

1 **Title:**

2 Challenges and opportunities to scale up sustainable finance after the COVID-
3 19 crisis: lessons and promising innovations from science and practice.

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Abstract

Over the past few years, the international community adopted important policy frameworks to foster an inclusive green economy that acknowledges the value of ecosystem services, protects natural resources and promotes a sustainable future. Without finance in the tune of trillions of dollars annually, all these objectives and commitments will remain on paper. As the COVID-19 pandemic deflected the attention of governments away from long-term sustainability objectives and imposed unparalleled injections of public capital to rescue national economies, the survival of global environmental and socio-economic sustainability priorities becomes more than ever dependent on the private sector. This requires a progressive rather than defensive financial system. One that reinvigorates the sustainability momentum established by the Sustainable Development Goals (SDG), by supporting the best examples of responsible behaviour, circularity, and solidarity that emerged during the health crisis. In turn, this demands a profound rethinking of sustainable finance instruments, practices, metrics and tools in use prior to the crisis, which were clearly failing in their ability to mobilize sufficient public and private capital to accomplish the sustainability transition and convince stakeholders of results achieved. This article provides a review of some of these decision-support tools, focussing in particular on instruments of non-financial disclosure. Its main objective is to highlight key issues and gaps in sustainability assessment practice, which help explain the sustainable finance challenges and failures observed prior to the COVID-19 crisis, while pinpointing some promising examples of novel approaches that could enable a *system update & reboot* and revive sustainable development ambitions.

1. Introduction

This article focuses on the role of finance in promoting Sustainable Development (SD), given the additional challenges and opportunities created by the coronavirus disease (COVID-19).

To achieve SD in the true sense of the term originally coined by the Bruntland Commission in 1987, the “needs of the present” should not compromise “the ability of future generations to meet their own needs” (Bruntland 1987). Inherent to this goal is our capacity to deal with the natural constraints and limitations imposed by the finite resources at our disposal, and our ability to direct our technologies, economic systems and social organization towards this path as a process, rather than as an end-point (Bagheri and Hjorth 2007).

However, the growth-based paradigm that has been at the core of most contemporary political and economic systems has created a “grow now and clean up later” attitude towards development and ecosystems (Stockhammer et al. 1997). As a consequence, ecological systems and natural resources worldwide have been subject to an increasing degradation, resulting in huge and often irreversible losses in terms of biodiversity and ecosystem services. In total, it has been estimated that these costs range between USD 6.3 trillion and 10.6 trillion per year, representing approx. 10-17 percent of global GDP (Costanza et al. 2014, ELD 2015).

Among the structural barriers and systematic rigidities that hamper a systemic transition to a more sustainable economic system, finance is a fundamental one (Ghisetti et al. 2015). To radically transform the “brown economy”, huge public and private investments are required at all levels (Rhode 2017). However, mainstream financial products and investments designed for the brown economy accelerate natural resource depletion and magnify environmental degradation (Clarke and Boersma 2016).

On the other hand, finance can offer a wide range of technically manageable and cost-effective instruments for scaling up sustainability efforts (Mills 2008) and generating positive impacts (Scholtens 2006). Examples of financial incentives and market-based mechanisms that reward environmentally responsible and sustainable activities exist, for instance in the form of blended finance and payments for ecosystem services (Wunder et al. 2018). But has the potential of finance to advance SD been fully harnessed? And more importantly, is sustainable finance going to gain or lose momentum in the aftermath of the COVID-19 pandemic?

This review explores the role of finance in SD through an analysis of lessons learned from some of the most promising financial products, instruments, and metrics that have been recently put in place to advance *sustainable finance*. The review builds on the findings of a set of independent studies of current sustainability assessment practice and other non-financial decision-support tools that guide investment. These findings are used to identify key factors and possible change conditions necessary to set the SD machinery back in motion.

The review focuses on land as a case study, for the following reasons. First of all, because sustainable finance is a vast field, not all facets of which could be reviewed within the time and resource constraints behind this research. Secondly, it was a practical choice given that for nearly 20 years the author's research and professional interests have focussed on resource mobilization for sustainable land management (SLM). And thirdly, the narrative around land-based investments has evolved considerably over the past few decades from a *pure play* real estate transaction to something that is much more inherently functional to the pursuit of a broad set of socio-economic and environmental sustainability considerations. Land is a natural capital asset that is crucial to life as it sustains virtually all ecosystem services and is needed to produce essential goods and services such as food, water, wood, fibre, fuel and minerals (Costanza et al. 1997, Wackernagel et al. 1999, Keller 2016). Land can be used and managed in a sustainable or unsustainable way (Thomas et al. 2013). When managed responsibly, land regulates the good functioning of vital ecosystem services such as photosynthesis, pollination, nutrient cycling, water purification, soil formation, climate stabilisation, flood prevention (Dominati et al. 2010). Furthermore, land is the natural habitat of many species and a unique source of inspiration, relaxation, and relief. As such, land is one of the most precious resources at our disposal and is central to SD (Foley et al. 2005).

For these reasons, land has gained centre stage in the SD discourse, and garnered all ingredients for success, at least in theory. Evidence shows that, with proven SLM techniques, it is possible to increase land-use productivity, rehabilitate and restore degraded land, and achieve food, water and energy security while safeguarding the continued provision of ecosystem services (Giger et al. 2015). It has been described as a triple-win solution for the economy, the society and the environment (Gurtner et al. 2011).

This should, in theory, make of SLM one the smartest investment choices of responsible investors. An investment that is capable of generating far greater returns, natural capital gains

and social wellbeing than any other asset class (Davies 2017). Instead, lack of finance has been repeatedly blamed as a major bottleneck in SLM implementation (UNCCD 2015, Quatrini et al. 2016). Despite elevating the issue of desertification as one of the highest UN priorities at the 1992 Earth Summit, together with climate change and biodiversity (Dodds 2014), land resources and terrestrial ecosystems have continued to degrade, largely because of commercial logics driven by a growing global demand for material supplies from the land (Wiedmann et al. 2015, Esch et al. 2017). And the supply of many ecosystem services has been steadily declining due to land degradation and desertification, particularly in drylands (UNCCD 2017, Scholes et al. 2018).

The inclusion of a Land Degradation Neutrality (LDN) targetⁱ in the SDG agenda of 2015 has somewhat revived the commitment by the international community to tackle this global environmental challenge, given its far reaching implications (Sachs 2015). By providing a reference framework to monitor progress more concretely, the LDN target has facilitated the mobilization of innovative blended finance solutions (Quatrini 2018). With the establishment of the LDN Fund between 2014 and 2018, the UN demonstrated the feasibility of engaging private sector institutional investors in terrestrial ecosystem conservation projects (Chasek et al. 2019), a topic that has traditionally been the exclusive realm of public sector entities (UN 2018). The LDN Fund was launched in September 2017 at a high-level UN Conferenceⁱⁱ. It was then incorporated in Luxembourg as a structured investment vehicleⁱⁱⁱ managed by a private sector fund management firm regulated under the EU Alternative Investment Fund Management (AIFM) Directive^{iv}. An independent evaluation recognized that “the LDN Fund provides a rare case study of how the UN system can undertake meaningful, deep engagement with the private sector” (MacPherson 2017).

The LDN Fund remains a rare example to date. Despite a growing number of blended finance transactions (Development Initiatives 2019), “little progress has been made on the ground” and “projects are not reaching scale” (Coppus 2019). Despite their synergistic value and increasing attractiveness to multiple funders (Quatrini & Crossman 2018), land restoration projects have not succeeded to mobilize sufficient public finance (Chasek et al. 2019). At the same time, financial needs continue to rise. The economic costs of land degradation alone are estimated by the UNCCD at USD 490 billion/year^v. Annual investment needs for preserving or restoring terrestrial ecosystem services range between USD 150 - 440 billion (Arlaud et al.

2018), against an average annual flow of approx. USD 65 billion (UNCCD 2015). More broadly, SDG implementation is estimated to require USD 5 - 7 trillion/year, of which with at least a half (i.e. USD 2.5 trillion/year) is chronically unfunded, including USD 1.4 trillion/year in developing countries (UNCTAD 2014, Schmidt-Traub and Shah 2015). Total official development aid (ODA) reached a peak of USD 147.5 billion in 2016, but registered a steady decline since then, ending up at USD 143.2 billion in 2018^{vi}. Preliminary ODA figures for 2019 released by the Organization for Economic Co-operation and Development (OECD) show a 1.4 percent increase in real terms from 2018, but revealed a downward trend in relative terms, i.e. as a proportion of the Gross National Income (GNI) of all donor countries combined (OECD 2020a).

This trend is likely to continue in 2020 due to the effects of the COVID-19 outbreak, which are predicted to produce major downside risks, a global slowdown of the global economy of no less than 3 percent (IMF 2020), and the emergence of domestic problems in both OECD and non-OECD countries that are likely to divert political attention and public resources away from foreign aid, except perhaps for health-related activities (OECD 2020b).

2. Material and methods

This review was designed to increase our understanding of the mechanisms that could potentially unlock more sustainable finance from public and private investors in the aftermath of the COVID-19 global crisis and lockdowns that came with it.

To this end, a **comparative analysis** was designed to assess the main strengths and weaknesses of some of the most advanced investment-oriented instruments, metrics and related decision-support tools available to promote sustainable finance. For practical purposes, this included only a limited number of representative case studies, as described in Table 1, which are however illustrative of a much broader set of tools in their respective typology or cluster. Clusters were defined in accordance with Douglas et al. 2017, which distinguished between “ratings”, (defined as “assessments of ESG performance [...] based on a unique methodology”), “rankings” and “indices” (defined as “listings [or portfolio assessments] based on selected sustainability factors [to assess] investors exposure to sustainability profiles”), and “rules & safeguards” (broadly defined here as a set of mandatory

or voluntary guidelines to prevent and mitigate harm, following a similar approach suggested by Horne 2009).

Table 1. Decision-Support Tools (DST) for sustainable finance included in this review.

DST Name	DST Type	Case Study
Country Sustainability Indices	Rankings	RobecoSAM Country Sustainability Ranking [†]
Voluntary Sustainability Standards (VSS)	Rules, safeguards	IFC Performance Standards [‡]
Government ESG [§] Performance	Sovereign ratings	Impact ÆSSURANCE [¶]

(†) RobecoSAM AG (<https://www.robecosam.com/en/key-strengths/country-sustainability-ranking.html>); (‡) IFC: International Financial Corporation – World Bank Group (https://www.ifc.org/wps/wcm/connect/Topics_Ext_Content/IFC_External_Corporate_Site/Sustainability-At-IFC/Policies-Standards/Performance-Standards); (§) ESG: Environmental, Social, and Governance; (¶) ETH Zurich, Transfer Office. Invention Disclosure no. 2018-202 (29 November 2018).

The case studies have been randomly selected from the wide range of DST accessible by responsible investors. Two out of three case studies focus specifically on the country or sovereign level, given their particular relevance in the context of the global COVID-19 crisis, and larger availability of data. Specific criteria for selection included (i) access by the author to historical data and reference methodological material, as well as (ii) DST claims of comprehensive coverage of all sustainability dimensions and/or (iii) evidence of widespread use (e.g. market share) for sustainability assessment to inform investment decisions. More details about the three case studies are provided below.

RobecoSAM Country Sustainability Rankings have been jointly developed by Robeco – a Dutch investment management firm founded in 1929, fully owned by ORIX Corporation Europe N.V.^{vii}, a subsidiary of ORIX Corporation^{viii} – and RobecoSAM AG – an asset management company established in Zurich (Switzerland) since 1995 under the initial name SAM, focussing exclusively on sustainability investing^{ix}. Their Country Sustainability Rankings, advertised as “a comprehensive framework for analyzing countries’ ESG performance”^x, are updated semi-annually. The ranking methodology is publicly available on RobecoSAM website (RobecoSAM 2015). Archive data is publicly available on RobecoSAM website, starting from June 2015^{xi}. They focus on aspects such as aging, competitiveness and environmental risks to “offer a view into a country’s strengths and weaknesses”^{xii}. As such, according to RobecoSAM, they provide investors with “a powerful tool to enhance risk analysis [...] enabling them to make better decisions”^{xiii}. The company itself allegedly uses the rankings to inform its investments and “to determine country weights within the S&P ESG Sovereign Bond Index

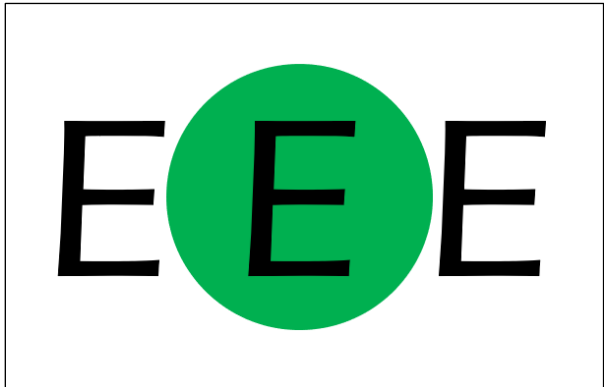
Family”^{xiv}. Reportedly, RobecoSAM indices are considered among those with the highest quality and usefulness by both investors and experts (SustainAbility 2019, 2020).

The **IFC Performance Standards** have been developed by the International Financial Corporation (IFC)^{xv} – the largest global development institution focused on the private sector in developing countries, member of the World Bank Group (WB)^{xvi}. The Performance Standards are designed for IFC clients, such as investee companies or project developers. As such, they define their responsibilities for managing the environmental and social risks inherent to their projects and activities. Specifically, the IFC Performance Standards provide guidance on how to identify risks, establish mitigation measures, and reduce project impacts alongside the following sustainability performance categories: (1) Risk Management, (2) Labor, (3) Resource Efficiency, (4) Community, (5) Land Resettlement, (6) Biodiversity, (7) Indigenous People, and (8) Cultural Heritage. These categories have been gradually added to the initial Environmental and Social Review Procedure (ESRP) issued by the IFC in December 1998 for the pre-investment project appraisal process. The current version of the IFC Performance Standard has been released in 2012. All the methodological documentation as well as historical data, including supporting material (e.g. disclosure policy, safeguard policies, guidance notes, exclusion lists, Environment, Health, and Safety (EHS) guidelines, etc.), are made publicly available on the IFC website^{xvii}. Over time, the IFC Performance Standards have become *de facto* a global benchmark for identifying and managing these risks by a large number of financial institutions and impact investment funds, such as the LDN Fund. Adherence to IFC Performance Standards is considered an “international good banking practice” (KFW 2020). Together with the voluntary “Equator Principles”, the IFC Performance Standards are now applied by almost 90 banks and financial institutions worldwide, 32 export credit agencies, the Multilateral Investment Guarantee Agency (MIGA), as well as the WB International Bank for Reconstruction and Development/International Development Association (IBRD/IDA) itself^{xviii}, representing more than 80 percent of all project finance transactions worldwide^{xix}.

Impact AESSURANCE is a proprietary rating model developed in 2018 at the Swiss Federal Institute of Technology (ETH) of Zurich^{xx}, and commercialized by AEDIS.Earth GmbH^{xxi} under an ETH license agreement^{xxii}. The model is designed to assess the *impact worthiness* of activities (e.g. projects, companies, jurisdictions, etc.) by looking at the full spectrum of social,

environmental and economic impacts. It integrates novel features such as environmental and social life-cycle analysis considerations and foresees the application of a number of technological innovations, such as the use of machine learning and distributed ledger technology (DLT) for stakeholder-based verification. As such, it claims to have launched the *next generation* of sustainability assessment and rating models, departing from conventional rating practice^{xxiii}. The computational structure of the model is scalable, allowing the assessment of different types of rating objects (e.g. balance sheets, investment fund portfolios, bonds' underlying assets, SLM operations, etc.) at different geographical scales. The impact worthiness assessment is based on a multi-criteria analysis of a range of performance and impact fundamentals that characterize the rated object, its underlying assets, and broader operational context. The system combines quantitative and qualitative metrics and uses composite indicators as proxies of environmental, social and financial performance and impact. Data for the scoring is collected from multiple sources, including for instance WB development and governance indicators, Earth observation data, environmentally-extended input-output tables (e.g. derived from Koellner et al. 2007), companies' supply chain data, and other databases on ESG impacts. The model, computational structure, scoring methodology, and historical datasets are accessible to the author, who has been closely involved in the development of this rating model since its inception in 2017 (Crossman et al. 2017). The ratings resulting from the Impact ÆSSURANCE model consist of three scores for each of the sustainability dimensions, i.e. one for the economic, one for the environmental, and one for the social dimension. The social score encompasses the governance dimension, which is intended in its broad connotation to also include all ethical, reputational, transparency, accountability, effectiveness, efficiency, responsiveness, equity, participation, and inclusiveness aspects. Scores are expressed in small or capital letters ranging from a triple E (i.e. EEE) as the top impact worthiness score (Figure 1), to a triple H (i.e. HHH) as the lowest impact worthiness score. A traffic-light colour scheme is also used to indicate trends, as illustrated in Table 2. These ratings and the underlying quantitative and qualitative indicators can be used to monitor and communicate a full set of positive or negative impacts generated by the rated object. As such, they can for example be used *ex ante* to guide impact-driven investment decisions, *ad interim* to monitor the actual positive or negative impact being generated during implementation, and *ex post* to assess actual impacts achieved or verify impact claims.

Figure 1. Impact ÆSSURANCE rating symbols. Impact ÆSSURANCE rating symbols consist of letters ranging from E (top score) to H (lowest possible score), in English alphabetical order. Each letter reflects the impact worthiness of the specific sustainability dimensions assessed – i.e. economic, environmental, and social – in this order. Depending on confidence levels (high vs. moderate), these rating symbols are presented in either small or capital letters. Each letter is displayed on a round-shaped coloured background showing how the individual rating score is expected to evolve on the basis of observed past trends. This traffic-light system consists of five colours ranging from dark green (strong positive trend) to red (strong negative trend), as further illustrated in Table 2. Note: figure 1 is a registered trademark ^a used as the official logo of the Impact ÆSSURANCE rating model.



(a): Registered trademark no. 743457 (Swissreg), Swiss Federal Institute of Intellectual Property.

Table 2. Impact ÆSSURANCE rating symbols and definitions.

		SYMBOL		PROJECTIONS
SCORE	DESCRIPTION	High confidence	Moderate confidence	
				++
Excellent	Highest impact worthiness supported by many excellent indicators of performance and impact. High probability of delivering expected results under normal conditions	E	e	+
Fair	Moderate impact worthiness supported by a higher number of good indicators of performance and impact than bad indicators. Risk few unsatisfactory results under normal conditions	F	f	=
Grievous	Limited impact worthiness due to fewer good indicators of performance and impact than bad indicators. High risk of unsatisfactory results under normal conditions	G	g	-

Hazardous	Lowest impact worthiness due to numerous indicators of bad performance and impact. Unlikely to deliver expected results under normal conditions	H	h	--
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The abovementioned comparative analysis was complemented by an extensive **literature review**, aimed to collect, from a broad and diverse set of sources, recent evaluations of effectiveness of sustainable finance DSTs as well as independent reviews of sustainability assessment practice, and distil the main lessons from their findings. A total of 100 knowledge resources were collected and included in the analysis, including 33 scientific reviews, 29 reports, 27 articles, 9 databases, and 2 seminars/webinars. Most of them (40) were academic studies published in peer reviewed scientific journals. Another 10 were reports published under the aegis of governmental or intergovernmental regulators (e.g. the European Securities and Markets Authority – ESMA). The rest were publications collected from institutional investors or investment advisors (19), credit rating or ESG ranking entities (13), private sector corporates and associations (9), as well as non-governmental organizations and specialized press (9). The vast majority of the resources identified for review (85) had been published in the past 10 years (2011-2020). Of these, 74 percent (63) were published in the past five years (2016-2020). The full list of documents reviewed as part of this literature review is provided in Table 3.

Table 3. Material collected and analysed as part of the literature review. Sorted by date of publication (most recent to oldest).

Resource Type	Cluster (DST Type)	Title	Source	Year	Reference
Webinar	Rankings, Ratings	Investors Engagement: Measuring your social Impact	Reuters Events - The Ethical Corporation	2020	Reuters 2020
Article	Ratings	The global pricing of environmental, social, and governance (ESG) criteria	Gregory, R. P., Stead, J. G., & Stead, E.	2020	Gregory et al. 2020
Review	Rankings, Ratings	Rate the Raters 2020: Investor Survey and Interview Results	SustainAbility	2020	SustainAbility 2020
Report	Rules, Safeguards	Taxonomy: Final report of the Technical Expert Group on Sustainable Finance	Technical expert group on sustainable finance (TEG)	2020	TEG 2020
Seminar	Rankings, Ratings, Rules, Safeguards	Investing for Impact 2020 vision	The Economist	2020	The Economist 2020
Review	Rankings, Ratings	The social performance of microfinance investment vehicles	Meyer, J., & Krauss, A.	2020	Meyer & Krauss 2020
Report	Rankings	Digital Inclusion Benchmark Methodology report	World Benchmarking Alliance	2020	WBA 2020
Article	Ratings	How can AI help ESG investing?	S&P Global	2020	S&P 2020
Article	Indices	How to measure the positive impact of biodiversity in investments?	CREM, ASN Bank, Finance in Motion, RVO	2020	CREM 2020
Report	Ratings	FAMA Inwertimentos: ESG & Responsible Investment at FAMA Inwertimentos	FAMA Inwertimentos	2020	FAMA 2020

Article	Ratings	Rating scales	Swiss Rating Agency	2020	SRA 2020
Database	Rules, Safeguards	Green Finance Measures Database	Green Growth Knowledge Partnership (GGKP)	2019	GGKP 2019
Review	Rules, Safeguards	Review of the ISEAL Credibility Principles 2019	International Social and Environmental Accreditation and Labelling Alliance (ISEAL)	2019	ISEAL 2019
Report	Rankings, Rules, Safeguards	The State of Sustainable Markets 2019: Statistics and Emerging Trends	International Trade Centre (ITC), FiBL, IISD	2019	Willer et al. 2019
Report	Rankings	CSRHUB Metrics Included in Harvard Business Review Top CEO's List 2019	CSRHUB	2019	CSRHUB 2019
Article	Rules, Safeguards	LandScale Assessment Framework: A New Approach for Assessing and Communicating Sustainability Performance at Landscape Scale	CCBA, Verra, Rainforest Alliance	2019	CCBA et al. 2019
Review	Rules, Safeguards	ESMA Technical Advice to the European Commission on Sustainability Considerations in the credit rating market	European Securities and Markets Authority (ESMA)	2019	ESMA 2019b
Article	Ratings	ESG Frontiers: Artificial intelligence: The rise of the responsible robots	Tornero C., Responsible Investor	2019	Tornero 2019
Report	Rules, Safeguards	Policy and Investment Recommendations for Trustworthy AI	High-Level Expert Group on Artificial Intelligence (AI HLEG)	2019	AIHLEG 2019
Review	Rankings, Ratings	Effective Socially Responsible Investing: Self-Proclamation, Sustainability Rating, and Cost	Chang, C. E., Krueger, T. M., & Witte, H. D.	2019	Chang et al. 2019
Report	Rules, Safeguards	Final Report: ESMA's technical advice to the European Commission on integrating sustainability risks and factors in MiFID II	European Securities and Markets Authority (ESMA)	2019	ESMA 2019a
Report	Rules, Safeguards	Investors' expectations on responsible artificial intelligence and data governance	Hermes Investment Management	2019	Hermes 2019
Report	Rules, Safeguards	EIRA: Environmental Impact Reporting in Agriculture	Clarmondial	2019	Negra et al. 2019
Article	Ratings	The Future of Fund Sustainability Ratings: Open Source	Krosinsky C., Real Impact Tracker	2019	Krosinsky 2019
Report	Ratings	Sovereign Rating Methodology	Beyond Ratings	2019	Beyond Ratings 2019
Article	Ratings	ESG Data Challenge	State Street Global Advisors	2019	SSGA 2019
Article	Ratings	General Description of the Credit Rating Process	S&P Global	2019	S&P 2019
Review	Rankings, Ratings	Rate the Raters 2019: Expert Views on ESG Ratings	SustainAbility	2019	SustainAbility 2019
Article	Ratings	Sustainable investment products – our idea and methodology	Vontobel	2019	Vontobel 2019
Article	Rules, Safeguards	Integrating ecosystem services into environmental decision-making	Congreve, A. & Cross, I. D.	2019	Congreve & Cross 2019
Article	Ratings	Credit Ratings Agencies Increasing their Focus on ESG Risks	Huber, B.M. & Zilberberg, D.	2019	Huber & Zilberberg 2019
Report	Ratings	Artificial Intelligence applied to companies' ESG involvement	Sensefolio SAS	2019	Sensefolio 2019
Review	Ratings	Why and How Investors Use ESG Information: Evidence from a Global Survey	Amel-Zadeh, A., & Serafeim, G.	2018	Amel-Zadeh & Serafeim 2018
Article	Rules, Safeguards	A protocol for an intercomparison of biodiversity and ecosystem services models using harmonized land-use and climate scenarios	Kim et al.	2018	Kim 2018
Report	Ratings	The case for sustainable investing in bond markets strengthens	Barclays Bank PLC	2018	Barclays 2018
Report	Rankings	Voluntary Sustainability Standards, Trade and Sustainable Development	United Nations Forum on Sustainability Standards (UNFSS)	2018	UNFSS 2018
Review	Rankings, Rules, Safeguards	State of Sustainability Initiatives (SSI) - Standards and the Extractive Economy	International Institute for Sustainable Development (IISD)	2018	Potts 2018
Review	Rankings	Success of voluntary sustainability certification schemes - A comprehensive review	R. Tröster & M. Hiete	2018	Tröster & Hiete 2018
Report	Rules, Safeguards	Impact Investing Market Map	Principles for Responsible Investment	2018	PRI 2018
Report	Rankings	Environmental Profit & Loss (EP&L) 2017 Group Results	Kering	2018	Kering 2018
Article	Rules, Safeguards	Assessing the institutionalization of private sustainability governance in a changing coffee sector	Grabs, J. (Westfälische Wilhelms-Universität Münster, Germany)	2018	Grabs 2018
Review	Rules, Safeguards	Landscape and Jurisdictional Sourcing Initiatives and Tools - A mapping and analysis	ISEAL	2018	ISEAL 2018b
Report	Rules, Safeguards	The false promise of certification	Changing Markets Foundation	2018	CMF 2018
Report	Rules, Safeguards	Framework to Support Credible Landscape and Jurisdictional Sourcing Claims. Draft v0.3	ISEAL	2018	ISEAL 2018a
Review	Rules, Safeguards	The effectiveness of sustainability standards - A State of Knowledge Review for the ISEAL Alliance	3Keel LLP, University of Oxford, ISEAL Alliance	2018	3Keel & U. Oxford 2018

Report	Rules, Safeguards	A Study on the Use of Artificial Intelligence within Government Pension Investment Fund's Investment Management Practices (Summary Report)	Sasaki, T., Koizumi, H., Tajiri, T., Kitano, H.	2018	Sasaki et al. 2018
Database	Rules, Safeguards	Insights from the Reporting Exchange: ESG reporting trends	World Business Council on Sustainable Development (WBCSD)	2018	WBCSD 2018
Review	Ratings	Sustainable finance ratings as the latest symptom of 'rating addiction'	Cash, D.	2018	Cash 2018
Article	Ratings	The Failure of Fund Sustainability Ratings	Krosinsky C., Real Impact Tracker	2018	Krosinsky 2018
Review	Rankings, Ratings	ESG Ratings and Rankings All Over the Map	Hawley, J., TruValue Labs	2017	Hawley 2017
Report	Rankings	Green Economy Progress Measurement Framework	Partnership for Action on Green Economy (PAGE)	2017	PAGE 2017
Database	Rankings, Rules, Safeguards	Sustainability Map	International Trade Centre (ITC)	2017	ITC 2017
Database	Rankings	Climetrics	Carbon Disclosure Project (CDP)	2017	CDP
Report	Ratings	ESG Reports and Ratings: What They Are, Why They Matter	Huber & Comstock, Davis Polk & Wardwell LLP	2017	Huber et al. 2017
Review	Rankings, Ratings	Are Sustainability Rankings Consistent Across Ratings Agencies?	Lin, B. B., Romero, S., Jeffers, A. E., DeGaetano, L., & Aquilino, F.	2017	Lin et al. 2017
Report	Rankings, Ratings	Analysis of the Current State of Impact Measurement Practices in Impact Investing	E. Hofer (University of St. Gallen, Switzerland)	2017	Hofer 2017
Review	Rules, Safeguards	A review of life-cycle approaches coupled with data envelopment analysis within multi-criteria decision analysis for sustainability assessment of energy systems	Martin-Gamboa, M., Iribarren, D., García-Gusano, D., & Dufour, J.	2017	Martin-Gamboa et al. 2017
Article	Rules, Safeguards	Learning about social-ecological trade-offs	Galafassi, D., T. Daw, L. Munyi, K. Brown, C. Barnaud, and I. Fazey	2017	Galafassi et al. 2017
Review	Rankings	Responsible investing: Guide to ESG data providers and relevant trends	Douglas, E., Van Holt, T., & Whelan, T.	2017	Douglas et al. 2017
Article	Ratings	ESG factors and risk-adjusted performance: a new quantitative model	Ashwin Kumar, N. C., Smith, C., Badis, L., Wang, N., Ambrosy, P., & Tavares, R.	2016	Kumar et al. 2016
Review	Rankings, Ratings	A systematic review of literature about finance and sustainability	Carolina Rezende de Carvalho Ferreira, M., Amorim Sobreiro, V., Kimura, H., & Luiz de Moraes Barboza, F.	2016	Rezende et al. 2016
Review	Ratings	Integrating ESG into valuation models and investment decisions: the value-driver adjustment approach	Schramade, W.	2016	Schramade 2016
Report	Rankings, Ratings	The Landscape of Social Impact Investment Research: Trends and Opportunities	Daggers J. & Nicholls A. MacArthur Foundation	2016	Nicholls & Daggers 2016
Review	Ratings	ESG and financial performance: aggregated evidence from more than 2000 empirical studies	Friede, G., Busch, T., & Bassen, A.	2015	Friede et al. 2015
Article	Rankings	Understanding Impact: The Current and Future State of Impact Investing Research	ImpactAssets	2015	ImpactAssets 2015
Database	Rules, Safeguards	Mapping the frontiers and front lines of global environmental justice: the EJAtlas	Universitat Autònoma de Barcelona - UAB	2015	UAB 2015
Review	Rankings	State Of The Practice On Sustainability Rating Systems	US Department of Transportation	2015	USDOT 2015
Report	Rankings, Ratings	The 2013 Ratings Survey: Polling the Experts	SustainAbility	2014	SustainAbility 2014
Report	Rankings, Rules, Safeguards	The State of Sustainability Initiatives Review 2014 - Standards and the Green Economy	International Institute for Sustainable Development (IISD)	2014	IISD 2014
Report	Rankings	Upscaling the impact of sustainability certification initiatives: Enabling conditions and policy recommendations for regional development	Waarts, Y., L. Judge, J. Brons, and M. de Ruyter de Wildt	2013	Waarts et al. 2013
Review	Rankings	Review of Sustainability Rating Systems used for Infrastructure Projects	Caroline M. Clevenger, Ph.D., Mehmet E. Ozbek, Ph.D., and Sherona Simpson	2013	Clevenger et al. 2013
Article	Rules, Safeguards	Civil Liability of Credit Rating Agencies after CRA 3—Regulatory All-or-Nothing Approaches Between Immunity and Over-Deterrence	Haar, B., Sustainable Architecture for Finance in Europe (SAFE)	2013	SAFE 2013
Review	Rules, Safeguards	The integration of sustainability into the theory and practice of finance: an overview of the state of the art and outline of future developments	Salzmann, A. J.	2013	Salzmann 2013
Article	Ratings	The numbers behind the ratings: How do you rate sovereign creditworthiness?	The Economist	2013	The Economist 2013
Review	Rules, Safeguards	Some Highlights on the Concept of Environmental Justice and its Use	Beretta I.	2012	Beretta 2012
Review	Rankings, Ratings	Reliable sustainability ratings: The influence of business models on information intermediaries	Eccles, R. G., Herron, J., & Serafeim, G.	2012	Eccles et al. 2012
Article	Rankings	The Metrics Challenge: Assessing "Impact Capacity" at the Firm Level	ImpactAssets	2012	ImpactAssets 2012

Review	Rules, Safeguards	The Issues and Methodologies in Sustainability Assessment Tools for Higher Education Institutions: A Review of Recent Trends and Future Challenges	Yarime, M., & Tanaka, Y.	2012	Yarime & Tanaka 2012
Report	Rules, Safeguards	The New Business Imperative for Valuing Natural Capital	Corporate Eco Forum (CEF)	2012	CEF 2012
Article	Ratings	Greift die EU bei Ratingagenturen durch?	M. Henn, World Economy, Ecology & Development (WEED)	2012	WEED 2012
Review	Rankings, Ratings	A Review of Sustainability Assessment and Sustainability/Environmental Rating Systems and Credit Weighting Tools	Poveda, C. A., & Lipsett, M. G.	2011	Poveda & Lipsett 2011
Review	Ratings	Comparative review of five sustainable rating systems	Nguyen & Altan	2011	Nguyen & Altan 2011
Database	Ratings	Ratingplatform	RATINGPLATFORM GesmbH	2011	RP 2011
Article	Rankings	RISE (Response-Inducing Sustainability Evaluation)	BFH-HAFL, Switzerland	2011	BFH 2011
Report	Rankings, Rules, Safeguards	Quantitative Sustainability Disclosure—An international comparison and its impact on investor valuation	Muller, S.	2011	Muller 2011
Report	Ratings	Competition and Credit Rating Agencies: Hearings	Organization for Economic Co-operation and Development (OECD)	2010	OECD 2010
Article	Rules, Safeguards	Environmental, Economic and Social Trade-offs	B, Matzdorf & K. Müller	2010	Matzdorf & Müller 2010
Review	Ratings	Socially responsible investing: sustainability indices, ESG rating and information provider agencies	Escrig-Olmedo, E., Muñoz-Torres, M. J., & Fernandez-Izquierdo, M. A.	2010	Escrig-Olmedo et al. 2010
Database	Rankings	ImpactAssets 50	ImpactAssets	2010	ImpactAssets 2010
Article	Rankings	Towards the Development of a Rating System for Sustainable Infrastructure: A Checklist or a Decision-Making Tool?	Georgoulas A., J. Allen, L. Farley, J. K. Kao, I. Mladenova	2010	Georgoulas et al. 2010
Review	Ratings	CSR Rating Agencies: What is Their Global Impact?	Scalet, S., & Kelly, T. F.	2010	Scalet & Kelly 2010
Article	Rankings, Rules, Safeguards	Global Standards and Ethical Stock Indexes: The Case of the Dow Jones Sustainability Stoxx Index	Consolandi, C., Jaiswal-Dale, A., Poggiani, E., & Vercelli, A.	2009	Consolandi et al. 2009
Review	Rankings	Sustainable Rating Systems Around the World	Say & Wood	2008	Say & Wood 2008
Review	Rules, Safeguards	A critical review of reductionist approaches for assessing the progress towards sustainability	Gasparatos, A., El-Haram, M., & Horner, M.	2008	Gasparatos et al. 2008
Review	Rules, Safeguards	A framework for clarifying the meaning of Triple Bottom-Line, Integrated, and Sustainability Assessment	Hacking, T., & Guthrie, P.	2008	Hacking & Guthrie 2008
Database	Rules, Safeguards	Ecolabel Index	Big Room Inc.	2007	Big Room 2007
Report	Ratings	Analyzing the Tradeoff Between Rating Accuracy and Stability	Cantor & Mann, Moody's Investors Service, Inc.	2006	Moody's 2006
Article	Ratings, Rules, Safeguards	Principles for sustainability rating of investment funds	Koellner, T., Weber, O., Fenchel, M., & Scholz, R.	2005	Koellner et al. 2005
Review	Rules, Safeguards	Conceptualising sustainability assessment	Pope, J., Annandale, D., & Morrison-Saunders, A.	2004	Pope et al. 2004
Database	Rankings	Providing the knowledge required to navigate ESG risks and opportunities	ECO:FACT	1998	ECOFAC 1998

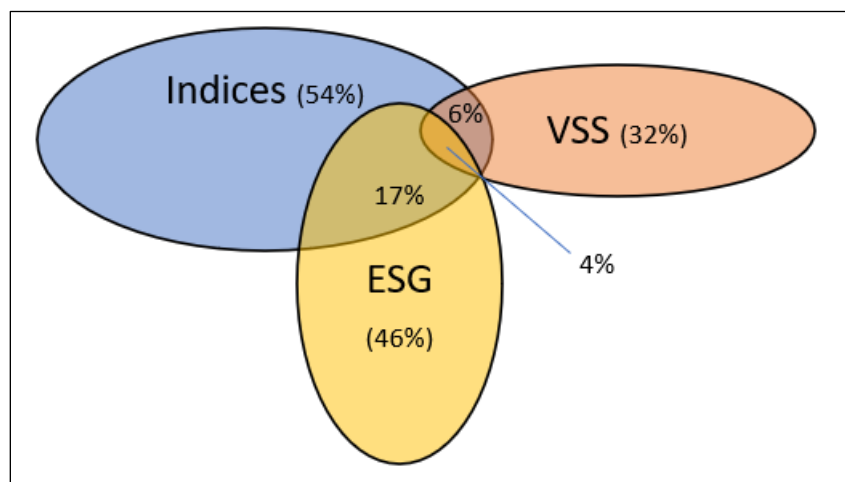
3. Results

3.1 Little overlap between complementary sustainable finance DSTs

While each cluster of the analysis (i.e. rankings, ratings, rules & safeguards) was addressed by at least 40 percent of the resources collected, only 21 resources discussed at least two DST types despite their complementarities. Within these clusters, 54 percent of all resources were found to focus specifically on sustainability indices, including related assessment models and metrics. 46 percent of them focussed on ESG ratings and related methodological approaches and challenges. 32 percent focussed on VSS and industry-level standards, including good and

bad practices, some of which presenting results from application. Only 4 resources covered the three DST types simultaneously. The distribution is further illustrated in Figure 2.

Figure 2. Literature review: coverage of case study topics and overlaps. 54 percent of all resources focussed on sustainability indices. 46 percent focussed on ESG ratings and related aspects, i.e. their integration in financial and non-financial disclosure and sustainability performance assessment. 32 percent focussed on VSS. 17 percent of resources discussed both ESG and indices. 6 percent discussed both VSS and indices. 4 percent covered all three topics. None was found to cover ESG and VSS simultaneously.



3.2 Strong, persistent criticism of current sustainability assessment practice

Despite the fact that sustainability assessment DSTs have made significant improvements in the past 10 years, as testified by several surveys of investors and experts^{xxiv} (e.g. GlobeScan 2013, Amel-Zadeh & Serafeim 2018, Sustainability 2019, Sustainability 2020), the literature reveals a persistent criticism. This criticism refers not only to aspects such as “reliability”, “timeliness”, or “systemic bias” that have been extensively discussed by scholars and practitioners for some time already (e.g. Eccles et al. 2012, ImpactAssets 2012), but also other, less known aspects that reveal a much broader and widespread *credibility deficit*. 28 percent of all the literature reviewed portrays an overall negative picture of sustainable assessment practice, with reference to specific ratings, rankings, standards or safeguards. This percentage increases significantly (55 percent) when removing from the list those publications issued by rating agencies themselves, as well as business corporations, advisors, standard setting organizations or associations with potential vested interests. To further illustrate this

312 sentiment, table 4 provides a list of some of the statements contained in the reviewed
313 material.

314 **Table 4. Judgments expressed in the reviewed material.** Random selection. Clustered by broad topic addressed.
315 Sorted by date of publication (most recent to oldest), per cluster.

TOPIC	FOCUS	STATEMENT	REFERENCE
Credibility	ESG, Indices	"We hope non-financial disclosure will become mandatory after the COVID-19 crisis"	Reuters 2020
	ESG, VSS, Indices	"Long-time impact investment voices also worry that charlatans are moving in, offering products with questionable impact credentials"	The Economist 2020
	Indices	"None of the existing benchmarks includes both a multi-system scope of companies and is independent from the industry"	WBA 2020
	VSS	"The outcome of the review determined that there is a need to revise the Credibility Principles"	ISEAL 2019
	ESG, Indices	"Credit ratings are assessments of creditworthiness of an issuer or entity, they are not sustainability assessments"	ESMA 2019b
	ESG, VSS, Indices	"Investors should be aware that about 20 percent of SPSRFs [Self-proclaimed socially responsible funds] don't live up to their self-proclamation"	Chang et al. 2019
	ESG, Indices	"It is important to introduce in the MiFID II Delegated Regulation a clear reference to the need for firms to identify conflicts of interest"	ESMA 2019a
	ESG	"Companies are left to determine for themselves which ESG factors are material to their business performance and what information to disclose to investors"	SSGA 2019
	ESG	"Corporations are no longer the sole authors of their own narratives, and therefore, self-reported and unaudited information has severe limitations"	Tornero 2019
	ESG	"If it hasn't already, fund manager greenwashing will continue to erode investor trust"	Krosinsky 2019
	VSS, Indices	"Only through access to credible and independent information can less-developed country stakeholders build strategies to benefit from Voluntary Sustainability Standards"	Potts 2018
	ESG	"The [ESG] ratings themselves are actually insufficient for the current purposes"	Cash 2018
	ESG	"ESG scores from different providers do not measure exactly the same thing"	Barclays 2018
	VSS	"Rather than being an accelerator for positive change, this 'flood' of certification creates confusion for consumers and the industry and is standing in the way of genuinely sustainable consumption"	CMF 2018
	VSS	"The ability to make claims is [should be] underpinned by an appropriately robust assurance programme"	ISEAL 2018a
	VSS	"Because of its nature the EP&L cannot achieve the accuracy of financial results nor can it be subjected to financial audits"	Kering 2018
	VSS	"The mainstreaming of certification to date can largely be explained by buyers' use of certifications as a cost-effective traceability and reputation management tool"	Grabs 2018
	ESG	"[CRA] Firms often have different ratings for the same country"	The Economist 2013
	ESG	"The correlation between the two major rating systems, Sustainalytics and MSCI, is just 0.32"	Krosinsky 2018
	ESG	"S&P Global Ratings does not perform an audit and undertakes no duty of due diligence or independent verification of any information it receives"	S&P 2019
	ESG, Indices	"Lack of consistency and transparency from these rating agencies currently exists, impeding greater efficiency in the capital markets"	Lin et al. 2017
	ESG	"A wide range of approaches are called SRI or ESG, and it is not clear what exactly is meant by that label"	Schramade 2016
	Indices	"The majority of reporting being done at this time is self-reported"	ImpactAssets 2012
	VSS	"Very limited credible evidence has been found on regional level impacts of certification initiatives"	Waarts et al. 2013
	ESG, Indices	"The conflict of interest issue is not unique to the United States"	Eccles et al. 2012
	VSS, Indices	"As with financial reporting, there is the demand for assurance regarding the sustainability of companies"	Muller 2011
	Indices	"Current regulations in the credit rating market have not gone far enough"	OECD 2010
	Indices	"The first binding regulations deriving from the EU Action Plan on Sustainable Finance demand that financial institutions adapt a series of policies, management processes, marketing materials, and disclosure processes by 2021"	ECOFAC 1998
Scope	ESG, Indices	"To be sustainable, transition-related investments must be consistent with emissions-reduction pathways throughout their entire economic life"	TEG 2020
	VSS	"While the promise of 'scaling impacts' is enticing, how to achieve this in a credible and transparent way through landscape and jurisdictional initiatives remains an open question"	ISEAL 2018b
	Indices	"The current level of environmental impact reporting is basic and limited, in contrast with abundant and detailed guidance on appropriate metrics."	Negra et al. 2019
	ESG	"Fitch states that these scores do not reflect judgments as to whether an entity has positive or negative ESG practices"	Huber & Zilberberg 2019
	ESG	"An investment product's sustainability hinges on two main factors: the issuer and the underlying"	Vontobel 2019
	VSS	"There are no basic methodologies, certifications or standards to identify and assess impact investing funds, or to distinguish ESG investing from impact investing"	PRI 2018
	VSS	"Shortcomings concerning market access barriers that are brought to light by the utilization of VSS must not be overlooked"	UNFSS 2018
	Indices	"Decision-making should be done on scales comparable with the ecosystem service. [...] The use and provision of ecosystem services varies over time as well as space"	Congreve & Cross 2018

	ESG, Indices	"The more superficial approach towards standardization of industry-building organizations such as the GIIN and the B Lab [...] ultimately results in difficulties to compare impact investments"	Hofer 2017
	Indices	"Addressing trade-offs is a fundamental aspect of the search for equitable and sustainable futures"	Galafassi et al. 2017
	ESG	"What gets measured and how it gets measured, matters. [...] ESG data must improve if it is to meet its potential"	Douglas et al. 2017
	ESG	"ESG factors bring lower volatility and therefore lower risk, and consequently higher risk-adjusted returns"	Kumar et al. 2016
	VSS, Indices	"Impacts need to be considered not only at the field level but also at the landscape, regional and global levels"	IISD 2014
	Indices	"There is a 'distributive deficit' in the policies applied to environmentally significant decision making"	Beretta 2012
	ESG, Indices	"The entire assessment process, particularly for country ratings, is to be reformed"	WEED 2012
	ESG, Indices	"The aim of the future work is the development of a proposal for a rating system that includes social, environmental and corporate governance"	Escrig-Olmedo et al. 2010
	Indices	"None of the metrics and tools discussed in this paper seems to be capable of assessing the progress towards sustainability in a holistic manner. [...] Reductionism has been criticized in the past as inadequate for sustainability policy making"	Gasparatos et al. 2008
Time	ESG, Indices	"[ESG ratings] are a rearview mirror — they only tell you the past. [...] We would love to see more frequent ratings (cycle and updates)"	SustainAbility 2020
	VSS	"We consider the paucity of time series data a major gap in understanding the processes and effects of certification"	3Keel & U. Oxford 2018
	VSS	"The success dimension <i>behavioral effectiveness</i> is poorly addressed in the scientific discussion"	Tröster & Hiete 2018
	Indices	"This enhancement lies in the consideration of dynamic aspects through [...] the evolution of life-cycle indicators"	Martín-Gamboa et al. 2017
	ESG, Indices	"Some data are available only annually, and there can be delays with obtaining this (dated) data. [...] Technological advances have the potential to make analysis and data available in near real time unlike most current raters and rankers"	Hawley 2017
	Indices	"One important limitation of the GEP Measurement Framework is the lack of data for a large group of countries and for a long period of time with which to measure progress"	PAGE 2017
	ESG	"Orientation toward long-term responsible investing should be important for all kinds of rational investors"	Friede et al. 2015
	ESG, VSS, Indices	"For reliable ratings [...] it is not sufficient to focus on past performance alone, as this is only an ex post measurement and theoretically does not allow any projections into the future"	Koellner et al. 2005
	Indices	"The term 'justice' is becoming more inclusive and is comprising gender and age differences, the rights of future generations, access to environmental goods and resources"	Beretta 2012
	ESG	"Not all CRAs use the notion of rating outlooks"	RP 2011
	VSS	"By allowing all project users to see and understand the environmental output of a project on a real-time basis that they will be inspired to take even more actions"	Georgoulas et al. 2010
	Indices	"It may be possible [...] to increase the short-term predictive content of our rating system by increasing the responsiveness of Moody's ratings to new information about credit fundamentals"	Moody's 2006

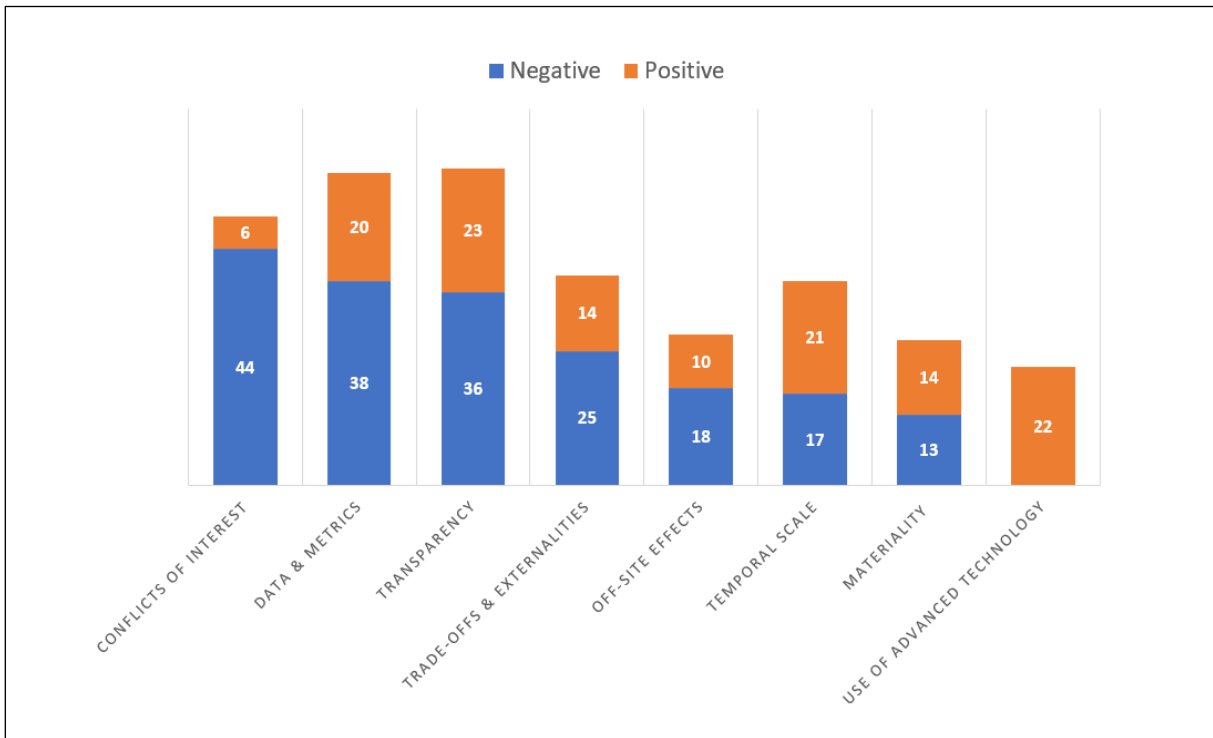
The abovementioned statements can be grouped into three broad topics:

- **Credibility:** refers to the capacity of the evaluated sustainable assessment instruments to serve as reliable DSTs to inform impact-related investment decisions;
- **Scope:** refers to the capacity of the evaluated sustainable assessment instruments to perceive and reflect the trade-offs that are inherent to complex socio-economic-environment systems, and/or related impact distribution issues;
- **Time:** refers to the capacity of the evaluated sustainable assessment instruments to integrate and reflect different time horizons of various concerned stakeholders, including inter-generational values, and/or the causality between reported outputs, behavioural changes (outcomes) and societal, economic or environmental impacts.

The specific aspects that stand out more prominently among the various characteristics discussed – positively or negatively – in all the publications included in the literature review

are illustrated in Figure 3. While only 2 percent of all publications expressed a negative judgement on all these aspects, none contained a positive judgement across the board. All in all, 45 percent of all publications reviewed expressed a negative judgement on at least two specific aspects. When removing from the analysis those publications with a potential vested interest (see above), this percentage increases to 65 percent.

Figure 3. Aspects of sustainable finance DSTs evaluated in the literature review. This chart shows the most recurring DST aspects evaluated in the material included in our literature review (N=100). Stacked columns show the number of publications providing a positive or negative evaluation. 75 percent of the literature evaluated more than one aspect. However, overlaps between the aspects addressed are not shown in the chart.



Aspects such as transparency (e.g. of the assessment models) and quality of outputs (e.g. of input data and metrics) have clearly permeated the mainstream debate over the past few years, as testified by the fact that they are present in the majority of publications. More than one third of reviews report notable improvements on these topics. On the other hand, 44 percent of all publications still question the reliability of existing tools, often providing evidence of conflicts of interest or lack of credible, independent verification processes. Furthermore, reviewers are pinpointing other aspects that are perhaps less visible or detectable from the rather succinct methodological descriptions that are usually disclosed by rating, ranking, or standard-setting agencies, but which could severely impair their ability to

deliver, particularly in terms of comprehensive non-financial impact. This includes trade-offs and externalities (e.g. between ecosystem services), off-site effects (e.g. broader socio-economic and environmental footprints and liabilities, e.g. beyond greenhouse gas emissions), and temporal scales (e.g. causality between actions, outcomes and impacts). Lastly, a growing number of recent publications have started to mention more or less explicitly the advantages of harnessing the power of new technology, such as advanced data analytics and Artificial Intelligence (AI), mainly in a forward-looking perspective.

3.3 Case studies confirm some weaknesses, but also indicate promising solutions

3.3.1 The IFC Performance Standards

Despite having become a *de facto* gold standard for the financial industry, the IFC Performance Standards fail to address all sustainability dimensions with an equal weight. Ecosystem services, for instance, feature in only two out of the eight Performance Standards, namely PS4 “Community Health, Safety, and Security” and PS6 “Biodiversity Conservation and Sustainable Management of Living Natural Resources”. They are not mentioned in relation to PS3 “Resource Efficiency and Pollution Prevention”, PS7 “Indigenous Peoples” or PS8 “Cultural Heritage” (IFC 2012).

Within PS4 and PS6, the IFC employs a rather restrictive interpretation, mainly focussing on provisioning ecosystem services, and partly, regulatory ecosystem services – i.e. two out of a much broader set of ecosystem services and other “nature’s contributions to people” as recognized by the international scientific community (MA 2005, Haines-Young & Potschin 2012, Díaz et al. 2018). In other words, for the IFC, impact is subordinated to economic considerations, which are evidently assigned higher order of priority.

Furthermore, no guidance is given on how to assess ecosystem services, nor the positive or negative impacts that can be generated by the project or investee thereon. This is left to the discretion of the “client”, defined as “the party responsible for implementing and operating the project” (IFC 2012), who is allowed to also decide how best to compensate or offset its self-declared impacts, without being given stringent conditions or criteria. Lastly, with the only exception of PS6, the IFC Performance Standards do not impose any independent verification,

thus exposing those who claim their compliance with the standards to a potential credibility deficit, as emphasized in the literature (Table 4).

Paradoxically, the IFC Performance Standards cannot therefore guarantee full safeguard against those very risks that were at the basis of their conception. Being designed for mitigating risks of collateral damage, the IFC Performance Standard cannot be used as mechanisms for incentivizing virtuous behaviour, either. At best, they can promote voluntary compliance with a set of minimum acceptable conditions, i.e. on the seven topics they address beyond the generic principle of risk management (PS1). Therefore, their prominent use as the bedrock of sustainable investment strategies and environmental and social management systems of a large number of financial institutions and impact investment funds can be misleading, as they cannot adequately serve the purpose of driving positive impact, as frequently reported in the literature (e.g. Chang et al. 2019, Krosinsky 2019, PRI 2018, Schramade 2016, etc.).

3.3.2 Differences in predictive capacities between two country-level case studies

When comparing Impact ÆSSURANCE country ratings (sovereign rating module) with commercial country sustainability rankings and sovereign ESG ratings, some important differences can be found in terms of predictive capacity, i.e. accuracy and responsiveness to changes in the underlying impact fundamentals. When looking at a time series of real-world country-level data publicly available between 2015 and 2019, this research reveals that Impact ÆSSURANCE ratings are more responsive than other sustainability ratings to changes in the underlying impact fundamentals. As an example, Figure 4 summarizes the main findings from the comparison between RobecoSAM Country Sustainability Rankings and simulated Impact ÆSSURANCE ratings for countries that underwent important sustainability shocks in the past five years, such as Australia (which has lost nearly 19 million hectares due to uncontrolled bushfires that started in the *Black summer* of June 2019^{xxv}), France (hit by a widespread social protest movement called *Yellow vests*^{xxvi} that started in late 2018 and continued throughout 2019), Germany (whose credibility and economy were affected by the diesel emission scandal^{xxvii}, or *Dieselpgate*, that hit the Volkswagen group following the violations notified by the US Environment Protection Agency in late 2015), Switzerland (which registered a massive *Green wave* in the parliamentary elections of October 2019^{xxviii}), and the UK (whose economy

was exposed to the risks and uncertainties caused by the referendum of June 2016 on the withdrawal from the European Union, i.e. the *Brexit*^{xxix}).

Figure 4. Comparison between country-level sustainability assessments. The first chart (4a) shows the evolution of RobecoSAM’s country-level sustainability rankings for Australia, France, Germany, Switzerland, and the UK, between 2015 and 2019. These lines follow a scale from 0 to 10 (maximum score). Blue lines illustrate the actual changes in RobecoSAM country sustainability scores. Calculations were based on 2015-2019 data (older data was not included). The second chart (4b) shows the evolution of Impact AESSURANCE sovereign ratings for the same five countries, calculated on the basis of available historical data for 2015-2019. The blue lines here refer specifically to the sustainability dimension affected by the shocks. Sustainability shocks are displayed in both charts by a black horizontal line, the length of which indicates the duration of the event on the timescale (*x*-axis). Red dotted lines in both charts show moving averages (3 periods). Shaded areas show confidence bands (95 percent confidence level). Orange lines on the right-hand side of both charts show projections based exclusively on historical trends.

Chart 4a. RobecoSAM Country Sustainability Rankings.

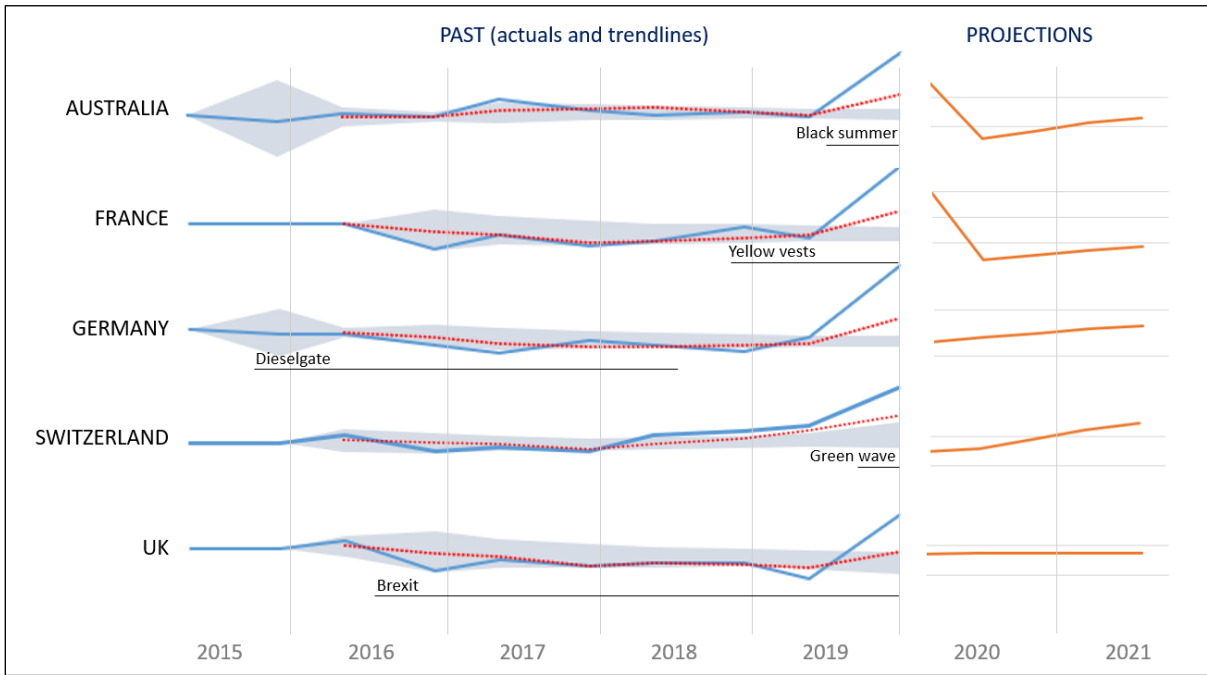
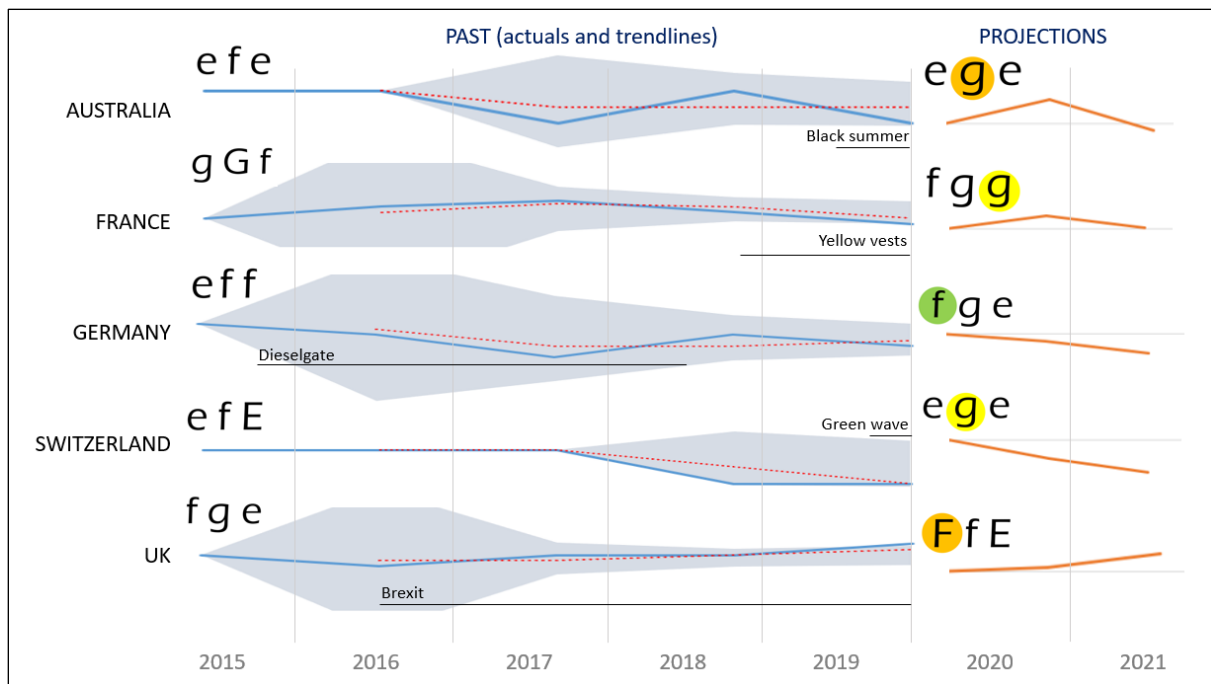


Chart 4b. Impact AESSURANCE Sovereign Ratings.



Included in chart 4b, for ease of reference, are the rating scores resulting from the Impact ÆSSURANCE model at the beginning (2015) and end (2019) of the case study period. Displayed in this chart are only the rating dimensions that have changed *inter alia* as a result of the selected sustainability shocks in each country case study, i.e. the economic (first letter), the environmental (second letter), or the social dimension (third letter). The evolution of these scores throughout the study period was well predicted by the model, at 95 percent confidence level. This was clearly not the case with the RobecoSAM country rankings. The company admits to “recalculate all previous scores” at each release of its rankings, in order to “provide a more accurate picture of real progress or regress and thus facilitate historical comparisons” (RobecoSAM 2018). Furthermore, the traffic-light colour scheme highlighted in the 2019 rating scores resulting from Impact ÆSSURANCE model provides useful indications about future projections, based on the observed past trends in the underlying impact fundamentals. This feature is available for each of the three sustainability dimensions.

4. Discussion and conclusions

The findings from this research suggest the need for sustainable assessment science and practice to improve on each of the aforementioned dimensions where, reportedly, significant weaknesses are found, namely: (i) credibility, (ii) scope, and (iii) time.

One interesting aspect that stands out above all the others in terms of prospects for future improvements is the use of AI-assisted technology. This could enable near real-time data collection and processing of numerous, large datasets, including social media feeds, that can complement, if not gradually substitute, the flow of information required to assess and verify relevant sustainability aspects. According to some observers (Reuters 2020), the potentially disruptive force of introducing AI-assisted applications in sustainability assessment might lead over time to a paradigm shift from the conventional *data push* from companies to a *data pull* approach, driven by stakeholders.

Presumably, every professional sustainability analyst and institutional investor already makes some use of business intelligence applications (SustainAbility 2020). However, of the rating models that were reviewed in this research, only Sensefolio and Impact ÆSSURANCE claim to employ advanced AI systems. The Impact ÆSSURANCE goes one step further by also foreseeing the application of peer-to-peer Distributed Ledger Technology (DLT) to facilitate bottom-up impact verification.

Because it was conceived *for* the financial industry, the Impact ÆSSURANCE model is specifically designed to address the main weaknesses and gaps in current sustainable assessment practice as reported by investors, regulators and independent analysts. It has benefited from inputs from both sustainable finance and investment professionals, and sustainability scientists, experts and practitioners in the business, natural and social domains.

The Impact ÆSSURANCE model shows several distinctive features that makes it unique in the landscape of sustainability assessment models and sustainable finance DSTs. These are illustrated in Table 5.

Table 5. Distinctive characteristics of the Impact ÆSSURANCE rating model.

Cluster	Issues addressed	How they are addressed
Credibility	<ul style="list-style-type: none"> - Lack of transparency - Assessment based on poor ESG reports and limited disclosure - Companies are free to pick-and-choose their sustainability priorities and metrics - Poor accuracy and insufficient quality and consistency over time - Conflicts of interest and no independent verification 	<ul style="list-style-type: none"> - Transparent rating methodology - Based on externally verified, authoritative information and triangulation of data - Uses AI-assisted technology for big data analysis, going beyond companies' reports - Uses machine learning and deep learning for improved accuracy and calibration over time - Designed for independent verification and DLT applications for stakeholder validation

Scope	<ul style="list-style-type: none"> - Often mono-sectoral, commodity-specific, using a narrow definition of sustainability - No or limited inclusion of system dependencies and socio-ecological and economic trade-offs - Weak assessment of environmental sustainability and ecosystem disturbance - Mostly established for listed companies and sovereign assets, without sufficient granularity - No holistic approach. Mostly concerned by financial performance and internal governance aspects 	<ul style="list-style-type: none"> - Multi-sectoral, landscape approach, using a broad definition of sustainability - Integration of system dependencies, social-ecological and economic trade-offs, using both quantitative and qualitative metrics - Robust assessment of environmental sustainability and ecosystem disturbance - Fully scalable methodology, suitable for all jurisdictions, large companies, and small and medium-sized enterprises (SMEs) - Looks at sustainability performance across its three dimensions, beyond finance: economic, environmental, and social
Time	<ul style="list-style-type: none"> - Only assess past performance, providing a static perspective (<i>point-in-time</i> opinions) - Ratings and rankings are not updated frequently - Behavioural effectiveness is poorly addressed 	<ul style="list-style-type: none"> - Dynamically adjusts ratings and projections based on historical trends and other data - Ratings are updated using near real-time data - Uses a Life Cycle Approach (LCA) to assess results and changes across the impact chain

464

465 Impact ÆSSURANCE combines the advantages of indices (e.g. scalability and applicability at
466 different levels), ratings (e.g. metrics standardization and methodological robustness), and
467 rankings (e.g. benchmarking and relative positioning). Each sustainability dimension is
468 assessed with a separate score, unlike conventional ranking and rating systems, thereby
469 preserving granularity, accuracy, and responsiveness.

470 A relatively simple country-level comparison revealed significant differences between Impact
471 ÆSSURANCE and other sustainability assessment products considered as *best-in-class* by
472 financial industry experts, operators and investors. Similar comparative studies at financial
473 product, company, and landscape level are currently underway. The fact that conventional
474 ratings show little sensitivity and responsiveness to changes in the underlying environmental
475 and social impact fundamentals, is symptomatic of their limited usefulness in terms of driving
476 sustainable investment and portfolio management decisions (SustainAbility 2020).

477 It should be noted that the Impact ÆSSURANCE model for sovereign ratings uses hundreds of
478 indicators, which contribute as weighted variables to the computation of 27 composite
479 indices, articulated across 9 performance and impact rating dimensions. RobecoSAM's
480 country sustainability score, on the other hand, uses 40 indicators in total. 7 of these indicators
481 cover environmental aspects, 16 indicators cover social aspects and 17 indicators cover
482 governance aspects. In the final country score, expressed as a numerical index ranging from 0

to 10, they are assigned a weight of 20 percent, 30 percent, and 50 percent, respectively (RobecoSAM 2019).

When it is not an issue of impact metrics or analytical models (i.e. related to the abovementioned *scope* and *time* dimensions), or data processing technology, the comparatively lower responsiveness of conventional ratings appears to be a deliberate choice made by rating agencies themselves in relation to the well-known dilemma of compromising superior accuracy over rating stability. Rating stability is usually preferred to “volatility”, because portfolio adjustments “imply costs” (Cantor 2006, SRA 2020). Evidently, not all costs are included in these considerations.

If sustainable finance is taken seriously by investors, fund managers and financial intermediaries, and ESG considerations are truly integrated in their investment strategies, then active portfolio management approaches reflecting all the available knowledge of risk and impact of the underlying assets are inevitable, if not quintessential (Schramade 2016, Amel-Zadeh & Serafeim 2018). This is becoming all the more obvious during the COVID-19 crisis, which is demonstrating in the most dramatic way the full spectrum and magnitude of materiality of a whole range of vulnerability factors that have been overly neglected in mainstream market transactions (OECD 2020b). Clearly, this crisis urges all investors and sustainable finance professionals to re-prioritize engagement, combat precariousness and inequalities, promote long-term environmental resilience, and employ all the means at their disposal to strengthen preparedness against the climate emergency and other economic and social threats (PRI 2020).

For sustainable assessment science and practice, this translates into the need to (i) measure more accurately all material risks and trade-offs in the short, medium and long-term, and (ii) increase the capacity to employ advanced AI and DLT technologies as well as big data mining techniques in order to increase readiness and responsiveness against (un)predictable events. The same or similar assessment systems for stakeholder-based monitoring and impact validation, possibly combined with mechanisms that incentivize sustainable behaviour such as disposal fees or deposit charges (e.g. Matheson 2019, Watkins et al. 2017), could in turn be used well beyond the financial industry, as instruments to accelerate the transition to LDN, for instance, and to more responsible production and consumption at scale, more broadly.

513 The famous quote “insanity is doing something over and over again and expecting a different
514 result” allegedly attributed to Albert Einstein, forcefully applies here. Definitely, it’s time to
515 change. Investors wishing to contribute to a more resilient, inclusive and sustainable economy
516 should expect better information about impacts. And the finance industry can and should do
517 much more in order to claim the *sustainable* label. If it embraces innovation, values the lessons
518 learnt, and harnesses the longer-term perspective of the youth, it might actually succeed.
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- ⁱⁱ <https://www.unccd.int/news-events/ldn-fund-officially-launched>
- ⁱⁱⁱ Trade registry No.: B218163. Date of creation: 28 September 2017 (Source: Luxembourg Business Registers : https://www.rcsl.lu/mjrsc/jsp/DisplayConsultDetailCompanyActionNotSecured.action?id=B218163×ession=1523963427703&CURRENT_TIMESTAMP_ID=1523963424859#null).
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- ^v <https://knowledge.unccd.int/topics/land-degradation-neutrality>
- ^{vi} <https://www2.compareyourcountry.org/oda?cr=20001&cr1=oeed&lg=en&page=1>
- ^{vii} <https://www.robeco.com/en/about-us/about-orix-corporation-europe.html>
- ^{viii} <https://www.orix.co.jp/>
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