

## **Advancements of Impact Assessment in Sustainable Finance: A systematic literature review focusing on Socially Responsible Investment practices**

### **Avancements de l'évaluation d'impact de la finance durable : Une revue systématique de la littérature axée sur les pratiques des Investissements Socialement Responsables**

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## Abstract

The main objective of this paper is to analyze works of literature on Impact assessment practices in sustainable finance and to highlight the different methods and indicators employed to assess the impact of Socially responsible investments SRI. The research uses the bibliometric and systematic literature review of the Impact assessment of SRI from 2015 to 2023. Considering the methodological issues involved in measuring impact in the complex environment of socially responsible investment, the paper aims to contribute to the advancing of the scientific evaluation of socially responsible investment, thus providing pertinent information to researchers, practitioners and policy makers.

**Keywords:** Impact assessment; impact measurement; performance evaluation; non-financial performance; extra-financial performance.

## Résumé

Cet article a pour objectif d'analyser la littérature sur les pratiques d'évaluation d'impact en finance durable et de mettre en évidence les différentes méthodes et indicateurs utilisés pour évaluer l'impact des investissements socialement responsables ISR. La recherche fait appel à la revue bibliométrique et systématique de la littérature sur l'évaluation de l'impact de l'ISR de 2015 à 2023. Compte tenu des problèmes méthodologiques impliqués dans la mesure de l'impact dans l'environnement complexe de l'investissement socialement responsable, l'article vise à contribuer à l'avancement de l'évaluation scientifique de l'investissement socialement responsable, fournissant ainsi des informations pertinentes aux chercheurs, aux praticiens et aux décideurs politiques.

**Mots clés :** Évaluation de l'impact, mesure de l'impact, évaluation des performances, Performance non financière, performance extra-financière.

## Introduction

Over the last few decades, the growing interest in sustainable finance has intensified, particularly in the wake of the 2007-2008 financial crisis, and the growing awareness of the risks associated with climate change and social issues. These trends are prompting economic actors to adopt behavior that is more responsible in order to meet economic, social and environmental challenges. The creation of the Brundtland Commission in 1987, then its consolidation in 2015 through the 17 Sustainable Development Goals (SDGs) integrated into the agenda 2030 have highlighted these commitments, gradually recognized by the United Nations (Granier and al, 2021).

In the current context, where the achievement of these objectives requires substantial capital expenditure, amounting to approximately \$6.9 trillion per year by 2030, as forecast by the OECD, mobilization of the financial system appears to be an imperative requirement. As the main agents in the allocation of funds, financial institutions have a crucial role to play in providing financing for the economy. Through their investment and financing strategies, investors and financial institutions have the capacity to stimulate a major shift towards sustainable practices within companies, or to strengthen their financial commitments in sectors with a minimal carbon footprint (Popescu and al, 2021).

In this frantic race to meet the ambitious targets set out in the Paris Agreement and the UN's Agenda 2030, capital markets are being called upon to join this collective effort, even if requirements and aspirations remain unfulfilled to date. Unexpectedly, the asset management industry estimates that investment in sustainable assets significantly outstrips investment in the energy sector (Popescu and al, 2021).

The advent of the European Union's taxonomic framework and the regulation on "Sustainability Disclosures in Financial Services" marks the emergence of a new era of sustainability-focused measurement and reporting. At the same time, several regional initiatives, including China's Green Industry Guiding Catalogue, are supporting the development of financial services.

In the midst of a diverse regulatory landscape and faced with the compelling need to establish universal standards, the Organization for Economic Co-operation and Development (OECD) has urged the financial sector to develop a shared understanding of impact assessment, defining this as an "impact imperative". This prompting has piqued our interest in mapping out the research that focuses on assessing the impact of investments, with a particular emphasis on socially responsible investing (SRI).

Adding to that, the scientific discipline devoted to non-financial reporting has developed considerably, with a focus on corporate social responsibility (Paugam and al, 2015) an important line of research has explored how CSR disclosure can link financial progress to non-financial development. Recently, academics have been trying to study how the impact of investments beyond the financial gains of invested funds is measured (Crifo, 2016). (Arjaliès and al. 2020) explain that assessing impact in the financial field is difficult and that impact assessment was only conducted by impact investors until few years ago. However, the authors also explain that Socially Responsible Investors now aim to demonstrate their practical impact (Durand and al, 2019).

This research therefore addresses the following research question: *what insights does the academic literature provide on impact assessment of Socially Responsible Investments?*

We conduct a bibliometric analysis in accordance with the method of PRISMA to answer the research question and to analyze trend, concepts, intellectual structure and findings in impact assessment practices. The Web of Science database is used for data collection, the choice of this database is motivated by the fact that it is considered as one of the leading sources and databases of scientific research articles. We aim to advance theory by clarifying constructs and by exposing emerging perspectives that rise from the review.

The rest of this paper is this paper is structured as follows. The next section provides the theoretical background and develops the review criteria. The second section elaborates on the method used while the third section describes the results. Future research directions, theoretical contribution and practical implications are described in the discussion and conclusion.

## **1. Theoretical background**

### **1.1. Conceptual definitions of impact and impact assessment:**

#### **1.1.1. About Impact:**

For a proper understanding of impact assessment, "impact" needs to be defined first. (Roor and Maas, 2024) state that impact often implies causality between the organization's activities and their effects on those to whom the effects apply. They also define impact as " the result of an organization's activities on individual stakeholders, society, and the environment, including intended and unintended, positive and negative, and short-term and long-term effects" (Roor and Maas, 2024). Impact is also described by (Klaiber and al. 2019) as significant and lasting change triggered by a given action or series of actions of an organization. A chain of impact value (figure 1) is used to show how an organization uses inputs in their business activities resulting in outputs, which have effects on individual stakeholders, society, and the

environment (impacts) (Roor and Maas, 2024; Klaiber and al, 2019). As final stage along this chain, impact is the sum of outcomes triggered by the inputs, activities, and outputs of a social organization



*Source: Adapted from Roor and Maas, 2024*

### 1.1.2. About Impact Assessment:

According to (Lynton K and al, 1988), the term "impact assessment" emerged in the United States in the 1960s as a response to a heightened public sensitivity to environmental and social concerns. The National Environmental Policy Act of 1970 subsequently mandated federal agencies to consider environmental factors as a prerequisite for project approval or modification.

In the aftermath of the 2008 financial crisis, the discourse on impact measurement gained prominence according to (Stievenart and Pache, 2014) and (Crifo, 2016). Social enterprises, committed to generating societal value beyond profit, came to the forefront. Interestingly, the concept of impact measurement recently entered the socially responsible investment (SRI) sector. The roots of impact measurement, however, can be traced back to the 1970s when environmental considerations became a crucial validation criterion for projects, as outlined by the National Environmental Policy Act of 1970 (Arjaliès and al, 2020). This period witnessed the inception of impact measurement, initially focusing on assessing environmental effects (Reeder and al, 2013), followed by the development of social impact assessment, covering the analysis, monitoring, and management of interventions and ensuing social changes (Reeder, 2013).

In the realm of impact investing, the measurement process revolves around two core concepts, namely additionality and intentionality (Busch, 2021; Arjaliès and al, 2022). Additionality asserts that impact investments should contribute uniquely to the real economy, a contribution unlikely to have occurred otherwise. Intentionality, as emphasized by (Arjaliès and al, 2020), addresses how impact investors intend to achieve their social or environmental objectives.

Despite the growing significance of impact investing, (Arjaliès and al, 2020) observes that guidelines from social business and impact investment communities offer little insight into how socially responsible investment (SRI) investors should measure impact. They primarily stress the necessity of a quantifiable assessment of established performance indicators.

Therefore, it becomes imperative to clarify the terminology used in measuring impact investing. A comprehensive literature review indicates the involvement of at least two fundamental concepts: impact and non-financial returns, also referred to as social and environmental returns (Reeder and Colantonio, 2013). This holistic understanding provides a foundation for examining the intricacies of impact assessment in investment practices.

## **1.2. Impact assessment methods**

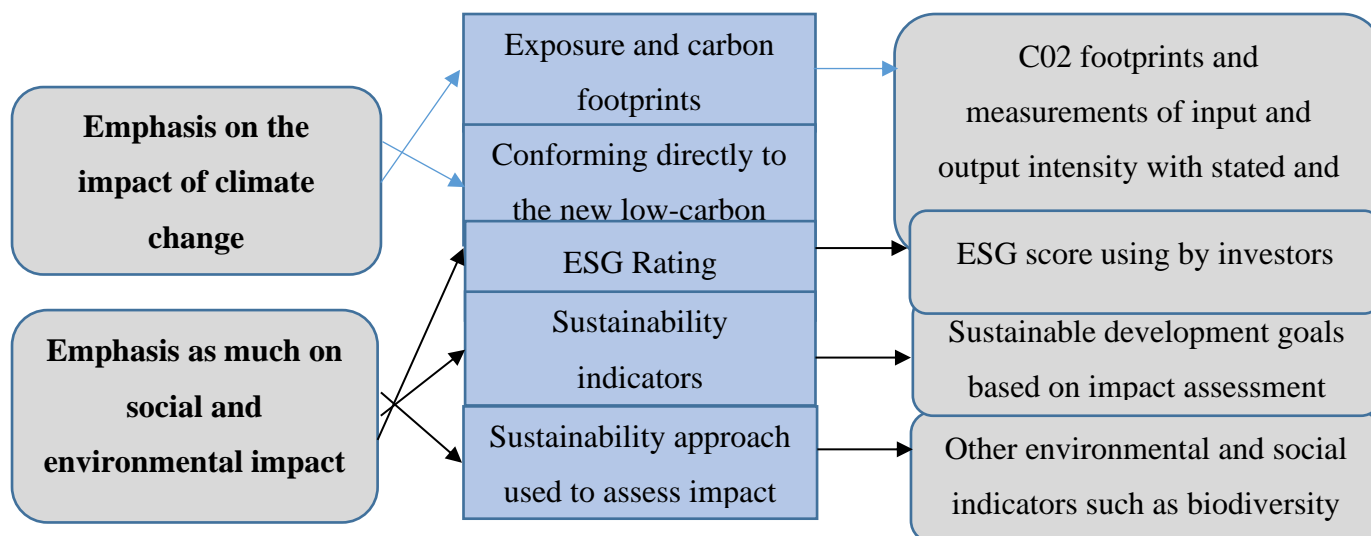
Our contribution aims to add significant value to existing classification frameworks for impact assessments in the field of sustainable finance. Existing literature has grouped together various methods of impact assessment. For example, the OECD proposes four categories for impact assessment in the context of sustainable investment: principles and guidelines; frameworks and methodologies; standards, certifications and ratings; and metrics and indicators. Principles and orientations ethically guide impact assessments, frameworks and methodologies provide systematic structures, standards, certifications and ratings establish standardized performance criteria, while metrics and indicators quantitatively and qualitatively measure the environmental, social and governance impacts of sustainable investments (Boiardi, P. 2020 (OECD,)). Similarly, (Popescu and al, 2021) have classified these methods into three distinct categories: carbon footprint, green metrics and climate scores.

According to the literature, Figure 2 is used to provide a more comprehensive explanation of the categorization of impact assessment methods, which is delineated into four distinct levels. The initial level involves the differentiation of two main categories of methods, while the next level involves the identification of five methods that are grouped according to their methodological similarities. These two main categories include methods focusing on the analysis of climate change impacts and those focusing on environmental and social impacts.

In more detail, methods focusing on climate change impacts fall into two sub-categories: carbon footprint and exposure measures, and alignment with low-carbon scenario assessments. Conversely, methods focusing on environmental and social impacts fall into three sub-categories: ESG ratings, sustainability labels and sustainability-based impact assessments (Popescu and al, 2021).

Finally, at the third level, each method comprises a set of distinct tools. These tools are specific applications of the methods, each possessing unique methodologies for assessing impacts in the field of sustainable finance. This hierarchical structure facilitates a global understanding of the various methodological approaches used in impact assessment.

**Figure 2: Methods classified according to objective and methodology**



*Source: Popescu and al (2021)*

### 1.3. Impact assessment of SRI and non-financial information

The motivations of companies and investors in adopting ESG and CSR criteria may vary. These motivations can be explained by the desire to align with current regulations, as articulated by (Friedman, 2007), who suggests that "CSR is limited to making profits while complying with state regulations". Additionally, (Porter and Kramer, 2011) justify these motivations through the "win-win" model and cost control concerns, introducing the concept of "shared value," where economic value is built by addressing societal issues.

(Arjaliès and al., 2020) explains that these motivations are embraced by investors and introduces the concept of the "universal investor," represented by financial actors. These investors are categorized into two groups, as explained by (Bucsh and al, 2021): "impact-aligned investors and impact-generating investors." The latter category includes major investors whose investment universe is so vast that it tends to reshape the global economy (Arjaliès and al, 2020) and actively contribute to social and environmental transformation solutions. (Bucsh and al, 2021) explains that this impact is possible through the provision of additional capital, enabling companies or projects to generate social and/or environmental impact or by encouraging companies to change.

These investments require and provide evidence of social and/or environmental materiality, defined by (Bucsh and al, 2021) as the measurement of tangible parameters in the social and/or environmental realm involving significant improvements based on sustainable development performance indicators, justifying the systematic consideration of non-financial criteria. Non-financial criteria often include non-financial information approached from various perspectives.

(Arjaliès and al, 2021) explains that investors favoring ESG integration most often seek to measure the impact of ESG factors on the company's financial flows, while impact measurement aims to assess the impact of the company's activities on the ESG issues themselves.

Non-financial criteria used as impact measurement variables can be represented by environmental, social, and governance criteria. Carbon footprint measures gain consensus in impact measurement (Kobiyh, and al, 2023).. Other quantifiable environmental indicators include renewable energy production, air, water, and soil pollution measurement, water consumption (m<sup>3</sup>), water extraction (m<sup>3</sup>), waste production (ton), and waste recycling (ton) (Crifo and al, 2021).

From a social perspective, (Vanclay and al, 2011) asserts that conceptualizing social consequences involves evaluating changes in people's lifestyles, cultures, community cohesion and stability, political systems, health and well-being, personal rights, property rights, and perceptions of safety, fears about the future of their community, and aspirations for their own and their children's futures. Furthermore, according to (Arjaliès and al, 2020), other indicators can be considered such as board composition, specifically the percentage of women and independent directors, as well as efforts against corruption and anticompetitive practices and transparency.

#### **1.4. Review criteria**

The research question addressed by this review is presented as follow: what insights does the academic literature provide on impact assessment of Socially Responsible Investments? The theoretical background presented above shows that Impact assessment methods are classified according to the objectives of the investors and according to the methodology measures used to assess the sustainability of socially responsible investments. We analyze the sample on the following criteria: the objectives and the measures used to assess Impact of SRI.

## **2. Methods**

### **2.1. Analysis framework**

The methodological approach advocated by the PRISMA framework was carefully observed throughout the review and selection process, making use of NVIVO, ZOTERO and SPSS software. When specific keywords were entered into the search field of the Web of Science database, an initial cohort of 418 204 articles was obtained. We restricted our analysis to articles dealing with the specific field of our research, namely "impact assessment", "impact

measurement", "socially responsible investment", "ESG (environment, social, governance)", and "non-financial or extra-financial performance evaluation".

We excluded articles according to our procedure detailed in Table 1. Initially, we categorized the articles according to their type of publication, limiting ourselves to journal articles, thus reducing their number to 13,054. Next, we introduced the periodicity criterion to trace a recent trajectory of the evolution of knowledge in the field of impact measurement, selecting articles published between 2017 and 2024, thus reducing the corpus to 7,039 articles.

To further refine our selection, we targeted works dealing specifically with impact measurement in the fields of management and corporate finance. We restricted our search to journals specializing in these two fields, giving priority to articles with a significant and highly rated impact factor. Following the criteria of the PRISMA method, as well as an in-depth analysis of publications using NVIVO software, we were able to select 39 relevant articles from the Web of Science database. Additionally, to identify other relevant publications, we implemented a citation chaining strategy. Key articles were selected on the basis of their upstream citations, referring to the list of references cited by each article. This process enabled us to identify four additional articles in the Cairn database.

Subsequently, the Scopus database was searched for relevant publications that might have escaped our previous Web of Science search. After eliminating duplicates, we identified 154 articles from various research fields, which we then categorized according to the main research questions they answered. After narrowing our search according to specific selection criteria, we identified four articles proposing either a new measurement framework or the use of existing methods dedicated to assessing the sustainability of socially responsible investment funds and stock market indices. These articles were identified by explicitly targeting results relating to impact assessment and measurement.

At the same time, a similar selection process was carried out in the ScienceDirect database, generating a panoply of 63,618 scientific articles from various fields of research. We identified and selected 25 publications dealing with impact measurement, with particular emphasis on work dedicated to the evaluation of socially responsible impacts (SRI). This approach was adopted with the aim of highlighting existing gaps and directing our contribution towards filling these gaps in the body of knowledge.

**Table 1: Systematic literature search, according to the PRISMA protocol**

<b>PRISMA stage and exclusion/inclusion criteria</b>	<b>Description</b>
<b>Eligibility and Publication Period</b>	Inclusive of the years 2015 to 2024.
<b>Language</b>	English, French
<b>Article Type</b>	Primarily review articles.
<b>Sources</b>	Main source: Web of Science. Additional sources: Scopus and ScienceDirect.
<b>Search Process in Fields</b>	Titles of articles, abstracts, and keywords. Search Keywords. Upstream and downstream citation search.
<b>Exclusion Criteria</b>	Articles not aligned with the domain of sustainable finance and social science.
<b>Inclusion Criteria</b>	Recent working papers focused on impact measurement. Publications indexed in the Social Sciences Citation Index. Journals dedicated to management and corporate finance.

*Source : by the authors*

### 3. Results

#### 3.1. Word clouds

After screening the results from three separate data sources, we compiled a set of 72 scientific articles relating to the topic under study. However, in order to deepen our analysis of impact measurement and performance evaluation, crucial aspects in the Moroccan context, we identified 22 articles considered to be the flagship publications of our research. This selection was made with exhaustive consideration of the other articles in our panel. (Figure 3) below illustrates the diversity of recurring keywords, highlighting the fundamental concepts emerging from our set of articles. This methodical approach reinforces the robustness of our scientific approach to exploring these key issues in our study.

At the same time, an examination of the word clouds in the selected articles reveals a notable prevalence of important terms such as "impact assessment", "sustainability", "environment", "social performance" and "evaluation methods". These results indicate an increased emphasis on impact assessment, sustainability, and environmental and social performance in the topics covered. The significant presence of these terms signifies a widespread apprehension in scientific literature of the need to understand and assess the environmental and social consequences of human activities, with particular emphasis on sustainability. Thus, this analysis highlights the importance of these concepts in contemporary research, demonstrating a sustained commitment to a comprehensive assessment of human actions in terms of sustainability and environmental and social performance.



### 3.3. Collection frequency

In our research, the textual analysis is based on a defined periodicity, with a time interval set from 2017 to 2023 as the main inclusion criterion (Table 2). However, two research papers, dating from 2015 and 2016 respectively, were incorporated into our study. It should be noted that the inclusion of these documents stems from a citation chaining methodology, reinforcing their relevance within the scientific framework of our research. This approach aims to ensure a thorough and contextual exploration of ideas and concepts related to our field of study over the specified period.

**Table 2: periodicity of the selected articles**

	Year	Workforce	Percentage	Percentage Valid	Cumulative percentage
Valid	2015	1	1,4	1,4	1,4
	2016	1	1,4	1,4	2,8
	2017	5	6,9	6,9	9,7
	2018	5	6,9	6,9	16,7
	2019	9	12,5	12,5	29,2
	2020	9	12,5	12,5	41,7
	2021	15	20,8	20,8	62,5
	2022	8	11,1	11,1	73,6
	2023	19	26,40	26,40	93,1
	Total	72	100	100	100

*Source: Compiled by the authors using SPSS and NVIVO software*

### 3.4. The textual data sources

The relevance of the results of our study depends considerably on the data sources selected. We therefore proceeded with rigor in the choice of databases used. In line with our findings, Table 3 shows the data sources taken into consideration. In particular, the main source chosen is the Web of Science database, representing 54.16% of the overall total, collecting a diversity of relevant publications and benefiting from an evaluation ranging from QA1 to QA3. This database is complemented by ScienceDirect, which contributes 34.73%. It should also be noted that the Scopus database has been weighted at 5.55%, in correlation with the Cairn database, following the citation chaining strategy.

**Table 3: data sources**

Data source		Frequency	percentage
Valid	Scopus	4	5,55%
Valid	Web of science	39	54,16%
Valid	ScienceDirect	25	34,73%
Valid	Cairn	4	5,55%
Total	4	72	100%

*Source: Compiled by the authors using SPSS and NVIVO software*

### 3.5. The language of text data

The interpretation of Table 3 displayed below highlights the importance of language choice in the bibliographic analysis of our research. We examined two main languages, French and English, within our corpus of scientific publications. The results show that French accounts for 2.78% of all the publications selected, while English dominates with a significant percentage of 97.22%. This predominance of English can be attributed to the strong tendency of researchers to publish in English, particularly in the field of measuring the impact of socially responsible investments.

**Table 4: The language of text data**

		Frequency	Percentage
Valid	French	2	2,78
	English	70	97,22
Total		72	100,0

*Source: Compiled by the authors using SPSS and NVIVO software*

### 3.6. Journal selection

The results of the analysis carried out using NVivo and SPSS software reveal a complex categorization of journals hosting scientific articles, offering a comprehensive view of the assortment and uneven distribution of publications (Table 5).

One of the main contributors among the journals listed is the "Journal of Environmental Management", which accounts for 34.7% of all articles. In addition, renowned journals such as the "European Journal of Operational Research" and the "Journal of Nursing Management" make noteworthy contributions, accounting for 8.3% and 8.5% respectively. Another noteworthy aspect is the presence of the "Sustainability Accounting Management and Policy Journal", which accounts for 4.2% of articles. These results underline the importance of

considering the frequency and distribution of articles by journal when interpreting the data, as they provide essential information on editorial trends in the field of study.

**Table 5: Journal selection**

Journal	Workforce	Percentage
BUSINESS PROCESS MANAGEMENT JOURNAL	1	1,4
Comptabilité Contrôle Audit	1	1,4
CORPORATE SOCIAL RESPONSIBILITY AND ENVIRONMENTAL MANAGEMENT	2	2,8
ECONOMICS-THE OPEN ACCESS OPEN-ASSESSMENT E-JOURNAL	1	1,4
Energy Economics	1	1,4
ENVIRONMENT AND DEVELOPMENT ECONOMICS	1	1,4
EUROPEAN JOURNAL OF OPERATIONAL RESEARCH	6	8,3
Finance: Theory and Practice	1	1,4
INTERNATIONAL JOURNAL OF PRODUCTIVITY AND PERFORMANCE MANAGEMENT	2	2,8
INTERNATIONAL JOURNAL OF SELECTION AND ASSESSMENT	1	1,4
International Review of Financial Analysis	1	1,4
Journal of Banking and Finance	1	1,4
Journal of Cleaner Production	1	1,4
Journal of Environmental Management Sustainability	25	34,7
Sustainability	4	5,6
JOURNAL OF MANAGEMENT	3	4,2
JOURNAL OF MANAGEMENT & ORGANIZATION	1	1,4
JOURNAL OF MANAGEMENT STUDIES	1	1,4
JOURNAL OF MODELLING IN MANAGEMENT	1	1,4
JOURNAL OF NURSING MANAGEMENT	6	8,3
MANAGEMENT DECISION	2	2,8
ORGANIZATIONAL RESEARCH METHODS	2	2,8
Revue française de gestion	1	1,4
SOCIAL RESPONSIBILITY JOURNAL	2	2,8
SUSTAINABILITY ACCOUNTING MANAGEMENT AND POLICY JOURNAL	4	5,6
Total	72	100,0

*Source: Compiled by the authors using SPSS and NVIVO software*

#### 4. Description of the different measures used to assess the sustainability of socially responsible investments

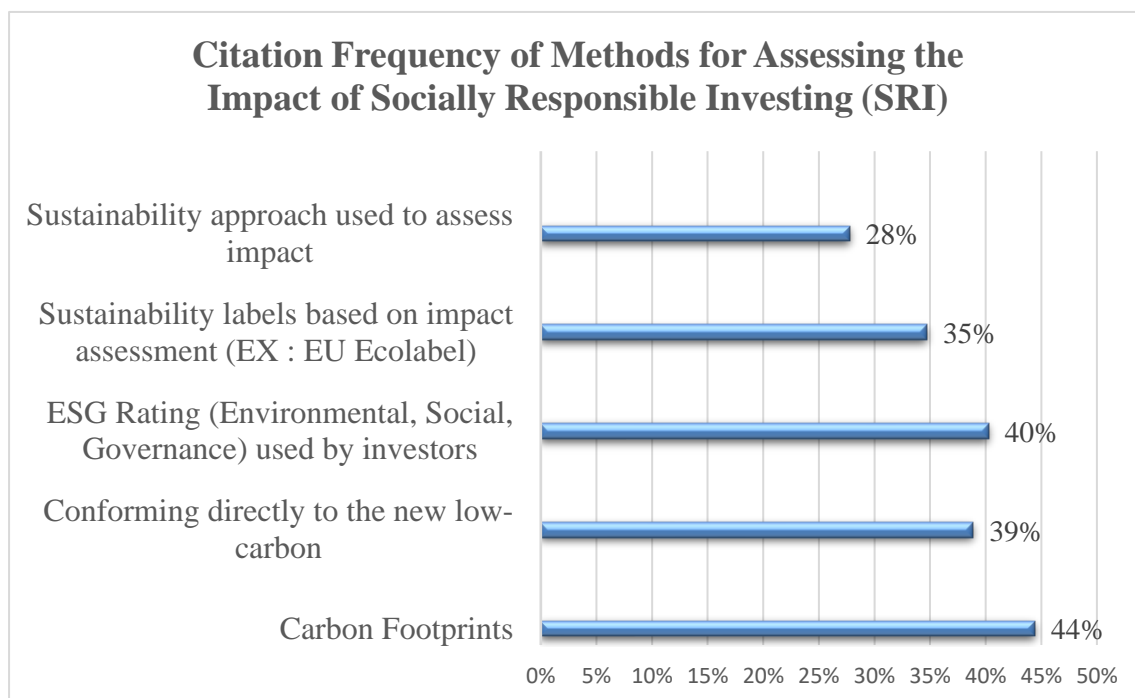
In the Sample articles, different measures are used to assess the impact of SRI. An overview on how authors measure the impact is illustrated in table 6.

**Table 6: Overview of Methods for Evaluating Environmental and Social Impacts**

Method	Description and Sources
<b>Carbon Footprints</b>	Assessment of CO2 emissions according to standard protocols, including scopes 1, 2, and 3, and comparison with regulatory thresholds. (Dietz and al, 2018) (Popescu and al, 2021), (Thomä, J, and al, 2019), (Schoenmaker, D, 2019), (Allevi, E and al, 2019).
<b>Conforming directly to the new low-carbon</b>	Carbon footprints and the intensity of inputs and outputs are assessed using reported and estimated data, while Life Cycle Assessment (LCA) is used to examine the total carbon impact, covering the production, utilization and distribution of products. (Boermans, M.A, 2019), (Busch, T, and al 2020), (Popescu and al, 2021), (He and al, 2022).
<b>ESG Rating (Environmental, Social, Governance) used by investors</b>	Evaluation by rating agencies based on environmental, social, and governance criteria, including external audits and company self-assessments (Petrillo, A, 2016), (Arjaliès and al, 2020), (Crifo and al, 2016).
<b>Sustainability labels based on impact assessment (EX : EU Ecolabel)</b>	Certification of products or companies based on strict sustainability and energy efficiency criteria, verified by independent third parties. (Novethic, 2016), (Zavyalova and al, 2019), (Claro and al, 2021), (Sancak and al, 2023).
<b>Sustainability approach used to assess impact</b>	Use of biodiversity indices, water footprint, and social responsibility to measure the overall impact of a company's activities. (Cohen, 2017), (Maturano and al., 2021) (Popescu and al, 2021).

Carbon foot print, ESG rating, Sustainability labels and approaches are the measures that are used to assess impact of SRI. We provide an illustrative overview of the citation frequency of the measures used in the sample articles to assess the impact of SRI in figure 5.

**Figure5: Classification of impact assessment methods**



*Source: Compiled by the authors*

#### 4.1. Carbon footprints

Carbon index (CI) refers to the quantification of carbon dioxide emissions, whether they originate directly or indirectly from an activity or are accumulated during the various stages of a product's life cycle (Popescu and al, 2021). Generally, this measure is calculated over a specific period and expressed in mass units representing carbon dioxide equivalents per unit of time or per unit of product (Demirbaş & Ates, 2021). The process of determining the carbon index involves the assessment of emissions, direct or indirect, resulting from the use of fossil fuels, which are responsible for the release of greenhouse gases and thus contribute to the greenhouse effect causing global warming (Angelakoglou and al, 2015).

The dominant approach used to establish the carbon index remains life cycle assessment (LCA) (Mohan and al., 2022). It is essential to emphasize that the carbon index encompasses not only direct carbon emissions resulting from the combustion of fossil fuels, but also indirect emissions associated with imported goods. This global perspective on the carbon index highlights the complex interaction between human activities and greenhouse gas emissions, underlining the need for in-depth measurement and analysis to address this environmental concern.

#### **4.2. Conforming directly to the new low-carbon ways**

In order to achieve full compliance with low-carbon economy, an active engagement in long-term strategic planning is of primary importance (Yang and al., 2019). This planning process should include a comprehensive examination of different transition scenarios to a low-carbon economy, with the aim of identifying the most economically and environmentally advantageous synergies (He, J and al, 2022). Furthermore, the achievement of low-carbon outcomes depends on the effectiveness of a development process capable of analyzing and tracking optimal carbon reduction trajectories (Wang and al, 2023).

Companies with more advanced carbon management practices are more likely to set targets in line with the goal of limiting global warming to 2°C (Dietz and al., 2018). In addition, an initial estimate that reconciles IPCC-assessed trajectories with inventories is crucial, using a climate model to explicitly incorporate the dynamics of indirect carbon removal in designated areas under the jurisdiction of nations (Gidden and al, 2023).

In the search for low-carbon pathways, meticulous analysis of the environmental ramifications of energy policy changes is imperative, as diverse directions can yield very different outcomes. In addition, the exploration of innovative technologies presents solutions for achieving carbon neutrality and fostering sustainable development, particularly in the fields of renewable energy production, food system transformation, waste recovery, preservation of carbon sinks and production of carbon-neutral goods.

#### **4.3. ESG Score (Rating)**

During the 2000s, large-scale listed companies were assessed and ranked on the basis of their environmental, social and governance (ESG) performance. The aim was to complement traditional financial statements by integrating additional data for a deeper understanding of the internal value of these companies. The ESG approach was not limited solely to environmental and social aspects, but also highlighted the importance of governance, focusing on checks and balances within management bodies (Husson and al, 2019).

These new approaches led to the creation of the Global Reporting Initiative and other standards, as well as the founding of Vigeo EIRIS by Nicole Notat in 2002, established as an extra-financial rating agency. These entities have adopted a different rating model from traditional agencies, and ESG ratings are now increasingly used by asset management companies and investors to guide their investment decisions. This has created a dilemma as to whether to exclude companies with the lowest extra-financial criteria scores from portfolios, in favor of

those with the highest ESG scores. ESG ratings are based on two key pillars, namely impact on societal aspects and sustainable development (Husson and al, 2019).

ESG rating agencies have focused on assessing the credibility and consistency of ESG data, concentrating on specific areas such as human rights, greenhouse gas emissions and community involvement. By integrating non-financial factors into the evaluation process, investors can make more informed decisions. Leading asset management organizations have created their own ESG research divisions to better reflect a company's value, particularly with the introduction of new growth markets such as green bonds (Husson and al, 2019).

It is crucial to establish a precise definition of the ESG concept, so in the literature, it is possible to find various definitions of ESG ratings. For example: The Global Reporting Initiative (GRI) describes it as a *“set of standards pertaining to a company's activities, utilized by socially conscious investors to select potential investments”*. The GRI framework is based on three fundamental pillars: environment, social, and governance. The environmental pillar encompasses aspects such as climate change, energy usage, and waste management. The social pillar addresses labor standards, human rights, and community involvement. The governance pillar focuses on issues such as board composition, monitoring, ensuring compliance with sustainability standards, CEO compensation, and shareholder rights (Thies and al. 2019).

A major challenge in recent years has been to extend coverage to a large number of listed companies. For example, VIGEO EIRIS and the Refinitiv database provide company-level analysis using 38 distinct analysis criteria grouped into 6 broad categories, as well as 330 indicators linked to principles that can challenge management practices. It is crucial that investors integrate these environmental, social and governance (ESG) factors into the construction of their portfolios to enhance returns and minimize the negative impact of these issues (Serafeim and al. 2022).

Currently, ESG-sensitive investments have become a global standard. The role of investors in adopting sustainable practices is a major issue, with growing recognition of their contributions to sustainable development. Over the years, sustainability, socially responsible investment (SRI) and ESG have often been considered similar concepts by professionals, standard-setting organizations and academics (Liu, 2022).

#### **4.4. Sustainability indicators**

As part of the competitiveness to obtain sustainability certifications for financial products, investment managers aim to obtain various accreditations to demonstrate their commitment and performance. In 2019, more than 400 European funds, totalling around 95 billion euro in assets

under management, managed to obtain such certifications (Novethic, 2016). Unlike ESG ratings, which are determined independently, labels are issued at the request of fund managers in exchange for remuneration.

Sustainability indicators play a key role in assessing and managing sustainability in various sectors. These indicators are quantitative measures designed to monitor sustainability and develop actions in the field of sustainability management. The Sustainable Development Goals (SDGs) have exerted a significant influence on organisations, posing challenges in terms of integrating sustainability into their business models and strategies (Erin and al., 2022). In addition, the SDGs have become a focal point for global challenges, impacting the activities of various social institutions (Zavyalova & Starikova, 2019). Integrating sustainability-focused strategies and the SDGs into business requires regular materiality assessments, explicit articulation of objectives and monitoring of progress in order to contribute positively without causing environmental degradation or socio-economic disruption (Claro & Esteves, 2021).

Environmental impact assessment (EIA) remains an indispensable tool for decision-making in development projects, as it involves identifying, predicting and evaluating environmental effects before any major commitment is made (Ibrahim et al., 2020). Furthermore, the effectiveness of EIA at the project level is influenced by decisions taken at higher levels of planning and decision-making, underlining the importance of assessing the wider impacts of strategic designs (Fonseca, 2022). In addition, the crucial role of environmental agencies in the EIA process lies in their contribution as a planning tool for the identification, prediction and assessment of potential environmental impacts and mitigation measures at an early stage of proposed projects (Sancak and al, 2023).

#### **4.5. Sustainability approach used to assess impact**

Sustainability impact assessment plays a central role in examining the environmental, economic and social impacts of different systems and activities. To understand the potential ramifications of various scenarios and make informed decisions in favor of sustainable development, several methodologies have been developed, including multi-criteria decision analysis (MCDA), life cycle assessment (LCA) and sustainability impact assessment (SIA) (Cohen, 2017); (Maturano and al., 2021). By structuring sustainability assessment around multiple dimensions and criteria, these approaches facilitate a comprehensive examination of the potential effects of various actions and policies.

In the field of sustainability assessment, the literature has grown considerably, encompassing diverse areas such as urban environments, indigenous communities, agricultural systems and

natural resource management. This expansion reflects the growing recognition of the importance of sustainability assessment in diverse contexts, necessitating the adaptation of assessment methods to meet specific challenges. In addition, the integration of sustainability principles into municipal planning and policy has been explored, highlighting the relevance of sustainability assessment in governance and policy formulation.

At the same time, the development of assessment methods tailored to specific fields, such as sustainable factories, hydroelectric power planning and management, and urban natural risk management strategies, highlights the versatility and applicability of sustainability impact assessment in different sectors. These specialized approaches are proving to be appropriate solutions to the different sustainability challenges and opportunities encountered in these particular sectors.

In addition, a number of tools focus on measuring sustainability in line with the Sustainable Development Goals (SDGs), or use industry-specific indicators. These tools go well beyond a simple focus on greenhouse gas emissions, and enable a global approach to be adopted. A framework developed by the Cambridge Institute for Sustainability Leadership presents a way of measuring impact across all the SDGs, offering an ideal and achievable set of metrics for assessing impact (CISL, 2019). Other methods, relating to industrial sustainability indicators, advocate the use of sector-specific indicators to signal a company's exposure to environmental degradation. For example, Trucost's Carbon Scorecard model uses sector-specific indicators such as "emissions from fossil fuel reserves". In short, these varied and specialized approaches enable a comprehensive analysis of sustainability in different contexts, going beyond general considerations to answer specific questions in particular sectors (Popescu and al, 2021).

### **Discussion & Conclusion :**

This systematic literature review analyses the growing body of literature on impact measurement of SRI. It analyses the different methods used for measuring impact of SRI and how impact is integrated throughout the integrated investment process.

Impact assessment of SRI is an emerging field of research; Many researches dealt with impact assessment in impact investing. Nevertheless, there is limited research available describing how impact is assessed in SRI, showing that impact remains a complicated topic in the market of SRI, as stated by (Arjaliès & al, 2020) and confirmed by (Busch & al, 2021) who concluded that introducing impact measurement raises an additional series of technical and organizational issues (Busch and al. 2021).

Scholars and practitioners could use this review article as a reference to understand the current status of the field of impact measurement of SRI and how to use it to assess and improve the impact of SRI. The results bring out the absence of a common approach to impact assessment of SRI and show that impact assessment practices by SRI actors are close to ESG criteria employed by the investment community of SRI. These results meet the results (Arjaliès & al. 2020) who also found that “The SRI community has not yet developed guidelines and metrics that its members can widely use, nor has it formed a novel cluster of evaluation practices that could be labeled as impact” (Arjaliès & al. 2020)

According to the bibliometric analysis, it is essential to adopt a holistic approach to the integration and analysis of different parameters in methods for assessing the impact of socially responsible investment (SRI). The determination of the carbon index (Popescu and al, 2021) reveals the global environmental impact of human activities. This approach underlines the importance of life cycle analyses (Mohan and al, 2022). In this context, the implementation of this approach is a crucial factor for companies wishing to achieve the objectives of a low-carbon economy. It requires rigorous strategic planning (Yang and al, 2019), as well as analysis of carbon emission reduction trajectories (He, J and al, 2022). By adopting advanced carbon management practices and integrating ESG scores into investment decisions (Husson and al, 2019), companies can address climate and social challenges while optimising their economic performance.

Similarly, in conjunction with these approaches, ESG scores and sustainability indicators play a pivotal role for this assessment. They underline the credibility of sustainability data and standards (Serafeim and al, 2022; Novethic, 2016). It is also important to note that impact assessment methodologies, such as climate impact analysis and sustainability impact assessment (SIA) (Cohen, 2017; Maturano and al, 2021), provide an in-depth understanding of the environmental, economic and social impacts of practices and policies. These integrated methodologies highlight the need for multidimensional analysis to effectively address sustainability issues. In addition, they promote investment strategies that achieve global sustainable development goals while reducing negative impacts (CISL, 2019; Popescu and al, 2021).

It is clear from the synthesis of impact assessment methods, such as carbon footprint assessment, compliance with new low-carbon pathways, ESG assessment and sustainability indicators, that the combined use of all these approaches enables a holistic understanding and effective management of environmental challenges. ESG ratings, in particular, represent a

fundamental basis for complementing life-cycle analysis by providing a multi-dimensional assessment of sustainability. Together, these tools offer robust structures for assessing and improving the sustainable performance of companies and projects. In this way, they contribute to the transition to a low-carbon economy and more sustainable development.

Based on the outcomes of this study, a number of future research avenues are opening up, which should improve socially responsible investment practices. First of all, it would be interesting to examine how the integration of technologies such as artificial intelligence enables the collection of real-time data on carbon emissions. This would enhance the accuracy of carbon footprint assessments and enable more effective management of emissions on a daily basis. Secondly, it would be useful to analyze different scenarios for transforming to a low-carbon economy at sector level. This would enable us to discover the most effective synergies between economic and environmental aspects. In addition, standardizing ESG criteria and assessing their impact on long-term financial returns could provide investors with more reliable instruments. In the same context, the adaptability of sectoral sustainability indicators to different geographical and economic contexts could help enrich current evaluation methods.

Certainly, this paper presents an analysis of existing methodological approaches for measuring the impact of socially responsible investments (SRIs). In this context, we conducted a literature review on impact assessment methods for SRIs, organizing the findings into several distinct categories of approaches. Our analysis revealed a gap concerning the need to identify the characteristics of the full range of impact assessment approaches. To address this gap, we established a framework based on internationally recognized guidelines issued by organizations such as the United Nations. The results of this analysis provide a clearer understanding of how to select the appropriate methodology based on the initially defined impact assessment objectives.

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