"> 1- applicable framework to assess ESG among contractors 2- creating guideline for contractor adaptation with ESG
Contractor monitoring methods	Direct	<ol style="list-style-type: none"> 1- ESG principles' enforcement by contractors for construction companies 2- Shows detailed methods for assessing contractor adoption with ESG principles

4.3 Indicator Classification and filtering

In the process of filtering indicators, it is essential to recognize that certain GRESB indicators provide a higher level of detail compared to those in the LEED framework, as previously noted. Although some LEED indicators share a partial relationship with their GRESB counterparts, these connections are not entirely congruent. Consequently, in the final selection of indicators, only those LEED indicators that exhibit a direct relationship with GRESB are selected as indicators overlapping with the GRESB framework. Thus, when a LEED indicator is fully aligned with a specific GRESB indicator (**Error! Reference source not found.**[Figure13](#)), the GRESB indicator is given precedence in the final selection process. Otherwise, the LEED indicator will be considered individually.

As previously mentioned, to establish an aligned connection between GRESB and LEED indicators and avoid multiple connections, their intent and objectives and benchmarks are considered.

[Figure13](#) shows the relationship between GRESB and LEED for cities indicators, thesis objectives and if there is an internal relationship between their indicators.

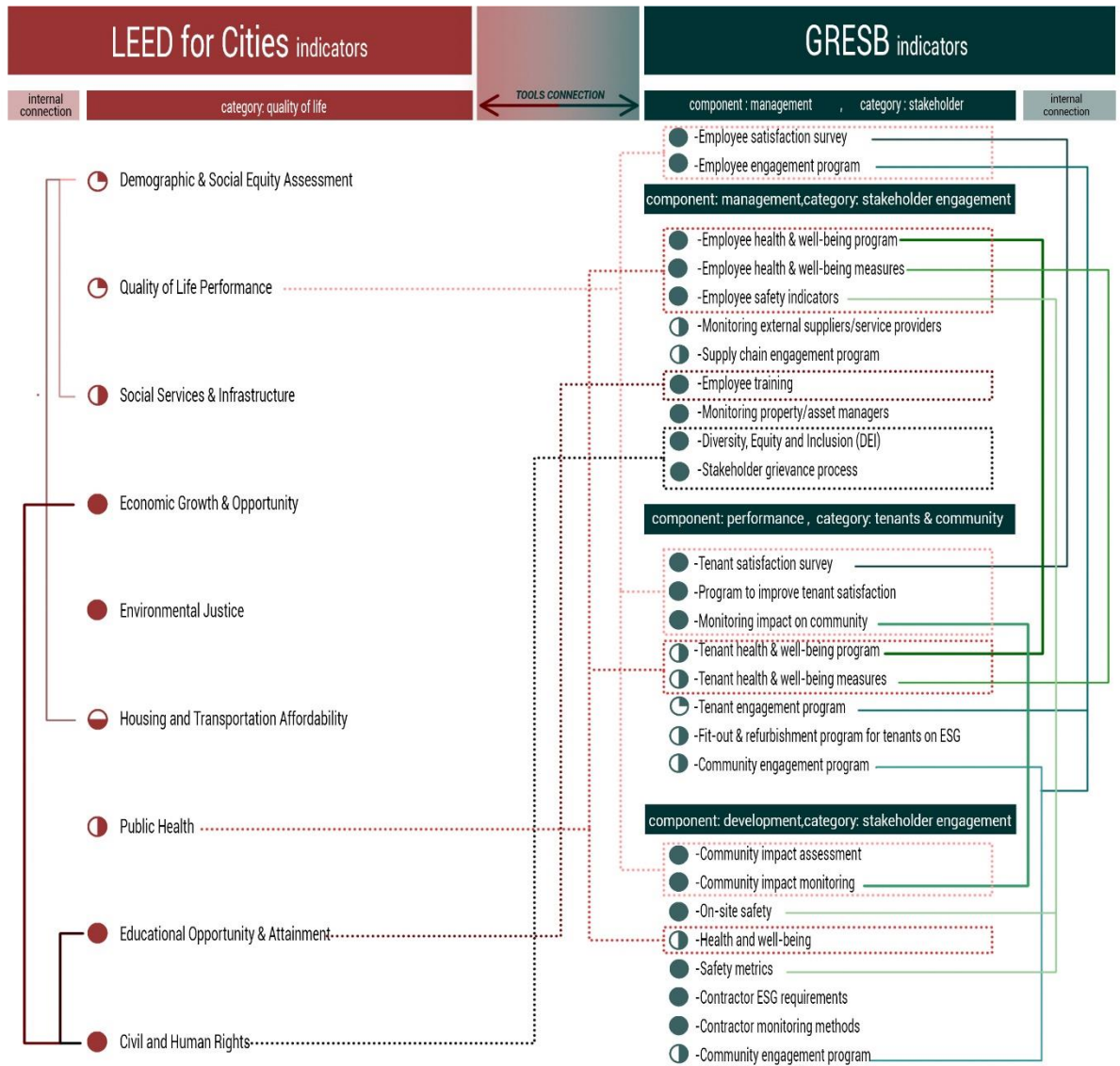


Figure 13- alignment between LEED for Cities and GRESB indicators, overlaped indicators from GRESB connected to their related indicator in LEED for Cities , interior connection between GRESB indicators(Each category is shown with different color)and LEED indicators' relevance to the objectives

4.4 integration and final selection

For final selection ([Figure13](#)):

- some of GRESB indicators have overlapped with LEED for cities indicators. In this case if overlapped indicator in LEED indicator is:
 - partially relevant: the indicator will be used individually and for those indicators of GRESB which are related to that relevant part of LEED for cities indicator will be considered as overlapped indicators, otherwise they will be consider as individual indicators.
 - Relevant: the indicator will be used individually and related indicators from GRESB will be considered as overlapped indicators
- Internal overlapped GRESB indicators:
 - If the indicators are the same, just the one from development component will be considered (refer to [The Development Component](#))
 - If the indicators are not the same, the indicator which is comprehensive and covers all issues related to overlapped indicator will be considered.

As a result of analyzing 36 indicators (27 social indicators in GRESB and 9 social indicators in LEED), a total of 23 indicators were selected. 20 indicators are derived from GRESB, while 3 indicators are sourced from LEED([Table12](#)). As illustrated in [Figure14](#) , the majority of the indicators pertain to the assessment of stakeholders' impacts.

LEED for cities indicators are broader in scope and covers a wide range of aspects and categories. It also addresses critical areas relevant to

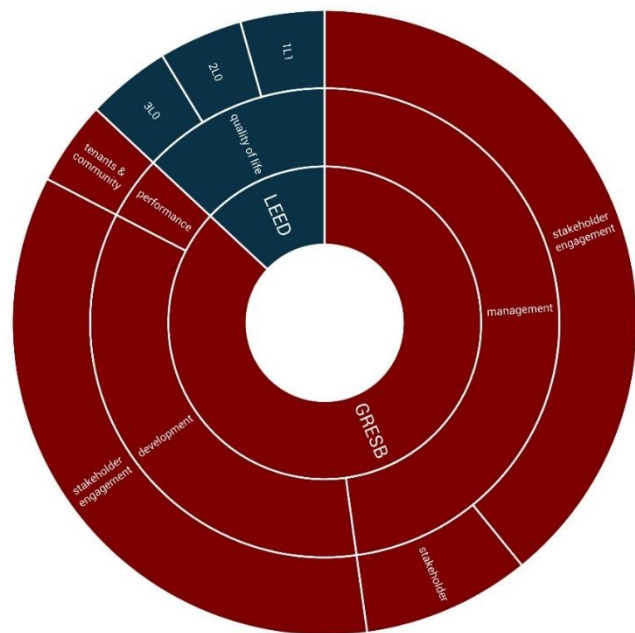
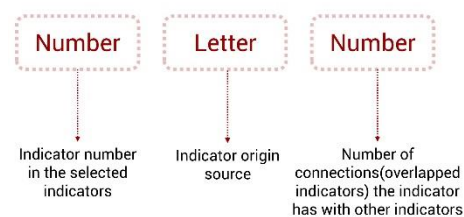


Figure 14-Stakeholder Impact and Indicator Redundancy in LEED and GRESB Assessment Tools (source: the author)

cities and necessary for social assessment. On the other hand, GRESB provides more detailed, specific monitoring and assessment of individual issues.

As a final selection for In LEED for cities, although all indicators are more or less related to the thesis objectives, indicators which are relevant and those are partially relevant will be selected because these indicators can have direct impact and are implementable in construction companies.



Example: 1L1
 Indicator number one
 Belongs to LEED assessment tool
 Has 1 connection with another indicator

To facilitate easier search and reference of indicators in this thesis, each indicator is assigned a unique code.

Figure 15- indicator coding (source: the author)

The coding structure is illustrated in [Figure 15](#) (reads from left to right) shows the meaning of each number and letter within an example of the indicator [1L1](#).

Table 12-final selection (source: author)

code	Indicator	tool	category	Overlapped indicators
1L1	Social services & infrastructure	LEED	Quality of life	Demographic & social equity assessment (source: LEED)
2L0	Economic growth & opportunity	LEED	Quality of life	-
3L0	Environmental Justice	LEED	Quality of life	-
4G1	Health and well-being	GRESB	stakeholder engagement (development component)	Public health (source: LEED)
5G1	Employee training	GRESB	Stakeholder engagement (Management component)	Educational opportunity & attainment (source: LEED)
6G1	Diversity, Equity and Inclusion (DEI)	GRESB	stakeholder engagement (management component)	Civil and human rights (source: LEED)
7G1	Stakeholder grievance process	GRESB	stakeholder engagement (management component)	Civil and human rights (source: LEED)
8G1	Employee satisfaction survey	GRESB	Stakeholder (management component)	Tenant satisfaction survey (source: GRESB)
9G2	Employee engagement program	GRESB	Stakeholder	Tenant engagement program (source: GRESB)

				(management component)	Program to improve tenant satisfaction (source: GRESB)
10G1	Employee health & well-being program		GRESB	stakeholder engagement (management component)	Tenant health & well-being program (source: GRESB)
11G1	Employee health & well-being measures		GRESB	stakeholder engagement (management component)	Tenant health & well-being measures (source: GRESB)
12G0	Employee indicators	safety	GRESB	stakeholder engagement (management component)	-
13G0	On-site safety		GRESB	stakeholder engagement (development component)	-
14G0	Safety metrics		GRESB	stakeholder engagement (development component)	-
15G0	Monitoring external suppliers/service providers		GRESB	stakeholder engagement (management component)	-
16G0	Supply chain engagement program		GRESB	stakeholder engagement (management component)	-
17G0	Monitoring property/asset managers		GRESB	stakeholder engagement (management component)	-
18G2	Community monitoring	impact	GRESB	stakeholder engagement (development component)	Quality of Life Performance (source: LEED) Monitoring impact on community (source: GRESB-performance component)
19G0	Fit-out & refurbishment program for tenants on ESG		GRESB	tenants & community (performance component)	-
20G1	Community engagement program		GRESB	stakeholder engagement (development component)	Community engagement program (source: GRESB-performance component)
21G0	Community assessment	impact	GRESB	stakeholder engagement (development component)	-
22G0	Contractor requirements	ESG	GRESB	stakeholder engagement (development component)	-
23G0	Contractor methods	monitoring	GRESB	stakeholder engagement (development component)	-

4.5 Indicator Template

As previously outlined in Phase 4, details pertaining to each selected indicator will be presented and documented in a template format([Table13](#)) . Consequently, the final selection comprises 23 templates, with each table providing information related to the specific details of the respective indicator (chapter4.6:[indicators' description](#)).

Table 13-Final Template Displaying Detailed Information on the Selected Indicators (source-the author)

Code	Title	Description
the defined indicators code in this thesis	Indicator	Name of the indicator
	Source	Shows this indicator belongs to which assessment tool and framework originally
	Intent	The definition and purpose of the indicator
	Relevance	It provides brief explanation or extra information about the indicator by underlying the intent
	unit of measurement	A standard quantity used to measure the indicator and act as a reference point for measurement (quoted from the source)
	Benchmarks	Standards or parameters that should be used to measure the indicator (quoted directly from the source)
	Workflow	The series of stages or types of work that should be done from the beginning to the end of measurement process (the author's interpretation)
	Input data	The type of data required for the assessment and suitable for evaluating benchmarks (quoted from the source or its standards, for those in citations quoted directly from the source)
	Standards	It refers to the standards that have been utilized and their corresponding references (quoted directly from the source)
	Indicator connection	In case of overlapping or relationship with other indicators in the other assessment tool: <ul style="list-style-type: none"> - Name of overlapped indicator/s - Brief explanation about their connection and the reason behind their selection Note that: The analysis in this row is based on the author's interpretation of the reviewed data
	Note	<ul style="list-style-type: none"> • extra explanation related to described indicator for better understanding for assessment. • examples of implementation

4.6 Indicators' Description

Code	Title	Description
1L1	Indicator	Social Services & Infrastructure
	Source	LEED for Cities V4.1/category of quality of life
	Intent	To offer facilities and services to residents that address their social needs, promote their full potential for personal growth, and improve overall community well-being [36]
	Relevance	A core characteristic of urban sustainability is the ongoing reduction of inequities in the allocation of social infrastructure. Each city possesses unique priority needs and specific areas of concern [36] Equitable access to facilities, services, and infrastructure arises from deliberate strategies that ensure all community members are involved in and benefit from decisions shaping their neighborhoods and regions. Collaborative efforts among cities can guide investments, the establishment of new facilities, and service improvements to achieve more balanced distribution and better meet population needs. Social capital, defined as the value of community social networks, encompasses the strength and trust within those networks, fostering cohesion and reciprocity. Higher levels of social capital enhance resident empowerment, neighborhood stability, and community resilience [56].
	Unit of measurement	Total 3 scores(points) based on the presence or absence of relevant data for benchmarks [36]
	Benchmarks	<p>“Analyzing options below to gain their related points:</p> <ul style="list-style-type: none"> • Option1: Community Needs Assessment(1 point) Conduct a community needs assessment at the neighborhood level to identify priority social service and infrastructure needs, with a focus on the city’s vulnerable populations. Demonstrate that the city has used the results of the community needs assessment to positively affect change through implementation of policy, program, or practice throughout the city. • Option2: Equitable Access to Social Infrastructure (2 points) Demonstrate that at least four social infrastructure assets or services are as accessible to any two or more neighborhoods with the highest percentage of low-income residents and people of color as they are to the city as a whole. • Option3: Community Cohesion (1 point) Meet one of the following criteria: <ol style="list-style-type: none"> a) Demonstrate that at least 80% of residents live within 1 mile of a community venue that is open to the public and offers free services and/or events for residents. b) Demonstrate that 51% or more of residents believe they can have a positive impact on their community based on local survey.

- c) Demonstrate that at least 80% of residents report positive levels of neighborhood cohesion based on a local survey.
- d) Demonstrate that at least 35% of residents volunteered based on a local survey.
- Option4: Public engagement (1 point)
Meet the following requirements:
 - a) Implement both high-tech and high-touch on-going engagement techniques that respect the differing abilities of residents to commit time to the process, to gain access to the background materials, to travel to meeting locations, and other factors.
 - b) Demonstrate that public engagement techniques include practices that intentionally and directly engage all residents, including traditionally unrepresented or underrepresented groups, through inclusive, context-sensitive, and transparent decision-making processes.
 - c) Ensure that appointments to local advisory boards and commissions reflect the gender, racial, and ethnic diversity of the city". [36]

Workflow

Option 1:

1. define objectives for achieving the score
2. data collection, demographic data and data related to vulnerable population
3. Conduct a community needs assessment (neighborhood level)
4. Analyze the collected data
5. Translate assessment results into actionable insights
6. Show implemented policy or program as a result of the need assessment, their income and evidence
7. Monitor and evaluate the impact
8. Create a report and provide recommendation for future actions

Option2:

1. Select the target neighborhood
2. Choose at least for relevant social infrastructure assets or services
3. Analyze the accessibility of each service
4. Data and evidence collection
5. Compare the accessibility and equity of selected infrastructure in selected neighborhood with citywide access

Option3:

1. define objectives for achieving the scores for each option
2. data collection
from residents (survey, community meeting...)
3. analyze and calculate the data individually based on selected objective
4. check whether the results meet the required threshold or not

option4:

1. data collection
2. check whether steps below are implementing or not:
high-tech and high-touch engagement techniques
all residents, including unrepresented or underrepresented groups engagement
diversity in local advisory boards and commissions

3. gather the evidence	
Input data	<p>“Option1:</p> <ul style="list-style-type: none"> - Community needs assessment identifying priority social service and infrastructure needs, with a focus on the city’s vulnerable populations. - Policies, or programs indicating improvement in priority social service and infrastructure needs of the city <p>Option2:</p> <ul style="list-style-type: none"> - Maps identifying any 4 social infrastructure assets or services in the city - Maps highlighting any two or more neighborhoods with the highest percentage of low-income residents and people of color - Calculations on social infrastructure available to all city residents, and identified neighborhoods with the highest percentage of low-income residents and people of color - Narrative describing equitable access to social infrastructure assets or services <p>Option3:</p> <ul style="list-style-type: none"> - Narrative on the selected community cohesion strategy - Map/s highlighting that 80% of the residents live within 1 mile of a community venue OR local survey report detailing survey response rates, and achievement of required data point <p>Option4:</p> <ul style="list-style-type: none"> - Overall percentage of male, female, and race/ethnic composition in the city - Percentage of male, female, and sociocultural groups appointed to local advisory boards and commissions - Supporting documentation clearly highlighting the data points - Narrative describing high-tech and high-touch on-going public engagement techniques and explaining actions undertaken to intentionally and directly engage with diverse groups of residents “ [36]
Standards	<ul style="list-style-type: none"> • “STAR v2 EE-4 Equitable Services & Access Outcome 1 • STAR v2 IP-1 Best Practices & Processes (2) • STAR v2 EE-1 Civic Engagement Outcome 2 and 3 • STAR v2 EAC-2 Community Cohesion Outcome 2 and 3” [36]
Indicator connection	<ul style="list-style-type: none"> • Demographic & social equity assessment (source: LEED): <p>A comprehensive understanding of population demographics, socio-economic conditions, community assets, and housing characteristics—particularly with regard to the “distribution of social infrastructure, assets, and services”—is essential for identifying localized needs.</p>
Note	<p>Local surveys must be conducted within five years of the certification year. [36]</p>

Code	Title	Description
2LO	Indicator	Economic Growth & Opportunity
	Source	LEED for Cities V4.1/category of quality of life
	Intent	To foster inclusive and equitable economic growth and prosperity. [36]
	Relevance	Sustainable Development Goal 8 emphasizes inclusive, sustained, and sustainable economic growth, alongside full and productive employment and decent work for all. However, the unequal distribution of economic growth benefits persists, often restricting access to education, adequate food, and livable housing, thereby diminishing residents' quality of life. Addressing disparities in post-secondary education, income, and employment is essential to develop a skilled workforce capable of meeting local business needs and seizing job opportunities. Achieving stable and robust economic growth requires collaboration between local governments and the business community to support existing enterprises and attract new ones [36]
	Unit of measurement	Total 3 scores(points) based on the presence or absence of relevant data for each benchmark [36]
	Benchmarks	<p>“Analyzing options below to gain their related points:</p> <ul style="list-style-type: none"> • Option 1. Income Distribution (1 point) Demonstrate that the median earnings of workers by gender, and top 3 racial/ethnic groups (by population) are within 5 percentage points of the overall median earnings value • Option 2. Workforce Readiness (1 point) Demonstrate that the post-secondary educational attainment of the population aged 25 and older by gender and top 3 racial/ethnic groups (by population) is within 5 percentage points of the overall post-secondary educational attainment. • Option 3. Equitable Employment (1 point) Demonstrate that the unemployment rate by gender, and top 3 racial/ethnic groups (by population) is within 5 percentage points of the overall unemployment rate. • Option 4. Strategies to strengthen economic prosperity (1 point) Adopt any three of the following strategies: <ul style="list-style-type: none"> a) Promote and participate in project labor agreements, community benefits agreements, and local hiring agreements. b) Appoint an advisory body representing the business community to collaborate on economic equity and improve economic conditions. The advisory body should be made up of community business representatives and have a formal role in advising the local government on business community trends, conditions, and activities. c) Provide job training and assistance programs tailored to the needs of the local workforce and small businesses.

- d) Provide focused support, resources, and services to locally owned, early-stage companies through business incubators.
- e) Provide financial literacy, money management and banking programs or services for low-income residents." [36]

Workflow	<ol style="list-style-type: none"> 1. Data collection based on each option requirements 2. Analyzing each options requirement and doing needed comparisons: <ul style="list-style-type: none"> • For options 1-3, it is necessary to take to account the value for each group should not be more than 5% for each measure between different demographic groups • For option4 review available strategies which are aligned to strengthen economic prosperity 3. Review all documentations and calculations to check whether with the results are enough to gain the points of that option or not 4. Sum up gained points from each option to reach the final score
Input data	<p>“Option1:</p> <ul style="list-style-type: none"> • Documentation supporting the data point for median earnings of workers by gender, and top 3 racial/ethnic groups (by population) <p>Option2:</p> <ul style="list-style-type: none"> • Documentation supporting the data point for post-secondary educational attainment of the population aged 25 and older by gender and top 3 racial/ethnic groups (by population) <p>Option3:</p> <ul style="list-style-type: none"> • Documentation supporting the data point for unemployment rate by gender, and top 3 racial/ethnic groups (by population) <p>Option4:</p> <ul style="list-style-type: none"> • Documentation demonstrating adoption of any three of the listed strategies to strengthen economic prosperity “ [36]
Standards	<ul style="list-style-type: none"> • “Variation on STAR v2 EE-6 Poverty Prevention & Alleviation Outcome 2 • STAR v2 Quality Jobs & Living Wages • STAR v2 Workforce Readiness • STAR v2 Business Retention & Development.” [36]
Indicator connection	None
Note	Post-secondary educational attainment includes high-quality credentials, as well as associate, bachelor’s, and graduate/professional degrees. [36]

Code	Title	Description
3LO	Indicator	Environmental Justice
	Source	LEED for Cities V4.1/category of quality of life
	Intent	To guarantee fair protection against environmental pollution. [36]
	Relevance	<p>Environmental justice (EJ) is based on the principle that all individuals, regardless of race, ethnicity, gender, or income, are entitled to a clean and healthy environment for living, working, studying, playing, and worshiping. While definitions of EJ vary, they typically encompass three key elements: distribution, procedure, and process. This focus is on distributional EJ, which addresses the unequal spatial distribution of environmental burdens within communities, leading to enduring negative social, environmental, economic, and public health impacts in certain areas. Examples include unequal placement of industrial polluters, proximity to high-traffic roadways, or exposure to workplace toxins.</p> <p>Priority EJ issues arise when specific groups, such as women, children, low-income populations, or particular neighborhoods, face disproportionate health or environmental effects, such as:</p> <ul style="list-style-type: none"> • Physical impairment, illness, or death. • Pollution of air, noise, water, and soil. • Destruction or disruption of resources, community cohesion, or economic vitality. • Limited access to public and private services and facilities. • Displacement or exclusion from the broader community. <p>EJ considers both the direct impacts of environmental degradation and the broader effects on the environments in which people live and work. [36]</p>
	Unit of measurement	Total 1 score(point) based on the presence or absence of relevant data of one of the benchmarks [36]
	Benchmarks	<ul style="list-style-type: none"> • "Option 1: Reducing Environmental Justice (EJ) Risks and Exposure (1 point) <ul style="list-style-type: none"> - Identify priority environmental justice conditions and priority areas for evaluation. - Demonstrate reduction in risks and exposure to the potential impacts of priority environmental justice conditions for priority areas in the last 5 years from the year of certification. • Option 2: Strategies to reduce Environmental Justice (EJ) risk and vulnerability (1 point) <p>Meet any three of the following requirements:</p> <ol style="list-style-type: none"> a) Conduct a comprehensive EJ assessment that includes data collection, extensive public engagement, and the identification of trends and issues. b) Create an Environmental Justice Collaborative Group and integrate into governmental planning and decision-making processes.

- c) Provide information and education to the public regarding EJ conditions and available programs and services to alleviate disproportionate impact.
- d) Incorporate EJ criteria and priorities into zoning, land use planning, permitting policies and development of new projects.
- e) Create community benefits agreements for EJ site remediation projects and/or proposed development projects with EJ concerns.
- f) Monitor and enforce environmental regulations for existing facilities that impact prioritized EJ sites and overburdened neighborhoods.
- g) Implement projects to reduce exposure to contaminants and risks associated with EJ conditions". [36]

Workflow	<p>Option1:</p> <ol style="list-style-type: none"> 1. Identify priority environmental justice conditions 2. Provide evidence shows over the past 5 years the city could decrease risk and potential negative effects related to environmental justice in areas which are considered as a high priority <p>Option2:</p> <ol style="list-style-type: none"> 1. review available strategies 2. select those strategies which are implemented to reduce Environmental Justice (EJ) risk and vulnerability mentioned in methodology 3. If the number of implemented strategies reaches 3, the option earns the point.
Input data	<p>"Option1:</p> <ul style="list-style-type: none"> - Narrative describing the identification of the priority environmental justice conditions, priority areas for evaluation - Supporting documentation demonstrating measurable reduction in risk or exposure to the potential impacts of the priority environmental justice condition/s in priority areas <p>Option2:</p> <ul style="list-style-type: none"> - Documentation demonstrating adoption of any three of the listed EJ risks and vulnerability reduction strategies" [36]
Standards	<ul style="list-style-type: none"> • "STAR v2 EE-3: Environmental Justice Outcome 1" [36]
Indicator connection	None
Note	None

Code	Title	Description
4G1	Indicator	Health and well-being
	Source	GRESB/ development component /stakeholder engagement category
	Intent	This indicator aims to outline the organization's approach to designing and constructing buildings that prioritize the health and well-being of occupants. Structures that incorporate considerations for occupant health and well-being are associated with enhanced employee satisfaction and improved productivity [45].
	Relevance	This measure evaluates the presence and scope of systematic initiatives aimed at addressing health and safety throughout the lifecycle of a product or service [57]. This measure evaluates the existence and scope of systematic efforts to address health and safety throughout the lifecycle of products and services. It focuses on assessing the health and safety impacts within various product and service categories. Reporting organizations are required to disclose the percentage of significant product and service categories that have been evaluated for health and safety improvements [58].
	unit of measurement	Select yes or no. If yes, select all applicable sub-options and complete the additional open fields. [45].
	Benchmarks	<p>"Does the entity take measures to incorporate occupant health & well-being in its development projects?</p> <ul style="list-style-type: none"> • Yes <ul style="list-style-type: none"> The entity addresses health and well-being in the design of its project/building through (multiple answers possible) <ul style="list-style-type: none"> - Requirements for planning and design, including (multiple answers possible) <ul style="list-style-type: none"> a) Health Impact Assessment b) Integrated planning process c) Other planning process: _____ - Common occupant health and well-being measures, including (multiple answers possible) <ul style="list-style-type: none"> a) Acoustic comfort b) Active design features c) Biophilic design d) Commissioning e) Daylight f) Ergonomic workplace g) Humidity h) Illumination i) Inclusive design j) Indoor air quality k) Natural ventilation l) Occupant controls m) Physical activity n) Thermal comfort o) Water quality p) Other: _____ - Provisions to verify health and well-being performance include (multiple answers possible) <ul style="list-style-type: none"> a) Occupant education

- b) Post-construction health and well-being monitoring (e.g., occupant comfort and satisfaction)
- c) For on average years: _____

- No" [45].

Workflow	<ol style="list-style-type: none"> 1. Collect required data 2. Select: <ol style="list-style-type: none"> a) No: if the entity doesn't include requirements, then the workflow stops here b) Yes: if the entity includes those requirements. Then: <ol style="list-style-type: none"> I. Check if the entity has each of sub-options elements II. Identify all relevant sub-options for three key areas: <ol style="list-style-type: none"> 1. planning and design requirements, 2. typical measures to support occupant health and well-being 3. provisions for verifying occupant health and well-being during operations. III. Select answers based on evidence IV. If the answer is not in the sub-options write the answer in <other> and prepare evidence to get check
Input data	Planning and design data (Specific and measurable data related to each subcategory)
Standards	<ul style="list-style-type: none"> • "LEED BD+C: New Construction, v4, Indoor Environmental Quality • BREEAM, International New Construction, 2016: 06 Health and well-being • BREEAM, UK New Construction, 2018: Health and Wellbeing • GRI Sustainability Reporting Standards, 2016: GRI 416; 416-1" [45].
Indicator connection	<ul style="list-style-type: none"> • Public health (source: LEED): Construction companies can positively influence health outcomes by addressing factors such as health risks, improving access to healthcare, and minimizing exposure to hazardous materials. Collaboration with local governments allows these companies to integrate public health policies into their projects. Notably, benchmarks 3 and 4 of this indicator are directly linked to objectives aimed at mitigating air and noise pollution and their impact on communities.
Note	None

Code	Title	Description
5G1	Indicator	Employee training
	Source	GRESB/ Management component/ Stakeholder engagement
	Intent	This indicator evaluates the types and content of training provided to employees responsible for the entity. A more skilled and knowledgeable workforce strengthens the entity's human capital and may lead to higher employee satisfaction. Employee training and development play a crucial role in enhancing business performance [45].
	Relevance	Employee Training refers to the average number of training hours completed by an organization's employees during the reporting period. Developing and retaining talent enhances a company's competitiveness by increasing expertise, fostering innovation, and supporting a strong corporate reputation. [59]. Fair labor practices, along with employee development programs, knowledge management, and appropriate incentive schemes, are crucial for fostering successful, safe, and healthy work environments. These factors contribute to improved productivity, the attraction of new talent, and the retention of employees [60]. Employee Training offers insight into the extent of an organization's investment in training and how evenly this investment is distributed across the entire workforce [59].
	unit of measurement	Select yes or no. If yes, select all applicable sub-options and complete the additional open fields.
	Benchmarks	<p>"Does the entity provide training and development for employees?"</p> <ul style="list-style-type: none"> • Yes <ul style="list-style-type: none"> - Percentage of employees who received professional training during the reporting year_____ - Percentage of employees who received ESG-specific training during the reporting year_____ - ESG-specific training focuses on (multiple answers possible): <ul style="list-style-type: none"> a) Environmental issues b) Social issues c) Governance issues • No" [45].
	Workflow	<ol style="list-style-type: none"> 1. Collect required data 2. Select: <ol style="list-style-type: none"> a) No: if the entity doesn't include requirements, then the workflow stops here b) Yes: if the entity includes those requirements. Then: <ol style="list-style-type: none"> I. Calculate required percentages II. Fill each of sub-options elements III. Select the provided specific ESG training in the entity
	Input data	<ul style="list-style-type: none"> • Percentage of employees covered • Training topics covered in the training series during the reporting year [45].

Standards	<ul style="list-style-type: none"> • “EPRA Best Practices Recommendations on Sustainability Reporting, 3rd version, September 2017: 5.3, Employee Training and development • RobecoSAM Corporate Sustainability Assessment 2017: 3.3.2, Coverage” [45].
Indicator connection	<ul style="list-style-type: none"> • Educational opportunity & attainment (source: LEED): <p>This indicator aligns with external societal contributions, enabling an assessment of how companies influence broader social equity. Construction companies can align their workforce development with the abilities of post-secondary educated individuals, preparing them to become skilled workers. By supporting local education, these companies can also positively impact the communities in which they operate.</p>
Note	None

Code	Title	Description
6G1	Indicator	Diversity, Equity and Inclusion (DEI)
	Source	GRESB/ Management component/ Stakeholder engagement
	Description	This indicator highlights the metrics employed by the entity to track diversity at both the governance and workforce levels. The diversity of boards of directors has become a key priority for investors, as it is viewed as a factor that positively influences investment decisions and enhances the entity's competitiveness [45].
	Relevance	Diversity-Employee measures the proportion of male and female employees in an organization's governance bodies and other key employee groups. Promoting gender diversity is widely acknowledged as valuable, though women are still underrepresented, especially in senior leadership roles. By comparing gender diversity across board-level, senior management, and other employee groups, this metric reveals the extent to which equal opportunity initiatives are integrated within the company. It offers a quantitative assessment of gender diversity, encouraging companies to track and enhance their efforts. Additionally, it supports compliance with mandatory diversity reporting standards, such as those in the UK, which require companies to report the number of women in senior roles and other key positions [59] Companies with higher gender diversity on their boards tend to offer more flexible working arrangements. Regulatory frameworks, especially within the European Union, have been instrumental in increasing gender diversity in corporate boards. In 2012, the EU proposed a directive to enhance gender balance, prompting six member states (Belgium, Italy, Portugal, Germany, Austria, and France) to implement binding quotas for gender diversity. An additional nine countries (Denmark, Ireland, Spain, Luxembourg, the Netherlands, Poland, Finland, Slovenia, and Sweden) adopted non-binding quotas. Countries with either binding or soft quotas have outperformed those without such measures in terms of board gender diversity [60]
	unit of measurement	Select yes or no. If yes, select all applicable sub-options and complete the additional open fields. [45].
	Benchmarks	<p>"Does the entity monitor DEI metrics?"</p> <ul style="list-style-type: none"> • Yes <ul style="list-style-type: none"> Diversity of the entity's governance bodies Select all diversity metrics (multiple answers possible) <ul style="list-style-type: none"> a) Age group distribution b) Board tenure c) Gender pay gap d) Gender ratio <ul style="list-style-type: none"> I. Percentage of personnel that identify as: <ul style="list-style-type: none"> Women: _____% Men: _____% e) International background f) Racial diversity g) Socioeconomic background

Diversity of the organization's employees
 Select all diversity metrics (multiple answers possible)

- a) Age group distribution
 - I. Percentage of personnel that are:
 - Under 30 years old: _____%
 - Between 30 and 50 years old: _____%
 - Over 50 years old: _____%
- b) Gender pay gap
- c) Gender ratio
 - I. Percentage of personnel that are:
 - Women: _____%
 - Men: _____%
- d) International background
- e) Racial diversity
- f) Socioeconomic background

Provide additional context for the response (maximum 250 words) _____

Provide applicable evidence UPLOAD or URL _____

Indicate where in the evidence the relevant information can be found _____

- No" [45].

Workflow	<ol style="list-style-type: none"> 1. Collect required data 2. Select: <ul style="list-style-type: none"> a) No: if the entity doesn't include requirements, then the workflow stops here b) Yes: if the entity includes those requirements. Then: <ol style="list-style-type: none"> I. Check if the entity has each of sub-options elements II. Select answers based on evidence III. Calculate percentage of selected sub-option IV. Fill each of sub-options elements V. Demonstrate evidence
Input data	<ul style="list-style-type: none"> - The average hourly earnings - Proportion of one gender relative to another within a specific population - Sociological and economic background of the assessed group - Nationalities represented within an organization's workforce
Standards	<ul style="list-style-type: none"> • "EPRA Best Practices Recommendations on Sustainability Reporting, 3rd version, September 2017: 5.1, Diversity-Employee gender diversity • GRI Sustainability Reporting Standards (2016): 102-22 • RobecoSAM Corporate Sustainability Assessment 2017: 3.1.3, Diversity Policy" [45].
Indicator connection	<ul style="list-style-type: none"> • Civil and human rights (source: LEED)

This indicator supports construction companies by highlighting the societal and sustainability impact through the integration of policies, civil and human rights, and monitoring frameworks. Both Diversity, Equity, and Inclusion (DEI) and Civil and Human Rights focus on promoting diversity and equity in governance and the workforce, aiming to eliminate discrimination and foster inclusion. Civil and Human Rights covers broader anti-discrimination policies, primarily

focusing on community-level issues. While the benchmarks from Civil and Human Rights can provide guidance, they are not fully applicable to the construction industry.

Note

None

Code	Title	Description
7G1	Indicator	Stakeholder grievance process
	Source	GRESB/ Management component/ Stakeholder engagement
	Intent	This indicator identifies whether a grievance mechanism is in place at the reporting entity. Procurement decisions and activities by an entity can result in significant negative sustainability impacts in the supply chain, including human rights violations, even when operations are running optimally. Grievance mechanisms are crucial for providing access to remedy and demonstrating the entity's commitment to ESG management. The entity should implement a system that allows stakeholders in the supply chain to raise concerns and seek redress [45].
	Relevance	Monitoring the implementation of human rights policies is crucial for businesses to ensure they are applied effectively, respond to impacts appropriately, and foster ongoing improvement. A grievance mechanism refers to any structured process—judicial or non-judicial, state-based or non-state-based—that enables individuals to raise and seek redress for business-related human rights violations. These mechanisms are effective only if the intended users are informed about them, trust their fairness, and can access them easily. Engaging with affected stakeholders during the design and evaluation of operational grievance mechanisms ensures they address user needs and promote shared responsibility for their success. Trust in the mechanism is essential, and accountability in preventing interference with its impartiality is a significant factor [61] Effective grievance mechanisms should adhere to principles of legitimacy, accessibility, predictability, equity, transparency, compatibility with rights, and continuous learning. Grievance mechanisms serve various purposes, including: <ul style="list-style-type: none"> • Offering remedies when negative impacts arise. • Identifying negative impacts. • Evaluating the effectiveness of the organization's management approach [62]
	unit of measurement	Select yes or no. If yes, select all applicable sub-options and complete the additional open fields [45].
	Benchmarks	<p>"Is there a formal process for stakeholders to communicate grievances?"</p> <ul style="list-style-type: none"> • Yes <ul style="list-style-type: none"> Select all characteristics applicable to the process (multiple answers possible) a) Accessible and easy to understand b) Anonymous c) Dialogue based d) Equitable & rights compatible e) Improvement based f) Legitimate & safe g) Predictable h) Prohibitive against retaliation i) Transparent j) Other: _____

Which stakeholders does the process apply to? (multiple answers possible)

- a) Contractors
- b) Suppliers
- c) Supply chain (beyond tier 1 suppliers and contractors)
- d) Clients/Customers
- e) Community/Public
- f) Employees
- g) Investors/Shareholders
- h) Regulators/Government
- i) Special interest groups (NGO's, Trade Unions, etc)
- j) Other: _____

- No" [45].

Workflow	<ol style="list-style-type: none"> 1. Collect required data 2. Select: <ul style="list-style-type: none"> a) No: if the entity doesn't include requirements, then the workflow stops here b) Yes: if the entity includes those requirements. Then: <ol style="list-style-type: none"> I. Identify all relevant sub-options II. Select answers based on evidence III. If the answer is not in the sub-options write the answer in <other> and prepare evidence to get check
Input data	<ul style="list-style-type: none"> - grievance reporting principles in the company - the characteristic of the grievance process in the company - document related to the characteristic of the stakeholders
Standards	<ul style="list-style-type: none"> • "ISO 20400, 2017: Sustainable Procurement • UN Guiding Principles on Business and Human Rights • Human Rights and Grievance Mechanism • GRI Sustainability Reporting Standards, 2016: 103-2, The management approach and its components" [45].
Indicator connection	<ul style="list-style-type: none"> • Civil and human rights (source: LEED): <p>Both indicators address human rights issues. The grievance process ensures stakeholders can express concerns when rights are violated, aligning with the Civil and Human Rights objective of safeguarding individual freedoms.</p>
Note	None

Code	Title	Description
8G1	Indicator	Employee satisfaction survey
	Source	GRESB/ Management component/ Stakeholder
	Intent	This indicator evaluates the entity's engagement with employees to assess satisfaction, using surveys to identify critical issues, enhance engagement, and improve retention and productivity. Recognized surveys generate clear metrics for analyzing and comparing outcomes across teams and departments [45].
	Relevance	Stakeholder engagement methods may involve surveys (e.g., supplier, customer, or employee surveys), focus groups, community panels, corporate advisory panels, written correspondence, management or union frameworks, collective bargaining agreements, and various other mechanisms [63]. Stakeholder engagement regarding to employee survey should measure both overall and work-specific employee satisfaction at the individual and organizational levels. The survey should directly address employee concerns and offer an opportunity for providing recommendations for improvement [45].
	unit of measurement	Select yes or no. If yes, select all applicable sub-options and complete the additional open fields [45].
	Benchmarks	<p>"Has the entity undertaken an employee satisfaction survey within the last three years?"</p> <ul style="list-style-type: none"> • Yes <ul style="list-style-type: none"> a) The survey is undertaken (multiple answers possible) <ul style="list-style-type: none"> Internally <ul style="list-style-type: none"> Percentage of employees covered: _____% Survey response rate: _____% b) By an independent third party <ul style="list-style-type: none"> Percentage of employees covered: _____% Survey response rate: _____% c) The survey includes quantitative metrics <ul style="list-style-type: none"> I. Yes <ul style="list-style-type: none"> Metrics include Net Promoter Score Overall satisfaction score Other: _____ II. No d) Provide applicable evidence <ul style="list-style-type: none"> UPLOAD or URL_____ Indicate where in the evidence the relevant information can be found____ • No" [45].
Workflow	<ol style="list-style-type: none"> 1. Collect required data 2. Select: <ul style="list-style-type: none"> a) No: if the entity doesn't include requirements, then the workflow stops here b) Yes: if the entity includes those requirements. Then: <ul style="list-style-type: none"> I. Check if the entity has each of sub-options elements II. Select answers based on evidence 	

	<ul style="list-style-type: none"> III. Calculate percentage of selected sub-option IV. Fill each of sub-options elements V. Demonstrate evidence
Input data	<ul style="list-style-type: none"> - employee satisfaction survey and its result - Percentage of Employees Covered - Survey Response Rate [45].
Standards	<ul style="list-style-type: none"> • “GRI Sustainability Reporting Standards, 2016: 102-43, Approach to stakeholder engagement • Bain & Company, Introducing: The Net Promoter System®” [45].
Indicator connection	<ul style="list-style-type: none"> • Tenant satisfaction survey (source: GRESB) <p>Both indicators assess how the entity interacts with stakeholders to identify key issues, improve engagement, and increase satisfaction. While their objectives are similar, they focus on different categories—one for tenants and end users, and the other for employees. The survey results from both indicators contribute to fostering improvement and promoting more engaged and satisfied groups.</p>
Note	None

Code	Title	Description
9G2	Indicator	Employee engagement program
	Source	GRESB/ Management component/ Stakeholder
	Intent	This indicator assesses how an entity responds to the results of an employee satisfaction survey. Proactive responses indicate a commitment to the employee engagement process and to fostering, sustaining, and improving employee satisfaction [45].
	Relevance	Strong communication and real-time feedback mechanisms play a critical role in enhancing employee well-being. Integrating environmental and social considerations with engagement practices extends their influence on community involvement and CSR activities. Participation in social initiatives fosters employee morale and loyalty, as workers take pride in being part of socially responsible organizations. Engagement strategies emphasizing sustainability, DEI, and CSR contribute to business success while positively impacting society and the environment. Addressing the unique needs of a diverse workforce is essential for creating inclusive and effective engagement programs [64]. Recognizing psychological factors such as motivation and behavioral triggers is crucial for developing programs that align with the needs of a diverse workforce. Engagement initiatives that incorporate active participation, discussions, and practical exercises are generally more successful in fostering employee involvement [65]. Employee engagement positively influences performance by promoting enthusiasm, commitment, and concentration. Employees who are engaged are more proactive, strive for better outcomes, and report higher job satisfaction, ultimately supporting the organization's success [66].
	unit of measurement	Select yes or no/not applicable. If yes, select all applicable sub-options and complete the additional open fields. [45].
	Benchmarks	<p>"Does the entity have a program in place to improve its employee satisfaction based on the outcomes of the survey referred to in employee satisfaction survey?</p> <ul style="list-style-type: none"> • Yes <ul style="list-style-type: none"> Select all applicable options (multiple answers possible) a) Planning and preparation for engagement b) Development of action plan c) Implementation d) Training e) Program review and evaluation f) Feedback sessions with c-suite level staff g) Feedback sessions with separate teams/departments h) Focus groups i) Other: _____ • No • Not applicable" [45].
	Workflow	<ol style="list-style-type: none"> 1. Collect required data 2. Select: <ol style="list-style-type: none"> a) No/Not applicable: if the entity doesn't include requirements, then the workflow stops here

	<ul style="list-style-type: none"> b) Yes: if the entity includes those requirements. Then: <ul style="list-style-type: none"> I. Select answers based on evidence II. If the answer is not in the sub-options write the answer in <other> and prepare evidence to get check
Input data	<ul style="list-style-type: none"> • The required data for each subcategory mentioned in the benchmark
Standards	None
Indicator connection	<ul style="list-style-type: none"> • Tenant engagement program (source: GRESB) <p>Both indicators emphasize the engagement process, identifying issues, and utilizing feedback for improvement within their respective groups, namely tenants and employees. While combining tenant and employee engagement could provide a broader stakeholder context, this thesis prioritizes the employee engagement program as the main indicator due to its direct relevance to the construction field, despite tenants being the final users.</p> <ul style="list-style-type: none"> • Program to improve tenant satisfaction <p>Both indicators aim to enhance satisfaction but for different stakeholders (tenant & employees). While the construction companies have to focus on employees' satisfaction primarily due to their nature of work which can directly influence productivity, safety, and overall company performance. If the company also manages or develops properties related to tenant, then Program to improve tenant satisfaction can be overlapped.</p>
Note	This indicator will be applicable if the company has conducted an employee satisfaction survey (indicator code: 8G1). [45].

Code	Title	Description
10G1	Indicator	Employee health & well-being program
	Source	GRESB/ Management component/ Stakeholder engagement
	Intent	This indicator assesses the existence and scope of an entity's program dedicated to enhancing employee health and well-being. A comprehensive approach to promoting health and well-being includes needs assessment, goal setting, implementation, and monitoring. This systematic process enables entities to create value and effectively manage risks [45].
	Relevance	Employee health and safety denotes the occupational health and safety performance of an organization regarding its employees. Workplace incidents pose risks to employee well-being and can lead to reputational harm, financial penalties, and productivity declines. Reduced injury and absentee rates are associated with better morale and increased productivity. Consistent attention to health and safety promotes safe workplace behaviors and supports overall well-being. Effective monitoring plays a crucial role in safeguarding employees. Employee health and safety assesses the effectiveness of health and safety practices in minimizing workplace injuries, lost days, and absenteeism [59]. Monitoring progress involves evaluating operational outcomes to refine and optimize interventions and needs assessments play a critical role in identifying risks, opportunities, and priorities for promoting health and well-being, ensuring that actions are efficient and effectively targeted [45]
	unit of measurement	Select yes or no. If yes, select all applicable sub-options and complete the additional open fields.
	Benchmarks	<p>"Does the entity have a program in place for promoting health & well-being of employees?"</p> <ul style="list-style-type: none"> • Yes <ul style="list-style-type: none"> The program includes (multiple answers possible): <ul style="list-style-type: none"> a) Needs assessment b) Goal setting c) Action d) Monitoring • No" [45].
	Workflow	<ol style="list-style-type: none"> 1. Collect required data 2. Select: <ol style="list-style-type: none"> a) No: if the entity doesn't include requirements, then the workflow stops here b) Yes: if the entity includes those requirements. Then: <ol style="list-style-type: none"> I. Select answers based on evidence
	Input data	<ul style="list-style-type: none"> • Documents addressing health and well-being indicators, either through written questions or physical inspections, are utilized to assess these issues • Mechanisms and objectives are established to support employee health and well-being. • Records of physical and mental evaluations by medical professionals are maintained.

Standards	None
Indicator connection	<ul style="list-style-type: none"> • Tenant health & well-being program (source: GRESB) <p>The measurement methods for both employee and tenant health and well-being programs are identical. However, as tenants are the ultimate users and their assessment takes place post-construction, the employee health and well-being program is prioritized to align with the thesis objectives.</p>
Note	None

Code	Title	Description
11G1	Indicator	Employee health & well-being measures
	Source	GRESB/ Management component/ Stakeholder engagement
	Intent	This indicator assesses the extent and effectiveness of the entity's employee health and well-being program. [45]
	Relevance	In organizational studies, health and well-being are commonly evaluated through self-reported measures, though objective assessments are also utilized. Hedonic well-being is measured by examining affective experiences, energy levels, and satisfaction across work and nonwork domains, including job satisfaction scales. Subjective health evaluations typically focus on physical symptoms such as headaches or back pain, using established tools like the General Health Questionnaire, the somatization sub-scale of the Symptom Checklist-90, or the Spector and Jex physical-symptoms scale. Additionally, physiological indicators offer critical insights into health-related processes. Workplace resources, including autonomy, learning opportunities, and task variety, significantly contribute to employee health and well-being, while job stressors adversely affect physical health. Research indicates that within-person variability accounts for about 50% of the differences observed in stress and well-being measures. Organizational stakeholders increasingly acknowledge the correlation between employee health, well-being, and organizational success, highlighting the importance of adopting integrative strategies to enhance these outcomes [67].
	unit of measurement	Select yes or no/not applicable. If yes, select all applicable sub-options and complete the additional open fields [45].
	Benchmarks	<p>"Does the entity take measures to incorporate the health & well being program for employees described in 10G1?</p> <ul style="list-style-type: none"> • Yes <ul style="list-style-type: none"> Select all applicable options (multiple answers possible) <ul style="list-style-type: none"> - Needs assessment <ul style="list-style-type: none"> The entity monitors employee health and well-being needs through (multiple answers possible): <ul style="list-style-type: none"> a) Employee surveys on health and well-being: <ul style="list-style-type: none"> Percentage of employees: _____% b) Physical and/or mental health checks <ul style="list-style-type: none"> Percentage of employees: _____% c) Other: _____ <ul style="list-style-type: none"> Percentage of employees: _____% - Creation of goals to address <ul style="list-style-type: none"> a) Mental health and well-being b) Physical health and well-being c) Social health and well-being d) Other: _____ - Action to promote health through <ul style="list-style-type: none"> a) Acoustic comfort b) Biophilic design c) Childcare facilities contributions d) Flexible working hours

- e) Healthy eating
- f) Humidity
- g) Illumination
- h) Inclusive design
- i) Indoor air quality
- j) Lighting controls and/or daylight
- k) Noise control
- l) Paid maternity leave in excess of legally required minimum
- m) Paid paternity leave in excess of legally required minimum
- n) Physical activity
- o) Physical and/or mental healthcare access
- p) Social interaction and connection
- q) Thermal comfort
- r) Water quality
- s) Working from home arrangements
- t) Other: _____

- Monitor outcomes by tracking
 - a) Environmental quality
 - b) Population experience and opinions
 - c) Program performance
 - d) Other: _____

- No
- Not applicable " [45].

Workflow	<ol style="list-style-type: none"> 1. Collect required data 2. Select: <ol style="list-style-type: none"> a) No/Not applicable: if the entity doesn't include requirements, then the workflow stops here b) Yes: if the entity includes those requirements. Then: <ol style="list-style-type: none"> I. Check if the entity has each of sub-options elements II. Select answers based on evidence III. Calculate percentage of selected sub-option IV. Fill each of sub-options elements V. Demonstrate evidence VI. If the answer is not in the sub-options write the answer in <other> and prepare evidence to get check
Input data	Documents that outline: the type of needs assessment, the health and well-being topics, the actions taken to promote health, and the methods used to track outcomes.
Standards	None
Indicator connection	<ul style="list-style-type: none"> • Tenant health & well-being measures (source: GRESB) <p>The measurement methods for both employee and tenant health and well-being measures are identical. However, as tenants are the ultimate users and their assessment takes place post-construction, the employee health and well-being measure is prioritized to align with the thesis objectives.</p>
Note	None

Code	Title	Description
12G0	Indicator	Employee safety indicators
	Source	GRESB/ Management component/ Stakeholder engagement
	Intent	This indicator aims to outline the metrics gathered by the organization to assess employee health, safety, and productivity. The monitoring and reporting of occupational health and safety serves as a hallmark of effective management, facilitating an ongoing understanding of health and safety concerns within the organization. Keeping records of employee incidents over time supports the analysis of trends and helps pinpoint areas requiring improvement [45].
	Relevance	Employee health and safety evaluates the occupational health and safety performance of an organization concerning its direct employees. Workplace incidents not only endanger workers but also expose companies to risks such as reputational harm, financial penalties, and reduced productivity. Low rates of injuries and absenteeism are associated with improved employee morale and productivity. A sustained emphasis on health and safety fosters safer workplace practices, and precise monitoring aids in safeguarding employees and enhancing well-being by minimizing occupational injuries, absenteeism, and lost working days [59].
	unit of measurement	Select yes or no. If yes, select all applicable sub-options and complete the additional open fields [45].
	Benchmarks	<p>“Has the entity monitored conditions for and / or tracked indicators of employee safety during the last three years?</p> <ul style="list-style-type: none"> • Yes <ul style="list-style-type: none"> Select all applicable options (multiple answers possible) a) Workstation and/or workplace checks: Percentage of employees: _____% b) Absentee rate: _____% c) Injury rate: _____ d) Lost day rate: _____% e) Other metrics: _____ Rate of other metric(s): _____ f) Explain the employee occupational safety indicators calculation method (maximum 250 words) _____ • No” [45].
	Workflow	<ol style="list-style-type: none"> 1. Collect required data 2. Select: <ol style="list-style-type: none"> a) No: if the entity doesn't include requirements, then the workflow stops here b) Yes: if the entity includes those requirements. Then: <ol style="list-style-type: none"> I. Check if the entity has each of sub-options elements II. Select answers based on evidence III. Calculate percentage of selected sub-option IV. Fill each of sub-options elements V. Demonstrate evidence

Input data	- Report related to information about: the Injury Rate, Lost Day Rate, Accident Severity Rate, Absentee Rate , and work-related fatalities for all direct employees [59]
Standards	<ul style="list-style-type: none"> • “RobecoSAM Corporate Sustainability Assessment, 2017: 3.5.2, Risk Culture • GRI Sustainability Reporting Standards, 2016: 403-2 • EPRA Best Practices Recommendations on Sustainability Reporting, 3rd version, September 2017: 5.6 H&S • Employee Health and Safety” [45].
Indicator connection	None
Note	None

Code	Title	Description
13G0	Indicator	On-site safety
	Source	GRESB/ Management component/ Stakeholder engagement
	Intent	The inherently hazardous nature of construction projects and certain building services work poses significant risks, including incidents, injuries, and fatalities. Such events can jeopardize a business's reputation and long-term viability. Occupational health and safety (OHS) performance serves as a critical indicator of an entity's commitment to its duty of care. The monitoring and reporting of on-site OHS practices reflect sound risk management strategies [45].
	Relevance	Workplace incidents, including injuries and illnesses, frequently result from the failure to identify or anticipate potential hazards. An effective safety program requires a proactive and ongoing approach to hazard identification and assessment. Over time, hazards may emerge due to changes in processes, worn equipment, inadequate maintenance, or declining housekeeping standards. Conducting regular workplace inspections can help detect and address these risks before incidents occur. Hazard information is available from various sources, and identifying health-related risks, such as chemical, physical, biological, or ergonomic hazards, is often more challenging than recognizing physical safety issues. Properly reviewing medical records, while maintaining privacy, can aid in identifying workplace exposure risks. Implementing effective controls is critical to safeguarding workers, preventing incidents, minimizing risks, and maintaining safe and healthy work environments [68].
	unit of measurement	Select yes or no. If yes, select all applicable sub-options and complete the additional open fields [45].
	Benchmarks	<p>"Does the entity promote on-site safety during the construction phase of its development projects?"</p> <ul style="list-style-type: none"> • Yes <ul style="list-style-type: none"> The entity promotes on-site safety through (multiple answers possible): <ol style="list-style-type: none"> a) Availability of medical personnel b) Communicating safety information c) Continuously improving safety performance d) Demonstrating safety leadership e) Entrenching safety practices f) Managing safety risks g) On-site health and safety professional (coordinator) h) Personal Protective and Life Saving Equipment i) Promoting design for safety j) Training curriculum k) Other: _____ • No" [45].
	Workflow	<ol style="list-style-type: none"> 1. Collect required data 2. Select: <ol style="list-style-type: none"> a) No: if the entity doesn't include requirements, then the workflow stops here b) Yes: if the entity includes those requirements. Then:

	<ol style="list-style-type: none"> I. Check if the entity has each of sub-options elements II. Select answers based on evidence III. Demonstrate evidence IV. If the answer is not in the sub-options write the answer in <other> and prepare evidence to get check
Input data	<ul style="list-style-type: none"> - Standards designed to safeguard the safety, health, and well-being of individuals involved in construction activities [45] - An outline detailing the range of workers, tasks, and workplaces encompassed by the occupational health and safety management system - Description of work related hazards , assess risks and work processes, H&S training, safety management system [69]
Standards	<ul style="list-style-type: none"> • “BS OHSAS 18001/18002, Occupational Health and Safety Management • ISO 9001, Quality Management Systems; and ISO 14001, Environmental Management System • ILO-OSH 2001, Guidelines on Occupational Safety and Health Management Systems • NAICS 23 • GRI Sustainability Reporting Standards, 2016: GRI 403 Occupational health and safety” [45].
Indicator connection	None
Note	None

Code	Title	Description
14G0	Indicator	Safety metrics
	Source	GRESB/ Management component/ Stakeholder engagement
	Intent	Monitoring and reporting on on-site health and safety serve as a key indicator of effective risk management practices. Maintaining records of incidents, injuries, and fatalities over time allows for the identification of patterns, which can inform the development and implementation of measures to mitigate health and safety risks [45]..
	Relevance	Losing workers with injury or illness [69], which can happen in all types of workplaces, for a short time might have serious disruption for their employers, their families and their workplaces and responsible employers use safety and health programs to avoid it [68] with putting policies and processes in place .This is workers' right to reject or stop working in unhealthy and unsafe work environment for themselves or others [69]. To have an effective program for health and safety, workers participation can play an important role because it means they are involving themselves in establishing, operating, evaluation and improving those programs. Also, evaluation of established safety and health program can confirm that the program has been implemented [68].
	unit of measurement	Select yes or no. If yes, select all applicable sub-options and complete the additional open fields [45].
	Benchmarks	<p>"Does the entity monitor safety indicators at construction sites?"</p> <ul style="list-style-type: none"> • Yes <p>Select all applicable options (multiple answers possible):</p> <ul style="list-style-type: none"> a) Injury rate: _____ b) Explain the injury rate calculation method (maximum 250 words) _____ c) Fatalities: _____ d) Near misses: _____ e) Lost day rate: _____ f) Severity rate: _____ g) Other metrics: _____ <p>Rate of other metric(s): _____</p> <ul style="list-style-type: none"> • No" [45].
	Workflow	<ol style="list-style-type: none"> 1. Collect required data 2. Select: <ul style="list-style-type: none"> a) No: if the entity doesn't include requirements, then the workflow stops here b) Yes: if the entity includes those requirements. Then: <ol style="list-style-type: none"> I. Check if the entity has each of sub-options elements II. Select answers based on evidence III. If the answer is not in the sub-options write the answer in <other> and prepare evidence to get check

Input data	- Report related to information about: the Injury Rate, Lost Day Rate, Accident Severity Rate, Absentee Rate , and work-related fatalities for all direct employees [59]
Standards	<ul style="list-style-type: none"> • "GRI Sustainability Reporting Standards, 2016: 403-2 • RobecoSAM Corporate Sustainability Assessment, 2017: 3.5.2 Risk culture • Occupational Safety and Health Administration, US Department of Labor" [45].
Indicator connection	None
Note	<p>In benchmarks:</p> <ul style="list-style-type: none"> • Open text box: For injury rates, it is essential to provide an explanation of the calculation method or formula used, which must be detailed in the designated open text box • Fatalities: Fatalities are expressed as a number. [45].

Code	Title	Description
15G0	Indicator	Monitoring external suppliers/service providers
	Source	GRESB/ Management component/ Stakeholder engagement
	Intent	This indicator evaluates the approaches employed by participants to oversee external suppliers' and service providers' adherence to ESG-specific requirements.
	Relevance	An organization can contribute to negative environmental impacts through its own activities or its business relationships with other parties. It is expected that organizations exercise due diligence to prevent, mitigate, and address actual and potential environmental harms within their supply chains. This includes impacts caused or contributed to by the organization, or those directly connected to its operations, products, or services through its relationships with suppliers [70]
	unit of measurement	Select yes or no. If yes, select all applicable sub-options and complete the additional open fields [45].
	Benchmarks	<p>"Does the entity monitor other direct external suppliers' and/or service providers' compliance with the ESG-specific requirements in place for this entity?</p> <ul style="list-style-type: none"> • Yes, <ul style="list-style-type: none"> Select all methods used (multiple answers possible) <ul style="list-style-type: none"> a) Checks performed by an independent third party b) Regular meetings and/or checks performed by external property/asset managers c) Regular meetings and/or checks performed by the entity 's employees d) Require supplier/service providers' alignment with a professional standard Standard: _____ e) Supplier/service provider ESG training f) Supplier/service provider self-assessments g) Other: _____ • No • Not applicable" [45].
	Workflow	<ol style="list-style-type: none"> 1. Define ESG specific requirements 2. Collect required data 3. Select: <ul style="list-style-type: none"> a) No/Not applicable : if the entity doesn't include requirements, then the workflow stops here b) Yes: if the entity includes those requirements. Then: <ol style="list-style-type: none"> I. Check if the entity has each of sub-options elements II. Select answers based on evidence III. If the answer is not in the sub-options write the answer in <other> and prepare evidence to get check IV. Demonstrate evidence

Input data	<ul style="list-style-type: none"> - Detailed list of ESG-specific requirements for suppliers - Entity's meetings record highlighting ESG compliance, and its checks performed document
Standards	<ul style="list-style-type: none"> • "GRI Sustainability Reporting Standards, 2016: GRI 308; GRI 414; 414-1; 412-1 • RobecoSAM Corporate Sustainability Assessment, 2017: 3.5.2, Risk Exposure" [45].
Indicator connection	None
Note	This indicator pertains to suppliers other than the property or asset managers addressed in 17G0 . [45].

Code	Title	Description
16G0	Indicator	Supply chain engagement program
	Source	GRESB/ Management component/ Stakeholder engagement
	Intent	This indicator describes the management practices and requirements the entity uses to manage supply chain risks. The procurement process is an effective way to integrate the entity's sustainability-specific requirements into their supply chain. This indicator applies to existing and new contracts [45].
	Relevance	Organizations should initiate due diligence at the earliest stages of establishing relationships with suppliers. By addressing potential impacts during the contract development phase and maintaining ongoing collaboration with suppliers, these risks can be prevented or mitigated [71] The early detection of emerging risks allows organizations to be better equipped for their occurrence. This process is supported by elements such as scenario analysis for non-traditional risks, ongoing communication with stakeholders, monitoring small operational failures, and cultivating a robust risk culture. A strong risk culture is particularly important, as highlighted by significant incidents like the Fukushima disaster, which emphasize the need for risks to be communicated directly to the highest levels of management [60]. Supply chain management capabilities are a fundamental foundation for identifying and selecting business opportunities, as well as for designing real estate development projects [13].
	unit of measurement	Select yes or no. If yes, select all applicable sub-options and complete the additional open fields [45].
	Benchmarks	<p>"Does the entity include ESG-specific requirements in its procurement processes?"</p> <ul style="list-style-type: none"> • Yes <p>Select elements of the supply chain engagement program (multiple answers possible)</p> <ol style="list-style-type: none"> a) Developing or applying ESG policies b) Planning and preparation for engagement c) Development of action plan d) Implementation of engagement plan e) Training f) Program review and evaluation g) Feedback sessions with stakeholders h) Other: _____ <p>Select all topics included (multiple answers possible)</p> <p>Business ethics</p> <ol style="list-style-type: none"> a) Child labor b) Environmental process standards c) Environmental product standards d) Health and safety: employees e) Health and well-being f) Human health-based product standards g) Human rights h) Labor standards and working conditions i) Other: _____

Select the external parties to whom the requirements apply (multiple answers possible)

- a) Contractors
- b) Suppliers
- c) Supply chain (beyond 1 tier suppliers and contractors)
- d) Other: _____

- No" [45].

Workflow	<ol style="list-style-type: none"> 1. Define ESG requirements 2. Collect required data based on requirements mentioned in methodology 3. Select: <ol style="list-style-type: none"> a) No: if the entity doesn't include those requirements in its procurement processes, then the workflow stops here b) Yes: if the entity includes those requirements in its procurement processes. Then: <ol style="list-style-type: none"> I. Check if the entity has each of sub-options elements II. Select answers based on evidence III. If the answer is not in the sub-options write the answer in <other> and prepare evidence to get check
Input data	<ul style="list-style-type: none"> - ESG-specific requirements in procurement processes - Action Plan Documentation, Documentation on adherence to business ethics principles, Child Labor Policies, contractor information, environmental Process and product Standards, H&S records, Health & Well-being Initiatives, human right policies , Records on labor practices and working conditions - Documentation on compliance with health-related product standards, including lists of prohibited chemicals in products - Records of supplier information and their activities
Standards	<ul style="list-style-type: none"> • "GRI Sustainability Reporting Standards, 2016: 204-1; 308, Supplier environmental assessment; GRI 414, Supplier social Assessment • RobecoSAM Corporate Sustainability Assessment, 2017: 3.5.2 Risk Exposure" [45].
Indicator connection	None
Note	None

Code	Title	Description
17G0	Indicator	Monitoring property/asset managers
	Source	GRESB/ Management component/ Stakeholder engagement
	Description	This indicator assesses the approaches employed by a participant to oversee property/asset managers' adherence to the participant's ESG-specific requirements. Monitoring compliance ensures that property/asset managers are accountable for executing the ESG standards established by the entity [45].
	Relevance	<p>A comparative analysis of CSR and sustainable building tools indicates that multiple sustainability factors influence corporate management. These factors shape a commercial property firm's strategic planning, daily activities, building development processes, and asset management. These interconnected functions contribute to a complex flow of information across different levels within the organization, as highlighted by UNEP FI (2014) To effectively incorporate sustainability into its operations, a company must systematically integrate these considerations into daily business practices and decision-making. This demands that investors, employees, and value chains have a comprehensive understanding of the company's sustainability objectives and remain informed about relevant trends. Additionally, the company's values, behaviors, and performance standards must be aligned with ethical principles, social equality, and socio-environmental justice [13]</p> <p>In March 2019, the European Parliament implemented regulations under its Sustainable Finance Action Plan that require asset managers to use a unified reporting standard for disclosing their consideration of ESG factors, with the goal of preventing greenwashing. Regional surveys of asset managers in the U.S., Canada, Australia, and New Zealand reveal that their primary motivations for adopting sustainable investing strategies are to reduce risk and enhance long-term financial performance [72].</p>
	Unit of measurement	Select yes or no. If yes, select all applicable sub-options and complete the additional open fields [45].
	Benchmarks	<p>"Does the entity monitor property/asset managers' compliance with the ESG-specific requirements in place for this entity?</p> <ul style="list-style-type: none"> • Yes <ul style="list-style-type: none"> a) The entity monitors compliance of: b) Internal property/asset managers c) External property/asset managers d) Both internal and external property/asset managers Select all methods used (multiple answers possible) <ul style="list-style-type: none"> a) Checks performed by independent third party b) Property/asset manager ESG training c) Property/asset manager self-assessments d) Regular meetings and/or checks performed by the entity 's employees e) Require external property/asset managers 'alignment with a professional standard f) Standard: _____ g) Other: _____

	<ul style="list-style-type: none"> • No • Not applicable" [45].
Workflow	<ol style="list-style-type: none"> 1. Define ESG requirements 2. Define property/asset managers' compliance 3. Select: <ul style="list-style-type: none"> a) No/not applicable : if the entity doesn't include requirements, then the workflow stops here b) Yes: if the entity includes those requirements. Then: <ol style="list-style-type: none"> I. Check if the entity has each of sub-options elements II. Select answers based on evidence III. If the answer is not in the sub-options write the answer in <other> and prepare evidence to get check IV. Demonstrate evidence
Input data	<ul style="list-style-type: none"> - ESG- specific requirements [45] - Percentage of new suppliers that were screened using social criteria [71]
Standards	<ul style="list-style-type: none"> • "GRI Sustainability Reporting Standards, 2016: GRI 308; GRI 414; 414-1; 412-1" [45].
Indicator connection	None
Note	None

Code	Title	Description
18G2	Indicator	Community impact monitoring
	Source	GRESB/ development component/ Stakeholder engagement
	Intent	Development projects often have the potential to affect or disrupt local communities. The extent of these disruptions varies depending on the specific project and phase of the development. Monitoring plays a crucial role in assisting an entity in managing and minimizing the impact of development projects on the local community throughout the development process [45].
	Relevance	In 2021, nearly 37% of energy- and process-related CO2 emissions, along with 34% of global energy demand, were attributed to the buildings and construction sector. Furthermore, buildings impact resource consumption, ecological systems, and the health and well-being of individuals [73]. Development projects, though often well-planned, can produce unintended negative effects on participants, communities, or the environment that may only emerge over time. Organizations typically focus on short-term goals and limited project areas, overlooking longer-term consequences. To address this, agencies must adopt flexible approaches, prioritize ethical responsibilities to communities, and include budgetary provisions for long-term monitoring to ensure sustainability and mitigate potential negative impacts. Effective monitoring depends on adequate resources, knowledge, and support [74].
	unit of measurement	Select yes or no. If yes, select all applicable sub-options and complete the additional open fields [45].
	Benchmarks	<p>“Does the entity have a systematic process to monitor the impact of development projects on the local community during different stages of the project?</p> <ul style="list-style-type: none"> • Yes <ul style="list-style-type: none"> The entity's process includes (multiple answers possible) <ol style="list-style-type: none"> a) Analysis and interpretation of monitoring data b) Development and implementation of a communication plan c) Development and implementation of a community monitoring plan d) Development and implementation of a risk mitigation plan e) Identification of nuisance and/or disruption risks f) Identification of stakeholders and impacted groups g) Management practices to ensure accountability for performance goals and h) issues identified during community monitoring i) Other: _____ <p>Describe the monitoring process (maximum 250 words) Provide applicable evidence UPLOAD or URL_____</p> <p>Indicate where in the evidence the relevant information can be found_____</p> • No” [45].

Workflow	<ol style="list-style-type: none"> 1. Collect required data 2. Select: <ol style="list-style-type: none"> a) No: if the entity doesn't include requirements, then the workflow stops here b) Yes: if the entity includes those requirements. Then: <ol style="list-style-type: none"> I. Select answers based on evidence II. If the answer is not in the sub-options write the answer in <other> and prepare evidence to get check III. Demonstrate evidence
Input data	<ul style="list-style-type: none"> - The document that outlines the specific objectives, stages, and metrics used to monitor community impact during development projects. - A documented plan that defines how the entity engages with the local community, detailing the frequency of community meetings, types of communication used, and evidence of community feedback being considered - Any documentation related to identified risks and the measures developed to mitigate these risks, such as addressing noise, traffic congestion, or pressure on local services due to development activities. - Any formal reports that include data analysis from surveys related to the impact of development projects on the community and surveys shows how the engagement between stakeholders and impacted groups informed decisions and actions regarding community impact
Standards	<ul style="list-style-type: none"> • "BREEAM Communities Manual, 2012" [45].
Indicator connection	<ul style="list-style-type: none"> • Quality of Life Performance (source: LEED) <p>This indicator is more relevant for cities, reflecting the long-term social outcomes that construction companies may influence, while the Community Impact Monitoring focuses on the short-term impacts during the development phase, monitoring community effects throughout the project. Quality of Life Performance indirectly influences construction companies but, as an overlapping indicator, helps avoid redundancy and connects the short-term impacts of construction to long-term social benefits</p> <ul style="list-style-type: none"> • Monitoring impact on community (source: GRESB-performance component) <p>While Community Impact Monitoring directly aligns with the thesis objectives by addressing short-term impacts during the development process, Monitoring Impact on Community indirectly considers the long-term outcomes of construction. As an overlapping indicator, it establishes a connection between the short-term and long-term impacts of construction. By including Monitoring Impact on Community, the company can comprehensively address both the development and operational phases.</p>
Note	<p>The response to this indicator must specifically address the impact of new construction and major renovation projects at various stages [45].</p>

Code	Title	Description
19G0	Indicator	Fit-out & refurbishment program for tenants on ESG
	Assessment Tool Name	GRESB/ performance component/ Stakeholder engagement
	Intent	This indicator evaluates how the entity incorporates ESG considerations in the fit-out and refurbishment of tenant spaces. A fit-out and refurbishment program facilitates alignment between landlords and tenants early in the occupancy process, before the tenant begins occupying the space. Providing guidance and support at the start of the lease underscores the significance of ESG issues and establishes a foundation for the sustainable operation of buildings [45].
	Relevance	<p>refurbishment roadmaps are being developed across the industry to improve property performance [75].many rating tool initiatives have been targeted towards new buildings while some believe the demolition of older buildings unnecessary. Although finding a way to address sustainability in existing buildings is more difficult but the market looking for it [76].</p> <p>instead of demolishing and rebuild a new building in construction phase it is better to emphasize the re-use of existing material or structure [75].Regarding improvements and refurbishments implementation of high-technology products and more efficient designs and fit-outs or as a few properties company in Australia used "green leases", and seizing opportunities based on lease expires strategies (where tenants conform to sustainability principles) to consider sustainability initiative in their capital expenditure or capex planning [76].</p> <p>Also, in design phase to reduce the probability of structural changes in the future it is necessary to stress to have flexibility and reusability layout of the building. It is expected by using smart refurbishments and low-carbon solutions it is possible to keep global warming under 1.5 degrees Celsius by 2050. To decrease buildings carbon footprints because of tenant fit outs or interior renovations and modification or even maintenance activities it is necessary to track refurbishment progress and monitoring and regulatory in collecting data [75].</p>
	Unit of measurement	Select yes or no. If yes, select " percentage portfolio covered " for applicable sub-options and complete the additional open fields [45].
	Benchmarks	<p>"Does the entity have a fit-out and refurbishment program in place for tenants that includes ESG-specific issues?</p> <ul style="list-style-type: none"> • Yes <ul style="list-style-type: none"> Select all topics included (multiple answers possible) <ol style="list-style-type: none"> a) Fit-out and refurbishment assistance for meeting the minimum fit-out standards b) Tenant fit-out guides c) Minimum fit-out standards are prescribed d) Procurement assistance for tenants e) Other: _____

- No " [45].

Workflow	<ol style="list-style-type: none"> 1. Collect required data 2. Select: <ol style="list-style-type: none"> a) No: if the entity doesn't include requirements, then the workflow stops here b) Yes: if the entity includes those requirements. Then: <ol style="list-style-type: none"> I. Check if the entity has each of sub-options elements II. Calculate the percentage portfolio covered for each applicable sub options III. Select answers based on calculations IV. If the answer is not in the sub-options write the answer in <other> and prepare evidence to get check
Input data	<ul style="list-style-type: none"> - Records or any documentation regarding fit-out and refurbishment in the entity and their guidelines/standards for the entity and tenants - The documentation shows ESG specific issues and its integration with entity's fit-out and refurbishment
Standards	<ul style="list-style-type: none"> • "SASB-Real Estate Owners, Developers & Investment Trusts, March 2016: IF0402-12" [45].
Indicator connection	None
Note	None

Code	Title	Description
20G1	Indicator	Community engagement program
	Source	GRESB/ development component/ Stakeholder engagement
	Intent	This indicator evaluates the strategies implemented by the entity to support communities connected to its operations. A systematic and thorough approach to community engagement reflects the degree to which community-related issues are integrated into the entity's overall strategy [45].
	Relevance	<p>An essential component of managing the impacts on local communities is the assessment and planning process, which aims to identify both actual and potential effects. Additionally, effective engagement with local communities is crucial to understanding their expectations and needs [77].</p> <p>The concept of community engagement involves the percentage of assets under operational control that have implemented programs for local community engagement, impact assessments, or development. This process is particularly significant for asset types such as retail. It is essential for organizations to establish a robust stakeholder engagement strategy, enabling them to understand how their assets influence local communities and to assess both actual and potential impacts. Through this engagement, organizations can incorporate community stakeholders' perspectives, needs, and expectations into their decision-making and address any impacts on local communities in a timely manner [59]</p>
	Unit of measurement	Select yes or no. If yes, select all applicable sub-options and complete the additional open fields [45].
	Benchmarks	<p>"Does the entity have a community engagement program in place that includes ESG-specific issues?</p> <ul style="list-style-type: none"> • Yes <ul style="list-style-type: none"> Select all topics included (multiple answers possible) a) Community health and well-being b) Effective communication and process to address community concerns c) Enhancement programs for public spaces d) Employment creation in local communities e) Research and network activities f) Resilience, including assistance or support in case of disaster g) Supporting charities and community groups h) ESG education program i) Other: _____ j) Describe the community engagement program and the monitoring process (maximum 250 words) • No" [45].
	Workflow	<ol style="list-style-type: none"> 1. Collect required data 2. Select: <ol style="list-style-type: none"> a) No: if the entity doesn't include requirements, then the workflow stops here b) Yes: if the entity includes those requirements. Then:

	<ol style="list-style-type: none"> I. Check if the entity has each of sub-options elements II. Select answers based on evidence III. If the answer is not in the sub-options write the answer in <other> and prepare evidence to get check
Input data	<ul style="list-style-type: none"> - Policies and strategies outlining the companies' approach to community engagement and integration of ESG specific issues - Evidence of programs' implementation and monitoring and ESG programs - Evidence of stakeholder involvement - Any kinds of evidence show the implementation of each benchmark
Standards	<ul style="list-style-type: none"> • "EPRA Best Practices Recommendations on Sustainability Reporting, 3rd version, September 2017: 5.9" [45].
Indicator connection	<ul style="list-style-type: none"> • Community engagement program (source: GRESB-performance component) <p>These two indicators evaluate specific benchmarks across various phases and demonstrate complete overlap.</p>
Note	None

Code	Title	Description
21G0	Indicator	Community impact assessment
	Source	GRESB/ development component/ Stakeholder engagement
	Intent	The built environment exerts substantial direct and indirect socio-economic influence, affecting aspects such as social well-being, quality of life, and the economic prosperity of local communities and individuals. Assessing socio-economic impacts aids in mitigating potential adverse effects of development projects and contributes to the creation of more sustainable, thriving, and livable communities [45].
	Relevance	Projects within the building industry encompass numerous interdependent activities and components that significantly influence social, environmental, and community-related factors across their entire lifecycle [78]. Sustainability strategies should address both built and social environments, but socio-economic factors are often overlooked in green building assessments. This omission makes it challenging to gauge the sustainability impacts of a building's lifecycle or its socio-economic contributions. Effective assessment systems must balance environmental, social, and economic impacts across all development stages, while considering worker wellbeing, socio-economic community development, and local cultural connections. However, socio-economic issues are frequently isolated from the full building lifecycle [13].
	unit of measurement	Select yes or no. If yes, select all applicable sub-options and complete the additional open fields [45].
	Benchmarks	<p>"Does the entity assess the potential long-term socio-economic impact of its development projects on the community as part of planning and pre-construction?"</p> <ul style="list-style-type: none"> • Yes <ul style="list-style-type: none"> Select the areas of impact that are assessed (multiple answers possible) a) Housing affordability b) Impact on crime levels c) Livability score d) Local income generated e) Local job creation f) Local residents 'well-being g) Walkability score h) Other: _____ • No" [45].
	Workflow	<ol style="list-style-type: none"> 1. Collect required data 2. Select: <ol style="list-style-type: none"> a) No: if the entity doesn't include requirements, then the workflow stops here b) Yes: if the entity includes those requirements. Then: <ol style="list-style-type: none"> I. Check if the entity has each of sub-options elements II. Select answers based on evidence

		III. If the answer is not in the sub-options write the answer in <other> and prepare evidence to get check
		I.
Input data	-	Documentation and evidence of assessment and planning and entity assess of socio-economic impact during construction and area affected by the development (housing affordability, crime levels...)
	-	Documentation and reports of stakeholder engagement and input on socio-economic impacts and their feedback
	-	ESG strategy and community engagement policy documents.
	-	Baseline socio-economic data (e.g., housing, income, job metrics) before project commencement and ongoing evaluation framework
	-	Compliance reports with local government standards on community impacts
Standards	•	"Green Star, Communities PILOT Version 0.1
	•	Mercer Quality of Life Index
	•	AARP Livability Index" [45].
Indicator connection	None	
Note	None	

Code	Title	Description
22G0	Indicator	Contractor ESG requirements
	Source	GRESB/ development component/ Stakeholder engagement
	Intent	This indicator evaluates the entity's approach to ensuring that contractors align with its ESG objectives and adhere to ESG management requirements. Establishing ESG-specific requirements for contractors facilitates the effective implementation of the entity's ESG policies in development projects. The relationships with contractors, formalized through written agreements, extend the enforceability of ESG requirements to a broader group of stakeholders [45].
	Relevance	<p>Health and safety are one of the important challenges along other challenges in construction and engineering sector such as environmental impacts and resource efficiency. Companies can gain advantages through participating in green building projects and accept demanding international rules [60].</p> <p>Workplace health and safety incidents can harm workers and put companies at risk of reputational damage, fines, and decreased productivity. Low injury and absenteeism rates are often linked to higher morale and better performance. Focusing on health and safety is essential to ensure safe practices are part of the workplace culture. Regular monitoring helps protect employees and supports their well-being. [59].</p> <p>As infrastructure spending rises in emerging markets, a company's chance of becoming a preferred contractor depends on avoiding reputational risks related to antitrust and bribery issues. This makes having a strong code of conduct essential for success. [60]</p>
	Unit of measurement	Select yes or no. If yes, select all applicable sub-options and complete the additional open fields.
	Benchmarks	<p>"Does the entity have ESG requirements in place for its contractors?"</p> <ul style="list-style-type: none"> • Yes <ul style="list-style-type: none"> Select all topics included (multiple answers possible) a) Business ethics b) Child labor c) Community engagement d) Environmental process standards e) Environmental product standards f) Health and well-being g) Human rights h) Human health-based product standards i) Occupational safety j) Labor standards and working conditions k) Other: _____ Percentage of projects covered: _____% • No" [45].
	Workflow	<ol style="list-style-type: none"> 1. Collect required data 2. Select: <ul style="list-style-type: none"> a) No: if the entity doesn't include requirements, then the workflow stops here

	<ul style="list-style-type: none"> b) Yes: if the entity includes those requirements. Then: <ul style="list-style-type: none"> I. Check if the entity has each of sub-options elements VI. Select answers based on evidence II. Calculate percentage of selected sub-option III. If the answer is not in the sub-options write the answer in <other> and prepare evidence to get check
Input data	<ul style="list-style-type: none"> - SG-specific requirements for contractors - Copies of formal contracts with contractors specifying ESG compliance and expectations (including penalties for non-compliance) and evidence of contractors' ESG performance - H&S reports in the workplace - Certifications or reports related to environmental labor/human rights standards - Reports or documents detailing contractors' contributions to community welfare and social projects.
Standards	<ul style="list-style-type: none"> • "BREEAM, International New Construction, 2016: 05 Management • United Nations Universal Declaration of Human Rights, 1948 • EPRA Best Practices Recommendations on Sustainability Reporting, 3rd version, September 2017: 5.6, H&S-Employee health and safety" [45].
Indicator connection	None
Note	None

Code	Title	Description
23G0	Indicator	Contractor monitoring methods
	Source	GRESB/ development component/ Stakeholder engagement
	Description	Monitoring measures are implemented to verify that contractors adhere to the contractual specifications and requirements related to ESG matters [45].
	Relevance	Contractors, who their performance has a direct effect on all supply chain competitiveness and are the core of construction supply chain. contractors are design converter to reality, and it logical for them to look for methods for maintaining performance Improvement. [79] contractors can do right actions during construction phases with awareness of sustainability goals established in the initial design phase if they do [80]. Also, instead of learning from operational error in previous projects to decrease construction cost, contractors might follow "wait and see" attitude until they receive the feedback when it is worse than their expectation [79].
	Unit of measurement	Select yes, no/ not applicable, if yes, select all applicable sub-options including the additional information requested [45].
	Benchmarks	"Does the entity monitor its contractors' compliance with its ESG specific requirements in place for this entity?" <ul style="list-style-type: none"> • Yes, <ul style="list-style-type: none"> Select all methods used (multiple answers possible) <ul style="list-style-type: none"> a) Contractor ESG training b) Contractors provide update reports on environmental and social aspects during construction c) External audits by third party, Percentage of projects audited during the reporting year: _____% d) Internal audits, Percentage of projects audited during the reporting year: _____% e) Weekly/monthly (on-site) meetings and/or ad hoc site visits, Percentage of projects visited during the reporting year: _____% f) Other: _____ • No • Not applicable" [45].
	Workflow	1. Collect required data 2. Select: <ul style="list-style-type: none"> a) No/Not applicable: if the entity doesn't include requirements, then the workflow stops here b) Yes: if the entity includes those requirements. Then: <ul style="list-style-type: none"> I. Check if the entity has each of sub-options elements II. Select answers based on evidence III. Calculate percentage of selected sub-option IV. If the answer is not in the sub-options write the answer in <other> and prepare evidence to get check
	Input data	<ul style="list-style-type: none"> - Documentation that outlines how the entity tracks contractor performance with respect to ESG standards. - Certification or attendance records showing contractors' participation in ESG-related training.

- Contractor progress and update reports
- evidence of independent or internal audits assessing contractors' adherence to ESG standards and reports of projects visited during the reporting year for ESG monitoring.
- Action plans outlining measures to rectify issues identified during site visits, audits, or reporting.

Standards	<ul style="list-style-type: none"> • "ISO 14001, Environmental Management Standard • SITES v2 Rating System • LEED BD+C: New Construction, v4, Sustainable Sites • BREEAM International New Construction, 2016 • RobecoSAM Corporate Sustainability Assessment, 2017: 3.5.5, ESG integration in supply chain strategy" [45].
-----------	---

Indicator connection None

Note	This indicator is directly attached to indicator Contractor ESG requirements (22G0) and will only be considered when the answer to indicator 22G0 is No. [45].
------	--

CHAPTER 5

COCLUSION



This thesis aimed to identify effective methods for assessing ESG indicators, evaluation tools, and assessment processes, as well as to develop ESG guidelines that emphasize the social components of the ESG framework for construction companies. To achieve these objectives, a series of steps were undertaken. First underscores the importance of ESG as a driver of sustainable development and the importance of robust, standardized ESG assessment tools, particularly in construction and urban planning, to balance environmental, social, and governance factors. The findings highlight the need for standardized tools to assess ESG indicators, emphasizing their relevance to sustainability and long-term success and the need for more comprehensive approaches that adequately address social dimensions. By incorporating ESG principles into corporate strategies, organizations can enhance sustainability performance, meet stakeholder expectations, and align with global sustainability goals. The study contributes to understanding how ESG principles can be effectively implemented in urban environments, aligning the construction sector with broader societal and environmental expectations.

Then, among various assessment tools, LEED for Existing Cities Version 4.1, applicable at the city level, and GRESB, a sustainability assessment tool for the real estate sector, were selected. The research successfully identifies and integrates social indicators from LEED for Existing Cities Version 4.1 and GRESB, creating a unified framework for assessing social aspects in ESG evaluations. By focusing on overlapping and interrelated indicators. Indicators relevant to the social aspects of these tools were then identified. Both tools were analyzed to identify similarities and internal connections.

The initial analysis selected 31 out of 36 indicators. To refine this list and focus on the most relevant and applicable indicators aligned with the thesis objectives, only those with direct or partial relevance were retained. Ultimately, 23 indicators (20 from GRESB and 3 from LEED) were selected, including 13 overlapping indicators. While LEED and GRESB assess different dimensions—one at a broader city level and the other at a smaller, real estate-specific level—LEED's social components were included for their applicability to real estate and construction contexts. However, most LEED indicators

lacked direct relevance to the thesis objectives and were used primarily as overlapping indicators.

Notably, indicators related to tenants and end-users were selected as overlapping indicators to address situations where construction companies are responsible for long-term project performance. These indicators account for cases where construction companies may not be directly involved in post-construction phases, as their primary focus is typically on pre-construction and development stages.

The selection process revealed that most indicators belonged to stakeholder management and stakeholder-related categories, highlighting the critical role stakeholders play in assessing the social components of ESG frameworks. This underscores the broader societal importance of stakeholder engagement in achieving effective social sustainability.

Terminology

Absentee rate: Absenteeism rate, calculated as the percentage of total absentee days out of the total scheduled workdays for the workforce in a year. [45]

Ad hoc site visits: unannounced visits [45].

Biophilic design: A design inspired by the human-nature connection, incorporating direct access to nature, natural views, place-based elements, and interiors featuring plants, water, or nature-inspired imagery, colors, and shapes. [45]

Community cohesion: Residents feel empowered to positively impact their community when the local government listens and responds to them. Survey questions should address concerns such as opportunities to participate in decision-making, collaborate with the local government to improve wellbeing, and directly contact officials to resolve community issues. The responsiveness of local officials strengthens this belief.

Neighborhood cohesion assesses how residents perceive their neighbors and community, focusing on trust, helpfulness, reliability, sense of belonging, and other factors that reflect the bonds between residents [45]

Community needs assessment: Includes an assessment of the current situation, projected changes, benchmarks, gaps, future demand analysis, and recommendations for social services and infrastructure needs based on the city's demographics and growth.

- Social services: Cover areas like mental health, substance abuse, housing and homelessness, abuse prevention, food access, senior centers, and childcare.
- Infrastructure needs: Include schools, libraries, hospitals, community facilities, public safety, and broadband access.
- Vulnerable populations: Include youth, older adults, women, LGBTQ+ individuals, Indigenous people, immigrants (documented and undocumented), people with disabilities or chronic illnesses, those experiencing homelessness, victims of violence or trafficking, linguistically isolated individuals, and outdoor workers [45]

Demography: "the changing number of births, deaths, diseases, etc. in a community over a period; the scientific study of these changes" [81]

Diversity, Equity, and Inclusion (DEI): Diversity, Equity, and Inclusion (DEI) encompasses three key elements:

- Diversity: The presence of differences in a setting, such as race, ethnicity, gender, sexual orientation, age, and socioeconomic background in the workplace.
- Equity: Ensuring processes and programs are fair, impartial, and provide equal opportunities for all.
- Inclusion: Creating a workplace where everyone feels a sense of belonging. [45]

Equity: The concept evolved from a philosophical idea (social contract) to a structural framework (constitutional) and then to an administrative focus (social equity) [82]

ESG-specific training: Training on environmental, social, and governance (ESG) topics [45]

ESG guide: A guide for tenants or customers with practical advice on ESG issues and actionable steps [45]

ESG-specific issues: Topics related to managing environmental, social, or governance issues. [45]

Environmental process standards: Minimum standards in procurement for environmental practices, such as waste disposal requirements for contractors [45]

Environmental product standards: Minimum procurement standards for environmental products, such as requiring products to be locally sourced or contain recycled content [45].

Fatalities: The death of a worker due to an injury or illness acquired while working for the company [45]

Fit-out: Work to design, renovate, and decorate areas of the leased property occupied by tenants [45].

Grievance mechanism: A formal or informal complaint process that allows individuals, communities, or organizations impacted by business activities to raise concerns and seek a solution or compensation [45]

Gender pay gap: A measure showing the difference in average hourly earnings between men and women. Simply disclosing gender-based pay without calculating the gap is not the same [45]

Impact assessment: Tools used to measure the impact of assets or projects on environmental, social, and economic factors. They usually involve a quantitative assessment of performance against specific thresholds, with a score that can be shared or kept private by the entity being evaluated [30].

Injury rate: A measure of the total number of injuries, including diseases, disabilities, and fatalities, occurring in operations, expressed as a percentage of the total number of employees [45]

Legitimate & safe: Build trust with stakeholders and protect them from potential threats or retaliation through a secure, anonymous, independent, and two-way communication system [45]

Lost day rate: A measure of the impact of workplace accidents and diseases based on the time workers miss. It compares the total workdays lost due to injury with the total scheduled workdays for the workforce during the year [45].

Nuisance and/or disruption risk: Risks that may cause disruption or inconvenience to stakeholders or communities, such as loud noise or heavy traffic [45]

Near misses: A work-related event that could lead to injury, disability, or illness for workers or the public (also called "dangerous occurrences") [45]

percentage of employees covered: The percentage of employees responsible for the entity, calculated by headcount. If the number of employees changes during the year, the percentage is based on the average number." Both percentages are calculated using the following formulas:

$$\text{Number of employees receiving professional training} / \text{Total number of employees} \times 100\%$$

$$\text{Number of employees receiving ESG-specific training} / \text{Total number of employees} \times 100\% \text{ [45]}$$

High-tech technique: High-tech techniques are those that use advanced data systems to share information clearly and effectively. This can also include locally produced content that broadcasts meetings or discusses community issues [36]

High-touch techniques: Involve direct engagement through in-person meetings, community mailings, and surveys. Internet-based surveys are not considered high-touch techniques [36]

Percentage portfolio covered: Coverage is calculated based on floor area. If the floor area changes during the year (e.g., due to a change in tenants), use the percentage at the end of the year. The denominator represents the total floor area of the portfolio. The coverage percentage must reflect the ownership percentage at the asset level. In GRESB assessment the coverage percentage is selected from a drop-down menu, which acts as a multiplier to determine the score:

Drop down option	Multiplier
> 0% , < 25%	0.25
≥ 25%, < 50%	0.5
≥ 50%, < 75%	0.75
≥ 75%, ≤ 100%	1.00

Rating and certification systems: Use criteria and indicators to assess and rate a project based on environmental, social, and economic factors, providing a quantified result that can be used to issue a certification for meeting specific performance standards [30].

Risk assessment: Refers to identifying and measuring processes or situations that could harm the entity and its investors. It's important for entities to monitor social risks, as they can damage reputation and lead to legal penalties [45]

Sustainable Development Goal 8: "Promote inclusive and sustainable economic growth, employment and decent work for all". [83]

Survey Response Rate: This shows the percentage of employees who completed the survey compared to those who were sent it. The formula is as follows:

$$\frac{\text{number of individual survey responses}}{\text{number of employees receiving the satisfaction survey}} \times 100\%$$

[45].

Social equity: Social equity is not explicitly stated in the constitution, but it represents fairness, justice, and rights. Policies in areas like the economy, environment, and immigration have impacts beyond borders and generations. Social equity goes beyond demographic differences and access to public programs, focusing more on human rights as global interdependence grows. Organizations like the United Nations play a key role in highlighting social equity by setting standards and sharing how nations perform in this area. Social equity is now a key concept in public administration, guiding ethical behavior for public servants and ensuring administrative integrity. Public administrators should follow these commitments:

- Procedural fairness, including due process and equal rights.
- Fair access to services and benefits.
- Fairness in how services are provided.
- Equal outcomes for all groups.
- A chance for all groups to voice their views on policies and services.

Social equity is a key concern of public administration, as government addresses issues that the market and social dynamics can't solve on their own. Policy debates on topics like education, healthcare, housing, food, water, and environmental justice all reflect ongoing social equity challenges [82]

socio-economic characteristics: Socio-economic challenges are a key issue in urban infrastructure, linked to social and economic inequalities in cities [84]. Socio-economic relations involve not just income inequality, but also unequal access to land, credit, information, and other resources, shaped by factors like ethnicity, class, and gender. [85]. Ensuring good living conditions is a key goal of urban infrastructure, aiming to include everyone in the city. Achieving this faces several challenges, such as:

- Providing affordable housing for diverse residents.
- Ensuring universal access to safe drinking water.
- Offering functional waste and wastewater services for public health.
- Providing equal mobility options for work and leisure.
- Supplying clean, affordable, and reliable energy.

In urban infrastructure, demographic challenges create socio-economic issues, leading to technical and environmental problems. Jurisdictional and financial challenges can help solve the overall issue [84].

Socio-economic issues like unemployment and income inequality negatively impact well-being. Rising inequalities can hinder development, poverty reduction, and economic growth. The lack of basic services in cities affects both the physical environment and the socio-economic conditions of families. To reduce inequalities, planning must overcome barriers to sharing decision-making power with those most affected. Coordinated policies and actions are crucial for promoting balanced urban development and reducing inequalities. Metropolitan governments can help by promoting economic opportunities, infrastructure investment, affordable transportation, and social housing, bridging political and socio-economic divides [85]

social infrastructure: It includes areas in a community that promote connections, an active lifestyle, creativity, and learning for residents [36]. Social infrastructure is crucial in people's daily lives. Features like home characteristics, neighborhood safety, proximity to schools, public transport, parking, and green spaces improve satisfaction with living spaces and overall quality of life. Infrastructure drives society's functioning and is essential for meeting basic human needs and promoting development. Social infrastructure, which includes institutions and municipal offices, helps fulfill the needs of residents and is key to sustainable social development. [86]

Sustainable development: It refers to development that meets current needs without preventing future generations from meeting theirs [41]

Severity rate: A measure of incident severity, calculated by dividing the total number of lost workdays by the total number of recordable incidents [45]

Bibliography

- [1] R. G. Eccles, L.-E. Lee and J. C. Strohle, "The Social Origins of ESG: An Analysis of Innovest and KLD," *Organization & Environment*, vol. 33(4), pp. 575-596, 2020.
- [2] M. Chiarolini, "ESG funds composition and certifications," POLITECNICO DI TORINO, Torino, 2022.
- [3] "sustainalytics," Morningstar Company, 28 10 2023. [Online]. Available: <https://connect.sustainalytics.com/scs-ebook-esg-getting-started-guide-for-corporations>.
- [4] G. Newell, A. Nada and A. Moss, "Improving the benchmarking of ESG in real estate investment," *Journal of Property Investment & Finance*, vol. 41:4, pp. 380-405, 5 February 2023.
- [5] A. Amel-Zadeh and G. Serafeim, "Why and how investors use ESG information: Evidence from a global survey," *Financial analysts journal*, vol. 74, pp. 87-103, 2018.
- [6] S. R. Park and J. Jae Young, "The Impact of ESG Management on Investment Decision: Institutional Investors' Perceptions of Country-Specific ESG Criteria," *International Journal of Financial Studies*, vol. 9, p. 48, 2021.
- [7] G. Wan, A. Yahya Dawod, S. Chanaim and S. Shankar Ramasamy, "Hotspots and trends of environmental, social and governance (ESG) research: a bibliometric analysis," *Data Science and Management* 6, pp. 65-66, 2023.
- [8] W. Henisz, T. Koller and R. Nuttall, "Five ways that ESG creates value," *McKinsey Quarterly*, November 2019.
- [9] S. Supunsala Senadheera, P. A. Withana, P. D. Dissanayake, B. Sarkar, S. S. Chopra, J. H. Rhee and Y. S. Ok, "Scoring environment pillar in environmental, social, and governance (ESG) assessment," *Sustainable Environment*, vol. 7, p. 1960097, 2021.
- [10] A. Edmans, "The end of ESG," *Financial Management*, vol. 52, pp. 3-17, 2023.
- [11] M. Arif Khan, "ESG disclosure and Firm performance: A bibliometric and meta analysis," *Research in International Business and Finance*, vol. 61, p. 101668, 2022.
- [12] P. Xidonas and E. Essner, "On ESG portfolio construction: A multi-objective optimization approach," *Computational Economics*, vol. 63, no. 1, pp. 21-45, 2024.
- [13] A. V. De Castro, G. R. Pacheco and F. J. N. Gonzalez, "Holistic approach to the sustainable commercial property business: analysis of the main existing sustainability certifications," *International Journal of Strategic Property Management*, vol. 24, no. 4, pp. 251-268, 2020.
- [14] J. Zvirgzdins, K. Plotka and S. Geipele, "Circular economy in built environment and real estate industry," *Proceedings of the 13th International Conference "Modern Building Materials, Structures and Techniques*, pp. 16--17, 2019.

- [15] P. L. Cruz, L. V. Ávila, M. A. P. Dinis and D. K. Baggio, "Environmental, social and governance (ESG) and innovation in the construction sector: Systematic Literature Review," *Revista de Administração da UFSM*, vol. 16, no. 4, p. e1, 2023.
- [16] R. R. R. Bezerra, V. W. B. Martins and A. N. Macedo, "Validation of challenges for implementing ESG in the construction industry considering the context of an emerging economy country," *Applied Sciences*, vol. 14, no. 14, p. 6024, 2024.
- [17] C. Louche, G. Delautre and G. Balvedi Pimentel, "Assessing companies' decent work practices: An analysis of ESG rating methodologies," *International Labour Review*, vol. 162, no. 1, pp. 69-97, 2022.
- [18] E. Clementino and R. Perkins, "How do companies respond to environmental, social and governance (ESG) ratings? Evidence from Italy," *Journal of Business Ethics*, vol. 171, pp. 379-397, 2021.
- [19] A. Hu, X. Yuan, S. Fan and S. Wang, "The Impact and Mechanism of Corporate ESG Construction on the Efficiency of Regional Green Economy: An Empirical Analysis Based on Signal Transmission Theory and Stakeholder Theory," *Sustainability*, vol. 15, no. 17, p. 13236, 2023.
- [20] E. Escrig-Olmedo, M. Á. Fernández-Izquierdo, I. Ferrero-Ferrero, J. M. Rivera-Lirio and M. J. Muñoz-Torres, "Rating the Raters: Evaluating how ESG Rating Agencies Integrate Sustainability Principles," *Sustainability*, vol. 11, p. 915, 2019.
- [21] A. Sharifi, A. Dawodu and A. Cheshmehzangi, "Neighborhood sustainability assessment tools: A review of success factors," *Journal of Cleaner Production*, vol. 293, p. 125912, 2021.
- [22] I. V. Zenkina, "Prerequisites and prospects for improving the quality of ESG assessment as a tool for responsible investment," *E3S Web of Conferences*, vol. 403, p. 08011, 2023.
- [23] A. Kocmanová and M. Dočekalová, "Construction of the economic indicators of performance in relation to environmental, social and corporate governance (ESG) factors," *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, vol. 60, pp. 195--206, 2012.
- [24] G. L. Clark and A. D. Dixon, "Legitimacy and the extraordinary growth of ESG measures and metrics in the global investment management industry," *Environment and Planning A: Economy and Space*, vol. 56, no. 2, pp. 645-661, 2024.
- [25] J.-M. Sahut and H. Pasquini-Descomps, "SG impact on market performance of firms: International evidence," *Management international*, vol. 19, pp. 40-63, 2015.
- [26] S. L. Gillan, J. C. Hartzell, A. Koch and A. Starks, "Firms' environmental, social and governance (ESG) choices, performance and managerial motivation," *Unpublished working paper*, vol. 10, 2010.
- [27] M. Bruno and V. Lagasio, "An Overview of the European Policies on ESG in the Banking Sector," *Sustainability*, vol. 13, p. 12641, 16 November 2021.

- [28] B. Cornell and A. C. Shapiro, "Corporate stakeholders, corporate valuation and ESG," *European Financial Management*, vol. 27, pp. 196-207, 2021.
- [29] M. C. Dos Santos and F. H. Pereira, "ESG performance scoring method to support responsible investments in port operations," *Case Studies on Transport Policy*, vol. 10, pp. 664--673, 2022.
- [30] E. Croci, A. Bagaini, N. Florenzio, B. Lucchitta and T. Molteni, "Definition of an ESG framework for sustainable urban regeneration," *Universita Bocconi, SUR Lab*, 2022.
- [31] R. G. Eccles and J. C. Strohle, "Exploring Social Origins in the Construction of ESG Measures," *SSRN*, 2018.
- [32] M. Billio, M. Costola, I. Hristova, C. Latino and L. Pelizzon, "Inside the ESG ratings: (Dis)agreement and performance," *Corporate Social Responsibility and Environmental Management*, vol. 28(5), pp. 1426-1445, 2021.
- [33] P. Wu, Y. Song, X. Hu and X. Wang, "A preliminary investigation of the transition from green building to green community: Insights from LEED ND," *Sustainability*, vol. 10(6), p. 1802, 30 May 2018.
- [34] A. Haapio, "Towards sustainable urban communities," *Environmental Impact Assessment Review*, vol. 32, pp. 165-169, 2012.
- [35] "LEED rating system," 18 December 2024. [Online]. Available: <https://www.usgbc.org/leed>.
- [36] USgbc, "LEED v4.1 Cities and communities: Existing cities," US green building council , 2024.
- [37] USgbc, "Tracking Progress on Global Goals: Existing Cities and Communities," usgbc, 2020.
- [38] USgbc, "LEED for Cities:Guide to Integrating Sustainability into Planning," usgbc, 2021.
- [39] U.S. Green Building Council, "About LEED for Cities and Communities," 2022. [Online]. Available: <https://support.usgbc.org/hc/en-us/articles/4608828987667-About-LEED-for-Cities-and-Communities>. [Accessed 7 March 2024].
- [40] C. C. R. G. Monteiro, F. U. F. Rodrigues and F. A. Picchi, "ESG Practices In Publicly Capital Construction Companies," *RGSA – Revista de Gestão Social e Ambiental*, vol. 18, no. 3, p. e05894, 2024.
- [41] GRI, "Consolidated Set of the GRI Standards," the Global Sustainability Standards Board (GSSB), 2024.
- [42] "A Short Introduction to the GRI Standards," [Online]. Available: <https://www.globalreporting.org/media/wtaf14tw/a-short-introduction-to-the-gri-standards.pdf>. [Accessed 10 January 2024].
- [43] "GRI," [Online]. Available: <https://www.globalreporting.org/standards/>. [Accessed 4 February 2024].

- [44] A. Devine, A. Sanderford and C. Wang, "Sustainability and Private Equity Real Estate Returns," *The Journal of Real Estate Finance and Economics*, vol. 68, no. 2, pp. 161-187, 2024.
- [45] GRESB, "Real Estate Standard and reference Guide," GRESB , 2024.
- [46] D. Brounen and G. Marcato, "Sustainable insights in public real estate performance: ESG scores and effects in REIT markets," *Berkeley Lab.: Berkeley, CA, USA*, 22 March 2018.
- [47] "Why BREEM?," [Online]. Available: <https://breeam.com/about/why-breeam/>. [Accessed 19 December 2024].
- [48] "A guide to how BREEAM works," [Online]. Available: <https://breeam.com/about/how-breeam-works>. [Accessed 19 December 2024].
- [49] "iisBE Italy and the ITACA Protocol," 19 December 2024. [Online]. Available: <https://iisbeitalia.org/node/278>.
- [50] "Ithaca protocol," 19 December 2024. [Online]. Available: <http://www.registroprotocolloitaca.org/protocollo.asp>.
- [51] WELL, "WELL v2™," 2024. [Online]. Available: <https://v2.wellcertified.com/en/wellv2/overview>. [Accessed 19 December 2024].
- [52] IWBI, "Investing in health pays back," International WELL Building Institute, 2022.
- [53] "The who, the how and the why," 2023. [Online]. Available: <https://wiredscore.com/about-us/>. [Accessed 19 December 2024].
- [54] S. Kim and S. Chang, Eds. "Construction Project Level-based Environmental, Social, and Governance (C-ESG): A Review," *EPiC Series in Built Environment*, vol. 3, pp. 236-244, 2022.
- [55] X. Wang, J. Wang, W. Guan and F. Taghizadeh-Hesary, "Role of ESG investments in achieving COP-26 targets," *Energy Economics*, vol. 123, p. 106757, 2023.
- [56] STAR, "STAR Community Rating System ,technical guide,version2," STAR Commiunities, 2016.
- [57] BRE, "BREEAM International New Construction version 6.0," BRE Global Ltd, 2021.
- [58] GSSB, "GRI 416: Customer Health and Safety 2016," the Global Sustainability Standards Board (GSSB), 2016.
- [59] EPRA, "Best Practices Recommendations on Sustainability Reporting,third version," european public real estate association , 2017.
- [60] ROBECO, "The Sustainability Yearbook," Evan Greenfield, 2021.
- [61] UN, "Guiding principles on business and human rights," United Nations, New York and Geneva, 2011.

- [62] GRI, "GRI 103: management approach," the Global Sustainability Standards Board (GSSB), 2016.
- [63] GRI, "GRI 102: GENERAL DISCLOSURES 2016," the Global Sustainability Standards Board (GSSB), 2016.
- [64] M. C. Ahuchogu, T. O. Sanyaolu and A. G. Adeleke, "Enhancing employee engagement in long-haul transport: Review of best practices and innovative approaches," *Global Journal of Research in Science and Technology*, vol. 02, no. 01, pp. 046-060, 2024.
- [65] T. O. Abrahams, O. A. Farayola, S. Kaggwa, P. U. Uwaoma, A. O. Hassan and S. O. Dawodu, "Cybersecurity awareness and education programs: a review of employee engagement and accountability," *Computer Science & IT Research Journal*, vol. 5, no. 1, pp. 100-119, 2024.
- [66] M. Ekhsan, Daspar, R. D. Parashakti and D. H. Perkasa, "The Impact of Talent Management on Employee Performance Mediated by Employee Engagement," *East Asian Journal of Multidisciplinary Research (EAJMR)*, vol. 2, no. 4, pp. 1821-1834, 2023.
- [67] S. Sonnentag, L. Tay and H. Neshor Shoshan, "A review on health and well-being at work: More than stressors and strains," *Personnel Psychology*, vol. 76, no. 2, pp. 473-510, 2023.
- [68] OSHA, "Recommended Practices for Safety and Health programs," Occupational Safety and Health Administration, 2016.
- [69] GRI, "GRI 403: Occupational Health and Safety," the Global Sustainability Standards Board (GSSB), 2018.
- [70] GRI, "GRI 308: Supplier Environmental Assessment 2016," the Global Sustainability Standards Board (GSSB), 2016.
- [71] GRI, "GRI 414: Supplier Social Assessment 2016," Global Reporting Initiative (GRI), 2016.
- [72] GSIA, "the Global Sustainable Investment Review 2018," the Global Sustainable Investment Alliance, 2018.
- [73] USgbc, "LEED v4.1 cities and communities: plan and design communities," U.S. Green building council, 2024.
- [74] K. Eckman, "How NGOs monitor projects for impacts: results of recent research," *Impact Assessment*, vol. 14, no. 3, pp. 241-268, 1996.
- [75] S. Bienert, H. Kuhlwein, Y. Schmidt, B. Gloria and B. Agbayir, "Embodied Carbon of Retrofits. Ensuring the Ecological Payback of Energetic Retrofits," IIÖ and the CRREM, Wörgl, 2023.
- [76] A. J. de Francesco and D. Levy, "The impact of sustainability on the investment environment," *Journal of European Real Estate Research*, vol. 1, no. 1, pp. 72-87, 2008.
- [77] G. R. I. GRI, "GRI 413: Local Communities 2016," Global Reporting Initiative (GRI), 2016.

- [78] A. Waqar, K. Skrzypkowski, H. Almujiabah, K. Zagórski, M. Basit Khan, A. Zagórska and O. Benjeddou, "Success of implementing cloud computing for smart development in small construction projects," *Applied Sciences*, vol. 13, no. 9, p. 5713, 2023.
- [79] P. S. P. Wong, S. O. Cheung and R. T. H. Wu, "Learning from project monitoring feedback: A case of optimizing behavior of contractors," *International Journal of Project Management*, vol. 28, no. 5, pp. 469-481, 2010.
- [80] SITES, "SITES v2 Rating System for sustainable Land Use Design and Development," Green Business Certification, 2014.
- [81] Oxford University Press, "Oxford Learner's Dictionaries," 2024. [Online]. Available: <https://www.oxfordlearnersdictionaries.com/definition/english/demography?q=demography>. [Accessed 5 October 2024].
- [82] M. E. Guy and S. A. McCandless, "Social equity: Its legacy, its promise," *Public Administration Review*, vol. 72, no. S1, pp. S5-S13, 2012.
- [83] UN, "sustainable development goals," [Online]. Available: <https://www.un.org/sustainabledevelopment/economic-growth/>. [Accessed 12 January 2025].
- [84] IGLUS and EPFL, "Introduction to Management of Urban Infrastructures," MOOC Management of Urban Infrastructures.
- [85] Un-Habitat, "State of the World's cities 2008/9: Harmonious Cities," UN-Habitat, 2008.
- [86] B. Grum and D. Kobal Grum, "Concepts of social sustainability based on social infrastructure and quality of life," *Facilities*, vol. 38, no. 11/12, pp. 783-800, 2020.
- [87] USGBC, "help sector," February 2024. [Online]. Available: <https://support.usgbc.org/hc/en-us/articles/4423532407571-About-Arc#what>. [Accessed 14 November 2024].
- [88] "Our mission and history," 18 December 2024. [Online]. Available: <https://www.globalreporting.org/about-gri/mission-history/>.
- [89] USGBC, "LEED v4.1 CITIES AND COMMUNITIES:EXISTING COMMUNITIES," US green building council, 2024.