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Review

ESG Maturity: A Software Framework for the Challenges of ESG Data in Investment

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Abstract: Given the rising demand for more transparent, consistent, and comprehensive non-financial information in investment, there is a need to provide more reliable, meaningful, and measurable ESG metrics, in a way that most frameworks cannot. Most established frameworks face difficulties and challenges in providing sustainability information to investors in a significant way, lacking in areas such as transparency, reliability, consistency, materiality, and particularly, their focus on the "S" dimension of ESG. The present article purposes to review the challenges associated with several frameworks and to present a solution to overcome them, by giving an overview of a new and innovative software as a service framework, ESG Maturity. This software presents itself as a solution for both reporting companies and their respective investors, by providing both with an assessment of the ESG maturity index of the companies, and delivering a report containing relevant initiatives, strategies, and action plans tailored to each one of them, within different sectors, dimensions, and geographic areas and consequently, their financial and non-financial implementation impact. ESG Maturity is considered a possible answer to the challenges in ESG reporting, having the potential to revolutionize the way companies report their non-financial information and how investors receive it.

Keywords: investment; ESG Frameworks; ESG Challenges; ESG Software

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1. Introduction

Sustainable investing has gradually become an essential criterion for the investment sector, with investors searching beyond the obvious financial promise of companies, to the Environmental, Social, and Governance [ESG] performance and responsibility of the companies in their portfolios [1].

In fact, ESG and sustainable investment have grown so much so, that, in 2021, ESG-focused portfolios managed close to US$40 trillion, and are expected to reach US$53 trillion, by 2025, representing a third of the total assets under management globally [2]. Additionally, as of 2021, sustainable funds, particularly in the United States, continue to grow steadily, with investors allocating nearly $70 billion into open-end and exchange-traded funds, resulting in 534 sustainability funds gathering in total more than $350 billion in assets [3]. Investors are a driving force for the growing momentum of ESG investing, by demanding and expecting that their portfolios translate and represent their values, reflecting their concerns across a variety of environmental, social, and governance themes. Some even adopt an impact investment approach, in which societal benefits are prioritized alongside their financial gains [1].

Beyond this, the social and economic conjuncture, as a result of a public health crisis and the consequent need for economic recovery, emphasized the need to "build back better", which can be translated into building more sustainably [4–7].

All these considerations help portray how relevant and significant sustainable investment has become, while also providing an important background for the growing interest in ESG metrics and reporting. So, with the increasing adoption of an ESG approach to investment, a demand for better ESG metrics and reporting has merged, aiming to transform ESG reporting into the mainstream strategy for investment [5,7].

However, to achieve this goal, there was a need to turn these ideals into a trustworthy and reliable process of analysis and report of sustainability data. This is what has led to the creation of several frameworks that pledge to provide investors with a clear, meaningful, and measurable view of companies' ESG performance [1,7,8].

The motivation for conducting this research was the need to de-complexify and enlighten the ESG journey for investors and companies, who can find themselves overwhelmed by, for example, the amount of information relating to non-financial reporting.

This paper intends to review the mainstream frameworks used today by several companies and investors to assess ESG performance, highlighting their short-comings in this area, and to analyze if a potential solution can be achieved through the development of a new and improved software as service framework, by reviewing its characteristics and features according to challenges presented by other frameworks.

The contribution of this paper is to offer investors, corporate and company top management, and academics and decision-makers, a comprehensive overview of the current state of ESG reporting, while presenting a future direction for improvement in non-financial reporting overall, through the adoption of ESG reporting software that congregates all other frameworks in order to respond to their flaws.

The remainder of this paper is organized as follows: Section 2 describes multiple mainstream frameworks, why they matter, and what they measure, providing a background for Section 3, which analyses, in-depth, the challenges and difficulties these frameworks present and pose to both the reporting companies and investors, ranging from overall to specific challenges with the ESG reported data. Section 4 describes a possible framework creation theory for tackling the aforementioned challenges while Section 5 provides a proposal to respond to and resolve these issues, by presenting a new, innovative, in-development, software framework, ESG Maturity, and how it can respond to each one of the challenges and add value to ESG reporting, while also pointing out potential challenges in the future and testimonies of companies that have already used it in their daily operations. Lastly, Section 6 concludes the paper, by highlighting a few key considerations and presenting the study limitations.

2. ESG Frameworks: Why They Matter and What They Measure

In response to the need for more reliable, measurable, and transparent non-financial information of companies, several sustainability/ESG accounting frameworks were designed and implemented, with the common aim of improving the standardized disclosure of environmental, social, and governance information of companies. These allowed investors to access more consistent, available, and easily interpreted non-financial information, that guided and inform them about the sustainability impact of their investment choices.

The frameworks were created with the aim of offering precision, validity, consistency, and inter-operability, with most of them remaining voluntary, while also proposing to provide high-quality comparability, distinguishing companies that are effectively invested in improving their sustainability performance from those involved in green- and good-washing, that could translate into long-term financial value [1,9].

2.1. United Nations Sustainable Development Goals [UN SGDs]

One of the first frameworks to emerge was the United Nations Sustainable Development Goals for 2030, in 2015. This was a landmark for investing in sustainability, intending to set policy priorities for governments globally while focusing on several global challenges such as hunger, poverty, clean water, climate change, economic growth, decent work, and human rights. Within the 17 SDGs, 169 quantitative targets underline the needs and respective responses to these challenges, by governments, the business community, and non-governmental organizations [10].

The SDG compass (GRI, UN Global Compact & World Business Council for Sustainable Development, 2015) is the framework behind the private facet of SDGs as a framework, although it is mostly intended for governments around the world. This is a five-step approach for businesses to align their strategies with the SDGs and it was developed by GRI, UN Global Compact, and the World Business Council for Sustainable Development [WBCSD]. The SDG Compass integrates business toolkits, standards, and assessment frameworks provided by other organizations, such as the Corporate Human Rights Benchmark and the Global Protocol on Packaging Sustainability, while also providing indicators that align with the accomplishment of the SDGs [9,10].

2.2. Global Reporting Initiative [GRI]

Another framework proposing a model for sustainability reporting is the Global Reporting Initiative, aiming to provide transparency on how companies and organizations contribute to sustainable development and manage their consequent impacts, through their GRI Sustainability reporting standards. These impacts can be related to the economy, environment, and people, including impacts on human rights, and are divided into universal standards, sector standards, and topic standards. The standards seek to allow companies to disclose and report information about their sustainability impacts consistently and credibly, contributing to the worldwide comparability and quality of reported information on such impacts, while also enhancing transparency and increasing organizational accountability [11].

This is also a framework that can be used alongside other frameworks, since most of the disclosed information is similar and can be used as both key performance indicators of the GRI standards, which helps to guide companies in the voluntary preparation of sustainability reports, alongside regulatory and financial reports [9,11].

2.3. International Integrated Reporting Council [IIRC]

The International Integrated Reporting Council [IIRC] has also developed the Integrated Reporting Framework intended to "improve the quality of information available to providers of financial capital to enable a more efficient and productive allocation of capital". This framework is specifically formulated for providers of financial capital, and it is designed to consider different types of capital, namely, financial, manufactured, intellectual, human, social, and relationship and natural, aiming at enhancing accountability and stewardship for every type of capital [12].

However, this approach seems to be more difficult to apply compared to other frameworks, since it implies a re-evaluation of the organization's business model and how the companies create value, given its principle-based nature and focus on the importance of different stakeholders for the value creation process of the organizations that use it [9].

2.4. SASB Sustainability Accounting Standards Board [SASB]

Similar to IIRC, the Sustainability Accounting Standards Board targets investors as the recipients of their offers. This foundation aims to establish and deliver disclosure standards regarding sustainability issues that facilitate the communication of useful non-financial information from companies to their respective investors. SASB offers its clients several different standards that refer to the minimum sustainability requirements across industries in 11 different sectors [13].

The great asset of the standards framework is the "SASB Materiality Map", which relies on the financial materiality underlining the sustainability efforts within a company, in several sectors assessing the company's materiality, accordingly. In this sense, this tool provides easy and accessible information about which sustainability matters are material in specific sectors directly to investors, relieving them from conducting extensive due diligence to analyze a company's financial materiality in matters relating to ESG [9,13].

2.5. Sustainable Finance Disclosure Regulation [SFDR]

The Sustainable Finance Disclosure Regulation is a European regulation, created and implemented to promote and improve transparency in the market for sustainable investments. It consists of several comprehensive disclosure requirements that should be implemented by financial market participants when disclosing sustainability-related information [14].

These requirements specify the content, methodology, and presentation of the information that should be provided regarding the efforts to address and reduce possible negative impacts on the environment and other dimensions of ESG, stemming from the investments, providing overall guidance to all financial market players. Compliance with this regulation seeks to decrease and prevent attempts at greenwashing, specifically, while strengthening investors' protection and making the available information more transparent and comparable [14].

2.6. Carbon Disclosure Protocol [CDP]

The Carbon Disclosure Protocol (formerly the Carbon Disclosure Project) is a comprehensive disclosure system that aims at measuring the environmental impact of corporate activity, through questionnaire surveys, which question some of the largest publicly traded companies regarding their carbon emissions within their operations [15].

The answers are then integrated into a database that is available to public and private subscribers [9,15]. This initiative is considered extremely relevant in the environmental reporting area, given that the data provided stem from a common questionnaire leading to more consistency across the responses provided by the companies, making them also, more accurate and detailed when compared to standard corporate sustainability reports [16].

2.7. Task Force on Climate-Related Financial Disclosures [TCFD]

The Task Force for Climate-Related Financial Disclosures is an initiative created by the Financial Stability Board, which is a group of finance ministries and central banks from the G20 countries, and it was created as an effort to report on the impacts and dependencies from the companies, on the environment. The aim of this initiative is to materialize climate change disclosures and to make financial risks and opportunities related to climate change a central concern in companies' risk management and strategic planning processes. However, this initiative seems to be targeting banks, lenders, and insurance underwriters, which means it is directed to several elements of the investment process, but not to the investors themselves [17].

It is worth mentioning that, due to the organizations behind its creation, the TCFD is more linked to the financial sector, which can help "overcome" its voluntary nature, given the legitimacy behind these organizations in putting pressure towards its implementation in day-to-day financial operations [9,17].

2.8. The Measuring Stakeholder Capitalism Initiative [MSCI]

The Measuring Stakeholder Mechanism Initiative was proposed by the World Economic Forum [WEF] International Council, to improve the measurements and disclosure of ESG performance indicators by companies and to monitor the contributions made by those to the SDGs. The integrated metrics are based on previous standards identified in four key areas: Principles of Governance, Planet, People, and Prosperity, consisting of 21 central metrics (e.g., Health and Safety) and 34 expanded metrics (e.g., Monetized Impacts of Work-related Incidents on Organization) distributed in these areas. It proposes to provide greater comparability and consistency in ESG reporting metrics and disclosures, resulting also in a greater convergence of private ESG standard setters, which ultimately should result in consistent progress towards an international system for global non-financial reporting standards [18].

Associated with this Initiative is also Morgan Stanley Capital International [MSCI], which provides investors and issuers with the latest, transparent, and consistent data that offer meaningful insights beyond corporate disclosure as well as industry ESG insights that contribute to financial performance and benchmarking. Beyond this, it provides a service of ESG Research that delivers data, ratings, research, and tools to help investors deal with increasing regulation, respond to new client demands, and assess industry material ESG risks and opportunities [19].

2.9. Principles for Responsible Investment [PRI]

The Principles for Responsible Investment constitute an initiative aiming at achieving a sustainable global financial system. Through the encouragement of the adoption of their six key principles, engagement, collaboration, and support provided during their implementation, to its signatories, the PRI is presently the beacon for responsible investment. It targets institutional investors, while it was also created by a group of investors, due to the growing concern around ESG issues in investment practices. Signatories of this initiative pledge to act upon their fiduciary duties as institutional investors, which translates to acting in the best long-term interests of the beneficiaries, and to consider environmental, social, and governance aspects that may affect and/or stem from possible investments. [20]. The PRI offers a set of responsible investment principles for investors to follow, and each one contemplates a range of possible actions to be integrated into investment operations when considering the impact of those in the ESG dimensions [20].

2.10. United Nations Global Compact [UN Global Compact]

The United Nations Global Compact, like PRI, is also a corporate sustainability initiative that seeks to mobilize stakeholders and companies worldwide to promote responsible business practices and advance broader societal goals (e.g., UN SDGs). To accomplish its goal, the UN Global Compact supports its signatory companies by collaborating with them in the adaption and implementation of business strategies and operations that align with the initiative principles on human rights, labor, environment, and anti-corruption. It also provides companies with a principle-based framework and guidelines on best practices, resources, and networking events to further their main objective [21].

2.11. Universal Declaration of Human Rights [UDHR]

Although the Universal Declaration of Human Rights is not a framework, it provides a set of guidelines for companies and investors, regarding the “S” dimension of ESG and the human rights it should contemplate and guarantee, advocating for the implementation of those into their operations. Beyond this, as of July 2022, the United Nations General Assembly has integrated another global human right: the ability to live in “a clean, healthy, and sustainable environment”. This new action constitutes a new frontier for human rights, as the United Nations General Assembly has appealed not only to countries but also to companies and international organizations to improve their efforts to turn this new right into reality [22].

A synthesis of the described frameworks is provided in Table 1.

Table 1. Synthesis of the described frameworks, type of framework, regulation, initiative, and/or guideline and its respective contribution to ESG.

Framework Identification	Framework, Regulation, Initiative or Guideline	Contributions to ESG
2.1. United Nations Sustainable Development Goals [UN SGDs]	Framework directed at governments worldwide.	Setting policy priorities/guidelines for governments globally while providing private and public businesses with strategies that are aligned with the SDGs (e.g., counter hunger, poverty, and violations of human rights).
2.2. Global Reporting Initiative [GRI]	Framework intended for private and public companies.	Providing a practical model for sustainability reporting.
2.3. International Integrated Reporting Council [IIRC]	Framework designed for providers of financial capital.	Provides a value-creation approach to both reporting and the operations of the companies.
2.4. SASB Sustainability Accounting Standards Board [SASB]	Framework directed at investors.	Establishing disclosure standards for sustainability reporting, that facilitate the communication of information from companies to their investors.
2.5. Sustainable Finance Disclosure Regulation [SFDR]	European Regulation relating to the disclosure of sustainability and financial information.	Providing comprehensive disclosure requirements that should be implemented by financial market participants in the disclosure of sustainability-related information.
2.6. Carbon Disclosure Protocol [CDP]	Framework in the form of a disclosure system associated with the "Environment" dimension of ESG.	Helps determine the environmental impact of the corporate activity of companies, through their questionnaire surveys.
2.7. Task Force on Climate-related Financial Disclosures [TCFD]	Initiative that targets banks, lenders, and insurance underwriters.	Promoting the integration of climate change disclosures and financial risks/opportunities related to climate change into companies' risk management and strategic planning processes.
2.8. The Measuring Stakeholder Capitalism Initiative [MSCI]	Initiative to help companies in reporting non-financial information.	Improving the measurements and disclosure of ESG performance indicators by the companies and monitoring the contributions to the SDGs.
2.9. Principles for Responsible Investment [PRI]	Initiative that provides general guidelines for institutional investors in sustainable-related areas, as well as reporting companies.	Establishing a set of responsible investment principles for investors to follow, as well as, making them accountable and responsible for their fiduciary duty, as signatories of this initiative.
2.10. United Nations Global Compact [UN Global Compact]	Initiative aimed at corporate sustainability that intends to mobilize stakeholders and companies worldwide to follow responsible business practices.	Providing companies with a principle-based framework and guidelines, while supporting their signatories through collaboration in the adaption and implementation of business strategies and operations that align with the initiative principles.
2.11. Universal Declaration of Human Rights [UDHR]	Worldwide-accepted guideline for companies and investors.	Providing guidelines regarding the "S" dimension of ESG and the human rights it should contemplate and guarantee, promoting the implementation of those into their operations.

3. ESG Frameworks: Difficulties and Challenges

Despite the vast number of frameworks and the greater quantity of data available, this is not a synonym for confidence for investors, fund managers, or asset managers. On the contrary, several doubts arise relating to the quality, validation, comparability, and integrity of both the sustainability measures and the non-financial information available and reported by companies [6–8,23].

This is a serious concern for actual and potential investors since much of the available data in the financial marketplace can be viewed as "background noise" instead of a "clear translation" of which companies are sustainably outperforming and those that are involved in "green- and good-washing", even when companies choose to report under frameworks as the ones described above [1,9,23,24].

3.1. Overall Challenges of Frameworks: Diversity, Specificity, and Materiality

The first of the general challenges presented by the ESG frameworks is the diversity they represent, sometimes causing conflicting reporting of sustainability data. Although some of the frameworks intersect and are an opportunity for investors to gather the information they need, it becomes an impossible task for the companies that supply such information. This aspect of the frameworks contributes to a phenomenon that companies refer to as "reporting fatigue" that results from the demanding task of reporting several types of information without a set of standardized guidelines or system that structures and synthesizes it [9,24,25].

Differences in what is valued in each framework can also become a challenge for sustainability reporting, since some are more interested in gathering information and providing guidelines for corporate environmental performance (e.g., TCFD) and others prioritize governance practices of companies, as a way to assess company's sustainability actions and strategies, while only a few value the company's commitment to the society's overall well-being, human rights defense, and other social themes (e.g., GRI) [8,23,24]. This exigency to specify and focus most of the reporting on only one of the aspects of ESG leads to gaps in the reports made by companies, leaving them vulnerable to, for example, reputational risks [1,9,23].

Piling on this "negative" diversity is the difficulty in quantifying the impact of sustainability on the operational success of companies [8]. Several studies have found statistically significant relationships between corporate, environmental, and social sustainability (using a global standard) and the financial/economic performance of companies, e.g., [26–28] while others propose that this is a difficult association to be established given the inherent challenges between financial and non-financial metrics and the consequent reporting difficulties, e.g., [29,30]. However, most frameworks fail to provide evidence or a guideline as to how a company can profit from being sustainable and contributing to the socio-economic global development [24].

Another discrepancy and controversial challenge of these frameworks is to identify which ESG metrics are material to ESG classifications. Inherently, this must be based on a sector approach since what is material for some businesses may be irrelevant to others [8,9,23,24]. For example, TCFD defines materiality as the company-specific disclosure of risks and opportunities related to climate change under national reporting requirements that ultimately may have a short-term effect on the price of a company's stock. Similarly, SASB considers financial materiality as the disclosure of information that would be considered relevant for investors when making an investment decision, which seems like a narrow view of the concept and might fail to encapsulate the real important questions in terms of ESG risks. Conversely, the GRI offers a more broad and long-term view of materiality by not only integrating the immediate impact of the ESG matters but also considering trends and issues that can influence the company's overall market posture and consequently their market capitalization [23].

As such, a more comprehensive approach, considering and integrating the company's growth, profitability, capital efficiency, and risk profile along with the reporting requirements integrated into an industry-by-industry basis would be a clearer way to look at materiality in ESG [8,23].

3.2. Specific Challenges with ESG Data Reported by the Frameworks:

(a) Lack of consistency

This is one of the biggest difficulties identified by companies that utilize different frameworks to report their non-financial information. This lack of consistency adopts many forms, such as unclear ESG methodological standards, which translates to wide variations in the companies that report on even broad ESG topics (e.g., reporting only on Scope 1 greenhouse gas emissions, or reporting on all Scopes); having different time frames for the information required, which leads to incomplete benchmarking for instances; and not providing a clear methodology for the reporting itself, which leads companies to report about the same themes and issues, in different ways, resulting in conflicting information even in companies of the same sector, hindering the comparability across sectors and industries [9,23,31]. Additionally, incomplete reporting of some key performance indicators and metrics or even failing to distinguish between missing data or just poor performance hinders the quality of the reported information, since most frameworks record and code both these types of information as zero in their classifications, resulting in companies being either benefited or undermined [8,23,31].

(b) Lack of transparency

Failing to consider and disclose how each metric is obtained in several frameworks, by not distinguishing the information obtained through "ground-work" investigation and due diligence or information gathered by surveys, for example, can contribute to the feeling that the information reported is not verifiable or trustworthy. Conversely, difficulties in monitoring the quality of the reported information, regarding possible errors and mislabels in the data entry, and consequent failure to alert the reporting companies can lead to misleading analysis and wrong assessments of the companies' ESG classification [9,23,24].

(c) Challenges in standardizing and normalizing data

Data standardization has long been a challenge for ESG reporting, making it difficult to guarantee that a company's classification reflects the common methodologies and benchmarking. This difficulty refers to, for instance, differences in measuring units (e.g., tons, vs. megaton), and difficulty in establishing a comparability analysis between companies, even in the same sectors given that most frameworks fail to consider both scale and scope of the reported information and the individual company's characteristics [23,24,31].

(d) Focusing on static metrics and negative impacts

Losing the scope of analysis of a company's progress or deterioration can only provide investors with a small portion of a company's sustainable efforts, rather than their performance overall. In line with this challenge, considering and reporting only past non-financial information, rather than analyzing the impact of strategies to be adopted by companies in the future, is a missed opportunity for ESG frameworks [23,30]. Lastly, there is a tendency to consider ESG reporting to disclose only negative impacts, despite the positive impacts being also "material" and influencing a company's financial performance, just as risks do [1,31,32].

(e) Ignoring the "S" in ESG

Another important challenge reflects the "forgotten" side of the ESG, the "S", which has been largely ignored in ESG reporting. How a company delivers on society's goals as well as its own, meaning how it contributes not only to environmental and governance sectors but to the social dimension has been a blind spot in ESG reporting and analysis in the last years [8,33]. However, issues related to civil and human rights, health and safety, diversity, equity and inclusion, equal pay, and stakeholder and community engagement, should be considered and integrated into the company's "S" strategy and ESG reporting [34].

These are key aspects for companies to consider due to several added values and risks they constitute for businesses in general. One of these aspects relates to reputation and value that it adds to the companies—for example, not addressing sexual harassment and racial discrimination in the workplace has a negative impact on market value while implementing ESG programs and initiatives can improve companies' value and capture new investments. Another relates to the productivity of the companies themselves and the ability for employee retention, since workplaces that promote diversity, inclusion, and integrate anti-discrimination policies, combat harassment, and promote equal pay and respect have higher productivity, translating to higher revenue growth, innovation, and employee retention rates. Another important side of investing and reporting on the "S" dimension is associated with legal compliance, given the rapidly changing regulatory standards and overall mandatory requirements environment. Companies that already implement ESG, and particularly "S" policies, will be able to comply with the regulatory developments and other mandatory requirements more rapidly, allowing them to avoid legal and financial penalties associated with being uncompliant; for a review see [34].

Nevertheless, without clear guidelines on how to report on this important dimension, businesses are vulnerable to legal liabilities under an increasing number of regulatory frameworks that require the disclosure of the efforts to prevent human rights violations, as well as reputational and financial harm, due to the lack of reporting of essential information regarding the social aspect of their performances [32]. Another important aspect related to this challenge is the need to assess compliance and due diligence conducted by the companies, regarding the social aspect of ESG, which in most frameworks is not verified or only translates to questioning companies about the existence of policies that consider social themes, such as human rights or modern slavery, but not even verifying if the policies themselves are compliant [8,32,33].

As such, there is a need to integrate and direct the attention to a broad sector of stakeholders and ensure that the companies not only disclose, but actively contribute to the customers, employees, suppliers, and communities around them as well as delivering profits to their shareholders [23,33].

4. How to Tackle These Challenges in the Future

Given the several challenges discussed above, it can be assumed that a single individualized framework cannot respond to the needs of current ESG metrics [6]. Instead, there is a need to design an ESG data framework that can cater to both the needs of investors and the needs of the reporting companies, as well as provide a set of sustainability standards and requirements that can overall encapsulate decision-useful metrics, signals, and information, through methodological rigor, consistency in standards, transparency, and integrity [23].

To tackle these challenges, it is suggested that a new ESG reporting framework should first focus on a set of mandatory reporting requirements associated with material issues, while also integrating industry-specific requirements, all based on specific methodological standards for reporting on each issue and theme.

A well-designed framework should be divided into three phases of reporting requirements [23]:

The first phase should consist of a central set of mandatory disclosure requirements that should address environmental (e.g., greenhouse emissions, waste management, chemical safety) and social (diversity in management and workforce, human rights defense, health, and safety) indicators that have the potential of being material in the financial or societal perspective over the coming years [23].

The second phase should comprise industry-specific metrics relating to specific sectors that do not need to be applied to all types of companies and businesses. This section of the framework should allow companies to disclose, voluntarily, specific sustainability strategies in their sector, that they believe set them apart from other companies.

The last section, the third phase, should center around governance metrics, which should be mandatory. This should reflect the company's good governance strategies and internal monitoring, covering issues such as the structure of the board of directors, while also considering and disclosing corporate transparency and reporting [23].

Beyond these future directions, standards and metrics of reporting should be reinforced through the verification of corporate responsibility and sustainability compliance, based, for example, on the work of the SASB and GRI.

Validation is also an important question for the development of new ESG frameworks. There is a need to develop a system that validates and verifies the data that a company reports, and this can be achieved by, first, making the ESG framework and reporting a mandatory standard, as it is for financial reporting, providing a legal incentive for compliance through legal penalties when companies fail to comply with the said standards and requirements. Second, integrating the analysis of other companies' informants, for example, through reputational analysis, to verify other sources of the same information [23].

5. ESG Maturity Software Framework Proposal

Within the last year, the "ESG Maturity" software framework has been in development at C-More Sustainability, a consulting company based in Portugal, and IBM, the main partner in the development of the software. ESG Maturity aims to support companies in their transition to more sustainable operations, emphasizing the ESG approach in their business models.

"ESG Maturity" is a software as a service (SaaS) framework that assesses the ESG maturity index and delivers a set of relevant initiatives, strategies, and action plans that impact companies, throughout different sectors. It was designed to project and transform sustainability into business, by focusing on "E", namely, a company's impact on the natural environment and the energy and resources it uses to operate, "S", which refers to how a company manages its relations with its employees, customers, suppliers, and society in general, and lastly, "G", translating how the internal policies and procedures of a company make effective decisions for the greater good [35]. The software relies on automated referrals based on company sector, dimension, and geographic location to help the companies select where to spend their sustainable and financial resources, confidently, appropriately, and assertively [35].

5.1. How Does ESG Maturity Work? An Overview

To obtain the ESG maturity index using this software, companies must first integrate their information into it, which generates a questionnaire regarding ESG themes and issues. This is achieved using a proprietary algorithm that assesses several ESG frameworks (GRI, SASB, SFDR, MSCI, CSRD, WEF MSCI, etc.) and creates a questionnaire based on the company's traits (e.g., dimension and geographic location). This questionnaire is created according to more than 350—450 metrics that are academically assessed and validated, inspired by the GRI, SASB, and GIIN methodologies, amongst others.

The questionnaire is customized, simple, and direct and has several different features to help guide companies in their progress and sustainability performance. It also allows the user to save their progress, and include questions and attachments to each question, which makes it more specific to each company's needs.

After responding to the questionnaire, a menu will appear with an action plan, containing several strategies and activities listed, by priority and criticality for the business in question. This action plan also features its expected financial and sustainable impact, while also providing a "toolkit" with strategies and concrete actions required to effectively implement it.

Afterward, a dashboard is created for the company, with relevant information that can be used to integrate non-financial disclosure reports. It also integrates a target section, in which the company can select different goals to monitor its progress while attributing deadlines and proof of said progress. It also generates reports that are customizable to the companies, containing frameworks, data, and graphs about the most relevant indicators. A visual example of dashboards created by ESG Maturity is presented in Figure 1.

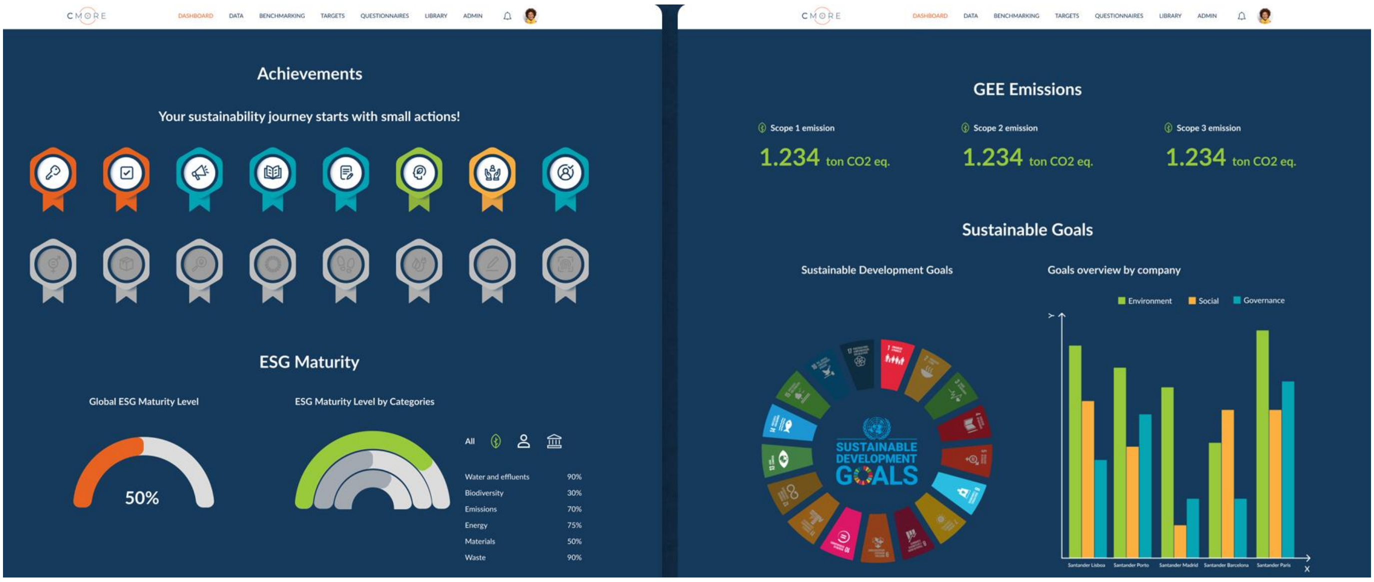

Figure 1. Example of Dashboards generated by ESG Maturity.

Data and document analysis is also an advantage of this software since it allows companies to validate their compliance with standards and metrics within ESG. For instance, this software provides an analysis of a company's policy (e.g., code of conduct or human rights policy) and provides information about missing criteria in that specific document that is relevant or might constitute a compliance legal risk.

Another important feature is benchmarking, which allows for the comparison of the company to others in the same sector, meaning its competitors. It can be selected/filtered through year, sector, revenue, and indicators.

The reputational analysis is also an important element that translates the reputation and perception of the company, allowing for a representation and crossover of how the external public views the company. This also provides an analysis of the social media interactions of the companies and their respective competitors.

ESG Maturity is an ecosystem software framework, which means that it allows companies to share their ESG performance and progress with relevant stakeholders (e.g., partners), investors, clients, and collaborators of the company (e.g., suppliers) providing an overview of the company's value chain to every element involved [35].

5.2. Characterization of the ESG Maturity Framework

(a) Diversity, Consistency, and Consolidation in reporting

ESG Maturity uses a complex set of algorithms that allow for the clustering of the criteria of several frameworks, adding up to approximately 1500 indicators, ranging from GRI to SFDR. This is a feature that allows for consistency and consolidation of the information reported by companies, since, by completing the questionnaire, the companies are responding to several indicators at the same time, without having to respond to several different questionnaires. This is an efficient way to not only avoid duplication of information but also "reporting fatigue", which is a phenomenon that most reporting companies present while trying to report their non-financial information [25].

(b) Quantifying the impact of sustainability actions by companies

Another feature of this software is the possibility of calculating the expected impact of the sustainability actions taken by companies to better their sustainability performance, which seems to be lacking in other frameworks and has been proved relevant by some studies, e.g., [26–28]. ESG Maturity not only provides an action plan containing the actions and strategies to respond to their sustainable shortcomings but also provides a report of the expected impact, both financially and sustainably, of the actions taken by the companies.

This is a clear response to the failure to quantify the impact of sustainability in business, since the software is able, through a proprietary algorithm, to calculate where the company will thrive when taking the necessary steps to make itself more sustainable.

(c) Assessment of materiality by sector

The proposed framework provides an assessment of the companies tailored to their needs and sector, by defining and implementing the materiality concept in each industry. This is a feature that allows companies to overcome the inconsistencies presented by the previous frameworks [9,23] since it aggregates the indicators that are material for their company, in its specific sector, industry, geography, and dimension. This is also an asset of this software, given that it also allows smaller companies to report and analyze their sustainability performance, according to their own personal characteristics, rather than a general guideline or indicators that are based on criteria that only applies to higher dimension companies.

(d) Information transparency

One of the most valuable characteristics and functions of this software relates to the transparency it provides, not only in the reporting of the information but in the verification of the reported data. ESG Maturity utilizes a process called “information triangulation”, that verifies the data reported by the company. This is achieved by cross-referencing the information provided by the company, combined with analysis, performed by using an algorithm. This algorithm compares the reported information with a reputational analysis of the company and also through benchmarking. This allows the company not only to be evaluated indirectly, by cross-referencing information from other platforms and social networks but also to compare and verify it against common standards for the characteristics of the reporting company.

This triangulation of the information has the potential to overcome one of the largest challenges that other frameworks face: relying only on non-financial information provided by the reporting company, which is interested in showing its “better side” to potential investors and society in general.

In fact, most companies that provide this non-financial information still do it voluntarily [1,9], which can translate into companies only reporting what they consider is relevant, and this functionality can revolutionize this reporting, making the information provided more transparent, reliable, and accurate.

(e) Data standardization

Standardization of the available data is another challenge that ESG Maturity seeks to address. This is a common difficulty in other frameworks since they provide general guidelines and do not consider the scale and scope of the reported information, according to the individual characteristics of the companies reporting [23,31].

This is achieved through first, aggregating more than 900 indicators, that establish minimum and maximum criteria, according to the geography, industry, dimension, and even number of employees assigned to companies. Second, the ability to congregate these standards into a single software framework, which allows for the compatibility of companies within their characteristics, instead of comparing on a general basis in which for example, geography might not be considered. It also standardizes measuring units, again, by geography, making the comparison of the standards themselves, easier and more accurate when compared to other frameworks.

(f) Focus on positive impacts and dynamic metrics

The software presented in this paper is also an approach to shift the way ESG reporting is viewed today. As discussed above, most frameworks utilize a backward-looking approach, in which the current state and data reported by companies are more relevant than the steps and processes undertaken by them to ensure their good sustainability performance [23,30,32,36]. However, ESG Maturity provides a new approach, by considering not only dynamic metrics, likely to be changeable over time but also the possibility to report positive impacts of the strategies undertaken by the company to “do better” sustainably. In fact, the software indicates where the companies are outperforming their competitors and where they are lacking and need to invest to become more sustainable.

(g) Value placed in each dimension of ESG: Bringing the "S" to light

This is the biggest shift that ESG Maturity has to offer, bringing the social dimension into the analysis and reporting of ESG information. Most frameworks seem to lack the criteria and processes to effectively analyze and report social responsibility information. In this regard, ESG Maturity stands in the vanguard, by putting a focus on the "S". The software specifically asks the companies reporting to disclose their implementation of specific processes for identifying and monitoring social risks and opportunities and to report their corporate strategy for addressing them, as well as it requests the submission of documents, such as the policies of human rights, the modern slavery act, and others, where applicable. Beyond requesting this submission, the software analyses the compliance of these documents, by analyzing the text and informing the company of criteria it lacks, for example, a company that only contains crimes against humanity in its human rights policy, will be flagged and informed that to be compliant it needs to address other human rights risks and violations.

The software also provides uniform standards for reporting social data, namely the correspondent and adequate criteria and/or frameworks and processes for collecting, analyzing, and disclosing this type of information, to establish the expectations companies must have for data sources, quality, and the metrics to be reported, always according to the dimension, geography, and sector of the companies. One example of this is the request to provide a supplier code of conduct and human rights policy for a company that utilizes a supply chain.

Beyond these key features, ESG Maturity also educates on what social aspects might need effective oversight and implementation, by, for instance, flagging an area in which the company is lacking socially and providing effective strategies that can overcome that flaw.

In sum, ESG maturity can be viewed as an important tool for companies, given that it works as an internal audit of the companies' ESG/Sustainability reporting, enabling the assessment of internal frameworks, validation of the completeness and accuracy of the reported information, and providing advice and recommendations on how to make companies more sustainable, transparent, and compliant.

5.3. Other Features of ESG Maturity That Add Value to ESG Reporting

However, the capabilities of ESG Maturity do not end in its ability to overcome the challenges presented by other frameworks, it also provides innovative features, such as compliance verification, which is increasingly important given the growing number of mandatory regulations, particularly in Europe (e.g., Corporate Sustainability Reporting Directive [CSRD]) [37]. Other regulations are embedded in the software, beyond the questionnaire presented to the reporting companies, also integrating the document analysis and the action plan further designed for the company. This is an important functionality, given that not only will companies have to be compliant in the future but investors will also need to know the risks they can expect under the requirements of legislation such as Regulation (EU) 2019/88 (Sustainable Finance Disclosure Regulation) and Regulation 2020/852 (Taxonomy Regulation) [38].

Another function that can be an advantage for companies reporting using ESG Maturity is the ability to receive an overview of the company's sustainability performance, progress, and strategy while being able to conduct a more granular and thorough evaluation of specific indicators or to target an area of ESG performance that may be lagging. This enables companies to focus their efforts where they effectively need to, making their sustainability strategy more efficient, and saving time and resources that otherwise could be conducted in an area in which the company is already thriving.

Lastly, this software provides the option to share the company's information with investors, shareholders, and other stakeholders, through a link that provides access to the most relevant indicators of the company and/or their dashboard, facilitating the accessibility of all interested parts to the progress and overall performance of the company.

5.4. Possible Limitations of the ESG Maturity

Even though there is the possibility of ESG Maturity becoming a solution for the current challenges that most frameworks face, it is not without its challenges and limitations to its development and implementation.

5.4.1. Software Still in Development and Dropout Rates

The first foreseen difficulty is associated with the fact that the software is still being developed, which means that most companies that subscribe to this service have yet to receive the final version with all functional features. Associated with this challenge, as well as with the feature of information triangulation, some companies might not appreciate the results provided by the software, regarding, for example, their reputational analysis, which might translate, in the long run, in a higher than the expected dropout rate of companies, since the software shows not only the "good" facet of the company but also the dimensions in which it is lagging or even failing.

5.4.2. Constant Need for Updates

Another limitation to consider is, as with all software used as services, the constant need to update—particularly, the legislation and regulation feature of the software. In the current rapidly evolving regulatory environment, particularly in European companies [37], it might be a challenge to constantly update the algorithm that provides compliance certification to companies, leaving companies with temporarily inaccurate classifications. However, the developers are working on integrating all regulatory and legislation available at the current time in this software.

5.4.3. Diverting Human Resources to the Software

Another challenge relates to the need for the reporting companies to still direct resources, particularly human resources, to the completion of the questionnaires, even though this is much more limited compared to other frameworks. Even though there is an improvement from having a team of professionals responding to several frameworks, there is still a need for at least one to two people to keep the company's dashboard up-to-date and correctly filled out.

5.4.4. Limited Inclusiveness

As of today, ESG Maturity is still limited in its inclusiveness, which can be considered a limitation, given that it was designed and directed at people that can read and see, which is a characteristic that needs to be adapted in the future so that people with disabilities or learning difficulties can also utilize the software.

5.4.5. Lack of ESG Literacy

Beyond the limitations of the software itself, there is also a limitation associated with the lack of ESG literacy, particularly in small and medium enterprises [SME], which are pressured into providing this information rapidly, since they are mostly involved in the value chain of larger companies or as suppliers, for instance. Although the software is intuitive and user-friendly, it can be difficult for a person with no or only limited previous knowledge to navigate all the dimensions of ESG in the software and to answer the questions in, for example, the diagnostic questionnaire. To tackle this challenge, there is a need to invest in ESG literacy and de-complexify sustainability information, so that it is accessible to all elements of the value chain of businesses.

5.5. Companies' Experiences Using ESG Maturity–Testimonies

Given that the software is still being developed, there is difficulty in providing concrete and quantifiable information regarding its effects on the company's ESG performance. However, some companies that have already used the software have made available testimonies that relate to their experience as users. The identification of the companies is kept anonymous to protect confidentiality agreements.

One of these companies, "Company A", highlights the benefit of using ESG Maturity in order to evaluate, assess and monitor its investees, as an investment firm: "(. . .) And, we are also using the ESG Maturity tool to evaluate our potential investees in the context of sustainability. So this tool helps us not only in this analysis, but also in the subsequent reporting of sustainability indicators for our portfolio of investees (...)" [39] (p. 10).

Another company, Company B", which is a worldwide organization, focused on the utility of the software as a guideline for sustainability, as well as a tool for assessing a company's strengths. The same company also emphasizes the practicality and the capability of involving all elements in the process of determining the next steps in the sustainability journey of the company: "(...) Answering the diagnostic questionnaire allowed us to see—even before the final result—points that we had never asked ourselves. At the same time, we also realized how mature we already are on some fronts. The platform is simple to use, the final results in the dashboard are also very visual and help us share with the whole team where we are and what are the next steps. The dashboard is visual and intuitive even for those who have not participated in the process (. . .) " [39] (p. 10).

Several other companies have also used the software and have reported considering the software relevant, useful, and easy to navigate, making their relation to ESG reporting easier. Nevertheless, the authors would like to emphasize that the software is still in development, so the information available from the user/reporting companies is still limited.

6. Conclusions and Study Limitations

As of today, sustainability reporting is a key process linked to the financial performance and market value of companies [40]. However, most frameworks that seek to help companies conduct this process present structural challenges, hindering the efficiency and capacity of companies to deliver accurate, reliable, and consistent non-financial information to their investors and shareholders, as well as society in general [1,9,23].

Given the challenges presented by the commonly used frameworks, the idea of a single framework containing all criteria and capable of adapting its guidelines to the characteristics of companies seems unlikely to produce the response needed to overcome the difficulties ESG reporting faces at the present moment [23].

Despite the existence of possible limitations and challenges of its own, a new, groundbreaking, sophisticated software is in development, that proposes to tackle all the challenges while offering added value to the companies that choose to report under it, as well as investors, giving them access to the information needed to make a responsible and informed investment decision. This new software, ESG Maturity, congregates several functionalities that offer more reliable, measurable, transparent, and consistent non-financial information, contributing to higher comparability among companies, and greater precision and validity of the reported information [35].

More than reporting, this is a software framework that helps companies do better, sustainability-wise, while not having to sacrifice time, practicality, or excessive resources, directing them to what really matters: being sustainably responsible and proactive, contributing to the socio-economic development of today's society.

Regardless of the relevant contributions of this study to ESG reporting, especially in the finance and investment area, there are still limitations associated with the presented research.

One of the limitations that the authors consider relates to the quantity and type of frameworks analyzed in this paper. As such, the frameworks described in this study are limited, not all frameworks available for companies to report their non-financial information are addressed, which would require a systemized review. The frameworks described were selected for being the most commonly used in the investment field as well as for non-financial reporting. In future studies, it is suggested to consider different frameworks, such as Future Fit Business Benchmark [FFBB] and The Climate Disclosure Standards Board [CDSB] to provide a different, and even larger overview of ESG reporting, particularly in the "E" dimension, which was not the focus in this paper.

Another limitation relates to the fact that the software described is still in development. Although some companies already have access to it, the data collected are still marginal, which makes it difficult to present data about user experience and/or satisfaction, as well as concrete indicators of improvement from companies using the software. Nevertheless, the authors have presented the testimony of companies that already had access to earlier versions and there is the expectation that more user experience data will be available within the foreseeable future.

Nevertheless, this paper contributes to a comprehensive understanding of the current state of ESG reporting, the available frameworks, and respective challenges and difficulties, while providing a new "avenue" for future investors, top management, decision-makers, and academics to assess ESG performance and reporting of companies, while also helping companies become more sustainable themselves.

7. Patents

The ESG Maturity Software described in this paper is an intangible asset (*nº 03052022*) liable and protected by trade secrets. The same software, along with the data are also registered to *Clarke, Modet y Cía. S.L.*, as Intellectual Digital Property in the Block Chain. To have access to the identification and description of the trade secrets and the evidence records of the digital files, please contact the authors.

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