

ESG indicator metrics used by organisations to assess the degree of sustainability in companies

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Abstract— *Sustainability is increasingly becoming a necessity for corporations due to changing perspectives around the world. In this scenario the following problematic issue has arisen: Which ESG indicators are used to evaluate companies? To answer this problem the following objective was set: map the ESG indicator metrics used by organisations to analyse sustainability in companies. To this end, an integrative literature review was conducted using the Web of Science database. The results of the research indicate the instruments for this analysis as: Bloomberg Sustainability Report, Compustat database, Thomson Reuters Eikon™ Report (ASSET4), MERCO Index, Kinder Lydenberg Domini (KLD) Report, Global Reporting Index (GRI) Report, Global Engagement Services (GES), Sustainalytics database and in some cases interviews with the organizations' managers. These instruments measure ethical behavior, responsibility with employees, transparency and good governance, contribution to the Community, and commitment to the environment and climate change, and help assess companies on their ESG performance.*

I. INTRODUCTION

Sustainability can be defined as satisfying present needs without compromising the needs of future generations to meet theirs. It is structured on three pillars: economic, environmental and social. In the corporate context, a sustainable business strategy seeks to have a beneficial effect on one or both, contributing to the resolution of some of the most serious issues facing the globe. Some of the global issues that sustainable business strategies help address include: climate change; natural resource depletion; gender inequality; fair working conditions; racial injustice; income inequality; pollution; circular economy; human rights issues [1].

Against this backdrop are the Sustainable Development Goals (SDGs) which represent an unprecedented global consensus. They are the result of 193 countries joining together in an agreement on a comprehensive and

ambitious development agenda for people and planet by 2030 [2]. The SDGs describe the biggest challenges and needs for human mankind of our time and the goals to address them. Achieving these goals requires collective action between governments, private sector, civil society, communities and dedicated individuals, needs to be linked with the appropriate resources, innovative capacity, and relationships to promote implementation [3].

There are several compelling reasons for corporations to achieve social impact and participate with the SDGs in the context of organizations. Beyond the requirement to satisfy society's demands for increased responsibility and transparency, fusing purpose with profit can produce a special competitive edge to satisfy the demands of discriminating customers, investors, and staff [4].

Companies are compelled to integrate social impact and SDG alignment into their core business by five main

financial value drivers: 1) Generate new revenues by creating opportunities for market differentiation, expansion and growth, including innovating to access extremely promising markets that do not yet exist or are in their early days; 2) employer attractiveness for better recruitment and retention; 3) increasing supply chain resilience by increasing supply chain sustainability and operational efficiency; 4) pique investor interest, increasing attractiveness to a wider range of investors; 5) be "ahead of the curve" in securing a license to operate, addressing regulatory compliance and managing risk [5] [6].

Linked to the SDGs stands ESG (Environmental, Social and Governance), which refers to these three dimensions and criteria to measure the sustainability impact of an investment in companies [7]. ESG criteria are a set of standards for a company's behaviour used by environmentally and socially conscious investors to select potential investments in particular companies. Environmental standards take into account how a business safeguards the environment, including corporate policies that address climate change, for instance. Social factors look at the company's interactions with its customers, suppliers, employees, and the communities in which it operates. Governance deals with company leadership, executive remuneration, audits, transparency, internal controls and shareholder rights [8].

ESG criteria are increasingly clear in defining the investment choices of large institutional investors, such as public pension funds and various types of mutual funds. The most recent US SIF Foundation report claims that at the end of 2019, investors held assets chosen based on ESG criteria for \$17.1 trillion, up from \$12 trillion just two years earlier [9]. O investimento da ESG é às vezes referido como investimento sustentável, investimento responsável, investimento de impacto, ou investimento socialmente responsável. To evaluate a company based on ESG criteria, investors look at a wide range of institutional behaviours and policies [10].

Environmental criteria should include corporate climate policies, waste, energy use, natural resource conservation pollution, and animal welfare. These criteria can also help to assess any environmental risks that a company may face and how the company is managing these risks. Likewise, the social criteria analyse the company's relations with stakeholders, including employees, customers and suppliers. ESG governance standards, meanwhile, ensure that a company employs transparent and accurate accounting practices, looks for integrity and diversity when choosing its leaders, and is accountable to shareholders [11].

Thus, the main aim of this study is to map ESG indicator metrics used by organisations to analyse sustainability in companies, in light of the bibliometric review. To this end, a bibliometric search was carried out in the Web of Science database. The research is divided, in addition to this introduction, into five parts. The first part is entitled introduction, the second presents the concepts on ESG indicators, the third the methodological path, the fourth results and discussions, and finally the authors' final considerations.

II. ESG INDICATORS

The concern and responsibility of companies with environmental, social and management/governance aspects are constantly being questioned. It is a fact that there are selfless companies that take care of these issues and include them in their business plan. But it is also a fact that other companies only address this issue if they see a value to their product and their corporate image and reputation. If the company uses resources, extracted from the same environment where it is located, for its manufacture, and at the end returns waste to this same environment, it needs a motivation to have a greater responsibility in this type of behaviour. If their actions, involving increased ESG responsibility, can be presented to the market as an added value to the product, then the market and consumers can value this as "good business" with a focus on sustainability. But the value of this responsibility in ESG is not always easily recognized [12] [13].

The Fig. 1 presents a particular scenario depicting the company's attempt to offer ESG responsibility value. And therein emerges the figure of "research firms" and "financial analysis firms", which assist investors, through specialized ESG reports. There are also "consulting companies", which help companies in their internal processes to meet the expectations of investors and the goods and consumer market.

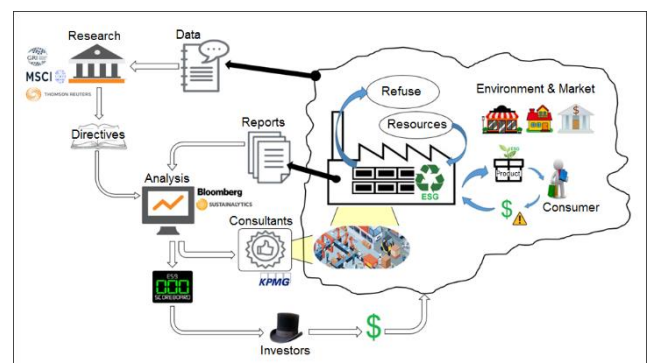


Fig. 1: ESG management in a company

There are other reasons why ESG liability happens. One very important reason is the company's image with investors. These investors increasingly consider and prioritize companies' ESG responsibility in their assessments and decisions to invest in a given company. If this occurs, it makes a lot of sense for companies to have a governance policy, which considers ESG criteria as a central pillar of their management model, which can attract the investor and simultaneously be a company of preference of conscious consumers [14].

But it is not enough to be responsible in ESG, as it is necessary for the company to measure its degree of responsibility. It is a way to demonstrate the effects of actions and to manage its management. It is necessary for the company to monitor and evaluate the different ESG indicators on an ongoing basis in order to measure and qualify each one of them [15]. When a company adopts ESG concern in its management, it commits to meet environmental, social and governance topics, generating product value, since its commitment to ESG needs to be disclosed to the market [16]. The Fig. 2 shows the three ESG pillars and the most important criteria for each one.

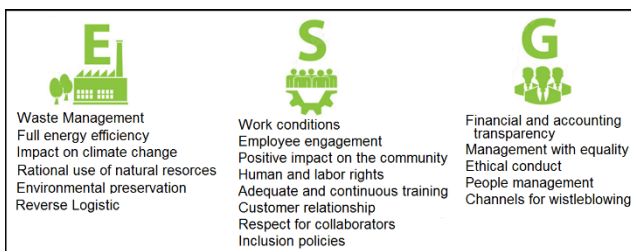


Fig. 2: ESG Pillars and some criteria

Announcing to the market that a company manages its waste, for example, does not automatically result in being recognised by the market. It is necessary to quantify or qualify this waste management in order to compare it with other companies that are in the same business context. It is therefore necessary to know how effective certain actions are in each ESG criteria, which it proposes to attend to, in order to manage its actions, investments and the dissemination of results. Thus the need arises to establish indicators to qualify or quantify the result of actions, in each ESG criteria [17].

Performance indicators are metrics used to measure and evaluate the performance of decisions and actions, which a particular company is taking to achieve its ESG goals. The objective is to understand how people or equipment/machinery are performing in relation to the different criteria, in order to know if they meet the expected standard and if in fact they will be able to achieve the determined goals. A meaningful indicator should be measurable and comparable, considering similar scenarios.

In this way one cannot only quantify, but also qualify the performance of certain ESG criteria [18].

As it is very difficult for a company to meet all ESG criteria, it is suggested that some specific indicators are prioritized, those that have the greatest impact on its operations and that can add value to the company's image in society. This is why it is important for a company to know the ESG criteria and indicators that the most reputable companies use. Investment funds or banks look at companies' ESG responsibility to measure their ESG risk [19].

III. METHODOLOGICAL APPROACH

To address the problem of this research, the present study is classified as exploratory-descriptive in order to describe the theme and increase the familiarity of researchers with the issue. The specific literature search method used was a systematic search in an online database (Web of Science), for the period from 2004 to 2022, followed by a bibliometric analysis of the obtained data. Bibliometrics is a methodology from the information sciences that uses mathematical and statistical methods to map documents from bibliographic records stored in databases [20].

It allows relevant calculations such as: number of production per region; temporality of publications; organization of research by area of knowledge; count of literature related to the citation of the study; identification of the impact factor of a scientific publication, among others that contribute to the systematization of the research result and the minimization of the occurrence of biases when analysing a certain topic.

For this type of analysis the present study was organized into three distinct stages: 1) planning, 2) collection and 3) result. These stages converge to answer the study's guiding question, namely: "What are the ESG indicator metrics used by organisations to assess the degree of sustainability in companies?"

IV. RESULTS AND DISCUSSION

The planning and research in the database took place in May 2022. In this phase, some criteria were defined, such as the limitation of the search to electronic databases, not contemplating physical catalogues in libraries, due to the number of documents considered sufficient in the databases chosen for the present research. In the planning scope, the Web of Science database was chosen as relevant to the research domain due to its relevance in the academic field and its interdisciplinary nature, and also because it is one of the major databases of abstracts and bibliographic

references of peer reviewed scientific literature, being constantly updated.

Considering the research problem, the search terms were defined during the planning phase, namely "Companies" and "ESG" or "Environmental Social Governance" and "indicator*". It is considered that the variations of the expressions used in the search are presented, in a larger context, within the same proposal, since a concept depends on the context to which it is related. Finally, the terms defined in the "title, abstract and keyword" fields were used without temporal, language or any other restriction that might limit the results.

Firstly, planning was conducted by elaborating the guiding question: "What are the ESG indicator metrics used by organizations to assess the degree of sustainability in companies?". To refine the search aligning it to the research problem the search was conducted using the following terms: "Companies" and "ESG" or "Environmental Social Governance" and "indicator*" which originated a set of 620 documents found. From these, some types of documents were excluded such as: reference articles, conferences, ebooks and book chapters, which resulted in a set of 475 indexed scientific articles published in scientific journals in the temporal period from 2004 to 2022.

As a result of this survey, 475 papers were identified, involving 1,372 authors, linked to 785 institutions in 65 different countries. The 5 main countries that have the most publications on the subject are the USA (102 publications), Italy (93), England (67), China (59) and Spain (59). In this set of articles, 1509 keywords were used. Table 1 shows the results of this data collection in a general bibliometric analysis.

Table 1: Bibliometric data of the search

Topic	Description	Results
Time period.	Time period analysed.	2004 a 2022
Document type.	Retrieved documents/publications	620
	Scientific articles.	475
Additional information.	Keywords.	1,509
	Authors.	1,372
	Number of authors per publication.	2.46

The eligible articles in the Web of Science database were published between 2004 and 2022. In 2020 there was a significant increase in publications, with 110 publications and in 2021 there was another increase in the

number of publications, with a total of 140 publications, as shown in Fig. 3.

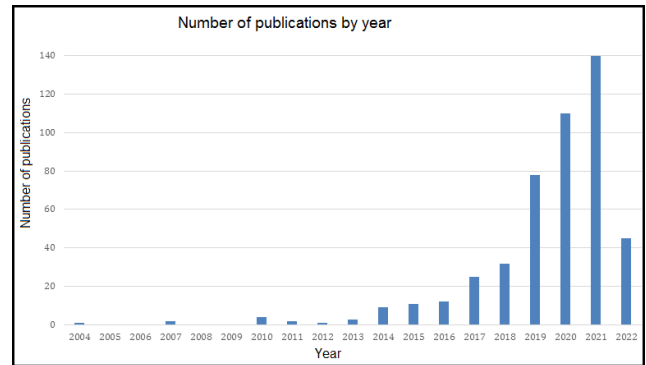


Fig. 3: Time distribution of obtained publications

When analysing the 20 countries with the highest number of citations in the area, the United States stands out with an average of 14% of total citations, a total of 786 citations, followed by Italy and the United Kingdom with 13% (717) and 12% (698), respectively, according to Fig. 4.

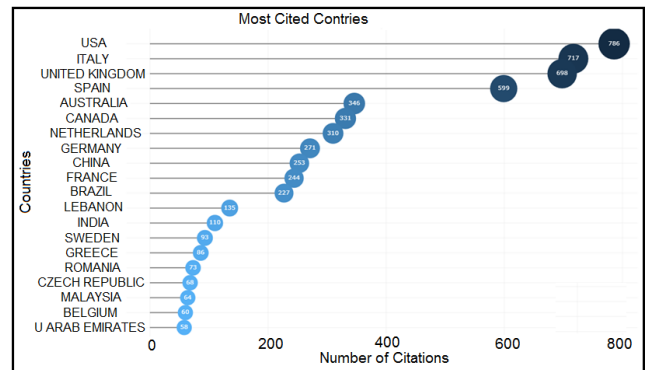


Fig. 4: Distribution of the number of citations of the articles found in the bibliometric search by country

Retrieved documents were published in 206 different scientific journals, 87 (25%) of which were published in the journal "Sustainability", as shown in Fig. 5, which presents the 20 scientific sources (journals) with the highest number of publications on the topic of "ESG" and "indicators".

The second most relevant journal among the 20 indicated in Fig. 5, is "Corporate Social Responsibility And Environmental Management", with 20 documents. In sequence is, with 17 publications, "Business Strategy And The Environment" on the subject matter of this study.

From the bibliometric analysis, based on the group of papers retrieved and the 1,509 keywords indicated by the authors, "performance" (performance) stood out with 119, "impact" with 99, "financial performance" with 95

occurrences, "management" with 87 and "governance" with 86, according to Fig. 6, concluding that the ESG pillar "governance" is an area widely explored by the scientific literature.

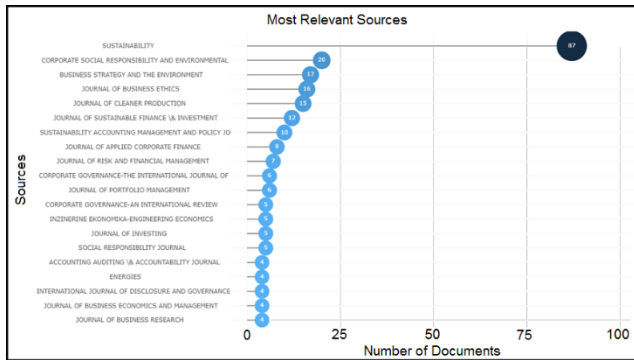


Fig. 5: Scientific journals with the highest number of publications



Fig. 6: TAG cloud

The 20 (twenty) most cited documents worldwide from the papers obtained through the database search are listed in Fig. 7.

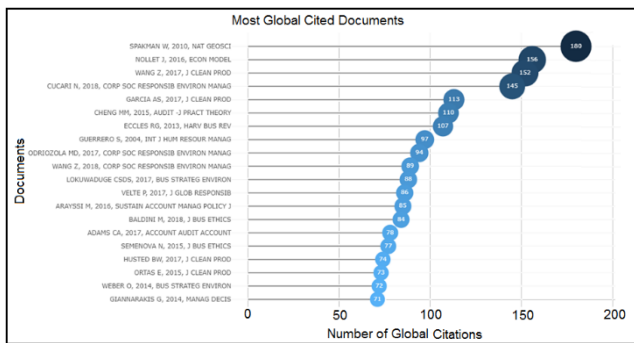


Fig. 7: Most cited documents globally

After systematic analysis of these 20 (twenty) most cited publications globally, the full reading of all articles was conducted in order to answer the research question: "What are the metrics of ESG indicators used by organizations to assess the degree of sustainability in companies?" Based on these 20 papers, 14 (fourteen) publications were chosen, for being of open access and for

answering the problematic of this study. Table 2 presents a summary for each of the 14 articles.

Table 2: Summary of the selected articles

Authors	Results
Nollet; Filis and Mitrokostas [21]	The authors seek to define the existing relationship between social performance (CSP - Corporate Social Performance) and financial performance (CFP - Corporate Financial Performance), as from the ESG Disclosure report issued by Bloomberg Sustainability institution, with the premise that potentiating the consumers' socially conscious demands and contributing with the company's financial performance, admitting of ESG actions do not cause linear effects on financial performance. The study disaggregated ESG into its subcomponents and added financial indicators, resulting in a set to be correlated, as follows: environmental significance (ENV), social significance (SOC), governance significance (GOV), return on assets (RoA), return on capital (RoC), return over market shares (Stock Returns), market risk assessment (Risk), sales revenue (Sales) and expenses in research and development (R&D). The results of this linear model suggest that no significant relationship can be reported between social performance (CSP) and financial performance (CFP), vis-à-vis financial indicators RoA, RoC and Stock Returns. In a non-linear relationship, this relationship implies that social performance pays off only after a certain threshold of investments and achievements in relation to financial performance. In general, companies use social performance as part of their strategic planning in order to create additional value for their product.
Wang and Sarkis [22]	The authors make a study of the relationship between Corporate Social Responsibility (CSR) management and corporate financial performance, based on environmental, social and governance (ESG) data from Bloomberg Sustainability and the COMPUSTAT database, in a sample of the 500 largest

	<p>green companies in the United States for the years 2009 to 2013. Based on the financial indicators of return on assets (RoA) and Tobin's Q factor, which represents the ratio between the sum of the market value of a company and its debts, by the replacement value of its current assets, focusing on its stock, confronted with the ESG indicators in their sub-components, namely: environmental significance (ENV), social significance (SOC), governance significance (GOV). As results, the paper presents that good CSR results help companies to achieve and maintain social legitimacy, thus contributing to the business environment and higher financial returns. And that a symbolic governance in CSR creates a legitimacy gap, resulting in lower financial returns. Good financial outcomes are related to good CSR outcomes. True legitimacy goals with real results will pay off more as financial performance, than token legitimacy efforts.</p>	<p>Silva and Orsato [24]</p>	<p>(subject to systematic social taboos, moral debates and political pressures, more likely to cause social and environmental damage), is associated with social and governance performance in ESG, using indicators from the database, Thomson Reuters EikonTM, considering 365 companies from Brazil, India, Russia, South Africa, and China (BRICS), said emerging countries. ESG performance indicators were used and their subsets in environmental performance (ENV), social performance (SOC), performance in corporate governance (GOV), systematic risk index, company financial leverage index, cash flow, company size and profit over assets. Results do point out that the best environmental performance is predominant in companies perceived as sensitive or more likely to cause harm to society, confirming the premise that companies in sensitive sectors tend to disclose their ESG indicators to protect their reputation. The systematic risk of the company and its ESG performance is described as an inverted U curve, indicating a maximum value for ESG performance, leading the investor to have to observe the opportunity for the investment. Overall, companies with better ESG performance tend to be less profitable.</p>
<p>Cucari; Falco and Orlando [23]</p>	<p>This study investigates the association between environmental, social and governance (ESG) indicators and board diversity (BoD) in 54 Italian companies for the period 2011 to 2014, based on Bloomberg Sustainability reports, in the Italian context. The work disaggregated ESG into its subcomponents, being: environmental significance (ENV), social significance (SOC), governance significance (GOV). The results indicate that corporate social responsibility (CSR) of the company is associated with the board, independent and committee. Moreover, women on management boards are negatively correlated to CSR, while board age is not significant. Based on this study, shareholders and policy makers will have a deeper insight into the significant roles that board diversity is defined as a determinant of ESG disclosure.</p>	<p>Cheng; Green and Ko [25]</p>	<p>The authors bring two studies that investigate the effect of environmental, social and governance indicators (ESG) in investors' decisions, varying the company's strategy according to these indicators, in its subcomponents, being them: environmental significance (ENV), social significance (SOC), significance in governance (GOV). A survey was applied to graduate students in Financial Analysis, in the role of non-professional investors. Points out that investors perceive the most important ESG indicators, and are more willing to invest in the company where ESG indicators have greater strategic relevance. The experimentation was a laboratory-based experiment, in a controlled environment. Results indicate that non-professional</p>
<p>Garcia; Mendes da</p>	<p>The study investigates whether the financial profile of sensitive industries</p>		

	<p>investors attach greater importance to ESG indicators when making investment decision and perceived importance increases willingness to invest, in direct relationship. The paper suggests that companies are likely to benefit both from ESG indicators perceived as strategically relevant and their assurance of sustainability reports containing this information.</p>	<p>Wang; Hsieh and Sarkis [28]</p>	<p>The authors used data from 331 Corporate Social Responsibility (CSR) reports issued by US public companies in the period from 2009 to 2012, adopting the Fog, Kincaid and Flesch indices to measure CSR report readability and Bloomberg sustainability and Kinder Lydenberg Domini (KLD) databases to measure ESG indicators and their components, with the purpose of examining the relationship between CSR performance and CSR report readability. Their results show a significant positive relationship between CSR performance and CSR report readability, indicating that companies with stronger CSR performance are more likely to have CSR reports with higher readability. Furthermore, the association of CSR reports readability with social performance is stronger than with environmental performance. Companies with good CSR performance are more likely to use plain language to disclose their CSR achievements, as a means of emphasizing positive information.</p>
<p>Guerrero and Barraud-Didier [26]</p>	<p>The authors do not directly point to a study on ESG indicators, but address the significance of human resource practices (HRPs), which make up the social (SOC) and governance (GOV) indicators, components of ESG. In order to test the effect of HRP on social and organizational performance and financial performance, 1,530 HR directors working in large companies in France were questioned. The results show that there is no significant correlation between high involvement actions and financial performance. As well as there is no effect on performance with regard to remuneration. Communication and training are strong points for improving organizational results. This highlights the importance of creating challenging and enriched activities to manage high engagement.</p>	<p>Lokuwaduge and Heenetigala [29]</p>	<p>The paper explores the extent of ESG reporting of 30 companies in the metals and mining sector listed on the Australian Securities Exchange in the year 2013 to determine the ESG indicators in use in the Australian metals sector. It used the indicators of the Global Reporting Index (GRI). They verified environmental (ENV), social (SOC) and governance (GOV) indicators. According to their results, the motives of ESG reporting are highly influenced by regulations. Some ESG reports that may negatively influence the legitimacy of the company are not reported or are less reported, which implies that legitimacy. Mining companies, as companies operating in a highly environmentally sensitive sector, are reasonably trying to disclose the information required by environmental regulators. Companies have used different measures to report ESG incidents and there is no uniformity in the measures used. In general, ESG reporting is not meaningful unless it is comparable, as</p>
<p>Odriozola and Baraibar-Diez [27]</p>	<p>The aim of this paper is to test whether the quality of sustainability reporting in ESG influences subsequent corporate reputation. Conducted on 22 Spanish companies listed on the Ibex35, representing the largest capitalization companies in the country, in the period 2006 to 2011. In this report, information was extracted on corporate reputation (MERC index), quality of information, company size, financial performance and visibility, against disclosure of general ESG indicators. The result highlights the importance of the quality of ESG information disclosed to obtain corporate reputation.</p>		

	<p>there is no uniformity due to lack of reporting standards.</p>		<p>Johannesburg Stock Exchange and the Australian Stock Exchange. The findings point out that there is a link between ESG risk, reputational damage and strategy compliance, as there is evidence of increasing investor demand for information on ESG risk. The importance of board involvement in integrating environmental and social sustainability into corporate practices is highlighted, as well as need for increased regulatory and stock exchange requirements to disclose both ESG risks and strategy. Further global discussion on the role of corporate reporting in setting sustainable development goals is necessary.</p>
<p>Velte [30]</p>	<p>The author presents a study of the impact of ESG performance, in each of its subsets, on financial performance (FINP), conducted on a sample of 412 companies listed on the German Prime Standard, in the period from 2010 to 2014. The ESG indicators were obtained by Asset4 data from Thomson Reuters, being the financial indicators used the Return on Assets (RoA) and Tobin's Q. As results, the paper points out that there is a positive impact of ESG performance on RoA, but no impact on Tobin's Q. Moreover, analyzing the three different components of ESG, governance performance has the strongest impact on financial performance (FINP) compared to environmental and social performance.</p>	<p>Semenova and Hassel [33]</p>	<p>This study explores the validity of MSCI ESG STATS (aka Kinder, Lydenberg and Domini Research & Analytics - KLD), Thomson Reuters ASSET4 (ASSET4) and Global Engagement Services (GES) environmental ratings. The results suggest that KLD environmental strengths tend to be a company-specific metric, while KLD environmental concerns appear to capture more industry attributes. ASSET4 and GES environmental metrics reflect more of an environmental opportunity perspective and provide information about a company's future performance. The study shows that the rankings have common dimensions, but on the whole, they do not converge.</p>
<p>Arayssi; Dah and Jizi [31]</p>	<p>The authors investigate the impact of female participation on corporate boards on their ESG performance. ESG data were extracted from Bloomberg Sustainability reports, in the period from 2007 to 2012, with 100 companies. As results, it points out that gender diversity on company boards and management positively impacts ESG performance. ESG disclosure sends a positive signal to stakeholders regarding expectations of future company growth and financial position. Female participation materially elevates shareholder well-being. Better decision making increases investors' perception of the legitimacy and competence of reported social activities, raising the signal of legitimacy and significance of sustainability reporting.</p>	<p>Husted and Sousa-Filho [34]</p>	<p>The authors examine how sustainability project governance affects environmental, social and corporate governance (ESG) performance. They use information from Sustainalytics and Bloomberg Sustainability databases, with 459 companies, in nine countries, over a range from 2013 to 2016. Results suggest that there are comparative impacts of sustainability governance on ESG performance. Collaborative governance resulted in the highest ESG performance benefits, followed by in-house and third-party. Internal company sustainability projects are positively related to company ESG performance.</p>
<p>Adams [32]</p>	<p>The author investigates the relationship that exists in ESG risk management and governance and value strategy development. The paper also investigates how corporate reporting mitigates these relationships. The data is drawn from interviews with CEOs and directors of large companies listed on the</p>		

The aim of the review of the selected articles in the present study is to identify the ESG indicator metrics used by organizations to assess the degree of sustainability in companies. Table 3 presents the list of articles indicating the ESG indicator metrics used.

Table 3: ESG Indicator Metrics used by organizations in the selected articles

Authors	ESG indicator metrics used
Nollet; Filis and Mitrokostas [21].	Bloomberg Sustainability Report.
Wang and Sarkis [22].	Bloomberg Sustainability Report; Compustat Database.
Cucari; Falco & Orlando [23].	Bloomberg Sustainability Report.
Garcia; Mendes da Silva and Orsato [24].	Thomson Reuters EikonTM (ASSET4) Report.
Cheng; Green and Ko [25].	Interviews with graduate students.
Guerrero and Barraud-Didier [26].	Interviews with HR directors of companies.
Odriozola and Baraibar-Diez [27].	MERCO Index.
Wang; Hsieh and Sarkis [28].	Bloomberg Sustainability Report; Kinder Lyndenber Domini (KLD) Report.
Lokuwaduge and Heenetigala [29].	Global Reporting Index (GRI) Report.
Velte [30].	Thomson Reuters EikonTM (ASSET4) Report.
Arayssi; Dah and Jizi [31].	Bloomberg Sustainability Report.

Adams [32].	Interviews with company chairmen and directors.
Semenova and Hassel [33].	Thomson Reuters EikonTM (ASSET4) Report; Kinder Lyndenber Domini (KLD) Report; Global Engagement Services (GES).
Husted and Sousa-Filho [34].	Sustainalytics Database; Bloomberg Sustainability Report.

Table 3 details that the ESG indicator metric provided by the "Bloomberg Sustainability Report" has the highest recurrence among related articles, accounting for a total of 6 (six) papers. In second place comes the "Thomson Reuters EikonTM Report (ASSET4)" and the format of "Interviews" with different sectors of companies, each cited by 3 (three) articles as assessed in the present study. The "Kinder Lyndenber Domini (KLD) Report" was used in 2 (two) cited papers.

Global Reporting Initiative (GRI) and Thomson Reuters (Asset4) are analysis companies with guidelines that use ESG indicators and have a greater focus on the environment and context in which they operate, valued by the investment market and used by them for decision making. They issue ESG reports and ratings of companies, considering the environment and context in which they operate. In addition, there are also economic/financial analysis companies, such as Sustainalytics and Bloomberg, that use ESG indicators and focus on an analysis based on corporate governance. KLD, on the other hand, uses a methodology more focused on the "Social" part of ESG.

The Global Reporting Initiative (GRI) Report helps companies and other organisations, through standards for sustainability reporting, by providing them with the common global language to communicate these impacts [35]. The GRI Report issues sustainability reports that present a company's economic, environmental, social and governance performance to society. It is the company's way of showing its impacts and measuring its actions, bringing increment of positive values to its image and increasing brand loyalty, comparing the organizational performance, with other organizations [36]. The Thomson Reuters EikonTM Report (ASSET4), on the other hand, provides market analysis, which aims to help professionals make decisions to better manage their businesses. It

investigates world economies regarding their laws, taxes, compliance, government, media, regulations and technology [37]. It uses the records of ASSET4-ESG, which has a database of information in this regard.

Sustainalytics is an international market analysis organization that measures ESG risk ratings, using Sustainalytics database, measuring a company's exposure to sector-specific risks, and how well a company is managing them. It combines the concepts of management and exposure, to arrive at an absolute ESG risk assessment, using GRI guidelines [38].

The Bloomberg Sustainability Report basically performs an economic/financial analysis that considers the ownership and control structures of the company, the composition and effectiveness of its board, the effectiveness of its incentive practices and the integrity of its accounting, including any controversies that may have a significant, negative impact on the value of the company. The method applied by KLD (Kinder Lydenberg Domini Report) aims to remove barriers to socially responsible investment by providing research and support to the socially responsible investment market, with a view to influencing corporate behaviour towards a fairer and more sustainable world.

The MERCO index (Corporate Reputation Business Monitor) is a corporate instrument of reference in Latin America for the evaluation of ESG criteria, which assesses the reputation of companies, based on a methodology consisting of six indices, plus twenty additional sources of information, and independently audited by KPMG, that validates the method and the results, obtained [39].

The methodology signals two strengths and one weakness among the following values: ethical behaviour, transparency and good governance, responsibility towards employees, commitment to the environment and climate change, and contribution to the community. Based on this information, interviews are conducted with various groups of people, including the general population, corporate social responsibility experts, financial analysts, NGOs, trade unions, consumer associations, economic information journalists, government representatives and social media managers. In addition, objective indicators answered by the companies themselves are considered [39].

All instruments for analysing companies and markets mentioned above point out that ethical behaviour, transparency and good governance, responsibility towards employees, commitment to the environment and climate change and contribution to the community contribute to measuring the indicators used in companies.

V. FINAL CONCLUSIONS

The search using the Web of Science database identified 475 papers, which deal with ESG indicator metrics in companies. The number of citations of these articles, by country, has the United States of America in first place with 786 citations, followed by Italy with 717 citations in the evaluation period, from 2004 to 2022. The 475 articles obtained in the bibliometric search are published in 206 different scientific journals, being in first place the journal "Sustainability" with 87 articles (25%). The main aim of this systematic review was to map ESG indicator metrics used by organisations to analyse sustainability in companies, in the light of a bibliometric review.

Regarding ESG indicator metrics used by organisations, the following stand out: Bloomberg Sustainability Report, Compustat database, Thomson Reuters Eikon™ Report (ASSET4), MERCO Index, Kinder Lydenberg Domini (KLD) Report, Global Reporting Index (GRI) Report, Global Engagement Services (GES), Sustainalytics database and in some cases interviews with the organizations' managers.

For future research, it is intended to map which specific indicators are used by organisations to assess the implementation and degree of sustainability of ESG in companies, and to compare between them, focusing on the metrics presented in the project study.

REFERENCES

- [1] Jonsdottir, G. E., Sigurjonsson, T. O., Alavi, A. R., & Mitchell, J. (2021). Applying responsible ownership to advance SDGs and the ESG framework, resulting in the issuance of green bonds. *Sustainability*, 13(13), 7331. <https://doi.org/10.3390/su13137331>
- [2] Caiado, R. G. G., Leal Filho, W., Quelhas, O. L. G., de Mattos Nascimento, D. L., & Ávila, L. V. (2018). A literature-based review on potentials and constraints in the implementation of the sustainable development goals. *Journal of cleaner production*, 198, 1276-1288. <https://doi.org/10.1016/j.jclepro.2018.07.102>
- [3] Florini, A., & Pauli, M. (2018). Collaborative governance for the sustainable development goals. *Asia & the Pacific Policy Studies*, 5(3), 583-598. <https://doi.org/10.1002/app5.252>
- [4] Bull, B., & Miklian, J. (2019). Towards global business engagement with development goals? Multilateral institutions and the SDGs in a changing global capitalism. *Business and Politics*, 21(4), 445-463. <https://doi.org/10.1017/bap.2019.27>
- [5] Sachs, J. D., & Sachs, L. E. (2021). Business alignment for the "Decade of Action". *Journal of International Business Policy*, 4(1), 22-27. <https://doi.org/10.1057/s42214-020-00090-6>

- [6] Van Zanten, J. A., & Van Tulder, R. (2021). Analyzing companies' interactions with the Sustainable Development Goals through network analysis: Four corporate sustainability imperatives. *Business Strategy and the Environment*, 30(5), 2396-2420. <https://doi.org/10.1002/bse.2753>
- [7] De Franco, C., Nicolle, J., & Tran, L. A. (2021). Sustainable investing: ESG versus SDG. *The Journal of Impact and ESG Investing*, 1(4), 45-62. <https://doi.org/10.3905/jesg.2021.1.019>
- [8] Kotsantonis, S., & Serafeim, G. (2019). Four things no one will tell you about ESG data. *Journal of Applied Corporate Finance*, 31(2), 50-58. <https://doi.org/10.1111/jacf.12346>
- [9] The US SIF Foundation's Biennial "Trends Report" Finds That Sustainable Investing Assets Reach \$17.1 Trillion. (2020). www.ussif.org. Retrieved September 21, 2022, from https://www.ussif.org/blog_home.asp?Display=155#:~:text=WASHINGTON%2C%20D.C.%2C%20November%2016%2C
- [10] Townsend, B. (2020). From SRI to ESG: The Origins of Socially Responsible and Sustainable Investing. *The Journal of Impact and ESG Investing*, 1(1), 10-25. <https://doi.org/10.3905/jesg.2020.1.1.010>
- [11] Park, S. R., & Jang, J. Y. (2021). The Impact of ESG Management on Investment Decision: Institutional Investors' Perceptions of Country-Specific ESG Criteria. *International Journal of Financial Studies*, 9(3), 48. <https://doi.org/10.3390/ijfs9030048>
- [12] Meira, E., Cunha, F. A. F. D. S., Orsato, R. J., Miralles-Quirós, M. M., & Miralles-Quirós, J. L. (2022). The added value and differentiation among ESG investment strategies in stock markets. *Business Strategy and the Environment*. DOI: <https://doi.org/10.1002/bse.3221>
- [13] Zumente, I., & Bistрова, J. (2021). ESG importance for long-term shareholder value creation: Literature vs. practice. *Journal of Open Innovation: Technology, Market, and Complexity*, 7(2), 127. DOI: <https://doi.org/10.3390/joitmc7020127>
- [14] Martins, M. (2022). A relação da divulgação das práticas ESG com o valor de mercado das empresas brasileiras de capital aberto (p. 110) [Review of *A relação da divulgação das práticas ESG com o valor de mercado das empresas brasileiras de capital aberto*]. <http://doi.org/10.14393/ufu.di.2022.175>
- [15] Buchetti, B., & Santoni, A. (2022). CG Stock Markets and the Environmental, Social, and Corporate Governance (ESG) Indicators. In *Corporate Governance in the Banking Sector* (pp. 93-111). Springer, Cham. https://doi.org/10.1007/978-3-030-97575-3_4
- [16] Ye, C., Song, X., & Liang, Y. (2022). Corporate sustainability performance, stock returns, and ESG indicators: fresh insights from EU member states. *Environmental Science and Pollution Research*, 1-12. <https://doi.org/10.1007/s11356-022-20789-8>
- [17] Li, S. (2022). Enterprise Value Assessment Based on ESG Evaluation. *Frontiers in Business, Economics and Management*, 4(3), 48-51. <https://doi.org/10.54097/fbem.v4i3.1073>
- [18] Francischini, A. S. N., & Francischini, P. G. (2017). *Indicadores de desempenho* (Alta Books, Ed.; p. 448)
- [19] Börsche, J. (2021). A Concept for Measuring Real Estate Sustainability from the Investors' Perspective. *Vierteljahrshefte zur Wirtschaftsforschung/Quarterly Journal of Economic Research*, 90(4), 19-42. <https://doi.org/10.3790/vjh.90.4.19>
- [20] Linnenluecke, M. K. (2017). Resilience in Business and Management Research: A Review of Influential Publications and a Research Agenda. *International Journal of Management Reviews*, 19(1), 4-30. <https://doi.org/10.1111/ijmr.12076>
- [21] Nollet, J., Filis, G., & Mitrokostas, E. (2016). Corporate social responsibility and financial performance: A non-linear and disaggregated approach. *Economic Modelling*, 52, 400-407. <https://doi.org/10.1016/j.econmod.2015.09.019>
- [22] Wang, Z., & Sarkis, J. (2017). Corporate social responsibility governance, outcomes, and financial performance. *Journal of Cleaner Production*, 162, 1607-1616. <https://doi.org/10.1016/j.jclepro.2017.06.142>
- [23] Cucari, N., Esposito De Falco, S., & Orlando, B. (2017). Diversity of Board of Directors and Environmental Social Governance: Evidence from Italian Listed Companies. *Corporate Social Responsibility and Environmental Management*, 25(3), 250-266. <https://doi.org/10.1002/csr.1452>
- [24] Garcia, A. S., Mendes-Da-Silva, W., & Orsato, R. J. (2017). Sensitive industries produce better ESG performance: Evidence from emerging markets. *Journal of Cleaner Production*, 150, 135-147. <https://doi.org/10.1016/j.jclepro.2017.02.180>
- [25] Cheng, M. M., Green, W. J., & Ko, J. C. W. (2014). The Impact of Strategic Relevance and Assurance of Sustainability Indicators on Investors' Decisions. *AUDITING: A Journal of Practice & Theory*, 34(1), 131-162. <https://doi.org/10.2308/ajpt-50738>
- [26] Guerrero, S., & Barraud-Didier, V. (2004). High-involvement practices and performance of French firms. *The International Journal of Human Resource Management*, 15(8), 1408-1423. <https://doi.org/10.1080/0958519042000258002>
- [27] Odriozola, M. D., & Baraibar-Diez, E. (2017). Is Corporate Reputation Associated with Quality of CSR Reporting? Evidence from Spain. *Corporate Social Responsibility and Environmental Management*, 24(2), 121-132. <https://doi.org/10.1002/csr.1399>
- [28] Wang, Z., Hsieh, T. S., & Sarkis, J. (2017). CSR Performance and the Readability of CSR Reports: Too Good to be True? *Corporate Social Responsibility and Environmental Management*, 25(1), 66-79. <https://doi.org/10.1002/csr.1440>
- [29] Lokuwaduge, C. S. D. S., & Heenetigala, K. (2016). Integrating Environmental, Social and Governance (ESG) Disclosure for a Sustainable Development: An Australian

- Study. *Business Strategy and the Environment*, 26(4), 438–450. <https://doi.org/10.1002/bse.1927>
- [30] Velte, P. (2017). Does ESG performance have an impact on financial performance? Evidence from Germany. *Journal of Global Responsibility*, 8(2), 169–178. <https://doi.org/10.1108/jgr-11-2016-0029>
- [31] Arayssi, M., Dah, M., & Jizi, M. (2016). Women on boards, sustainability reporting and firm performance. *Sustainability Accounting, Management and Policy Journal*, 7(3), 376–401. <https://doi.org/10.1108/sampj-07-2015-0055>
- [32] Adams, C. A. (2017). Conceptualising the contemporary corporate value creation process. *Accounting, Auditing & Accountability Journal*, 30(4), 906–931. <https://doi.org/10.1108/aaaj-04-2016-2529>
- [33] Semenova, N., & Hassel, L. G. (2014). On the Validity of Environmental Performance Metrics. *Journal of Business Ethics*, 132(2), 249–258. <https://doi.org/10.1007/s10551-014-2323-4>
- [34] Husted, B. W., & Sousa-Filho, J. M. de. (2017). The impact of sustainability governance, country stakeholder orientation, and country risk on environmental, social, and governance performance. *Journal of Cleaner Production*, 155, 93–102. <https://doi.org/10.1016/j.jclepro.2016.10.025>
- [35] GRI. (2022). Global Reporting Initiative. [Globalreporting.org](https://www.globalreporting.org). <https://www.globalreporting.org>
- [36] Terreo, G. (2022). Evolução dos relatórios de sustentabilidade (K. P. Silveira, Interviewer) [Review of *Evolução dos relatórios de sustentabilidade*]. In *Federação das Indústrias do Estado de São Paulo*. <https://www.fiesp.com.br/indices-pesquisas-e-publicacoes/entrevista-glaucia-terreo-representante-da-global-reporting-initiative-gri-no-brasil-fala-sobre-a-evolucao-dos-relatorios-de-sustentabilidade/>.
- [37] Thomson Reuters ESG Scores. (2017). https://www.esade.edu/itemsweb/biblioteca/bbdd/inbdd/archivos/Thomson_Reuters_ESG_Scores.pdf
- [38] ESG Risk Ratings. (2022). [Www.sustainalytics.com](https://www.sustainalytics.com/esg-data). <https://www.sustainalytics.com/esg-data>
- [39] Ranking Merco Corporate Responsibility ESG Brasil. (2022). [Www.merco.info](https://www.merco.info). Retrieved September 21, 2022, from <https://www.merco.info/br/ranking-merco-responsabilidad-gobierno-corporativo>