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Review

Shifting the Focus to Measurement: A Review of Socially Responsible Investing and Sustainability Indicators

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Abstract: An increasing number of investors is including sustainability considerations in their investment processes. This can improve both financial and corporate sustainability performance. The emergence of sustainable investing as an academic research field has been accompanied by considerable interest from the industry. Despite its importance, there is still no uniform understanding of what a socially responsible investment (SRI) comprises. There is a multitude of similar terms that are not clearly defined and delineated, accompanied by a lack of a uniform understanding of how sustainability should be measured in the investment context. The resulting confusion hinders conceptual clarity, a material barrier for both scholarly and practitioner endeavours in the field. We try to address these issues by conducting a structured literature review based on database searches and cross-reference snowballing. We aim to provide a synthesised and unified definition of SRI and ancillary terms and to draw attention to the exact sustainability measurements. We (1) outline the history of the concept, (2) concisely define SRI and related terms, (3) propose a trinomial sustainability indicator framework (the Cambridge SRI indicator framework) for conceptualisation, and (4) use this framework to provide a structured overview of sustainability indicators for SRIs.

Keywords: sustainable investing; socially responsible investment; impact investing; sustainable finance; green finance; sustainability measurement; sustainability indicators; literature review; cross-reference snowballing

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1. Introduction

Larry Fink, CEO of Blackrock, currently the largest asset manager in the world according to Assets under Management, said in the *Financial Times* that "Sustainable investing will be a core component for how everyone invests . . . . We are only at the early stages" [1]. What he calls sustainable investing goes by many names, including socially responsible investment (SRI); responsible investment; sustainable investment; ethical investment; green investment; environmental, social, and governance (ESG) investment; value-based investment; and socially conscious investment. In this article, we argue that these terms can be understood as synonyms of one another, except for impact investing, which has a materially different scope (in Section 3.3, we provide evidence for this claim). The underlying concept, referred to as SRI in the following, can support the transformation to a sustainable, long-term-oriented economic system [2,3]. There is also evidence that companies that include sustainability considerations in their investment decisions tend to outperform those that do not [4,5]. Furthermore, most studies have found a non-negative relationship between ESG performance and corporate financial performance (CFP) [6]. One of the most widely cited papers in the field even synthesised the contradicting findings of some previous research (negative vs. positive relationship) and proposed a curvilinear relationship between ESG performance and CFP, which the authors later further elaborated [7,8], and is supported by

other recent and related research [9–11]. The correlation between ESG and CFP has thus drawn significant attention, in recent years [12].

The vivid and controversial discussion in academia is accompanied by increasing industrial interest. Several companies already base their investment decisions on sustainability considerations [13,14]. A prominent example is Apple Inc., which heavily invests in renewable-energy projects to address its upstream supply chain emissions [15]. This has led to a growing interest in assessing and avoiding greenwashing, both in the investment industry and on a per-firm level [16].

Despite the importance of the topic, there is considerable conceptual unclarity among scholars and practitioners: Are socially responsible investing (SRI), sustainable investing, and ESG investing mutually exclusive and collectively exhaustive? Are these concepts all the same, or where are the differences? To a certain extent, it is surprising that there is still no a unified definition of socially responsible investing, given the growing interest by academia and its rising importance in practice [17]. Moreover, the concept still needs to be differentiated from related concepts [18]: there is still a significant level of conceptual ambiguity in the field of SRI [18]. Such a lack of a uniform understanding of one of the most basic definitions in the field hinders its operationalisation and compromises the term's utilisation [19]. Differing views are fundamental in research, yet a lack of a uniform understanding of fundamental research objects might also hinder further scientific progress [20].

In addition, if SRI can leverage a more sustainable economic system, how can we measure sustainability performance? Sustainable development tries to "facilitate growth aligning with the needs of the present without compromising the availability of resources for future generations" [21]. In this study, we try to address these questions through a comprehensive review of the academic literature to analyse and illustrate the current state of research. Therefore, the first research aim of this review is to increase conceptual clarity in the field of socially responsible investing by (a) synthesising a comprehensive yet concise definition of sustainable investing and (b) identifying what differentiates the concept from related notions.

There is also considerable diversity in measuring sustainability, with various indicators with different foci, advantages, and disadvantages. While there has been a range of efforts to establish a carbon footprint measurement standard recently [22], there is still no standard and holistic framework for sustainability indicators [13]. Additionally, established frameworks miss critical dimensions for sustainability indicators [23]. Thus, the second aim of our research is to develop a comprehensive framework for sustainability indicators, yielding an improved understanding and providing a complete overview of sustainability indicators.

Consequently, this research aims to improve conceptual clarity and guide future research. By better understanding socially responsible investing and the different instruments to measure sustainability, this study could yield practitioner implications, e.g., for the investment industry. After this introduction, we describe the method that we use for the literature review in Section 2, before presenting its results in Section 3. We conclude this research with a discussion, a summary of the findings and limitations, and thoughts on possible future research.

2. Methodology

This literature review investigates the sustainable investing literature, an emerging field at the interface between finance and sustainability research on one hand and sustainability indicators on the other, to measure sustainability performance in this context. A concern for scientific meta-analyses, like structured literature reviews, is the scope and, therefore, the selection of studies for the investigated literature sample [24,25].

For the structured literature review, we define the most relevant papers as the initial population of relevant articles based on findings from a bibliometric analysis. Bibliometric research helps investigate the prevalent intellectual structure [26] and is an essential sup-

plement to traditional literature review methods [27]. Consequently, bibliometric research determines the initial sample of relevant articles.

Following the conventions in our field, we considered using the Clarivate Analytics Web of Science and Elsevier Scopus databases [28]. However, for all search strings relevant to this study, Web of Science yields fewer articles, consistent with previous findings for the research fields of finance and business, economics, and management from Martín-Martín et al. [28]. It often misses important listings, such as the second- and third-most-cited article in Scopus for the search string *TITLE-ABS-KEY ((“sustainable investment” OR “responsible investing” OR “responsible investment” OR “ESG investing” OR “ESG investment”)) AND (LIMIT-TO (SRCTYPE, “j”))* for SRI (1854 results) and *TITLE-ABS-KEY ((“sustainability indicator”)) AND (LIMIT-TO (SRCTYPE, “j”))* for sustainability indicators (3085 results), respectively. Therefore, only Scopus is used. The search string “sustainable investing” yields predominantly thematically unrelated results and was thus not included. Socially responsible investment/investing is included via responsible investment/investing. We selected the 200 most cited articles yielded from this search string as the initial sample of articles for our review.

Because of the field’s interdisciplinarity, meaningful work is published in many journals. Most of these journals are not exclusively focused on SRI or sustainability indicators. Therefore, we do not restrict our research to specific journals, as we strive to examine the whole research field. The focus is on journal articles, following conventions in management research that regard them as “certified knowledge” thanks to peer review and screening processes [27].

Each article is tested on its relevance for socially responsible investing and sustainability indicators. Articles not explicitly referring to the topic are excluded, while we generally try to be as inclusive as possible. Emphasis is put on the number of citations an article has received to include the most influential academic work. In addition, articles that recently gained much attention have also been included, accounting for more recent advances in research. We therefore screened the 100 most cited articles published from 2019 to 2021. After screening those and testing all articles of the population on relevance for our research question, we were left with 112 relevant publications.

This is followed by a structured chain referral process, as shown in Figure 1, based on previous work from Geissdoerfer et al. [29] and Wohlin [30]. By looking at the population’s reference titles, place of references, and their corresponding abstracts, we add further articles to the population. The inclusion criterion here is the ability of an article to significantly enrich the population with new or contradicting thoughts or new interrelations and concepts [29]. This process is also used on the newly added articles and is iterated until no new relevant articles are found.

As sustainable investing has recently gained considerable traction, not every finding might have passed the time-intense review process to be published in considered journals. Therefore, we also include congress records and other publications where applicable to address the publication bias effects [31]. The origin of the congress records and other publications is twofold: first, congress records are also covered via Scopus’s “j” search tag, by which we included them in our cross-reference snowballing approach [29]. Second, other sources include mainly important practitioner reports, such as Eurosif’s SRI reports [32], as well as important regulatory frameworks, such as the United Nation’s Sustainable Development Goals [21], with special relevance for goal no. 9.3 (“increase access to financial services and markets”) [21] and the European Union sustainable finance regulation [33,34]. These were also found via the structured cross-reference snowballing process, focusing on reports that gained wider attention and had wider policy implications.

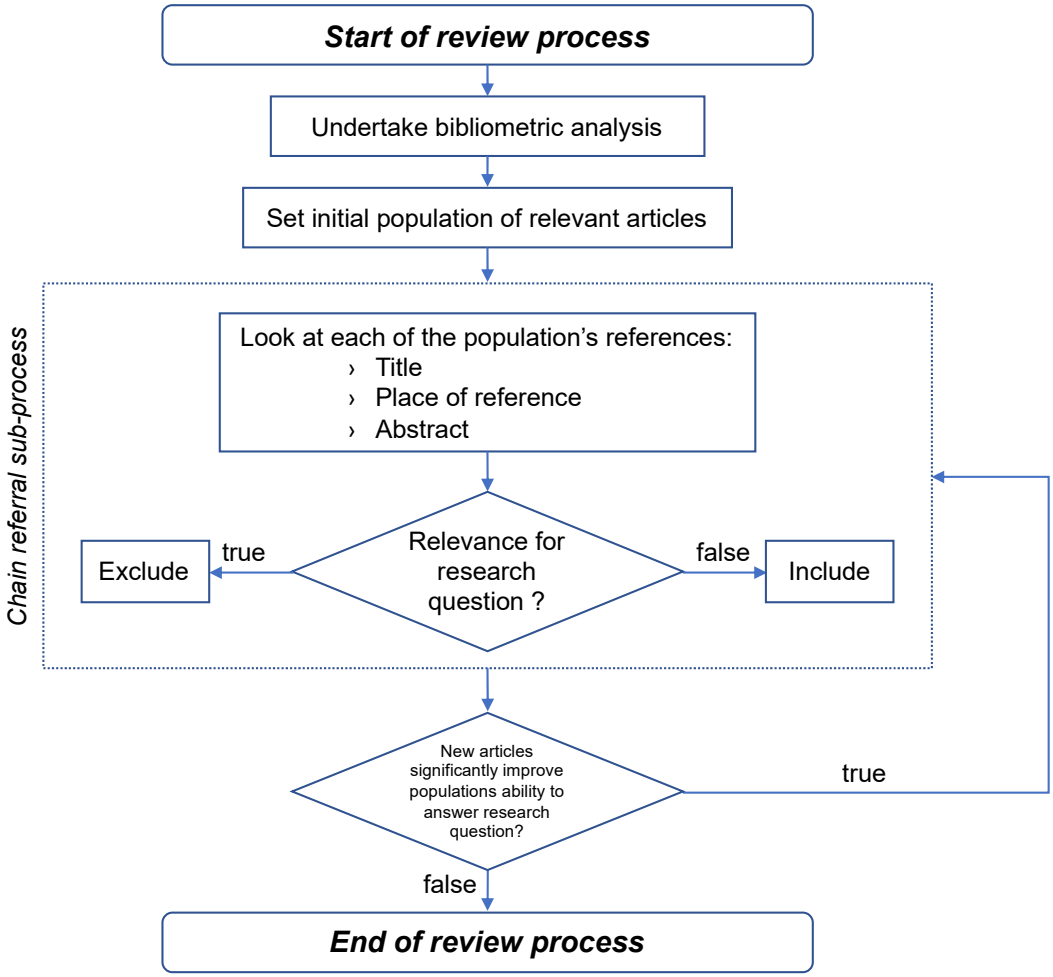

Figure 1. Literature review process.

As a result of this process, the final article population of this review contains 316 relevant articles. This includes 274 journal articles, 8 conference proceedings, 16 practitioner reports, and 18 other sources.

3. Literature Review Results

This section presents the results of our literature review. After providing a short history of the SRI concept in Section 3.1, we discuss current trends in the field in Section 3.2. Subsequently, in Section 3.3, we discuss the different terminologies in the field of SRI; outline the differences between the two critical underlying concepts of this research, namely SRI and impact investing; and synthesise definitions for both terms. Finally, in Section 3.4, we conclude this chapter by discussing SRI indicators and developing a consistent framework.

3.1. A Short History of Socially Responsible Investing

The history of sustainable investing can be traced a considerable way back. For example, the Jewish Torah set rules interpreted as ethical criteria for investments more than 2400 years ago [35,36]. During the medieval ages, the Catholic Church imposed ethical rules concerning investments and credits, especially against what was perceived as usury [37]. For example, the taking of interest by clerics was prohibited after the First Council of Nicaea, and Canon 25 of the Third Council of the Lateran forbids usury, which equates with charging any interest whatsoever. Those who still accepted interest were excommunicated, and even clerics who buried usurers were suspended [38]. In the 18th century, John Wesley, the founder of the Methodist denomination of Protestant Christianity, remarked that the correct usage of money was one of the most important themes of the

New Testament, and social screens as part of an investment decision had been used by Methodists for more than 200 years [39].

A starting point for the concept that we describe as sustainable investing today can be attributed to the political atmosphere of the 1960s [39]. Grassroots movements across Europe and the US raised public awareness for sustainability and social responsibility issues, influencing investment decisions and future behaviour: investors started to question whether to indirectly support the Vietnam War through their investments, and the first shareholder resolutions were able to place social issues on the stockholder ballot [40,41]. One of the first officially labelled SRI activities can also be traced back to these grassroots movements: the divestment of corporations and investment funds in South Africa during the apartheid regime in the 1980s [42]. By blacklisting assets perceived as too closely connected to the regime, these investors signalled that they did not want to financially back the regime [42,43].

Socially responsible investing has gained global traction since the 1990s, as shown in Figure 2. For most of the time of modern capital market theory, the risk-liquidity-return trade-off was the dominant framework for investors [44,45]. This recently has shifted as an increasing number of investors include sustainability as a fourth dimension in addition to return, risk, and liquidity [36], or they include sustainability considerations as part of their risk assessment [5,46]. While until the 1980s, only a negligible amount of capital in the United States was invested in funds that incorporated socially responsible investment criteria [42], there has been a substantial shift in attitudes towards the end of the 20th century, with about 10% of capital being invested according to those criteria [40]. That number has since grown to about 25% [47], a trend that can be attributed to the changes in consumer preferences [39]. Consumers more commonly started to consider their personal social and ethical convictions in their decision-making process [36]. This change in behaviour goes hand in hand with the overriding trend towards greater sustainability in all areas of life, such as the emergence of organic food, which has led to the rapid growth in sustainability assets in recent years [37].

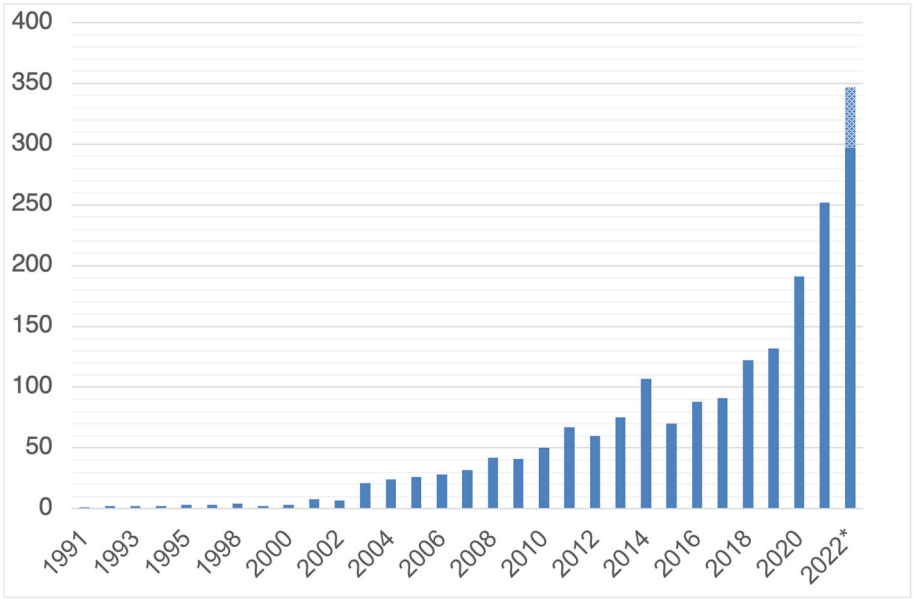

Figure 2. Number of publications per year for SRI. Note: Because the data are as of 31 October 2022, we calculated the hypothetical number of articles for the full year of 2022, under the assumption of an equally distributed linear publication frequency. Marked by an asterisk (*), the already-published articles in 2022 are displayed in full fill, whereas the potential articles to be published are shaded. There is only one article published in before 1991, specifically in 1981. The years 1981–1990 have been excluded from this graph for improved readability.

3.2. Current Trends

The field of sustainable investing is rapidly evolving. Research themes that were focal to advancement just a couple of years ago [48] have been tackled, sometimes even partially solved, and new scientific frontiers have emerged [12,49–51]. Without claiming to be exhaustive of the current research foci, various thematic clusters have been identified that have been the focus of research since the beginning of the 2020s. These can be roughly divided into three perspectives: On the one hand, there are first voices that, similar to the motivation of this work, put an increased focus on the measurement of sustainability [49] and its subcomponents, such as social sustainability [51]. On the other hand, there is an attempt to extend and generalise the existing knowledge on the extensively researched question, "Does it pay to be green"? [12,50]. In addition, research is diversifying away from established fields. This includes a pivot away from Western economies, which have taken a pioneering role in climate transition finance, for example, towards research into specialties relating to emerging markets [51]. There is also an increased focus on other forms of financing than traditional equity investments, such as green bonds or studies on green finance [51].

From a bibliometric analysis [12], we find a steep increase in publications for the past 31 years (see Figure 2). This gives evidence for the often-mentioned traction that this field of research recently gained, with five times more publications in 2022 than in 2015. This development was paralleled by the increase in publications on sustainability in general (three times more publications in the same timeframe), CSR (two times) and sustainable development goals (SDG) (16 times). Nevertheless, comparing the results for SRI with the results for the more general concept of corporate social responsibility, the research field seems still far from satiation (1854 results vs. 20,631 results, other things held constant). The same holds when SRI is compared with a search string focused on SDGs, a much broader research stream, including sustainable investing thoughts as part of substreams (21,642 results, other things held constant).

3.3. A Unified Definition for Socially Responsible Investing and Impact Investing

According to the US Forum for Sustainable and Responsible Investment, there is "no single approach to SRI [and] no single term to describe it" [47]. In fact, the differences between most terms can be seen in semantics. Socially responsible investing, responsible investing, sustainable investing, and ESG investing are the most prevalent terms among industry practitioners, socially responsible investing being by far the most widely used term [18]. These terms are, in most cases, understood as synonyms [52], which is supported by the high number of industry practitioners mentioning interchangeable usage of the different terms, as illustrated in Table 1.

Table 1. Prevalence of different terminologies for SRI among industry practitioners, developed from Sandberg et al. [18].

Terminology	Industry Practitioner Prevalence
Socially responsible investment	43%
Sustainable investment	10%
Responsible investment	9%
Sustainable and responsible investment	5%
Ethical investment	3%
Socially and environmentally responsible investment	2%
Governance and socially responsible investment	1%
Interchangeable/prefer not to say/other	27%

There are multiple definitions for sustainable investment and adjacent terms in the literature. Some authors point out that there is no need for a commonly accepted definition of sustainable investing, as several understandings of the concept and various sustainability objectives are addressed [53]. However, for conceptual clarity and precision, it is essential

to create a mutual understanding of the terms used within the research field, and the SRI movement has had to cope with academic criticism because of that deficit of clarity in its terminology [18]. Furthermore, understanding the sustainable investing concept has important implications for various aspects, such as future regulation and capital allocation. Therefore, we will show the most common definitions and distinguish the concepts from each other by outlining similarities and differences.

Before the scientific debate around sustainable investing took off, Statman [54] described socially responsible investments as applying different "social screens" while not willingly sacrificing performance. Renneboog, Ter Horst, and Zhang [37] define socially responsible investments as "an investment process that integrates social, environmental, and ethical considerations into investment decision-making". Different screening and selection schemes are applied as part of the investment process. These complement conventional performance criteria such as financial indicators. Hebb [55] and Scholtens [52] define responsible investing similarly, describing it as accounting for environmental, social, governance, and ethical issues in the investment process.

The Principles for Responsible Investing (PRI) is an independent not-for-profit organisation that is one of the world's leading advocates for responsible and sustainable investing. The PRI was founded in 2006 and has since been supported by the United Nations. Like the definitions shown above, they define responsible investment as "an approach to investing that aims to incorporate environmental, social and governance factors into investment decisions, to manage risk better and generate sustainable, long-term returns" [56].

Sandberg et al. [18] describe the concept in a broader context, characterising it as integrating nonfinancial concerns in the otherwise strictly financially driven investment process by highlighting the dimensions of ethical, social, environmental, and corporate governance. They also note that while there is a consensus on integrating those factors, it is controversially discussed in the academic debate how strongly the classical financial dimension is emphasised in SRI.

We outlined that many terms can be used interchangeably, with the important exception of impact investing. Sustainable and impact investing can be understood as ways to incorporate ESG criteria into investment decisions [55], but they are distinct concepts with fundamentally different scopes [57,58].

In 2007, the concept of "impact investing" was termed outside of academia by a group of practitioners at the Rockefeller Foundation [59,60]. Impact investing has two key conceptual differences to sustainable investing. On the one hand, impact investing implies different return expectations. While sustainable investors still have a standard return expectation for their investment, impact investors consider profitability subordinate to the intended societal or environmental impact [57,61]. Nevertheless, impact investing does not mean that investors altogether forfeit an expectation of positive returns but rather still require at least some degree of return [61]. Cases where sustainability considerations are the only consideration of the investment decision and where the underlying business case does not include any profit seeking are covered by the concept of philanthropy [61,62]. On the other hand, impact investors are interested in a higher stake of equity that enables them to directly influence the target organisation's management [32], whereas socially responsible investors usually hold only minor stakes [57].

While Höchstädter and Scheck [58] mention that impact investors are generally aiming at lower investment sizes, we were able to obtain only one practitioner report from Credit Suisse that followed this perspective [63]. Therefore, smaller investment sizes from impact investments vis-à-vis sustainable investing might also be an effect of economic limitations, a "shortage . . . of successful high-quality impact investment opportunities" [64], rather than a true characteristic of the field; we do not consider investment size to be a true differentiator.

Current research shows that the differences between socially responsible and impact investing materialised over time, with SRI less often associated with personal values [48]. Those are essential aspects of impact investing and are way more pronounced in its context. Albeit having a higher compounded annual growth rate than SRI, this may be one of

the reasons why it accounts for only a minimal number of assets and responsible fund management strategies: impact investing comprises less than 1‰ of the European SRI market [32].

Performing a prevalence analysis of the different terminologies, as shown in Table 2 reveals that SRI is the most used term on the sustainable investment side. This analysis supports the earlier-mentioned findings of Sandberg et al. [18]. On the impact investing side, the term "impact investing" has the highest number of results. The analysis also shows that more academic articles are dedicated to sustainable investing, indicating higher academic interest and research coverage for it than for impact investing.

Table 2. Prevalence analysis of sustainable investing compared with impact investing and its synonyms, using Elsevier Scopus database.

Sustainable Investment		Impact Investment	
Term	**Prevalence** [1]	**Term**	**Prevalence** [1]
Socially responsible investment [2]	692	Impact investing	193
Responsible investment [3]	235	Social finance	84
Sustainable investment	234	Double bottom line	59
Ethical investment	200	Blended value	25
Green investment	172	Mission-related investment	4
ESG investment/investing	20		
Value-based investment	6		
Socially conscious investment	4		
Socially aware investment	1		

[1] The data were retrieved from Elsevier's Scopus database, and all source types other than journal articles were excluded. [2] For every term that included "investment", we also looked for "investing" and summed the numbers up. The same procedure was used for "social" and "socially". [3] Search results explicitly referring to "socially responsible investment" were excluded.

Some contributions conflict with the sustainable investing vs. impact investing separation. The US SIF subsumes impact investing under its terminology for sustainable and socially responsible investing [47]. In addition, Schueth [39] considers the (seldomly used) term "mission-related investing" as socially responsible investing, which others interpret as an alternative expression for impact investing [55]. However, none of those above-mentioned authors provides a rationale for not distinguishing between the terms. This could be because they perceive the terms synonymously or are unaware of the conceptual differences. When we write about sustainable investing in this article, it is understood as a catch-all term for all the terms described, but not as a synonym of impact investing or vice versa.

A standardised definition for "sustainable investing", therefore, does not yet exist. For this article, because the definitions all lack some dimensions, we see the necessity to set up a new definition. A broader approach is necessary to cover all the crucial characteristics. We contribute to the current academic debate by suggesting a new, dualistic definition for the two most different topoi arising in the discussion.

Starting with understanding the "sustainability" part first, one of the most used definitions of sustainability is the one established by the Brundtland Report [29]. The report defines "sustainability" as ensuring "the needs of the present without compromising the ability of future generations to meet their own needs" [65]. We follow this definition of sustainability as part of our assessment to define the SRI.

With that in mind, we now have to understand only what an investment process is: in order to synthesise a holistic definition of SRI, OxfordDictionaries.com defines the term "investment" as "The action or process of investing money for profit" [66] and "investing" as "Put[ting] (money) into financial schemes, shares, property, or a commercial venture with the expectation of achieving a profit" [67]. Each investment process is thus a decision to allocate capital with future profit in mind, meaning a positive outcome from the investor's perspective. On this basis, we define SRI as follows:

Definition 1. *Socially responsible investing is the integration of considerations that ensure the inter- and intragenerational balance of ecological, economic, and social consequences into capital allocation decisions.*

We outline that the two significant factors differentiating impact investing from SRI are (1) the subordination of return expectations and (2) the aspiration to directly influence the investments' underlying characteristics. To separate impact investing from sustainable investing, we define "impact investing" as follows:

Definition 2. *Impact investing is capital allocation to improve the underlying asset's ecological, economic, and/or social performance, with profitability considerations as a secondary concern.*

These two definitions aim at clarifying the semantic confusion in the field. They also help emphasise the important connection between SRI and the achievement of sustainable development. In addition, we intend to provide a more concise separation between the two general concepts and help shape the academic debate towards a more uniform understanding.

3.4. A Trinomial Framework for Sustainability Indicators

When we discuss the characteristics of sustainable investments, it is central to investigate ways to assess sustainability. Darton [68] emphasises that "assessing the sustainability impact of any system—factory, business, institution, supply chain, industry, city, province, or country—is essential to setting a policy for sustainability". Nevertheless, it is hard to establish objective criteria to evaluate sustainability because, in most cases, the underlying phenomena are hard to directly observe. This lack of information prevents us from perfectly monitoring the impact on society, natural resources, ecological functionalities, and the interrelationships between all those factors [69]. Sustainability assessment methodologies can increase the amount of information. Therefore, they are increasingly viewed as crucial for transitioning to a more sustainable economy [70].

Generally, there are three major approaches to assessing sustainability: indicators and indices, product-related assessment tools and integrated assessments [71]. In contrast to the other two, more qualitative approaches, indicators can be more effectively communicated [72] as they enable an often-preferred quantified measurement [73]. In most situations, they are an indispensable way of collecting information and support decision-making in sustainable decision-making policies [74] in academia and industry [75,76]. Furthermore, combining different indicators into an index allows for holistically covering sustainability for all dimensions of the sustainability triple bottom line with just one measurement [77]. Because of these advantages, in our research on sustainability measurements, we concentrate on sustainability indicators and indices.

What gets measured gets managed: Sustainability assessments provide decision-makers with the necessary tools to measure not only the economic but also the environmental and social impacts of their decisions. Decision-making requires simplified measurements for complex issues (such as sustainability) to aggregate and condense information for the decision-making progress—these condensed measurements are known as indicators [78]. Establishing, computing, and comparing indicators is one of the most common ways to assess sustainability [75,76]. Indicators play an essential role within the sustainability chain of cause and effect: they help to describe issues resulting from adverse changes in the triple-bottom-line outcome. They link the underlying and unmeasurable issues to measurable and observable metrics (see Figure 3).

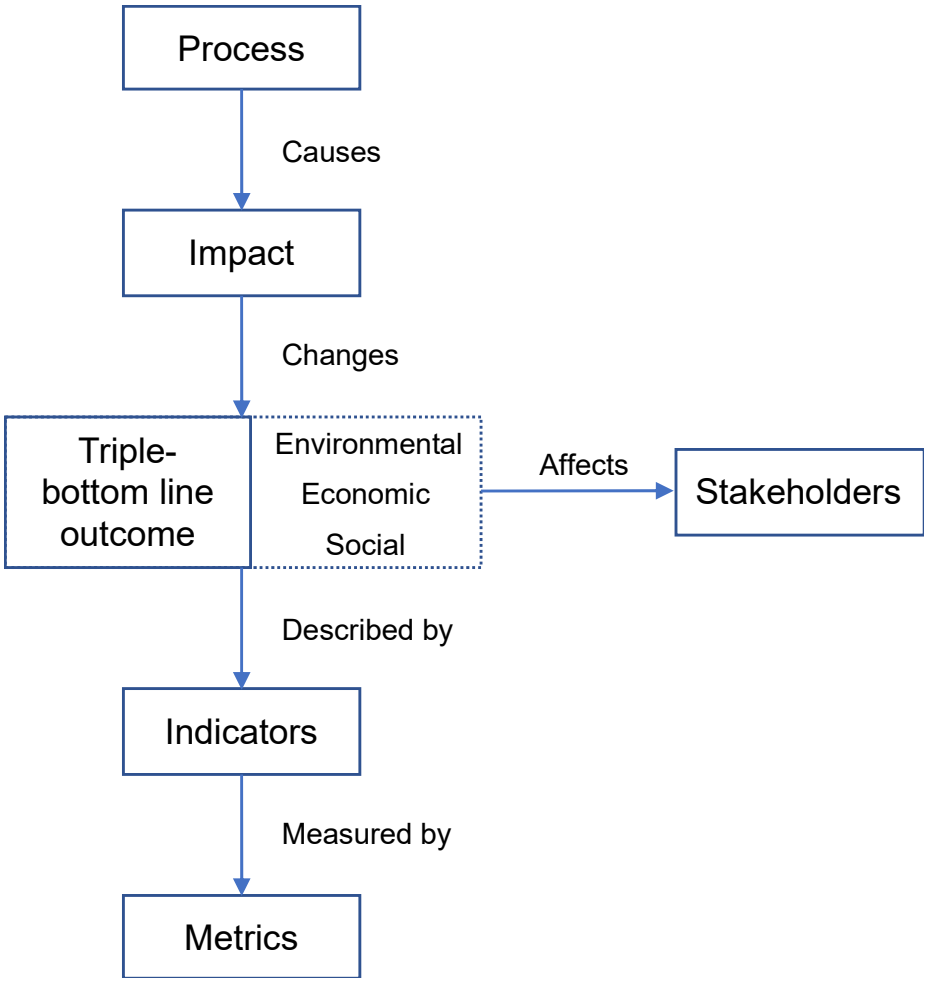

Figure 3. The process analysis framework of sustainability, developed based on Darton [68] and Smith et al. [79].

According to Ness et al. [71], sustainability indicators can be defined as "simple measures, most often quantitative, that represent a state of economic, social or environmental development". According to this understanding, sustainability indicators are performance figures for triple-bottom-line performance [80]. Despite the apparent drawbacks of accumulating a broad range of complex issues into a small set of measurements, indicators can help to improve the understanding of sustainability and be powerful tools in efficiently communicating the results of sustainability assessments [72,81].

However, what makes a good indicator? Which ones should be selected from the considerable range of candidates in the literature? An effective indicator must have specific characteristics to be considered valid. We therefore developed a comprehensive list of these characteristics, shown in Table 3, which we developed from Winograd and Farrow [69], Tanzil and Beloff [82], and Pannell and Glenn [83]. A helpful indicator must be specific and easily measurable. Conversely, it must be relevant and representative of the overall problem space [69]. Some trade-offs between those criteria make it hard to find the best set of indicators for each situation: even a seemingly great indicator might be useless if there is a lack of clarity in how it is designed or if there are interpretation difficulties.

Table 3. Criteria on indicator characteristics and indicator usefulness, developed based on Winograd and Farrow [69], Tanzil and Beloff [82], and Pannell and Glenn [83].

Indicator Characteristics	Indicator Usefulness
Clear cause-and-effect links	Applicability
Development cost	Comparability
Disjunct	Clarity in design
Measurability	Ease of interpretation
Monitoring cost	Limitation in number
Relevance	Nonredundancy
Representativeness	Potential to change behaviour
Reproducibility	Protective of proprietary information
Sensitivity	Reduction in uncertainty
Specificity	Retrospectivity and predictivity
Stability	Validity
Target and baselines	

Currently, sustainability indicators are distinguished by four key indicator dimensions [84], which Xian et al. [23] describe as a *unit of measurement*, *period of measurement*, *improvement goal*, and *quantification method*. There is no classification of the scope of sustainability indicators. The applied indicator will vary greatly depending on the field of application: measuring sustainability for small, regional firms will be different from the measurement approach for large firms [85], and will vary even more for entire countries. According to the sustainability process analysis framework [79], there must be a differentiation, as the underlying processes and thus their triple-bottom-line outcome are dissimilar. On the one hand, Keeble et al. [86] identified this and distinguished project-level sustainability indicators from corporate-level indicators. On the other hand, Erol et al. [87] differentiated microlevel indicators, on an organisational level, from macrolevel indicators, which aim at nations as the level of aggregation. However, no approach combines all levels of aggregation in one model.

In the following, we will distinguish different subgroups of indicator scopes and outline their characteristics, similarities, and differences. Because of the different circumstances in which indicators are used, many approaches have evolved over time, reflecting the originators' understanding, motivation, or philosophy [88]. This falls especially into place when looking at different levels of aggregation. For example, a company can be considered a collection of individual projects, and an equity portfolio is a collection of companies. Likewise, an industry can be depicted as the sum of all projects of a certain kind. As a result of these distinct perspectives, different subgroups of indicators for each have evolved. Consequently, we cluster the different approaches in a trinomial framework (the Cambridge SRI indicator framework): project-level, organisation-level, and portfolio/industry-level sustainability indicators, illustrated in Figure 4.

Given that SRI plays an essential role in achieving SDGs, to help bridge the financing gap for SDG implementation [89], SDGs are interwoven into all three scopes of our sustainability indicator framework. To achieve SDGs, sustainability must be measured across all these dimensions, but certain SDGs have more connection to some aggregation levels than others do. Thus, throughout the following sections, we refer to the corresponding SDGs and their specialities.

Linking the framework to our proposed definitions, we synthesised that SRI (and impact investing) need to integrate considerations in the investment decision that ensure the inter- and intragenerational balance of ecological, economic, and social (EES) consequences into the capital allocation decision. However, to integrate these considerations, decision-makers need quantification methods. The investment process, on a professional level, heavily relies on a plethora of approaches, KPIs, and metrics. Therefore, sustainability indicators ought to be employed to enrich these financially oriented "toolkits" with methods to quantify nonfinancial aspects. In addition, intense research has been conducted in the past decades not necessarily connected to the traditional SRI and sustainable investing literature.

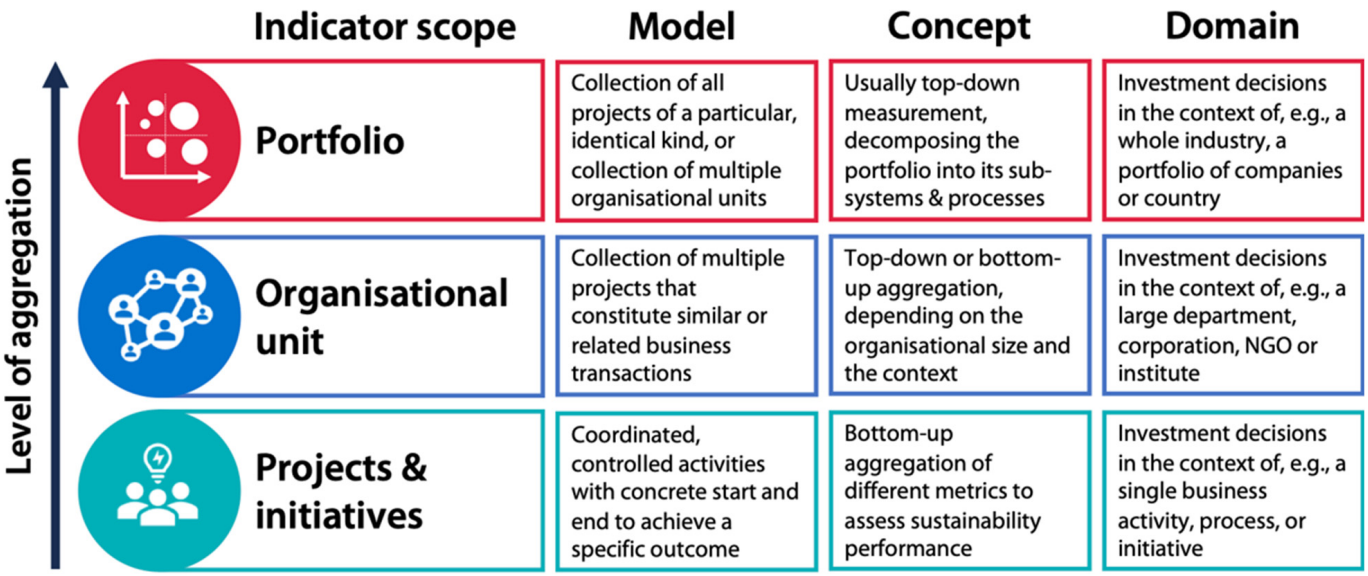

Figure 4. Cambridge SRI indicator framework—sustainability indicator scope must be inherently different, depending on the level of aggregation.

In the following, we will look deeper into the sustainability indicator literature. Then, we will map the most established and highly regarded approaches according to the trinomial framework of sustainability indicators for socially responsible investing (the Cambridge SRI indicator framework): (i) project-level sustainability indicators, (ii) organisation-level sustainability indicators, and (iii) portfolio-level sustainability indicators.

3.4.1. Project-Level Sustainability Indicators

Project sustainability management positively and significantly impacts a project's success [90]. Then again, projects also present challenges for stakeholders and their environment. How can a project be developed with all current and future stakeholders in mind [91]? Therefore, we need to find a way to measure and manage sustainability in the project context. Looking at indicators, Keeble et al. [86] define project-level sustainability indicators as indicators "measuring alignment of project activities with the principles of sustainable development", a clear connection to the United Nations Sustainable Development goals [21]. Project-level indicators can generally be classified into four major categories: On the one hand, input indicators observe the projects' input factors, whereas output indicators assess the project's products. On the other hand, outcome indicators assess the short-term impact of the project, whereas impact indicators try to evaluate the long-term consequences [92].

A well-known concept for project-level sustainability indicators is the indicator framework established by the World Bank [92]. It is inspired by the natural cycle of a project [69]. After defining the project's objectives, it is decomposed into distinct project components. Then, for all those different components, output indicators must be defined. Finally, the component output indicators are synthesised into the final project impact indicators. The objective and its indicator share a meaningful connection; the same goes for the project components and the component indicators. This relation is illustrated through the dotted lines shown in Figure 5).

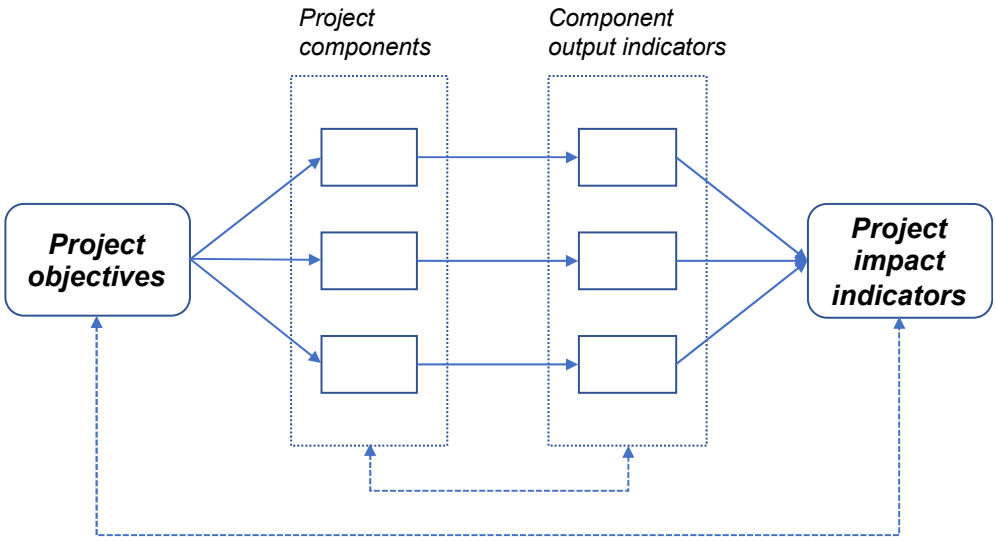

Figure 5. Project-level indicator framework [92].

Projects in the construction sector can be massive, and if one thinks, for example, of dam projects, these can also have significant sustainability consequences. It is, therefore, not surprising that some work focuses on sustainability indicators specifically for construction projects. The International Organization for Standardization provides a framework for developing sustainability indicators for buildings. ISO 21929-1 lists 14 critical areas for projects in this area, ranging from air emissions, usage of nonrenewables and water (environment), and safety and aesthetics (social) to costs, adaptability, and maintainability (economic) [93]. Fernández-Sánchez and Rodríguez-López [94] provided a similar framework to identify sustainability indicators for projects specifically in construction, with this identifying 19 key areas for the sustainability of the triple bottom line, comprising 79 subareas. After that identification, they suggest a twofold prioritisation process to develop an adequate number of indicators specific to each project type. Zhong and Wu [95] stress the importance of addressing sustainability issues as early as the project's inception. Only if sustainability measures are defined at the beginning of a project can sustainability performance be tracked, and project management can make informed decisions on the basis of these data. The sustainability competencies of project participants have a mediating effect on the process of overcoming sustainability barriers for the project's overall sustainability performance [96]: their sustainability skills help achieve the project's goals, with continuous skills such as adaptability, collaboration, and problem-solving being more critical than self-competencies such as strategic planning, sustainability accounting, and other technical skills. This is interlinked with SDGs no. 3 and no. 5 [21] (ensure healthy lives and promote well-being for all at all ages and achieve gender equality and empower all women and girls) in that project participants with higher skills can consider these dimensions in their acting and help projects be positive with regard to these two goals.

Project sustainability indicators can also be derived from the life-cycle-assessment method [97]. The life-cycle assessment is a standard tool for assessing the environmental impacts and resources consumed throughout a project's life cycle [98] and can thereby assist in selecting the most relevant indicators, especially for environmental performance [99]. The drawbacks of life-cycle assessments as a technique to find appropriate project sustainability indicators are the data intensity [98] and exclusive focus on the environmental perspective of sustainability [71]. It might be too restricted perspective-wise and too elaborate, especially for smaller projects, to focus solely on this technique.

Despite these developments, a lack of using sustainability indicators at the project level can be observed in practice: the lack of sustainable thinking or education, economic short-termism, and the need for more workable solutions have so far hampered the broader implementation of sustainability indicators [100].

3.4.2. Organisation-Level Sustainability Indicators

These types of indicators can be defined as sustainability indicators that "Measure corporate-wide sustainability performance" [86]. However, these indicators can also be used for other organisations, such as institutions, nonprofit businesses, or agencies, which is why we perceive the term organisation-level sustainability indicators as being more precise and accurate than corporate-level sustainability indicators. Nikolaou et al. [101] identified three general differentiating criteria within corporate sustainability indicators: (1) financial vs. nonfinancial indicators, (2) which aspect(s) of sustainability the indicator focuses on, and (3) single-based vs. composite-based indicator indices.

Corporate sustainability indicators should always reflect the special needs and unique characteristics of the corporation that uses them. It can thus make sense to individually adjust those indicators depending upon the indicators' field of application, despite the drawback of a decrease in the comparability of different companies [86]. Therefore, many individual indicators have evolved. In this context, Veleva and Ellenbecker [84] argue that it is better to measure the right things approximately than to measure the wrong ones very precisely. Therefore, they see the need yet also the possibility to develop a standard set of sustainability indicators for all types of companies. Internationally recognised standards, such as those established by the International Organization for Standardization (ISO) and the Global Reporting Initiative (GRI), subsequently play a vital role in harmonising and professionalising the usage of different indicator methodologies [86]. In addition, within the regulatory regime of the European Union, particular emphasis has been put on developing a uniform criteria catalogue for sustainable investments during the past years [102].

To better understand and illustrate the different organisation-level sustainability indicators, we highlight several approaches without claiming the list to be complete. First, dichotomous criteria can be used as a "signal" for corporate sustainability. For example, the criterion of being listed on the Dow Jones Sustainability Index (DJSI) can be seen as an early indicator of sustainability [103,104], especially when compared with other companies from the same industry that might not be listed. Another criterion can be inclusion in ethical mutual funds [105]. Those approaches all have the advantage that the data are often freely and readily available. However, they all share the identical drawback of heavily relying on external data providers and their judgement, which might be biased.

A vast number of private companies, often rating agencies, also provide sustainability ratings for corporations (see Table 4). In contrast to dichotomous criteria, these ratings provide information on a scale, mostly ordinal or interval based. With that, a far more granular judgement is possible, and various analytical methods can be applied when comparing the different entities. The information is also often easily accessible, as different data providers, such as Bloomberg and Refinitiv, offer their ratings and those of other rating providers. However, their terminologies, their methodologies, and the number of companies that they rate differ significantly [106]. They therewith share the disadvantage of a potential bias with dichotomous indicators.

When looking at an organisation level, SDG no. 12 [21], responsible consumption and production, becomes particularly important. Given that the producing sector is responsible for significant portions of world pollution, measuring sustainability at the level of emission, i.e., the firm, as well as financing towards more-sustainable pathways, is crucial to achieving this SDG. The same holds for SDGs no 5., aiming at equality of opportunities for both genders, which the social sustainability dimension tries to cover.

Lastly, several academic approaches have tried to develop a single sustainability index. For example, Spangenberg [107] established a macrolevel, relatively easy-to-compute indicator for corporate sustainability: the Corporate Human Development Index. As the name suggests, it borrows from the concept of the Human Development Index, which tries to evaluate the development of a whole country. Barrett and Scott [108] developed an approach to measure the ecological footprint of a corporation. This approach focuses solely on the ecological dimension of the sustainability triple bottom line. By focusing on this one dimension, they propose a single measurement for organisational ecological

sustainability, measured by the total area of land required to support an organisation's continuing operations. Krajnc and Glavič [109] even developed an indicator reflecting the triple bottom line. While the strengths of this approach are its high flexibility and applicability to companies in various business fields, this also creates subjectivity biases, as the alteration of indicators and the subindices' weightings necessitate judgement calls from the creator. They later provided scientific methods that objectivise the indicator selection and weighting process [110], providing one of the best-received academic approaches for a corporate sustainability index.

Table 4. Selection of rating providers offering corporate-level sustainability ratings, developed from Huber et al. [106] and Staub-Bisang [111].

Rating Agency	Country	Website [3]	No. of Companies Rated	Rating Scale (High to Low)
Inrate	Switzerland	inrate.com	3500	Ordinal Scale A+ to D−
I.S.S. oekom	Germany	issgovernance.com	7000	Interval Scale 4.00/A+ to 1.00/D−
MSCI ESG Research	USA	msci.com	7000	Ordinal scale AAA to CCC
Refinitiv [1]	UK, USA	refinitiv.com	7000	Interval Scale 1.000/A+ to 0.000/D
Sustainalytics	Germany	sustainalytics.com	9300	Interval Scale 0 to 100
Moody's ESG [2]	France	esg.moodys.io	4500	Interval Scale 100 to 0
Bloomberg ESG Data	USA	bloomberg.com	14,000	Interval Scale 0 to 100
RepRisk	Switzerland	reprisk.com	84,000	Ordinal scale AAA to D

[1] Refinitiv, back then operating under the name Thomson Reuters, acquired the data provider Asset4, to which Staub-Bisang [111] is referring, in 2009 [112]. Today it is an important part of their ESG rating framework. [2] Vigeo merged with Eiris in 2015, now Moody's ESG [113]. [3] All websites accessed on 4 January 2023.

3.4.3. Portfolio-Level Sustainability Indicators

The third category in which we can classify sustainability indicators is portfolio-level indicators. By "portfolio", we mean the collection of different investments in organisations and projects within specific boundaries. Examples of this third category can be indicators for the sustainability of an investment portfolio [114] or even indicators for the sustainability of all projects within one country, by approximating its sustainability [115]. Another common approach in academia has been establishing sustainability indicator frameworks for the sustainability of an entire industry [116,117]. Often, these sets are tested for businesses of that industry, also within a specified geographical region [118–121]. Countries, industries, and investment portfolios are all instances of aggregated organisations and projects within specific boundaries (geographic, type, and affiliation), and as such, portfolio-level sustainability indicators can be applied. In the following, we elaborate on the three sets in more detail.

With the emergence of SRI, asset managers and investment firms implemented criteria for the sustainability evaluation of their portfolios and underlying assets. However, the larger the capital invested and the higher the turnover are, the less feasible it is for those to do a fully fledged analysis for each investment class that they are considering because they have a limited amount of time [122]. From the investment industry side, measuring sustainability from that second stage is more complicated than from the first stage (project/organisation level) with the approaches currently known [123]. Therefore, several simplifying approaches to measuring sustainability have developed, which can be specified as best-in-class investment selection, exclusion of holdings from the investment universe, norms-based screening, the integration of ESG factors into the financial analysis, and engagement in and voting on sustainability matters [32,124,125].

Country ratings, such as the Vigeo Sustainability Country Rating, can be used as an indicator of the social responsibility of a whole country. It can consequently be a helpful tool to evaluate the triple bottom line of, e.g., government debt, predominantly bonds [115]. It makes sense to use highly aggregated indicators or indices for countries as they also can be seen as a high aggregation of all projects undertaken within a country's borders. Two other commonly used concepts to measure sustainability on the country level are the ecological

footprint and the Environmental Sustainability Index (ESI) [126], the latter succeeded by the Environmental Performance Index (EPI) [127]. Both approaches focus solely on the environmental dimension of sustainability. Developed and defined by Rees [128], the ecological footprint applies to industries, regions, or even the whole world [119]. The EPI uses 24 performance indicators, focusing on environmental health (40% weighting) and ecosystem vitality (60%) [129], and is widely used in academia and in practice [126]. However, Babcicky [130] found that the ESI might be biased in such a way that industrial nations, despite being responsible for most of the pollution on earth, perform consistently well. Still, the top 29 countries from the 2018 EPI are industrial nations belonging to the developed world [131], indicating that the developed-nations bias might still be present. Other indicators, such as the Human Development Index (HDI), can also approximate country-level sustainability [132]. Given that the HDI is composed of an income index, a longevity index, and an education index, all equally weighted [131], it can be seen as an indicator of economic and social sustainability, but it lacks a measurement of environmental sustainability. The Environmental Performance Index and the Ecological Footprint can thus act as additions to the HDI to complement it in a framework that reflects all three dimensions of sustainability.

However, it is about more than just ratings from private providers when looking at country-level sustainability; instead it also includes institutional stakeholders. With the emergence of the United Nation's SDGs, a powerful tool to investigate a country's efforts towards sustainability has emerged. For example, when looking at SDG no. 9 (industry, innovation, and infrastructure), it is important to note that small-scale industries lack financial access to financial sources to finance sustainability transformations [133].

Finally, there are indicators focusing explicitly on specific industries. This might be because value creation is decidedly different among various industries. Consequently, the environmental, economic, and social consequences also vary. Scientists have therefore developed many indicator frameworks that fit specific industries particularly well. In Table 5, we provide a comprehensive list of different industry-specific frameworks. One can see that the number of indicator categories and indicators significantly varies. The average number of indicators used was 29, while the mean number of categories was seven. Most (75%) of the approaches covered all three classical dimensions of sustainability. The others focused their research primarily on the environmental dimensions [119,120,134], as these are usually the ones that differ the most among industries. A critical point for an industry-specific indicator framework is the selection process: often, more than enough indicators are available to choose from, but which ones are the most important? The answer to this question can differ depending on the industry specifics and characteristics, but to discover these peculiarities, the Delphi technique [87,135] and local surveys [136] seem particularly well suited.

The concept of industry-specific sustainability indicators is sometimes fuzzy, as some approaches have a dual usage: these indicators do not always distinguish specifically between their respective industry and a corporation of that industry. Consequently, they can be used either for measuring the sustainability of their related industry or companies within that industry. This is, to a certain extent, expected as, e.g., the environmental consequences are comparable. Nevertheless, the economic sustainability dimension might differ for a company and its industry, requiring different indicators. This dual usage can therefore cause conceptual ambiguity and imprecision.

Table 5. Portfolio-level sustainability indicator approaches for industries.

Industry	Author(s)	Focus	No. of Categories	No. of Indicators	Sustainability Dimension [1]	Notes
Agriculture	Lim and Biswas [137]	Regional (Malaysia), palm oil	5	22	Env, Eco, Soc	Uses ordinal ranking scale (1–5) for all indicators
Automotive	Salvado et al. [116]	n/a	3	14	Env, Eco, Soc	
Chemicals	Samuel et al. [138]	Regional (Malaysia), petrochemicals	16	54	Env, Eco, Soc	
Chemicals	Seuring et al. [139]	Detergent industry, Regional (Germany)	4	17	Env, Eco, Soc	
Construction	Huang et al. [140]	Regional (China)	7	11	Env, Eco, Soc	
Energy	Diniz Da Costa and Pagan [141]	Coal power	4	10	Eco, (Soc)	Human health as a weak proxy for social sustainability
Energy	Rovere et al. [121]	Regional (Brazil)	4	14	Env, Eco, Soc	
Energy	Vithayasrichareon et al. [117]	Regional (ASEAN5)	5	18	Env, Eco, (Soc)	Sustainability was assessed via the 3A framework (accessibility, availability, acceptability)
Food and beverages	Maxime et al. [120]	Regional (Canada)	6	13	Env	
Forest management	Valls-Donderis et al. [142]	Regional (Spain)	15	58	Env, Eco, Soc	
Health care	Veleva et al. [134]	Pharmaceuticals	n/a	12	Env	Testing of early adopters of the then-new GRI sustainability standards.
Manufacturing	Pan et al. [143]	Construction automation and robotics	20	75	Env, Eco, Soc	It also focuses on technological sustainability as a separate sustainability dimension
Mining and minerals	Nordheim and Barrasso [118]	Regional (Europe), Aluminium	10	34	Env, Eco, Soc	Absolute measurements, such as greenhouse gas emissions; disaggregated
Mining and minerals	Azapagic [144]	n/a	6	31	Env, Eco, Soc	An absolute, relative, and qualitative measurements, such as greenhouse gas emissions; disaggregated
Oil and Gas	Infante et al. [145]		3	15	Env, Eco, Soc	Uses ordinal ranking scale (1–5) for all indicators
Recycling	Darby and Jenkins [146]	Regional (UK), social enterprise	n/a	8	Env, Eco, Soc	
Retail	Erol et al. [87]	Regional (Turkey)	3	16	Env, Eco, Soc	
Services	Halme et al. [147]	Regional (Europe), household services	3	17	Env, Eco, Soc	
Textiles	Herva et al. [119]	Regional (Galicia)	3	20	Env	Using the ecological footprint approach; Applying the approach as an example to the textile industry in Galicia, Spain
Tourism	Choi and Sirakaya [135]	Community tourism	6	125	Env, Eco, Soc	From the 125 developed indicators, the 18 with the most significant effects were chosen

[1] Env: environmental; Eco: economical; Soc: social.

4. Discussion and Conclusions

This research reviewed the academic literature on socially responsible investing and sustainability indicators. We linked the two concepts by synthesising a comprehensive definition of SRI and established a new trinomial framework for sustainability indicators (the Cambridge SRI indicator framework), providing extensive guidance on various sustainability indicator approaches.

4.1. Theoretical Contributions

To summarise our findings for the first of our research aims, finding a comprehensive yet concise definition of sustainable investing and identifying the distinction of the concept from related notions, we rigorously screened the literature for SRI, shedding light on the different aspects of it. There is a multitude of terms that can all be understood as synonyms of SRI, e.g., sustainable investing, responsible investing, and ESG investing. Even though SRI is often used in the same or similar contexts as impact investing, we have illustrated the distinct conceptual natures of the two. The mix-up of these two concepts might confuse and affect the usefulness of both terms. Therefore, we synthesised broader yet more-precise definitions for each of the two and outlined the similarities and differences. We believe this will promote conceptual clarity and help better understand the motivation and practical consequences of the concepts' usages within research and in practice.

We reviewed the literature on sustainability indicators for the second research aim: developing a comprehensive framework for sustainability indicators for an improved understanding and complete overview. As a result, we developed the trinomial Cambridge SRI indicator framework, which categorises them into project-based, organisation-based, and portfolio-based sustainability indicators. This new classification contributes to transparency in the research field. By that, it can help foster the appropriate application of different sustainability indicators in the scientific world and business practice.

In summary, we see three major contributions to academic theory: First, we provide an overview of the history of SRI, helping other researchers better understand the context that led us to the current research frontier. Second, we suggest more-comprehensive and -concise definitions for SRI and impact investing, which might help reduce unclarity and disparity of understanding between researchers in the field. Third, we propose a trinomial framework for sustainability indicators in the context of SRI. This framework emphasises our suggestion to shift the current focus of the academic SRI debate more towards improving sustainability measurement.

4.2. Practitioner Implications

When looking at the implications of our research for practitioners, we see our contribution twofold. First, our proposed definition of SRI and related terms might help clarify what constitutes a sustainable investment and what does not. It can play an important addition and cross-check to other definitions proposed by private players and regulators alike. Second, we provide the Cambridge SRI indicator framework for sustainability measurement instruments. This framework can help practitioners decide which indicators are appropriate for their situation to measure their sustainability outcome. We also highlighted which SDGs are particularly relevant at certain aggregation levels in our framework, helping practitioners find suitable indicators to align their efforts with sustainability.

4.3. Research Limitations

However, there are limitations to our research design. For the initial sample, we rely on authors to publicise their work in academic journals. We, therefore, could have missed contributions that have yet to be included in scholarly publications. In addition, keyword-based analysis can cause subjectivity bias in the article selection and might retrieve unrelated articles owing to its lack of randomised representativeness [148]. In addition, we applied a cross-reference snowballing approach to generate the final sample of articles relevant to the literature review. While this is an established and often-used approach [30],

literature reviews with a more systematic lens often choose other approaches, which might have otherwise led us towards another direction. Finally, the sustainability indicator framework is based on a mature body of literature but has not been tested, verified, or applied in different scenarios.

4.4. Future Research Avenues

The research has also indicated a range of promising avenues for future research. If it is increasingly common to assess business activities by their sustainability, it is just another side of the coin to seek investment opportunities on the basis of their ESG characteristics [13]. Further research is needed on how investing guided by the illustrated sustainability indicators influences the investment outcome. First, the scope of the established categorisation of sustainability indicators needs to be tested and validated. Second, each subcategory needs further enrichment and research on its own, improving understanding and current practices. Third, established indicator sets need to be screened and expanded in matters of the applying scope of each indicator. Finally, it is crucial to investigate the influence of a better understanding of the various concepts related to SRI and its development in the future.

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