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Implementing corporate sustainability information in socially responsible investing: a systematic review of empirical research

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Abstract

Purpose – This study aims to provide a precise understanding of how corporate sustainability information is used in socially responsible investing (SRI). The study is motivated by the lack of a recognised body of knowledge on this issue. This study, therefore, collates and reviews relevant studies (67 studies) to provide guidance to investors interested in SRI and identify a research agenda for academics desiring to contribute to this area.

Design/methodology/approach – This study conducts a systemic literature review employing recognised key words and searching the Web of Science. HistCite is utilised to ensure important cited studies are not missed from the collection. The review was conducted from two perspectives: (1) sources of sustainability information and (2) how the information is used in SRI.

Findings – The review identifies five major sources of sustainability information, including corporate reports, ESG ratings, industry affiliation, news and private communication with firms. These sources of information play different roles in the cross section of SRI strategies (i.e. negative and positive screening, active ownership and integration). This study provides guidance on how to use this information in SRI and provides recommendations for future research on how analysts interact with the information, how different informational characteristics impact implementation, ways to improve data quality, improvements to analysis methods and where data use needs to be extended into new strategies.

Originality/value – This review contributes to the SRI literature by inventorying studies of an important, yet omitted aspect, namely, sustainability information. This work also enriches the literature on corporate sustainability information by investigating how this information can be used for a specific purpose, namely, SRI. Given the increasing interest in SRI, this review will provide much-needed guidance for a range of practitioners, including investors and regulators.

Keywords Corporate social responsibility, CSR disclosure, Sustainability disclosure, ESG disclosure, ESG investing, Responsible investing, Socially responsible investing, Sustainable investing

Paper type Literature review

1. Introduction

Investors are placing greater importance on sustainability or environmental, social and governance (ESG) [1] when making investment decisions (Daugaard, 2020). However,

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a survey conducted by the CFA Institute (2015) found that 21% of investors reported having insufficient knowledge of integrating sustainability information [2] into socially responsible investing (SRI) [3]. This concern is also apparent in the published literature. For example, "missing know-how, understanding, skill, and expertise for a complex topic and its interrelations, cause diverse challenges for the individual to consider ESG factors" (Friede, 2019, p. 1274). While the notion that corporate sustainability information as material is well-established in accounting studies (e.g. Cahan *et al.*, 2016; Du and Yu, 2021; Huang and Watson, 2015; Malik, 2015), no literature review on how the information can be used in SRI has been conducted (Amel-Zadeh and Serafeim, 2018; Gödker and Mertins, 2018; Renneboog *et al.*, 2008; Widyawati, 2020). Amel-Zadeh and Serafeim (2018, p. 93) argue "little is known about how investors use ESG information". The lack of a recognised body of knowledge on how to incorporate sustainability information in SRI motivates this paper. We, therefore, review the SRI studies that incorporate the use of corporate sustainability information to provide guidance to investors interested in SRI and identify a research agenda for academics desiring to contribute to this area. Our review is guided by two research questions [RQs].

RQ1. Which sources of corporate sustainability information are used in SRI?

RQ2. How is corporate sustainability information be used in SRI?

After systemically searching through the Web of Science [4], we identified 67 SRI studies that involved the use of sustainability information in SRI. After carefully coding the studies, we found five sources of sustainability information, including corporate reports, ESG ratings, industry affiliation, news and private communication with firms [RQ1]. Our review identified ESG ratings as the source of sustainability information used most extensively across SRI strategies. These strategies employing ESG ratings include negative screening, positive screening, active ownership and integration. The other sources of sustainability information are relatively peripheral to ESG ratings. For example, industrial affiliation is pre-dominantly used in only one strategy – negative screening. In addressing RQ2, we will, therefore, mainly refer to the implementation of ESG ratings. Nevertheless, sustainability information is implemented in SRI strategies in a wide variety of ways. Our review found that in negative (positive) screening, sustainability information is used to identify firms that should be avoided (over-weighted) in the investment portfolio; with regard to active ownership, investors use sustainability information to decide which firms to target as well as verify whether firms have met their demands; in integration, sustainability information can be adopted to assess firm risk and return more accurately when constructing investment portfolios. This literature review also provides recommended avenues for future research: how analysts interact with the information, how different informational characteristics impact implementation, ways to improve the quality of the data and improvements to analysis where the data is used but also extending the use of this information into the strategies not yet fully benefiting its availability (e.g. thematic investing and impact investing).

Our literature review bridges two isolated groups of literature, namely, SRI studies and accounting studies on corporate sustainability information. Firstly, SRI has received a surge in research interest (Amel-Zadeh, 2018; Clarkin and Cangioni, 2016; Daugaard, 2020; Eccles and Viviers, 2011; Friede, 2019; Sparkes and Cowton, 2004; Viviers and Eccles, 2012; Widyawati, 2020). Our work enriches this literature by identifying further research opportunities for a niche and novel aspect: how sustainability information is used in SRI. As far as we can ascertain, Friede (2019), Daugaard (2020) and Widyawati (2020) are the reviews closest to ours. Friede (2019) explored SRI challenges grouped into individual-based, firm-based, market-based and regulatory-based, while Daugaard (2020) focused on emerging themes in the SRI literature (e.g. Islamic investment funds, climate change and emerging markets), and Widyawati (2020) reviewed the overall SRI literature. Distinct from these three studies, our review is devoted to the use of sustainability information in SRI.

Secondly, our review contributes to accounting studies on sustainability information (Cho *et al.*, 2015; Deegan, 2002; Huang and Watson, 2015; Malik, 2015; Moser and Martin, 2012). Many literature reviews, including Alrazi *et al.* (2015), Andrew and Baker (2020), Gray *et al.* (1995), Gödker and Mertins (2018), Hsiao *et al.* (2022) and Huang and Watson (2015), suggest that sustainability information is financially material. For example, Gödker and Mertins (2018) reviewed studies of how the characteristics of corporate sustainability reports (e.g. assurance) and investors (e.g. financial literacy) affect investors' responses to the reports. Distinct from their work, our review focuses on how this information (including corporate reports) can be used for a specific purpose, namely, SRI.

Our study has practical contributions. Firstly, it will be of interest to investors. Amel-Zadeh and Serafeim (2018), Cohen *et al.* (2011) and Teoh and Shiu (1990) suggest that more investors recognise the relevancy of corporate sustainability information, leading to greater use of sustainability information. However, the absence of guidance is identified as the main obstacle to investors who intend to engage in SRI (CFA Institute, 2015; OECD, 2017). Therefore, by collating the approaches to using sustainability information, our study is an invaluable resource for investors. Secondly, our findings have implications for regulators and accountants. Significant milestone developments have occurred in sustainability disclosure standards; for example, those provided by the International Sustainability Standards Board (IFRS/ISSB) [5], the United States Securities and Exchange Commission (SEC) [6] and the European Financial Reporting Advisory Group (EFRAG) [7]. As a result, accountants and firms are expected to devote more resources to preparing sustainability disclosure. Our review shows the connection between different SRI strategies and the use of sustainability disclosure, thereby contributing to the discussion of the relevance of sustainability disclosure standards. Thirdly, ESG rating agencies will benefit from our study. Given the heterogeneous uses of sustainability information in SRI strategies, and the increasing competition between ESG rating agencies (de Villiers *et al.*, 2022; Novethic, 2014), our review identifies which SRI strategies more heavily depend on ESG ratings (e.g. positive screening). This helps clarify the current specific types of users for rating agencies as well as identifies the types of users rating agencies can potentially engage with in the future.

The remainder of the paper is structured as follows. Section 2 discusses the background of SRI and prior literature reviews and how our paper contributes to this literature. Section 3 details our literature review method. The findings are reported in Section 4. This section also provides commentary and recommendations, including the likely avenues for future research. Section 5 concludes the paper.

2. Background

As indicated by Amel-Zadeh and Serafeim (2018), CFA Institute (2015), Inderst and Stewart (2018), OECD (2017) and Viviers and Eccles (2012), five mainstream strategies can be adopted in SRI, namely, screening, active ownership, integration, thematic investing and impact investing.

(1) *Screening*

Screening can be classified into two types, negative screening and positive screening. Negative screening or exclusionary screening involves excluding industries and firms from an investment portfolio based on their sustainability concerns and risks (OECD, 2017). Investors may exclude many industries (including abortion, adult entertainment, alcohol, animal testing, weapons, fur, gambling, genetic engineering, nuclear power and tobacco) due to sustainability concerns (Trinks and Scholtens, 2017). Overall, negative screening filters out (a number of) firms from portfolio construction based on their sustainability concerns (Starr, 2008).

Positive screening, also known as best-in-class screening, involves investors allocating more weight to industries and firms with better sustainability performance compared to their past performance or peers (CFA Institute, 2015). Positive screening provides flexibility as it allows investors to invest in firms that prioritise sustainability issues relevant to their respective industries, regardless of the industries. A positive screening approach is also more subtle as it involves adjustment to the weights of investments based on their degree of sustainability and accountability (Trinks and Scholtens, 2017). Inderst and Stewart (2018) warn that the use of screening (including negative and positive screening) can impact the investment universe available to investors, and screening may lead to unintended sector and factor biases in constructing portfolios.

(2) *Active ownership*

Active ownership or shareholder activism is defined as "the use of shareholder power to influence corporate behaviour through direct corporate engagement . . ., filing or co-filing shareholder proposals" (Amel-Zadeh and Serafeim, 2018, p. 94). Under this strategy, investors actively exercise their ownership rights to influence corporate policies and practices regarding sustainability issues. For example, Linzor (a Latin American-based $736m private equity fund) embraces active ownership approaches by working closely with investees to create and implement business strategies supportive of sustainability [8]. Specifically, investors can leverage their ownership position to initiate a range of actions, including private communication (e.g. meeting with managers), proposals and resolutions. Prior literature also sheds light on these actions. For example, Dimson *et al.* (2015) investigate 2,152 corporate-sustainability-oriented engagements with US public firms between 1999 and 2009, identifying various antecedents of the engagements. Firms are more likely to be engaged if they are large, mature and with poor sustainability performance. The likelihood of engagement is further increased when SRI-embracing investors have high shareholdings in the firms. Overall, while this strategy may lead to investors divesting from specific industries and firms, it is normally characterised by investors proactively interacting with firms.

(3) *Integration*

Integration is defined as a systematic inclusion of sustainability risks and opportunities in investment analysis (e.g. cash flow forecasts), portfolio construction and risk management (Inderst and Stewart, 2018). For example, Nuveen ESG Large-Cap Growth ETF (NULG) [9] uses integration strategies. Following Edmans (2023a), SRI can be viewed as investments in intangible assets, which warrants integration strategies. In the literature, Harper (2020) suggests that Sustainability Accounting Standards Board's Materiality Map can help investors to extract financial and material sustainability issues from corporate reports. Overall, as Edmans (2023b, p. 13) suggests, investors embracing SRI may focus on how sustainability issues ". . .. . . change the expected cash flows in the numerator of a valuation", and integration approaches would explicitly consider sustainability risks and opportunities together with other financial reckons in making investment decisions. Unlike positive screening, integration does not involve peer group benchmarking.

(4) *Thematic investing*

Thematic investing involves investing in themes relating to sustainability issues, such as sustainable agriculture, water supply and clean energy (CFA Institute, 2015). It focuses on identifying significant opportunities, long-term trends and themes. An example of a thematic investing product is iShares Global Clean Energy ETF (ICLN) [10]. Taking clean energy as its theme, ICLN invests in energy firms based on solar, wind and other renewable sources of energy. Following recent literature, we consider divesting an important component of modern thematic investing (Inderst and Stewart, 2018; OECD, 2017) [11]. For example, in response to

climate concerns, an energy investor may shift their portfolio's exposure away from potentially stranded assets by selling their holdings in the coal industry and reallocating funds to renewable energy firms. Thus, thematic investing approaches involve investors focusing on a theme or specific social and/or environmental goal, enabling them to address sustainability issues through investing in specific solutions or themes.

(5) *Impact investing*

Impact investing has the following characteristics: investors aim to make a social and/or environmental impact, investments are expected to generate financial returns, the returns range from below market to risk-adjusted market rate and investors are committed to measure and report environmental and social impact (CFA Institute, 2015). Therefore, focusing on projects and social enterprises, *impact investing* has a clear "intention to generate and measure social and environmental benefits alongside a financial return" (Inderst and Stewart, 2018, p. 7). In other words, investors who embrace impact investing try to strike a balance between financial returns and social returns (Inderst and Stewart, 2018). For example, Vital Capital Fund (a $350m private equity fund) is well-known for its impact investments in sub-Saharan Africa [12]. In addition, impact investing approaches involve assessing the social and/or environmental impact of investments together with their financial returns. The impact assessments can be done using tools such as social impact metrics, environmental performance scores and other methods of measuring such impact.

Overall, the use of SRI strategies ebbs and flows. Renneboog *et al.* (2008) suggest that screening is the most frequently used SRI strategy. Recent studies, including Amel-Zadeh and Serafeim (2018) and CFA Institute (2015) [13], have found that investors embrace a range of strategies, including thematic investing and impact investing. Using different SRI strategies may require processing different sources of corporate sustainability information. For example, the use of integration may require investors to consider a range of information from corporate disclosures to proprietary data (PRI, 2017); in contrast, the use of negative screening may only require investors to process some basic information (e.g. industry affiliation). Therefore, to better understand the heterogeneous and diverse uses of sustainability information in SRI, we conducted a literature review in this regard.

3. Method

To conduct a review on studies of how corporate sustainability information can be used in SRI, we consulted with seminal studies, including Amani and Fadlalla (2017), Daugaard (2020), Daugaard and Ding (2022), Linnenluecke *et al.* (2020) and Massaro *et al.* (2016). Our approach aligns with the methodology of systematic literature review outlined in these studies. A systematic literature review is useful because it thoroughly maps the landscape of research to date and helps discover areas that are missing and those just beginning to attract attention [14]. Our review is comprised of seven major steps.

Step 1. *Scoping of the review.* Our initial step was to define the scope of our literature review. As our review focuses on how sustainability information can be used in SRI, our review scope was on SRI studies that involve the use of sustainability information.

Step 2. *Identification of search terms.* Following Daugaard (2020), we applied a well-recognised set of keywords as the search terms in the article retrieval process. Our search terms are listed in Table A1. As Table A1 presents, we included all five mainstream strategies discussed in Section 2 as our search terms. Following Amel-Zadeh (2018), Eccles and Viviers (2011), Friede (2019) and Widyawati (2020), we also added additional keyword combinations (e.g. "low carbon" investing and community investing) in this list of search terms to ensure a broad collection of relevant articles is captured.

Step 3. *Identification of data sources.* Following Daugaard (2020), Linnenluecke *et al.* (2020) and Widyawati (2020), our study retrieved articles from the Web of Science (WOS). WOS is highly regarded for having a comprehensive collection of published and indexed journal articles along with their complete citation information. We selected two WOS journal indices in relation to corporate sustainability and SRI, (1) the Social Sciences Citation Index (SSCI)-Economics, Business, Management and "Business, Finance" categories and (2) the Conference Proceedings Citation Index- Social Science and Humanities (CPCI-SSH). We also employed HistCite to provide a thorough mapping of citation links, thereby helping us to identify possible missing articles (Garfield, 2004, 2009). The power of HistCite is in highlighting the most-cited articles both within and outside the set of retrieved articles. This, therefore, enabled us to identify articles that have been cited but were not included in the set of retrieved articles (Garfield, 2004). The approach thereby achieves a replicable and thorough literature search (Daugaard, 2020; Linnenluecke and Griffiths, 2013; Linnenluecke, 2017; Linnenluecke *et al.*, 2017). Overall, the search sources (i.e. the two WOS indices along with the visual presentation of HistCite) cast a wide enough net to ensure significant studies relevant to our scope are included in the collection.

Step 4. *Article collection.* We searched for literature using the search terms specified in Step 2. The search was performed on 19 July 2022. As described in Step 3, we also employed HistCite to inspect the citation links between articles and discovered a few articles omitted in the initial search. The use of HistCite enables researchers to easily trace and analyse citation links, facilitating a comprehensive and systematic literature review that enhances the rigour and reliability of their research findings. Two reasons explain why the articles were not identified using the search terms shown in Step 2 but were instead identified through mapping the citation links. Firstly, there are articles that are relevant to the purposes of our literature review but do not contain the search terms identified in Step 2. For example, Andersson *et al.* (2016) are an article relevant to our research questions, but it does not contain the search terms. Secondly, the articles were not published in journals listed in the SSCI or the CPCI-SSH. For example, Arjaliès and Bansal (2018) are an article that was not published in a journal listed in the SSCI or the CPCI-SSH, but it is within the scope of our literature review and was identified using the visual presentation of citation links. However, HistCite also found articles that are highly cited across our collection but were not relevant to the purposes of our literature review. These articles mainly focussed on established fundamental finance principles and theories (e.g. Carhart, 1997; Markowitz, 1952) or on theories or general discussion regarding corporate sustainability or corporate social responsibility but were not relevant to SRI (e.g. McWilliams and Siegel, 2001; Waddock and Graves, 1997). Overall, the search terms in Step 2 were reliable and comprehensive, and the use of HistCite helped us identify significant articles that may have been omitted, ensuring a comprehensive literature review.

Step 5. *Article filtering.* All articles were screened to make sure that they discussed how corporate sustainability information can be used in SRI [RQ2], and if possible, the source of sustainability information [RQ1]. Literature reviews and articles with insufficient details (e.g. commentaries and interpretative articles) were excluded. Our review conducted two stages of inspection to reduce subjective bias. The first inspection was performed by the three authors and a research assistant to exclude articles that did not meet the criteria. The titles, keywords and abstracts of articles were carefully reviewed. For example, after checking the abstract of Muñoz (2020), we removed this article because it examines neither RQ1 nor RQ2. The second inspection aims to resolve any inconsistencies arising in the first inspection. Two of the authors carefully read the full text of each article, compared their decisions, and discussed these until agreement was achieved. After the two stages of inspections, our final collection comprised 67 articles published between 2003 and 2022. Our search procedure is replicable, and the filtering process is shown in Figure A1.

Step 6. *Content analysis*. Content analysis can be defined as "a research technique for making replicable and valid inferences from texts (or other meaningful mater) to the contexts of their use" (Krippendorff, 2013, p. 24). Specifically, following Guthrie *et al.* (2004, p. 287), we manually coded the 67 articles ". . .. . . into pre-defined categories in order to derive patterns in the presentation and reporting of information". Our study has two pre-defined focuses in the coding process: (1) the sources of sustainability information specified in each article and (2) how the information is used in SRI (based on the five mainstream SRI strategies). However, it is worth noting that the sources of sustainability information identified in the initial round of coding were grouped into five broader categories (i.e. corporate disclosure, ESG ratings, industrial affiliations, news and private communication). This aligns well with our RQ1. With regard to RQ2, we coded the usage of sustainability information in SRI strategies. For example, when coding Muñoz (2021a, b), our review focused on how investors can use industrial affiliations (19 industries) to estimate their carbon risks by aggregating the weights of these industries in their portfolios. In other words, our study coded the 67 articles to extract specific instances of sustainability information usage in SRI strategies. As the coding related to RQ2 is interpretative, two authors completed the initial round of coding independently, and the three authors resolved inconsistencies arising in the initial round by re-coding relevant articles. Last, following de Villiers *et al.* (2022) and Ferguson and Seow (2011), we also coded other important descriptive information, including research methods and sample coverage. A detailed summary of the coded articles is shown in Table A2.

Step 7. *Reporting*. We reported the findings based on our content analysis. The findings are presented in Section 4.

4. Findings

4.1 Descriptive information

As Table 1, Panel A presents the number of studies on how sustainability information is used in SRI has increased significantly over time. For example, there were only 3 in 2011, increasing to 7 in 2020 and 14 in 2021. However, compared with the overall literature on SRI (Daugaard, 2020), this topic (i.e. how corporate sustainability information is used in SRI) has attracted far less attention. This aligns with Amel-Zadeh and Serafeim (2018) and Young-Ferris and Roberts (2021) who encouraged further research efforts in this area. Table 1, Panel B, shows the list of journals that published the studies. The top three journals (by number of publications) are *Journal of Business Ethics*, *Journal of Portfolio Management* and *International Review of Financial Analysis*. This demonstrates these studies are appealing to accounting and finance audiences. Table 1, Panel C, presents the research methods used in the reviewed studies. Most studies were archival studies (50), followed by conceptual (7) and survey (6) studies.

To better visualise the collection, we utilised the bibliographic tools of HistCite. This software features a graphing capability that maps the highest cited studies through time and displays their relative importance within all 67 studies reviewed. Figure 1 presents the relationships between the top 18 cross-cited studies of our collection. In Figure 1, each study is represented by a node. The size of the node represents the number of times the study was cross cited within the collection. Earlier studies are plotted at the top of Figure 1 and more recent studies towards the bottom. The connecting lines between the nodes represent the citations between the 18 studies. This number was chosen because it captures a reasonably high quantity of the top citations without including so many as to clutter the graph with densely overlapping links. As Figure 1 shows, there is a relatively high degree of cross-citation occurring across the collection.

Table 2 presents the list of the studies shown in Figure 1. A review of the 18 studies revealed that most analysed how corporate sustainability information is used in screening, and particularly, in negative screening. In addition, we found that the studies devoted to each

Panel A: Number of studies to 2021 Year	Number of studies
2003	1
2006	1
2007	2
2008	1
2009	3
2010	1
2011	3
2012	1
2013	2
2014	4
2015	4
2016	7
2017	4
2018	3
2019	7
2020	9
2021	14
Total	67

Panel B: Journals that published the studies Journal	Number of studies
Journal of Business Ethics	12
Journal of Portfolio Management	12
International Review of Financial Analysis	5
Financial Analysts Journal	4
Journal of Banking and Finance	3
Accounting and Finance	2
Finance Research Letters	2
Journal of Sustainable Finance and Investment	2
Pacific–Basin Finance Journal	2
Strategic Management Journal	2
Accounting, Organizations and Society	1
Business Ethics: The Environment and Responsibility	1
Corporate Governance: An International Review	1
Corporate Social Responsibility and Environmental Management	1
Entrepreneurship and Sustainability Issues	1
European Accounting Review	1
European Financial Management	1
International Journal of Social Economics	1
International Review of Economics and Finance	1
Journal of Applied Corporate Finance	1
Journal of Corporate Finance	1
Journal of Financial and Quantitative Analysis	1
Journal of Financial Economics	1
Journal of Financial Intermediation	1
Journal of Investing	1
North American Journal of Economics and Finance	1
Organization and Environment	1
Organization Studies	1

(*continued*)

Table 1. Descriptive information of studies reviewed

Panel B: Journals that published the studies Journal	Number of studies
Oxford Review of Economic Policy	1
Review of Financial Studies	1
Review of Managerial Science	1
Total	67

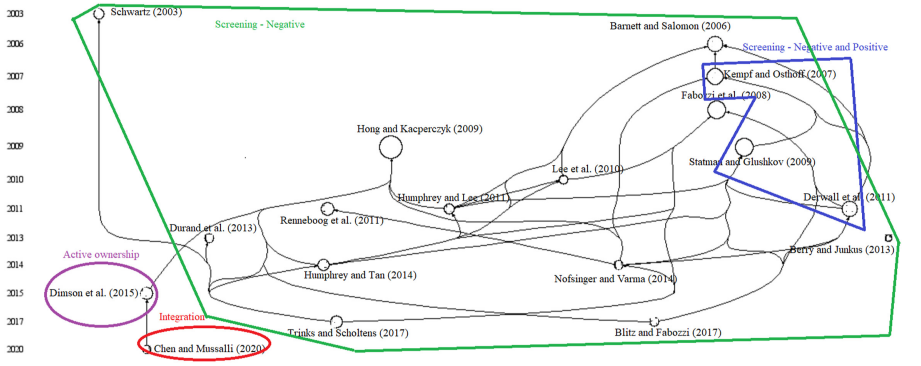
Panel C: Research methods used in the studies Research methods	Number of studies
Archival	50
Conceptual	7
Survey	6
Interviews	3
Experimental	2
Fieldwork	2
Model building	1
Total	71[1]

Note(s): Table 1 provides descriptive information about the studies reviewed in our study. Panel A reports the number of studies to 2021. Panel B shows the journals that published the studies. Panel C presents the research methods used in the studies

[1] Some studies use more than one research method

Source(s): Developed by the authors

Table 1.



Note(s): Figure 1 presents the relationships between the top 18 cross-cited studies of the 67 studies

Source(s): Developed by the authors

Figure 1.
Citation map

SRI strategy have developed in a relatively siloed manner. For example, focusing on active ownership, Dimson *et al.* (2015) barely cite the prior screening studies. A possible explanation is that the SRI strategies being researched are highly heterogeneous and not tightly connected to other SRI strategy forms. This reinforces the importance of our work. Given the literature is so fragmented, a comprehensive review across all SRI strategies reveals the links and illuminates the key differences. Overall, we found that while many accounting and finance journals are publishing relevant studies on how corporate sustainability information is used in SRI, the topic remains fragmented and the linking themes are under-developed (Amel-Zadeh and Serafeim, 2018). To encourage further research on this topic, we combed through the individual studies and offer suggestions for important future research.

No.	Authors	Year	Journal	LCS	GCS
1	Schwartz MS	2003	*Journal of Business Ethics*	5	83
2	Barnett ML, Salomon RM	2006	*Strategic Management Journal*	11	632
3	Kempf A, Osthoff P	2007	*European Financial Management*	12	302
4	Fabozzi FJ, Ma KC, Oliphant BJ	2008	*Journal of Portfolio Management*	13	115
5	Statman M, Glushkov D	2009	*Financial Analysts Journal*	13	210
6	Hong H, Kacperczyk M	2009	*Journal of Financial Economics*	22	747
7	Lee DD, Humphrey JE, Benson KL, Ahn JYK	2010	*Accounting and Finance*	4	82
8	Derwall J, Koedijk K, Ter Horst J	2011	*Journal of Banking and Finance*	11	168
9	Humphrey JE, Lee DD	2011	*Journal of Business Ethics*	6	61
10	Renneboog L, Ter Horst J, Zhang CD	2011	*Journal of Financial Intermediation*	8	146
11	Durand RB, Koh S, Tan PL	2013	*Pacific–Basin Finance Journal*	4	25
12	Berry TC, Junkus JC	2013	*Journal of Business Ethics*	2	78
13	Humphrey JE, Tan DT	2014	*Journal of Business Ethics*	6	34
14	Nofsinger J, Varma A	2014	*Journal of Banking and Finance*	4	167
15	Dimson E, Karakas O, Li X	2015	*Review of Financial Studies*	7	219
16	Trinks PJ, Scholtens B	2017	*Journal of Business Ethics*	7	60
17	Blitz D, Fabozzi FJ	2017	*Journal of Portfolio Management*	4	37
18	Chen MK, Mussalli G	2020	*Journal of Portfolio Management*	3	11

Note(s): Table 2 shows the top 18 cross-cited studies of our collection. Figure 1 presents the cross citations between the 18 studies
Source(s): Developed by the authors

Table 2.
List of highly cited articles

4.2 Sources of corporate sustainability information

Table 3 shows the sources of corporate sustainability information considered in the 67 studies (the first research question [RQ1]). Five main sources of sustainability information are discussed in the literature, including sustainability information disclosed in corporate reports, (proprietary) ESG ratings, industry affiliation (i.e. using industry affiliation to decide whether a firm is sustainable or not), news (i.e. the news coverage on a firm's sustainability policies and practices) and information through private communications. As Table 3 reveals, industrial affiliation and ESG ratings were the most discussed in the 67 studies. A total of 28

	Socially responsible investing strategies				
Sources of information	Negative/ exclusionary screening	Positive/best-in-class screening	Active ownership	Integration	Others
Corporate disclosure		1		4	1
ESG ratings	16	14	3	10	
Industrial affiliations	28	1			
News	1		1		
Private Communication	1		1		

Note(s): Table 3 shows the sources of corporate sustainability information identified in our review. We separate these studies according to their socially responsible investing strategies and the sources of sustainability information. It is noteworthy that some studies involve more than one strategy and/or discuss more than one source
Source(s): Developed by the authors

Table 3.
Sources of corporate sustainability information

studies (e.g. Trinks and Scholtens, 2017) employed industrial affiliation as a source of sustainability information, and industrial affiliation is a well-recognised pillar for negative screening strategies. Investors use industry affiliation to decide a firm's sustainability concerns and risks. For example, firms in the tobacco, alcohol and gambling industries were deemed to have a high level of sustainability risk, therefore, excluded from portfolios (Fauver and McDonald IV, 2014). In contrast, ESG ratings were used in a broad range of strategies, including active ownership (Dimson *et al.*, 2015), positive screening (Joliet and Titova, 2018) and integration (Martellini and Vallée, 2021). This aligns with other studies that found that ESG ratings are widely used in SRI (de Villiers *et al.*, 2022; Patten, 2015). Our review identified that corporate reports (e.g. standalone sustainability reports) play a less prominent role in SRI. Few studies mentioned that corporate reports were their sources of sustainability information (e.g. van Duuren *et al.*, 2016). However, this does not negate the importance of corporate reports. Many ESG rating agencies analyse these reports in preparing their ESG ratings (de Villiers *et al.*, 2022). Therefore, our review suggests that the primary users of corporate sustainability reports are ESG analysts [15]. This parallels the accounting literature which shows that financial analysts process and interpret accounting information and provide their products (e.g. estimated earnings) to investors (Ramnath *et al.*, 2008), and investors are, therefore, not necessarily the direct users of accounting information. Accordingly, we believe accounting researchers need to adjust their focus from investors (Brown-Liburd and Zamora, 2015; Gödker and Mertins, 2018) to ESG analysts, explore how ESG analysts interpret corporate sustainability reports and investigate how ESG analysts' decisions are shaped by the characteristics of sustainability reports (e.g. tones of language, readability and the use of external assurance). Although some studies have examined how corporate sustainability reports affect financial analysts' decisions (e.g. Dhaliwal *et al.*, 2012; Hinze and Sump, 2019; Pflugrath *et al.*, 2011; Tsang *et al.*, 2022), only a few studies have explored how such reports affect ESG analysts' decisions. Christensen *et al.* (2022) are an early exemplar of this type of research. By analysing a sample of US firms, they found that an increase in the volume of corporate sustainability reporting actually made it difficult for ESG analysts to reach a consensus for ESG ratings. Overall, further research efforts could be used in probing how various characteristics of corporate sustainability reports influence ESG analysts, and more importantly, how to address the (probably) undesirable influence of these characteristics (e.g. an overly optimistic tone of language). As ESG ratings are expected to play an increasingly critical role in SRI (de Villiers *et al.*, 2022), this research avenue is necessary to support industry best-practices.

RR1. Researchers need to examine how various characteristics of corporate sustainability reports affect ESG analysts' interpretations and final ratings. Moreover, whether and how ESG analysts' characteristics (e.g. education and prior training received) affect their responses to the characteristics of corporate sustainability reports is also worthy of further research.

4.3 How is corporate sustainability information used in screening?

As discussed in Section 2, screening can be grouped into two categories, (1) negative/exclusionary screening and (2) positive/best-in-class screening. For negative screening, ESG ratings (for example, the MSCI ESG database for stocks and the Verisk database for bonds) can be used to identify firms with poorer performance than their peers. In negative screening, these firms would be excluded from investment portfolios. For example, Auer (2016) showed that for stock portfolios, excluding firms without ESG ratings and those with relatively poorer corporate governance ratings generated higher returns; while Martellini and Vallée (2021) found that for sovereign bond portfolios, investors could use ESG ratings to exclude the 25% lowest-ranked bonds and thereby lowering portfolio risks.

Investors can also screen firms based on whether their business operations are controversial from the perspective of sustainability. For example, Trinks and Scholtens (2017) suggest 14 controversial business operations associated with a high level of sustainability risk [16]. A popular approach is to use industrial affiliation to infer whether firms are involved in controversial business activities (Barnett and Salomon, 2006; Fauver and McDonald IV, 2014; Guidi *et al.*, 2020; Humphrey and Tan, 2014; Renneboog *et al.*, 2008). ESG ratings can also be used to identify firms with controversial business operations. For example, the MSCI database flags firms with controversial business operations (Humphrey and Tan, 2014). Lastly, news articles help investors to identify firms with controversial business operations (Schepers and Sethi, 2003; Verheyden *et al.*, 2016).

Overall, there are two main indicators in negative screening: (1) ESG performance and (2) involvement in controversial business operations. For the first indicator, investors can consult a firm's ESG ratings to understand the firm's ESG performance (compared with their past ratings or their peers' ratings) or whether its business operations are red-flagged by rating agencies. For the second indicator, investors may use industrial affiliation, ESG ratings and news articles about violating sustainability initiatives and the occurrence of incidents to infer whether firms are involved in controversial business operations.

Although the notion of negative screening is straightforward, our review found that implementing negative screens typically requires additional research efforts. Firstly, given the presence of discernible ESG rating disagreement (Berg *et al.*, 2022; Chatterji *et al.*, 2016; Sahin *et al.*, 2022), investors may exclude different firms based on which rating agencies they consult with. The presence of ESG rating disagreement also affects how investors identify involvement in controversial business operations. The literature does not yet provide clear evidence or guidance in this regard.

RR2. Researchers need to examine how the presence of ESG rating disagreement impacts investors when they use negative screening.

Secondly, if investors wish to identify whether a firm is involved in controversial business activities, they need to overcome two challenges. A firm's business operations can be difficult to trace and verify. For example, to check whether firms are involved in nuclear operations, investors need to access several databases and indices (S-BOX Nuclear Power Index, World Nuclear Power Index of Deutsche Borse, Zurcher Kantonalbank and Thomson ONE Banker) (Lobe and Walkshäusl, 2016). In addition, the presence of infringement can cloud decisions, as "Infringement may take place by acting as a supplier, a customer, a joint venture partner, a creditor, or a shareholder of other firms that would otherwise be excluded by the ethical screens" (Schwartz, 2003, p. 209). A solution is using 50% of the total revenue of an operation as a threshold to determine the presence of infringement (Lobe and Walkshäusl, 2016). As far as we could ascertain, information about how to determine the presence of infringement is absent in the literature.

RR3. Researchers should examine how investors determine the presence of infringement when using negative screening.

Thirdly, the comprehensiveness of negative screening needs to be balanced between the feasibility of investment and the pursuit of sustainability. For example, Arribas *et al.* (2019) found that if comprehensive screening is adopted, most listed firms in the world are excluded due to violations of corporate sustainability. Clearly, such comprehensive screening is not feasible while following the notion of sustainability. The comprehensiveness of screening is heterogeneous in the literature. For example, many studies (e.g. Humphrey and Tan, 2014) have adopted an aggregate screening that collectively considers different ESG issues; however, Nofsinger and Varma (2014) show that investors may consider these issues separately. With regard to industrial affiliation, some studies (e.g. Durand *et al.*, 2013; Hong and Kacperczyk, 2009; Liu *et al.*, 2014) have excluded three industries (alcohol, tobacco

and gaming industries), although many more industries could be potentially excluded (Trinks and Scholtens, 2017). Zwergel *et al.* (2019) suggest that investors could even screen firms by country-level characteristics. For example, firms located in countries violating human rights could be excluded. Overall, future researchers need to explore how investors maintain a (pragmatic) balance between the feasibility of investment and the pursuit of sustainability in deciding the comprehensiveness of negative screening.

RR4. Researchers should investigate how investors determine the comprehensiveness of their negative screening.

In terms of positive screening, investors assess ESG ratings to find firms that perform better relative to their historical performance (Verheyden *et al.*, 2016) or their peers (Cahan *et al.*, 2017). While there are relatively few studies on positive screening, its popularity among investors should be not underestimated. For example, Le Sourd and Safaee (2021) found that positive screening strategies are used for most exchange-traded funds in Europe, and most SRI funds in France also use positive screening strategies (Leite and Cortez, 2015). Our review suggests that positive screening strategies rely on ESG ratings for implementation, and other sources of sustainability information are not mentioned in the literature.

Our review found two challenges to positive screening strategies, with the presence of ESG rating disagreement as the primary challenge. As investors rely (heavily) on ESG ratings to decide which firms are included or which firms receive more weight, the rating disagreement is influential. Therefore, we call for more studies on how investors can better manage rating disagreement in positive screening. Another challenge is that positive screening strategies may allow investors to invest in firms involved in controversial business activities if they perform relatively better than their peers (Arribas *et al.*, 2019). Therefore, investors need to address this potential conflict. However, the literature to-date does not explore how to address this conflict. The literature does reveal that positive screening and negative screening are not mutually exclusive, and can be combined (e.g. Cai *et al.*, 2021; Derwall *et al.*, 2011; Statman and Glushkov, 2009; Verheyden *et al.*, 2016). In practice, the combined use of negative screening and positive screening is very common (Leite and Cortez, 2015). For example, investors can exclude firms belonging to alcohol, firearms, gambling, military, nuclear operations and tobacco industries and then invest in the required proportion (e.g. 30%) of the remaining firms with top ESG ratings (Statman and Glushkov, 2009).

RR5. Researchers should examine how the presence of ESG rating disagreement impacts investors when using positive screening.

RR6. Researchers should also examine how investors perceive and address the concern that positive strategies allow for investment in firms with exposure to a high level of sustainability risk.

4.4 How is corporate sustainability information used in active ownership?

Active ownership, or shareholder activism, has attracted significant research attention (Denes *et al.*, 2017; Goranova and Ryan, 2014; Karpoff, 2001). Due to financial incentives, shareholders may use the ownership position to actively influence corporate policies and practices (Denes *et al.*, 2017). Shareholders also use their ownership position to change corporate sustainability practices. The mechanisms available to them include private communication (e.g. meeting with managers) (Dimson *et al.*, 2015), shareholder proposals (David *et al.*, 2007; Flammer, 2015; Grewal *et al.*, 2016) and resolutions (Reid and Toffel, 2009). Although there is evidence of studies that are devoted to active ownership and corporate sustainability (Sjöström, 2008; Cundill *et al.*, 2018) as well as investor surveys indicating sustainability information is used in active ownership (Amel-Zadeh and Serafeim, 2018), our review found only a few studies covering this area.

Firstly, an activist investor may consult with sustainability information when deciding which firms should be targeted. Examining 613 US-listed firms from 1999–2009, Dimson *et al.* (2015) found that ESG ratings, news articles about corporate sustainability and private communication with managers were used by investors when initiating their activities. Similarly, Barko *et al.* (2021) identified that various sources of sustainability information (including ESG ratings and corporate reports) were considered. It is noteworthy that some investors (e.g. Nordic institutional investors) use the information provided by professional engagement agents (Semenova and Hassel, 2019). Overall, in determining which firms should be targeted, investors tend to use heterogeneous sources of sustainability information. Given the presence of greenwashing in corporate reports (Li *et al.*, 2022), ESG rating disagreement (Berg *et al.*, 2022) and managerial exaggeration in private communication (Solomon *et al.*, 2013), future research can examine whether and how investors reconcile and weigh information from different sources. Better understanding in this regard could help investors to overcome the first hurdle of exercising their ownership positions, namely, deciding which firms they should target.

RR7. Researchers can investigate how investors can better verify and weigh different sources of sustainability information when determining which firms to target.

Secondly, given that investors may privately communicate with firms (Becht *et al.*, 2009) and/or publicly voice their positions, we encourage researchers to examine how the choice of engagement strategies affects the use of corporate sustainability information. For example, if investors aim to hold private discussions with firms, would they have greater use for corporate reports [17]? If they prefer to publicly voice their positions, should they consult with independent sources of information (e.g. ESG ratings and news) to substantiate their positions?

RR8. Researchers should explore how engagement strategies in active ownership affect the use of corporate sustainability information.

Thirdly, as the engagement initiated may fail (Cundill *et al.*, 2018) and substantial firm-level changes take time (Dimson *et al.*, 2015), corporate sustainability information can be used to facilitate investors in tracing and verifying the outcomes of their engagement. Clearly, if disclosing more sustainability information is the investors' aim (e.g. Baloria *et al.*, 2019), it is relatively simple to assess whether firms have satisfied investors. For outcomes that are not easily observable (e.g. making suppliers to improve workplace safety), investors need to find an alternative solution. The existing literature about active ownership does not provide many alternatives. For example, investors may trace corporate policy and governance changes (e.g. forming a board committee devoted to sustainability) (Dimson *et al.*, 2015) or use professional engagement agents (Semenova and Hassel, 2019). Gifford (2010) suggests that investors have different levels of influence or salience to firms. This may affect how investors can trace and follow up on their engagement. Overall, we suggest that future researchers examine how investors can use sustainability information to follow up on their engagement.

RR9. Researchers need to investigate how investors (with different levels of salience) can better use sustainability information in following up on their engagement and checking the outcomes of their engagement.

4.5 How is corporate sustainability information used in integration?

Studies on integration cover different sources of sustainability information, including carbon emissions (Andersson *et al.*, 2016), corporate reports (Harper, 2020; Pan, 2020; Van Duuren *et al.*, 2016) and ESG ratings (Capelli *et al.*, 2021). Our review found that studies on integration emphasise the use of corporate reports. In contrast, as prior sections suggest, studies on

screening and active ownership focus more on ESG ratings and other sources of information (e.g. news). Our review suggests that the Sustainability Accounting Standards Board's (SASB) Materiality Map is a key analytical framework to tease out financial material sustainability issues that can be integrated (Khan *et al.*, 2016). For example, Harper (2020) and Henriksson *et al.* (2019) explained how investors can use the SASB's Materiality Map to extract financial material issues from corporate reports (e.g. positive, negative and missing items) and quantify them. Pan (2020) and Van Duuren *et al.* (2016) emphasised that investors can flag (potential) risks by analysing corporate reports. However, the existing literature does not thoroughly examine the problem that firms may manipulate tones of language in their reports (Clarkson *et al.*, 2020; Li *et al.*, 2022) and withhold negative information to cloud investors' decisions (Archel *et al.*, 2009; Boiral, 2013, 2016; Cooper and Slack, 2015; Rodrigue, 2014; Williams and Adams, 2013). Therefore, further research is necessary into how investors' judgments about corporate reports are influenced by tones of language and withholding of negative information. In addition, researchers have an opportunity to investigate whether the SASB's Materiality Map and other frameworks (e.g. Global Reporting Initiative) can alleviate the negative impact of undue reporting behaviour.

RR10. Researchers should investigate how investors are affected by withholding negative information and moderated tones of language in corporate sustainability reports.

RR11. Researchers are also encouraged to examine whether existing analytical frameworks can help investors to alleviate the negative impact of firms' undue disclosure behaviour.

Our review found that sustainability information tends to be analysed from the view of firm risk. For example, Capelli *et al.* (2021) suggest that investors consult with ESG ratings to measure a firm's exposure to sustainability risk. As corporate sustainability mitigates firm risk (Albuquerque *et al.*, 2019), it is reasonable to integrate sustainability information from the view of firm risk. However, sustainability information is likely to have an impact on returns as well as risk. As corporate sustainability is related to customer preference and loyalty (Lacey and Kennett-Hensel, 2010; Luo and Bhattacharya, 2006; Mandhachitara and Poolthong, 2011; Servaes and Tamayo, 2013), firms publishing positive sustainability information have the potential to generate more free cashflow. Therefore, to expand the literature, researchers should also consider sustainability information from the view of expected cashflows. Lastly, a few studies, including Chen and Yang (2020), de Souza Cunha *et al.* (2021), Fan and Michalski (2020), Lee *et al.* (2021) and Martellini and Vallée (2021), discussed integrating sustainability information into portfolio construction. For example, a momentum strategy in which investors buy stocks "with strong previous stock returns and with top ESG scores" and sell stocks "with poor previous stock returns and low ESG scores" (Chen and Yang, 2020, p. 2).

RR12. Researchers need to explore how sustainability information can be integrated into the prediction of expected cashflow.

While integrating sustainability information is typically considered to be the main approach for investors interested in sustainability (CFA Institute, 2015), some studies, including Arjaliès and Bansal (2018), Henriksson *et al.* (2019), Pan (2020) and Young-Ferris and Roberts (2021) found that integrating sustainability information is used less often than expected. For instance, investors of fixed-income securities were found to not integrate sustainability information because of the challenges of quantifying the information (Arjaliès and Bansal, 2018). This issue helps profile the practical guidance that this current literature review creates for investors. For example, identifying financial material sustainability information is

a challenge to many investors (Arjaliès and Bansal, 2018; Young-Ferris and Roberts, 2021). Our review suggests that the use of SASB's Materiality Map and ESG ratings can help investors to overcome this challenge. To further promote the use of integration, researchers can also contribute to solving another major challenge faced by investors. There are significant limitations to corporate reporting which restricts investors' understanding of the impact of corporate practices on sustainability (Milne and Gray, 2013; Young-Ferris and Roberts, 2021). "In making sense of sustainability, primarily through an ill-developed and incomplete notion of the TBL [Triple Bottom Line], businesses and their associated institutions have limited their ideas to issues about themselves" (Milne and Gray, 2013, p. 24). Because ESG ratings are based on corporate reports (Deegan, 2017; de Villiers *et al.*, 2022), using ratings may not effectively address the challenge. Therefore, we encourage researchers to investigate which sources of data and information investors can combine with corporate reports to depict a more comprehensive picture of how firms impact the sustainability of society and the environment.

RR13. Researchers may explore which sources of data and information investors can leverage to better understand a firm's impact on sustainability.

4.6 How is corporate sustainability information used in other SRI strategies?

Although surveys (e.g. Le Sourd and Safaee, 2021) have shown that thematic investing and impact investing are used by some investors, our review found very few studies investigate how corporate sustainability information is used in these two SRI strategies. For example, while investors use divestment (Bolton and Kacperczyk, 2021; Dawkins, 2018), as far as we could ascertain, no SRI studies whether and how investors use sustainability information in making divestment decisions exist. Regarding impact investing, we found only one study, Lee *et al.* (2020), which revealed investors engaging in impact investing are affected by cognitive bias (i.e. categorical cognition) stimulated by sustainability information in allocating resources between projects. However, corporate sustainability information should be useful in identifying desirable social enterprises and projects (Block *et al.*, 2021; Islam, 2022).

RR14. Researchers have an opportunity to explore how corporate sustainability information can be used in thematic investing and impact investing.

5. Conclusion

Motivated by the momentum currently experienced by SRI and the importance of corporate sustainability information to SRI, we reviewed prior studies that involved the use of sustainability information. We systemically reviewed 67 SRI studies. The studies were coded from two aspects: (1) the sources of sustainability information and (2) how the information is used in SRI. For the first aspect, our review found five sources of sustainability information (i.e. corporate reports, ESG ratings, industry affiliation, news and private communication with firms). In relation to the use of sustainability information, we summarised and discussed its usage. In general, we found that for negative and positive screening, sustainability information is used to select firms to be avoided or to receive greater investment weighting. For active ownership, investors can consult sustainability information to determine which firms the investors should engage with as well as use this information to follow up and verify the outcomes of the engagement. Regarding integration, sustainability information is used to better measure firm risk and return, and thereby improve portfolio construction. In contrast, there is a significant lack of studies on thematic investing and impact investing. Based on this literature review, we have set out 14 key recommendations on important avenues for future research.

Our review contributes to the SRI literature by inventorying studies of an important, yet omitted aspect, namely, sustainability information. Equally importantly, our work enriches the accounting literature about sustainability information by investigating how the information is used for a specific purpose, namely, SRI. Given the increasing interest in SRI, our review will provide much-needed guidance for a range of practitioners, including investors and regulators.

Some limitations in our review can also motivate future research. Firstly, as the scope of our review is limited to two Web of Science journal indices, future reviews may consult with other journal databases, thereby expanding the review scope. Secondly, our review focuses on SRI studies, and our findings speak to investors who are interested in engaging in SRI. Clearly, sustainability information may be also relevant to conventional investors who do not yet consider sustainability when investing. Therefore, researchers should consider examining the differences between those investors engaging with SRI and those more conventional investors who are not yet considering sustainability.

Notes

1. For example, the number of organisations who are signatories to the Principles for Responsible Investment reached 4,000 in 2021, and the assets owned or under management by these signatories grew to US$121tn. See https://www.unpri.org/annual-report-2021/how-we-work/building-our-effectiveness/enhance-our-global-footprint#:~:text=The%20collective%20AUM%20represented%20by,as%20of%2031%20March%202021.; https://www.unpri.org/pri-blog/pri-reaches-4000-signatories-with-emerging-markets-boosting-ri-uptake/7823.article (accessed date 12 September 2021).
2. Following Hsiao *et al.* (2022), here, we define (corporate) sustainability information as the communication of corporate environmental, social and governance practices. There are different types of corporate sustainability information. For example, corporate disclosure (e.g. standalone sustainability reports) (Clarkson *et al.*, 2020) and environmental, social and governance [ESG] ratings provided by third-party agencies (Chatterji *et al.*, 2016).
3. We are aware that different terms are used to describe investing activities that consider corporate environmental, social and governance practices in investment analysis (Daugaard, 2020). For example, socially responsible investing [SRI] (Renneboog *et al.*, 2008; Widyawati, 2020), ESG investing (Daugaard, 2020) and sustainable investing (Bauer *et al.*, 2021). In this paper, we use the term "SRI" because it is the term used most frequently in the literature (see Table 2 of Daugaard, 2020).
4. Web of Science is an important database frequently used in systematic reviews (Daugaard, 2020; Linnenluecke *et al.*, 2020; Widyawati, 2020).
5. https://www.ifrs.org/projects/completed-projects/2021/sustainability-reporting/(accessed date 12 September 2021).
6. https://www.sec.gov/sec-response-climate-and-esg-risks-and-opportunities (accessed date 12 September 2021).
7. https://www.efrag.org/Activities/2010051123028442/Sustainability-reporting-standards-roadmap?AspxAutoDetectCookieSupport=1 (accessed date 12 September 2021).
8. Readers may refer to https://www.unpri.org/stewardship/linzor-responsible-and-active-ownership-in-emerging-market-private-equity/11050.article (accessed 30 March 2023).
9. Readers may refer to https://www.nuveen.com/en-us/exchange-traded-funds/nulg-nuveen-esg-large-cap-growth-etf (accessed 29 March 2023).
10. Readers may refer to https://www.blackrock.com/us/individual/products/239738/ishares-global-clean-energy-etf (accessed 29 March 2023).
11. We acknowledge that divesting can be related to negative or exclusionary screening (Dawkins, 2018).

12. Readers may refer to https://www.weforum.org/organizations/vital-capital-fund#:~:text=Vital%20Capital%20Fund%20is%20a,attractive%20financial%20returns%20for%20investors. (accessed 29 March 2023).
13. Readers may refer to Table 4 of Amel-Zadeh and Serafeim (2018) and page 7 of CFA Institute (2015).
14. Petticrew and Roberts (2006, p. 9) suggest that "systematic reviews are literature reviews that adhere closely to a set of scientific methods that explicitly aim to limit systematic error (bias), mainly by attempting to identify, appraise and synthesise all relevant studies (of whatever design) in order to answer a particular question or set of questions".
15. ESG analysts are defined as analysts who assign ESG ratings to firms in a rating universe. Usually, they are employed by ESG rating agencies. However, many institutional investors also have "in-house" ESG analysts (Arjaliès and Bansal, 2018).
16. For example, abortion, adult entertainment, alcohol, animal testing, contraceptives, controversial weapons, fur, gambling, genetic engineering, meat, nuclear power, pork, (embryonic) stem cells and tobacco.
17. Investors use corporate reports for a variety of reasons. For example, they can use the information to better understand how managers perceive sustainability before they privately meet with managers. Such knowledge would enable investors to negotiate with managers more effectively.

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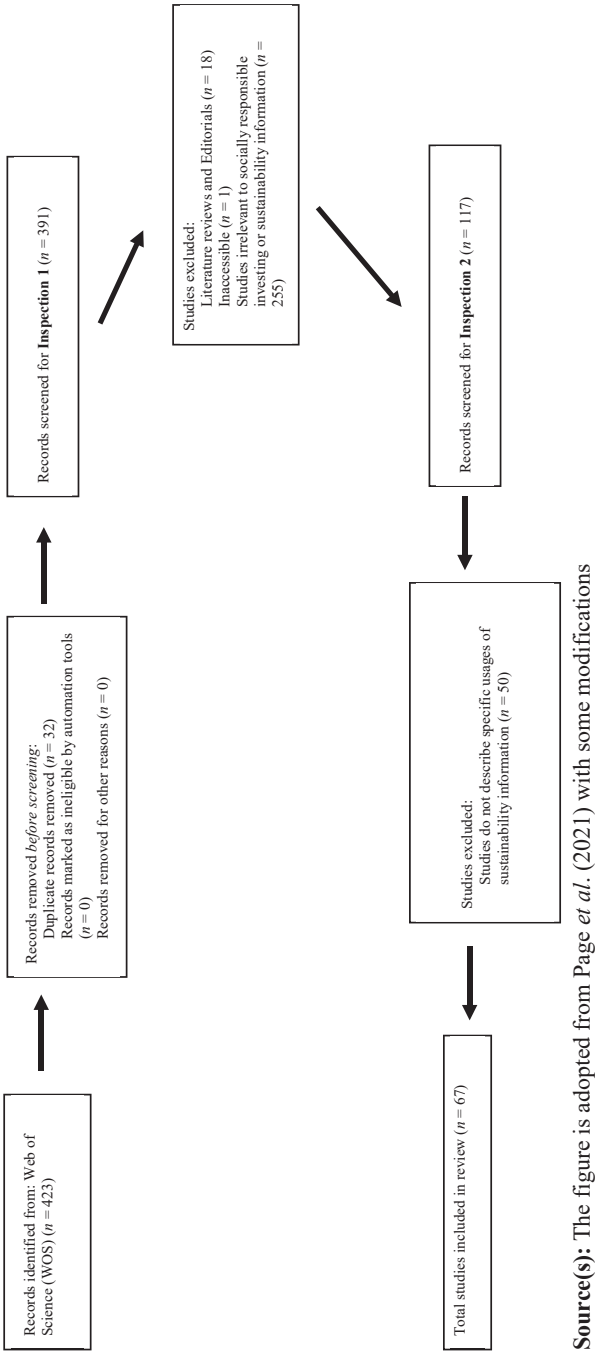
Appendices

Set	Search terms
Set 1	(invest*) AND ((ESG screen*) OR (negative screen*) OR (exclusionary screen*) OR ("exclusion of holdings") OR (positive screen*) OR ("best in class" screen*) OR (ESG policies investing) OR (ESG investing criteria) OR ("low carbon" investing) OR ("positive investment selection") OR ("best in class investment selection") OR ("Norms based screening") OR ("integration of ESG factors") OR ("ESG integration") OR ("Integrating ESG") OR (impact investment$) OR (impact investing) OR (community investment$) OR (community investing) OR (thematic investing) OR (active ownership))
Set 2	("security selection") AND ((ESG screen*) OR (negative screen*) OR (exclusionary screen*) OR ("exclusion of holdings") OR (positive screen*) OR ("best in class" screen*) OR (ESG policies investing) OR (ESG investing criteria) OR ("low carbon" investing) OR ("positive investment selection") OR ("best in class investment selection") OR ("Norms based screening") OR ("integration of ESG factors") OR ("ESG integration") OR ("Integrating ESG") OR (impact investment$) OR (impact investing) OR (community investment$) OR (community investing) OR (thematic investing) OR (active ownership))
Set 3	("asset allocation") AND ((ESG screen*) OR (negative screen*) OR (exclusionary screen*) OR ("exclusion of holdings") OR (positive screen*) OR ("best in class" screen*) OR (ESG policies investing) OR (ESG investing criteria) OR ("low carbon" investing) OR ("positive investment selection") OR ("best in class investment selection") OR ("Norms based screening") OR ("integration of ESG factors") OR ("ESG integration") OR ("Integrating ESG") OR (impact investment$) OR (impact investing) OR (community investment$) OR (community investing) OR (thematic investing) OR (active ownership))
Set 4	(portfolio$) AND ((ESG screen*) OR (negative screen*) OR (exclusionary screen*) OR ("exclusion of holdings") OR (positive screen*) OR ("best in class" screen*) OR (ESG policies investing) OR (ESG investing criteria) OR ("low carbon" investing) OR ("positive investment selection") OR ("best in class investment selection") OR ("Norms based screening") OR ("integration of ESG factors") OR ("ESG integration") OR ("Integrating ESG") OR (impact investment$) OR (impact investing) OR (community investment$) OR (community investing) OR (thematic investing) OR (active ownership))

Note(s): This table presents all search terms used in our literature review. It is based on Daugaard's (2020) Table 1

Source(s): Developed by the authors based on Daugaard (2020)

Table A1.
Search terms used



Source(s): The figure is adopted from Page *et al.* (2021) with some modifications

Figure A1.
Article filtering

Table A2.
Summary of the studies reviewed

Title	Method	Sample coverage	Sources of corporate sustainability information	The use of corporate sustainability information
Panel A: Screening				
A tale of values-driven and profit-seeking social investors	Archival	United States	ESG ratings	Investors may use the Kinder, Lydenberg and Domini (KLD) database to identify firms with controversial businesses. These firms would be removed from the investment universe. Then, investors may rank firms in the investment universe from the highest to the lowest rating. Last, investors may long high-rated portfolios and short low-rated portfolios
Australian socially responsible funds: Performance, risk and screening intensity	Archival	Australia	Industry affiliations	Investors may use industrial affiliations to exclude or include firms, although investors in Australia prefer positive screening to negative screening. The affiliations include environment, defence/weapons, tobacco and labour relations
Beyond dichotomy: The curvilinear relationship between social responsibility and financial performance	Archival	Worldwide	Industry affiliations	Investors may use industrial affiliations to exclude firms. These affiliations include alcohol, tobacco, gambling, defence/weapons, animal testing, product/service quality, environment, human rights, labour relations, employment equality, community investment and community relations
Carbon-intensive industries in socially responsible mutual funds' portfolios	Archival	United States	Industry affiliations	Investors may use industrial affiliations to calculate the exposure to "black" industries. For fossil fuel industries, investors may aggregate the weights of the following industries: oil and gas drilling, oil and gas exploration and production (E&P), oil and gas integrated, oil and gas midstream, oil and gas refining and marketing, oil and gas equipment and services and coal. For metal industries, investors may aggregate the weights of the following industries: aluminium, copper, gold, industrial metals and minerals, silver, steel and metal fabrication. For utilities industries, utilities-independent power producers, utilities diversified, utilities regulated-electric, utilities regulated-gas and utilities regulated-water would be aggregated
Climate change and asset management	Conceptual		ESG ratings	Investors may remove firms with worse carbon intensity based on their carbon emissions
Do greener funds perform better? An analysis of open-end equity funds in China	Archival	China	Industry affiliations	Investors may use industrial affiliations to include firms in their investment universes. For example, investors may focus on firms involved in energy conservation, resource recycling and utilisation and environmental protection
Do socially responsible funds actually deliver what they promise?	Conceptual		Industry affiliations	Investors may use industrial affiliations, newspaper stories, anecdotal information and occasional conversations with corporate officials to exclude firms. The paper suggests that this approach is questionable because the criteria for defining these negative screens are seriously flawed both in terms of (a) the underlying rationale for the negative screen itself and (b) its indiscriminate and uneven application
Do socially responsible investment policies add or destroy European stock portfolio value?	Archival	Countries in Europe	ESG ratings	Investors may use the Sustainalytics database to measure the ESG performance of firms. Firstly, investors may exclude all firms without any ESG scores. Then, they rank the stocks according to the scores. Based on this ranking, investors may exclude the worst 5–20% of the stocks and form an equally weighted portfolio of the remaining securities

(*continued*)

Table A2.

Title	Method	Sample coverage	Sources of corporate sustainability information	The use of corporate sustainability information
Does it really hurt to be responsible?	Archival	United States	Industry affiliations ESG ratings	Firstly, investors may use industrial affiliations to exclude firms of tobacco, alcohol, gambling and defence/weapons. Secondly, such negative screening could use the Kinder, Lydenberg and Domini (KLD) database to exclude firms involving controversial businesses (i.e. tobacco, alcohol, firearms, gambling, weapons, military and nuclear). Thirdly, investors may use the KLD database to measure the ESG performance of firms by taking the total number of strengths minus the total number of concerns. Then, the firms with a positive total score would be included in the investment universe
Equity SRI funds vacillate between ethics and money: An analysis of the funds' stock holding decisions	Archival	United States	ESG ratings	Compared with growth funds, active funds allocate more weight to ESG performance. However, for active funds, the timing of inclusion or exclusion of firms is driven by financial fundamentals rather than by ESG performance. Interestingly, even conventional funds also consider ESG performance in their decisions, while SRI funds pay more attention to ESG performance
ESG for all? The impact of ESG screening on return, risk, and diversification	Archival	Worldwide	ESG ratings	Investors may use the Sustainalytics database to measure the ESG performance of firms. With regard to positive screening, investors may exclude the firms in the bottom 10% of ESG rankings (relative to their competitors) and the bottom 25%. As to a combination of positive screening and negative screening, investors further exclude firms in violation of any of the 10 Global Compact principles from the two best-in-class portfolios. Investors may also combine positive screening with ESG momentum by focusing on firms that experienced changes in their ESG scores over the last three and six months
Ethical screening and financial performance: The case of Islamic equity funds	Archival	Worldwide	Industry affiliations	Investors may use industrial affiliations to exclude firms
Finding socially responsible portfolios close to conventional ones	Archival	United States	ESG ratings	Investors may use the Kinder, Lydenberg and Domini (KLD) database along with consulting with experts to measure firm-level environmental performance and construct portfolios based on different screenings
Institutionalising social impact investing: Implications for Islamic finance	Archival Interviews Fieldwork	Worldwide	Industry affiliations	They may use industrial affiliations to exclude firms. These affiliations include alcohol, gambling, pornography, tobacco and weapons. However, this may not offer any guarantee that investments will lead to impact or social change. Moreover, negative screens may be insufficient to promote positive social changes. Secondly, investors may use positive screens, including firms contributing to communities below a certain income threshold and/or meeting the community's needs
International variation in sin stocks and its effects on equity valuation	Archival	G20 countries	Industry affiliations	Investors may use industrial affiliations to exclude. The affiliations are tobacco, alcohol, and gambling
Is ethical money financially smart? Nonfinancial attributes and money flows of socially responsible investment funds	Archival	Worldwide	Industry affiliations	Investors may use industrial affiliations to exclude firms. The paper found that investors may refer to different affiliations in their negative screening processes

(*continued*)

Table A2.

Title	Method	Sample coverage	Sources of corporate sustainability information	The use of corporate sustainability information
Is sin always a sin? The interaction effect of social norms and financial incentives on market participants' behaviour	Archival	United States	Industry affiliations	Investors may use industrial affiliations to exclude. The affiliations are tobacco, alcohol and gambling
MRI and SRI mutual funds: A comparison of Christian, Islamic (morally responsible investing), and socially responsible investing (SRI) mutual funds	Conceptual		Industry affiliations	Investors may use industrial affiliations to exclude firms. For socially responsible investment (SRI) funds, industrial affiliations include alcohol, gambling, tobacco and weapons production or distribution. Additional screens may include showing respect and good performance in the areas of animal welfare, board diversity, community relations, corporate governance, environment, human rights, indigenous peoples' rights, product safety and impact and workplace practices
Negative screening and sustainable portfolio diversification	Archival	Worldwide	ESG ratings	Investors may use the Thomson Reuters Eikon database to identify firms involved in controversies. The paper found that the use of negative screening is difficult, because (1) most of the major public firms in the world, in all industries, would be excluded due to their involvement in controversies and (2) this portfolio could not properly be diversified, not in geographical terms, nor regarding industry sectors. In addition, the use of the best-in-class screening approach is probably misleading, because this approach allows investors to invest in firms involved in irresponsible behaviour
On the heterogeneity of sustainable and responsible investors	Survey	Germany		Investors may use characteristics at three levels (firm, industry and country) to exclude firms. The country-level characteristics are: violating human rights in general; using controversial or banned weapons; allowing the export of arms and weapons in crisis regions; not effectively combating corruption and money laundering; restricting freedom of expression and assembly; being not committed themselves to the protection of biodiversity of animals and plants. The industry-level characteristics are the arms and defence industry; industrial cattle breeding; pornography; nuclear power; genetic engineering in agriculture; gambling industry. The firm-level characteristics are exploitative child labour; destruction of (primaeval) forests and natural areas; violations of human and labour rights; speculation in food; and corruption and bribery. Investors may consult with characteristics at three levels (firm, industry and country) in their positive screening. The country-level characteristics are: respecting Democracy and human rights; taking effective measures to combat poverty; ensuring equality of all people; ensuring fair labour standards; effective laws against corruption and money laundering; taking effective measures against climate change. The industry-level characteristics are: combating poverty; education; ecological agriculture and sustainable forestry; supply of drinking water; renewable energies; hospitals and care facilities. The firm-level characteristics are good working conditions and fair income; production of environmentally friendly products/technologies; resource and energy efficiency; creation of jobs; reduction of pollutants (e.g. less chemical use); reducing greenhouse gas emissions
Optimal strategies for ESG portfolios	Archival	Worldwide	ESG ratings	Investors may use the MSCI ESG database to exclude firms with the 50% lowest ESG scores and construct an equal weighting portfolio of the remaining firms

(*continued*)

Table A2.

Title	Method	Sample coverage	Sources of corporate sustainability information	The use of corporate sustainability information
Performance of European socially responsible funds during market crises: Evidence from France	Archival	France	ESG ratings	For socially responsible investment (SRI) funds, the vast majority (95%) of French SRI funds use positive screens and, especially, "best-in-class" screening strategies. However, in most cases (around 58% of our sample) these "best-in-class" strategies are combined with the use of negative screens/exclusion approaches, which may be either values-based and/or norms-based. Values-based exclusions are associated with "sin" screens, with the most common being alcohol, tobacco, weapons and gambling. Norms-based screens result in the exclusion of companies that do not comply with international standards and norms, such as the United Nations Global Compact or the Universal Declaration on Human Rights
Islamic investors consider SRI criteria in their investment strategies?	Archival	United States	ESG ratings	Investors may use the Kinder, Lydenberg and Domini (KLD) database to measure ESG performance of firms. The ESG ratings later could be used in negative screening or positive screening
Sin sectors and negative screening	Archival	United States	Industry affiliations	Investors may use industrial affiliations to exclude firms. The affiliations include adult entertainment; alcohol; animal testing; abortion/contraceptive/stem cells; controversial weapons; fur and special leather; gambling; GMO; military contracting; nuclear power; palm oil; pesticides; small arms; thermal coal; and tobacco
Sin stock returns	Archival	Worldwide	Industry affiliations	Investors may use industrial affiliations to exclude. The affiliations are tobacco, alcohol, gambling, defence/weaponry, biotech and adult services
Sin stocks revisited: Resolving the sin stock anomaly	Archival	Worldwide	Industry affiliations	Investors may use industrial affiliations to exclude. The affiliations are tobacco, alcohol, gambling, and defence/weaponry
Social norms and CSR performance	Archival	United States	ESG ratings	Investors may use the Kinder, Lydenberg and Domini (KLD) database to measure ESG performance of firms. The ESG ratings later could be used in negative screening or positive screening
Social screens and systematic investor boycott risk	Archival	United States	Industry affiliations	Investors may use industrial affiliations to exclude. The first set of affiliations includes alcohol, coal and tobacco, and the second set comprises alcohol, fossil fuel, gaming, weapons and tobacco
Socially responsible investing and factor investing, is there an opportunity cost?	Archival	United States	ESG ratings	Investors may use the Kinder, Lydenberg and Domini (KLD) database to exclude firms. Firstly, investors may calculate the ESG-net score as a firm's total number of strengths minus its total number of concerns. Secondly, to eliminate sector bias, investors may use an industry standardised ESG measure. ESG-Industry, which is the ESG-net score minus the average ESG-net score in the corresponding industry, divided by the standard deviation of the ESG-net score of the corresponding industry. Thirdly, different portfolios could be constructed. For example, investors may have ESG-net + portfolios that include only the stocks in the benchmark that are nonnegative in ESG
Socially responsible investing: An investor perspective	Survey	United States	Industry affiliations	Investors may use industrial affiliations to remove firms from their investment universes. The most common categories used are alcohol, tobacco, gambling, animal testing, weapons, human rights, labour relations, community investment and proxy voting
Socially responsible investment and firm value: The role of institutions	Archival	Worldwide	Industry affiliations	Investors may use industrial affiliations to exclude firms

(*continued*)

Table A2.

Title	Method	Sample coverage	Sources of corporate sustainability information	The use of corporate sustainability information
Socially responsible investment fund performance: The impact of screening intensity	Archival	United States	Industry affiliations	Investors may use industrial affiliations to exclude or include firms. These affiliations include alcohol, tobacco, gambling, defence/weapons, animal testing, product/services, environment, human rights, labour relations, equal employment and community investment
Spreading the sin: An empirical assessment from corporate takeovers	Archival	Worldwide	Industry affiliations	Investors may use industrial affiliations to exclude firms. These affiliations include tobacco, alcohol, gambling, firearms, military or nuclear operations
The effect of socially responsible investing on portfolio performance	Archival	United States	ESG ratings	Investors may use the Kinder, Lydenberg and Domini (KLD) database to measure firm-level sustainability performance and construct portfolios based on different screenings
The effects of the fossil fuel divestment campaign on stock returns	Archival	Worldwide	Industry affiliations	Investors may use industrial affiliations to exclude firms. For example, firms with a Global Industry Classification Standard of "Energy" are treated as fossil fuel firms
The ethics of ethical investing	Conceptual		Industry affiliations	Investors may use industrial affiliations to exclude. The affiliations are tobacco, alcohol, gambling and military. Then, investors need to consider the presence of indirect infringement of screens. Infringement refers to that acting as a supplier, a customer, a joint venture partner, a creditor or a shareholder of other firms that would otherwise be excluded by the ethical screens. Last, investors may establish various percentage limits for certain business practices
The opportunity cost of negative screening in socially responsible investing	Archival	Worldwide	Industry affiliations	Investors may use industrial affiliations to exclude firms. The paper suggests that this approach is questionable. Firstly, broad industry codes do not capture all potential involvement in particular controversial businesses, leading to an incomplete representation of the actual universe of controversial stocks. Secondly, a substantial number of (potential) controversial issues have no industry classifications or are difficult to capture using broad classifications. Thirdly, issues other than tobacco, alcohol and gambling are also of interest to responsible investors. The paper summarises 14 controversial issues
The price of sin in the Pacific–Basin	Archival	Countries in the region of Pacific–Basin	Industry affiliations	Investors may use industrial affiliations to exclude. The affiliations are tobacco, alcohol, gambling, and defence/weaponry
The price of sin: The effects of social norms on markets	Archival	United States	Industry affiliations	Investors may use industrial affiliations to exclude. The affiliations are tobacco, alcohol, and gambling
The wages of social responsibility	Archival	United States	ESG ratings	Investors may use the Kinder, Lydenberg and Domini (KLD) database in their screening process. Firstly, tobacco, alcohol, gambling, firearms, military and nuclear operations firms are excluded. Secondly, firms with zero indicators of strength and concern are excluded. Thirdly, investors may calculate each firm's industry-adjusted KLD score by deducting a firm's KLD score from the mean score of its industry. Last, investors would invest in firms with top 30% of scores

(*continued*)

Table A2.

Title	Method	Sample coverage	Sources of corporate sustainability information	The use of corporate sustainability information
Vice vs virtue investing around the world	Archival	Worldwide	Industry affiliations	A firm is identified as "sin" if its revenue obtained from one of sin industries is more than 50% of the firm's total revenue on average. The *alcohol* industry consists of the brewing industry, i.e. manufacturers and shippers of cider or malt products, as well as the distiller and vintner industry, i.e. producers, distillers, vintners, blenders and shippers of wine or spirits such as whisky or rum. The *gambling* industry includes providers of gambling and casino facilities, such as online casinos, racetracks or manufacturers of casino and lottery equipment. Manufacturers and distributors of *cigarettes, cigars and other tobacco* products, including tobacco plantations, represent the tobacco industry. The *weapons* industry is represented by aerospace and defence stocks consisting of manufacturers, assemblers and distributors of aircrafts and producers of components for the defence industry, including military aircraft, radar equipment and weapons. To determine firms in the adult entertainment industries, the extended business descriptions of Thomson ONE Banker are screened for *adult and sexual-related content*. In terms of nuclear operations, Thomson ONE Banker, nuclear power indices (including the S-BOX Nuclear Power Index and the World Nuclear Power Index of Deutsche Borse), and ZKB Kernenergie-Basket performance participation certificate of Zurcher Kantonalbank can be consulted with to identify firms involved in nuclear operations
Weathered for climate risk: A bond investment proposition	Archival	Worldwide	ESG ratings	Bond investors may calculate a carbon-saving score for bonds. The Carbon Disclosure Project provides firm-level carbon emissions (in tons). Then, investors may calculate a carbon-intensity score by dividing the firm's yearly carbon tonnage by the sales revenues of the corresponding years. The carbon-saving score would be the inverse of the carbon-intensity score. Bonds would be thus screened and selected based on investors' preference for the carbon-saving score
Why wine is not glue? The unresolved problem of negative screening in socially responsible investing	Conceptual		Industry affiliations	The paper suggests that negative screening is neither ethically justified nor instrumentally effective. Firstly, negative screening is unable to accurately reflect the values and ethical beliefs that socially responsible investment proposes to represent. Secondly, at the practical level, the use of *a priori* criteria is potentially misleading
Panel B: Active ownership				
Active ownership	Archival	United States	ESG ratings News Private communication	In terms of selecting target firms, target firms are often identified by using ESG screening metrics, the occurrence of public events or private communication. They are chosen from the asset manager's current and prospective holdings. The asset manager also engages with firms beyond its investment portfolio and on behalf of at least twenty consulting clients. With regard to actions, there are two types of actions: Raising Awareness and Request for Change. Actions of Raising Awareness aim to inform and warn the target firms about certain sustainability issues. Actions of Request for Change ask for specific changes in the target firm to address its unsatisfactory sustainability practice. This paper found that an asset manager needs to take a series of actions to engage with a target firm. If changes were eventually made (i.e. Milestones), on average, they took nearly one-and-a-half years after the initial engagement. The success rate of engagement is about 18% (i.e. 382 Milestones with 2,152 unique engagement sequences)

(*continued*)

Table A2.

Title	Method	Sample coverage	Sources of corporate sustainability information	The use of corporate sustainability information
Private engagement by Nordic institutional investors on environmental, social, and governance risks in global companies	Archival	Worldwide	ESG ratings	Institutional investors may consult with a specialised agent along with its collaborative platform to more effectively engage with the firms concerned. Specifically, the agent has a systematic screening of firms as to their compliance with sustainability/social norms. Publicly reported bad news of corporate sustainability would be analysed by the agent to advice whether a violation of sustainability/social norms is worthy of engagement. In addition, the agent is able to facilitate the engagements. For example, the agent may help investors to hold a sequence of interactions, such as letters, emails, phone calls, conference calls and face-to-face meetings on the operational, management, and board levels; the agent can establish a dialogue with the corporate investor relations department or sustainability team. Last, the collaborative platform is able to provide a real-time view of the development of the engagement process
Shareholder engagement on environmental, social, and governance performance	Archival	Worldwide	ESG ratings	In terms of contact methods, sending emails and letters and organising meetings are used in engagement/active ownership. Issues on climate change, public health and corporate governance are likely to succeed. However, investors are more likely to focus on issues of environmental management and human rights and ethics. Target firms are typically large and visible, perform well and have high stock turnover and poor ESG performance
Panel C: Integration				
An integrated approach to quantitative ESG investing	Model building		ESG ratings	Investors may use ESG databases to measure firm-level risk exposure
Beyond numbers: How investment managers accommodate societal issues in financial decisions	Interviews Observations	France	ESG ratings	The paper found that given that sustainability issues are difficult to be quantified, fixed-income investors are likely to not integrate sustainability issues. However, for equity investors, they use emojis (visuals) to represent sustainability issues and better connect the investing process with sustainability issues
Climate information in retail investors' decision-making: Evidence from a choice experiment	Experimental	Countries in Europe	Corporate disclosure	The presentation format of climate disclosure would affect retail investors' decisions. The use of the star rating label most induces investors to consider climate disclosure in making their decisions. Compared with reflective investors, intuitive investors allocate more weight to climate disclosure in making their decisions
Do investors exaggerate corporate ESG information? Evidence of the ESG momentum effect in the Taiwanese market	Archival	Taiwan	ESG ratings	Investors may use the Thomson Reuters Asset4 database to form an earnings momentum strategy based on firm-level ESG scores
Do low-carbon investments in emerging economies pay off? Evidence from the Brazilian stock market	Archival	Brazil	ESG ratings	Investors may construct a carbon-efficient index based on corporate greenhouse gas emissions per sale

(*continued*)

Table A2.

Title	Method	Sample coverage	Sources of corporate sustainability information	The use of corporate sustainability information
ESG integration and the investment management process: Fundamental investing reinvented	Survey	Worldwide	Corporate disclosure	Corporate disclosure is more likely to be integrated with the firm-level analysis than more aggregate-level analyses. Firstly, the disclosure can be used to identify and manage risks. Secondly, integrating sustainability information is like active management based on fundamental investing. However, it is noteworthy that such ways of integration need more corporate-specific disclosure
Forecasting volatility by integrating financial risk with environmental, social, and governance risk	Archival	Worldwide	ESG ratings	Investors may use the Thomson Reuters Asset4 database to measure firm-level ESG risk and incorporate the risk factor to better predict the volatility of their financial assets
Get green or die trying? Carbon risk integration into portfolio management	Archival	Worldwide	Financial	Investors may use carbon beta to incorporate carbon performance into their portfolios. Carbon beta measures the carbon risk assessment of the capital market
Hedging climate risk	Archival	Worldwide	ESG ratings	Investors may under-weight firms with relatively high carbon footprints to achieve higher financial returns because of the presence of under-price carbon risk
Integrating ESG in portfolio construction	Archival	United States	ESG ratings	Investors may use the Sustainability Accounting Standards Board [SASB] Materiality Map and Bloomberg sustainability disclosure ratings to integrate corporate sustainability disclosure. Firstly, the Map would assist investors in identifying material sustainability disclosure items in each industry and firm. Secondly, for binary disclosure items (Yes vs No), we initially identify the item as either positive or negative. For a positive item with "Yes" ("No"), we assign 1 (−1) as the score for the item. For a negative item with "Yes" ("No"), we assign −1 (1) as the score for the item. Thirdly, for unscaled numeric disclosure items, we manually scale the unscaled items by firm market capitalisation. Once all of the numeric items are scaled, we rank each item into one of two groups within its GICS industry, above and below the median. If the rank is above (below) the median, we assign a 1 (−1) score for the item. Similar to the binary disclosure items, if the item is negative, we reverse the score. Last, if there were at least six material items and at least half of them were positive, we classify the firm as a good ESG firm; if there were at least six material items but less than 20% were positive, we classify the firm as a bad ESG firm. Firms that had fewer than six material items but disclosed at least one material item and firms that had six material items but a percentage of positive items that fell between 20% and 50% were classified as neutral
Looking for something that isn't there: a case study of an early attempt at ESG integration in investment decision making	Interviews		Corporate disclosure	The paper found some challenges in integrating corporate sustainability disclosure. Firstly, whether sustainability disclosure is value relevant or not is arguable. Secondly, how to quantify sustainability issues is difficult. Thirdly, how to attach a monetary value to sustainability issues in either an aggregated or disaggregated form is uncertain. Fourthly, consideration of sustainability issues is constrained by the spatial boundary of the "entity" that financial accounting performs, and the short temporal "horizon" of the financial projections of the entity's future performance that it enables

(*continued*)

Table A2.

Title	Method	Sample coverage	Sources of corporate sustainability information	The use of corporate sustainability information
No more excuses! Performance of ESG-integrated portfolios in Australia	Archival	Australia	ESG ratings	Investors may use the Thomson Reuters Asset4 database to rank firms in the investment universe from the highest to the lowest total ESG rating. Then, investors may long high-ESG-rated portfolios and short low-ESG-rated portfolios. Such portfolios can be constructed based on industry
One institutional investor's approach to integrating ESG in the investment process	Others	US		In terms of real estate investment, investors may include a set of sustainability metrics in managing their properties. For example, they may incorporate energy-efficient practices that make properties more competitive and attractive for tenants. With regard to investments in other assets, the Sustainability Accounting Standards Board [SASB] Materiality Map could be used to integrate sustainability information. For example, for investors in infrastructure and power generation, they may use the Map to integrate four primary dimensions of sustainability information (i.e. environmental, data security (cyber), human capital, and business leadership and behaviours) to identify risks (e.g. legal/ regulatory risks). However, this paper recognises that some investors do not use sustainability information, because of the absence of an industry-standard definition, the potential or perceived conflicts between financial returns and sustainability considerations and the financial immateriality of sustainability
Sustainable factor investing: Where doing well meets doing good	Archival	Australia	ESG ratings	Investors may use the Bloomberg sustainability disclosure ratings to rank firms in the investment universe from the highest to the lowest total rating. Then, investors may long high-rated portfolios and short low-rated portfolios
Panel D: Thematic investing and Impact investing				
Categorical cognition and outcome efficiency in impact investing decisions	Experimental	Worldwide	Corporate disclosure	**Impact investing:** Impact investors are likely to be affected by categorical cognition that causes investment outcome inefficiency
Panel E: More than one strategy				
Demystifying ESG investing considerations for institutional cash investors	Conceptual			**Integration:** Investors may use corporate sustainability information to understand the hidden risk factors of a firm. Specifically, an institutional risk analytical framework could be used to incorporate sustainability information as part of risk analysis. This paper suggests that corporate disclosure of corporate governance is more used by investors. However, the disclosure of social and environmental issues is difficult to be integrated or used **Active ownership:** Institutional investors may actively engage firms to implementing sustainability strategies. Such engagements may refer to sustainability information in selecting, filtering, monitoring, and portfolio rebalancing

(*continued*)

Table A2.

Title	Method	Sample coverage	Sources of corporate sustainability information	The use of corporate sustainability information
From preaching to investing: Attitudes of religious organisations towards responsible investment	Survey	Worldwide	Industry affiliations Corporate disclosure	For religious organisations, they consult with different indicators in their strategies. With regard to negative screening/exclusionary, firms involving nuclear weapons, military armaments, tobacco, pornography and abortion would be excluded. Regarding positive screening, firms committed to environmental policy and programmes, employee welfare and rights, diversity and inclusion, transparency, and supply chain labour practices would be favoured. In terms of engagement/active ownership, religious organisations would use proxy voting, writing letters, shareholder resolutions filing, having meetings with company's representatives and divesting. With regard to impact investing, religious organisations would like to focus on community development, micro-finance, affordable housing, fair trade, and clean energy or environmental management. The four strategies are frequently used by the organisations surveyed
Measuring and managing ESG risks in sovereign bond portfolios and implications for sovereign debt investing	Archival	Worldwide	ESG ratings	**Screening:** Investors may use the Verisk database to measure the ESG performance of bond issuers. They may apply a set of screens to exclude or select sovereign bonds from the investment universe on the basis of their ESG scores **Integration:** Investors may use the Verisk database to measure the ESG performance of bond issuers. They may introduce a minimum ESG score target as a constraint in a formal portfolio optimisation process. Moreover, investors may construct a portfolio of ESG-improving countries by longing the 15% best-ranked countries (i.e. countries showing the greatest improvement) and shorting the 15% worst-ranked countries (i.e. those showing the lowest improvement)
Socially responsible funds and market crises	Archival	Worldwide	Industry affiliations	**Screening:** Investors may refer to different screening strategies. Firstly, they may refer to product-related screens, including alcohol, tobacco, gambling, weapons, nuclear technology, pornography, abortion or animal testing. Secondly, environment screens focus on climate, adoption of clean technologies, pollution, release of toxic substances and sustainability. Thirdly, social screens are related to community development, employee diversity, equal employment opportunities, racial/gender diversity in company boards, human rights and labour relations. Fourthly, governance screens consider the board of director-related issues (such as independence of directors), executive compensation and other general corporate governance provisions **Active ownership:** The paper also found that some funds play and actively exercise their voting rights in firms to advance the sustainability issues

(*continued*)

Table A2.

Title	Method	Sample coverage	Sources of corporate sustainability information	The use of corporate sustainability information
The European ETF market: Growth, trends, and impact on underlying instruments	Survey	Countries in Europe		In relation to asset classes, respondents are implementing ESG mainly in equity (82%) and fixed-income (57%) asset classes. Twenty-one per cent also consider ESG in the real estate asset class and 15% in other asset classes, including private equity (5%) and infrastructure (4%). With regard to investing strategies, the best-in-class (i.e. positive screening) approach comes far ahead of the other two, with 44% of respondents preferring it, compared with 34% for the thematic approach and 22% for the negative screening approach. Respondents were also asked about the approach they consider to be best in reducing a portfolio's carbon footprint. 48% of respondents consider positive screening the best approach, and portfolio optimisation comes in second (31%). Lastly, only 21% of respondents consider negative screening the best approach. Respondents declared they observe factor biases when incorporating ESG in their portfolio, mainly sector bias (46% of respondents) and quality bias (41%), but also size bias (25%), value bias (20%), and low volatility bias (12%). As a result, 61% think that sector or neutrality constraints are appropriate when using an ESG filter. In terms of motivations for considering ESG in investing, the two main motivations given were to facilitate a positive impact on society (64%) and to reduce long-term risk (61%). Interestingly, only a third (34%) think that incorporating ESG will serve to enhance portfolio performance. However, when respondents were asked if they were willing to accept lower performance in exchange for a better ESG score, almost two-thirds (65%) said they were not. It will therefore be important to find the right balance between ESG score and portfolio performance. Respondents indicate they intend to use ETFs to incorporate ESG into their portfolio, first to improve its overall sustainability (48% of respondents) and second to incorporate ESG across the passive allocation (45%). Incorporating innovative ESG exposures came in last, with 30% of respondents. Seventy-one percent of respondents integrate ESG considerations in more than 20% of their assets and 21% integrate ESG in more than 80% of their assets which shows the significant place of ESG in investment for those who already consider ESG
The global sustainability footprint of sovereign wealth funds	Archival	Worldwide	ESG ratings	Although sovereign wealth funds consider past ESG performance and recent changes in the performance when investing in listed firms, the funds do not use strategies of engagement/active ownership
Why and how investors use ESG information: Evidence from a global survey	Survey	Worldwide		This paper found that sustainability information is predominantly used in active ownership, integration, and screening. However, almost 17% of survey participants do not use sustainability information in investing, with the percentage being higher for small firms than large firms and for US-based investors than for those in Europe

Note(s): This table summarises all the studies included in our literature review. They are arranged according to the alphabetic order of their titles. Panel A summarises the studies related to *screening*. Panel B summarizes the studies related to *active ownership*. Panel C presents the studies related to *integration*. Panel D presents the studies related to *thematic investing* and *impact investing*. Panel E shows the studies related to more than one SRI strategy

Source(s): Developed by the authors