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Accounting for 'ESG' under Disruptions: A Systematic Literature Network Analysis

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Abstract: Corporations and small/medium enterprises (SMEs) are subject to a variety of external and internal pressures that often lead to changes in their corporate governance structures and accounting/reporting systems. The environment in which these organizations are collocated has undergone a deep process of change, due to the COVID-19 pandemic, climate change, the blockchain, and the energy industry crisis. Business activities represent a critical and a vital component of human existence across the globe—one that is not restricted to a financial standpoint—and their impact on societal, environmental and animal conditions is now undisputed. However, these activities are frequently coupled with allegations of their being the actual causes of those disruptions and collapses that persist in escaping the scrutiny of international governments. For the effective delivery of sustainable business activities, the concepts of governance and accountability are crucial, and the future of the inhabitants of planet Earth is arguably dependent on the ability of corporations (through their entire value chain) to govern themselves well and to demonstrate accountability to their many stakeholders. This should be achieved through the adoption of good governance standards which are well accepted, and that are globally harmonised with 'Environmental, Social and Governance' (ESG) reporting tools that are able to strategically assess and evaluate risk exposure and provide forward-looking information. In this critical context, few studies have actually examined these issues thoroughly, and, because the findings of those studies have been contradictory, there is still no definitive understanding of the causes of weak accounting and reporting tools for ESG dynamics under conditions of disruption. A systematic literature network analysis (SLNA) is used in this study to examine the evolution of the ESG reporting research domain based on existing relationships (e.g., aggregation, cross-citations and isolation) among authors contributing to the field. The findings demonstrate the current state of the art, disclosing interesting and timely future research directions. Furthermore, this study employs a novel approach known as SLNA to conduct the analyses, confirming its efficacy as a tool for dynamic analysis also within the field of sustainability accounting research.

Keywords: ESG reporting; literature review; SLNA; CSR; disruption; energy; blockchain; sustainability; LCA

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1. Introduction

The resilience of companies and their roles have been shown to be crucial under disruptive circumstances, such as a crisis or a pandemic, both before and after the occurrence. Effective corporate governance systems influence the quality of disclosure and should make it stronger. However, since the paradigm regarding the so-called 'golden rule' of finance—revolving around 'shareholder value'—appears to no longer hold true, at least alone, it has been deemed necessary to understand what really makes corporate disclosure 'of higher quality'. In fact, what was once considered comprehensive and thorough is now considered essentially faltering: in this, environmental, social and governance (ESG) dynamics need to be taken into due consideration [1–3]. In essence, accounting and corporate

reporting activities achieve their goal if the consequent disclosure pertains not only to the exact financial position of a company, but also to its impact on the referential communities, the ecosystems and the entire planet.

The greatest large-scale challenges humanity has faced in recent years have mostly been the outcome of a sum of corporate misconducts and lack of integrity. Take the global financial crisis (GFC) of 2007–2008 as an example; had accounting and auditing activities, among other things, been more effective and aligned with the present and emerging trends, in all probability it would not have occurred [4,5]. Having said that, the responsibility of companies and individuals is not limited only to financial results, since scientific literature, for instance, on the sources of COVID-19 has revealed that two-thirds of epidemics originate from zoonoses [6], which are not natural and accidental coincidences but are the result of unsustainable economic and social practices relating to ecosystems [7,8]. By the same token, other environmental disasters (e.g., oil spills) and economic recessions (as a result of gas disruptions or the ongoing energy industry crisis) are evidently the consequence of questionable anthropogenic activities. Hence, sustainable business and corporate practices oriented towards accountability and integrity are needed, and accounting as a strategic tool is thus challenged to provide the necessary improved decision-making support, from a forward-looking perspective, in order to prevent or, at least, reduce the likelihood of further viral pandemics, social and health tensions, environmental catastrophes, economic/financial crises and, in general, anthropogenic disruptions of any kind. In essence, growing evidence and real-world changes have convincingly shown that humanity is driving global environmental change, pushing the planet into a new geological epoch—the Anthropocene. Further human pressure may well provoke widespread, abrupt and irreversible disturbances, triggering humanitarian emergencies throughout the globe [1,9]. None of the targets for sustainable growth will be met without thorough and sharp adjustments to the economic playing field, where corporate governance systems and reporting activities play such a pivotal role in re-orienting business decisions and actions.

This systematic literature network analysis (SLNA) is oriented specifically to this timely topic. To the best of our knowledge, there are no literature reviews focusing attention on the role of accounting, reporting and disclosure activities pertaining to financial and ESG information, and their influence on, and interrelations with, disruptions and/or disturbances that have already occurred. This paper aims, therefore, to assess the state of the art of previous literature on the ability of existing accounting and reporting tools to prevent, anticipate or, at least, control for future anthropogenic disruptions, albeit at a corporate level, with the underlying rationale of providing 'forward-looking' information and of effectively managing sustainability risks as a whole. Moreover, it aims to suggest possible paths for future research.

In fact, it is now time to intensify business efforts to incorporate sustainable development practices into strategy, management approach and governance oversight and be accountable for them. Critical accounting scholars have been urged, on multiple levels, to publicly offer input to the debate and to conduct research to make visible any decline in corporate accountability and any impacts on sustainable development [9] for any kind of products/services provided and along the broader value chain. Though the topic in discussion is urgent, efforts are essentially insufficient at a global level [3]. In truth, while nature is likely to eventually maintain itself, the prospects for the well-being and flourishing of humanity are far more uncertain, and this is why immediate action is required. Regardless of whether we speak of south, north, east or west, societies—though it would be potentially more correct to go beyond the 'nature–society' dichotomy to also include 'non-human animals' in this consideration and definitely move on from an anthropocentric view of living [10]—are dependent on the natural environment and the ecological services it provides. Accounting is a powerful form of governance in modern societies [11], and accounting practices, if conveniently calibrated in their various shapes and forms, have substantial implications in and for societies, possibly increasing the chances of success towards an effective and sound sustainable development [12].

The methodological approach adopted for conducting the proposed literature review is based on a three-step framework defined as the systematic literature network analysis (SLNA), which essentially combines a systematic literature review (SLR) with a bibliographic network analysis (BNA). It is used for academic purposes to extract quantitative information from bibliographic networks as well as to detect emerging trends in research [13], making the evolution of the scientific literature in a specific field emerge, together with its main criticalities, and potential directions for future research. In fact, based on the flow of citations recorded within a specific research field, it provides a proxy of the most significant published papers. Since the SLNA follows fixed and definite protocols and rules, it also drastically reduces the likelihood of subjectivity in performing such analyses compared with traditional literature reviews [14]. Moreover, the existence of a literature gap is not enough, in itself, to justify the choice of a specific research strategy. Hence, the selection of an SLNA as a research strategy stems from the specific elements of this study that fit with its key points—in particular, the SLNA allows for the emergence of relationships (in terms of aggregation, cross-citations and isolation) among authors contributing to the field, which is one of the research aim of this study. Having said that, this methodology is not exempt from criticalities. First, the risk of exclusion of recent articles must be taken into consideration, where content might be relevant despite a clear lack of many (current) citations. Conversely, a large number of citations does not necessarily imply high-quality research [15]. In order to tackle these impediments, the SLNA is accompanied by other methodological tests such as the citation score (CSA) and keyword analyses [16,17].

This study is structured as follows. First, the material and the research methodology (Section 2) used to conduct the proposed literature review are explained, providing the evidence pertaining to the SLNA, the CSA and the keyword analysis. The remaining subsections present further methodological aspects and results of the first (Section 3), second (Section 4) and third (Section 5) phases of the research strategy. These paragraphs are extensive in length due to the three-step research strategy (i.e., SLNA) which merges methodology and results in an unconventional, yet straightforward, fashion. After that, the main findings are synthesised, and suggestions for further research are proposed (Section 6). The study ends with final remarks for discussion (Section 7).

2. Methodology

The SLNA is based on the collection of data deriving from chosen citation databases such as Web of Science, Google Scholar, Scopus and so forth.

For the purpose of this study, Scopus was chosen as, due to its comparative largeness [18], scholarly reliability and document consistency [19], it represents the most commonly preferred database for these analyses [16]. Moreover, the adoption of the SLNA is also justified by the growing interest of accounting studies on this specific protocol [17].

In Figure 1, the SLNA methodology has been visualised so to give a depiction of the entire research strategy as per the three steps involved. Specifically, Figure 1 presents each specific analysis conducted and provides a summarized reference of the study so to make the overall discussion more accessible.

Three main steps characterize the SLNA research approach:

1. **SLR—Systematic Literature Review**: the first step regards the determination of the scope and boundaries of the extant literature, selecting, evaluating and isolating the most relevant articles to be used for the mentioned purposes. In essence, locating studies by means of keywords, time, type of documents and language is the first activity carried out. Locating studies through this procedure allows the researcher to extract the necessary data more objectively than would be the case with other review methodologies, in line with its principles of inclusivity, transparency, explanatory and heuristic nature;
2. **BNA—Bibliographic Network Analysis**: the second step begins once the papers have been selected via the previous step, and it is characterised by analyses on citation network(s). In fact, citation network analysis (CNA) agglomerates the selected articles

in clusters on the basis of their content, highlighting those that have contributed the most to the development of the research field. Based on the assumption that research works belonging to the same field cite one another, the citation flows resulting from the CNA are then partitioned into 'paths', among which the main path is identified. The latter would essentially constitute the backbone of the research tradition, and its constituent papers can be considered as the main reference points for possible trends in recent research [20];

3. **AAT—Additional Analysis Techniques**: the third step can be separated into two further phases, which are:
   I. CSA—Citation Score Analysis: this identifies those seminal articles—not located in the above-mentioned citation network—that have also had a large chronological number of citations in Scopus;
   II. KNA—Keyword Network Analysis: based on the identification of co-occurrences among author-chosen keywords (that might, as a result, represent an appropriate proxy of the underlying research themes), this provides evidence with potential patterns and trends in the research field under analysis.

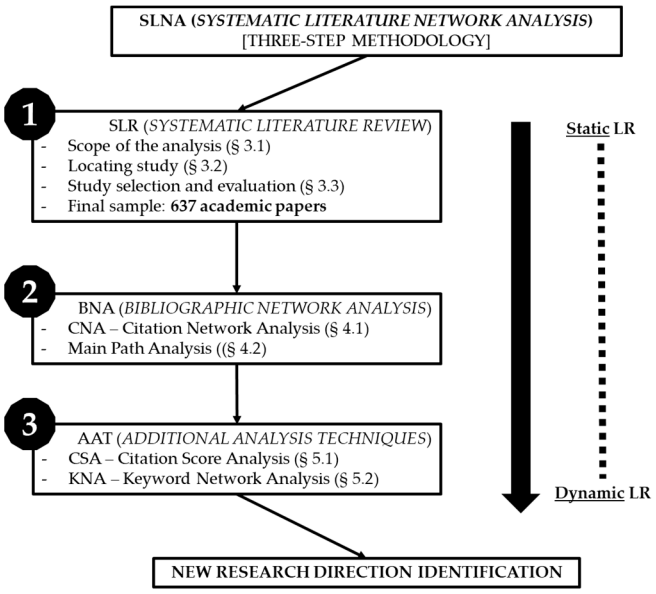

Figure 1. SLNA three-step methodology protocol.

The combined use of the presented methodological tools allows us to avoid the limitations and subjectivity that reside in each of them taken singularly. For instance, a consideration of findings generated solely by citations of papers might be biased since studies that are not cited could be indeed relevant. On the other hand, the most cited papers may not necessarily represent those of the highest quality and/or relevance [21].

To conclude this first section, references to the several software applications are deemed crucial. In fact, in order to perform this SLNA—concerning the role of accounting for ESG dynamics under disruptive events—the following five AI tools were applied:

- VOSviewer: this software allows a preliminary test to be carried out via network visualization and the co-occurrence keyword network analysis. It is also used to create the input file for Pajek;
- Pajek: this program is necessary for conducting a social network analysis on the various citation networks in order to extract the main path(s) in research;
- Sci2 Tool: this modular toolset allows temporal, geospatial, topical and network analysis to be performed, and was specifically applied in this study for the computation of the burst detection algorithm (whose utility will be explained in the related section);

- GIMP: this software is used in combination with the previous one in order to better visualize the results;
- Scopus analytics: a specific section of Scopus database, which also allows us to execute preliminary tests on the selected paper sample as well as to corroborate, integrate or confute results deriving from the application of the other above-mentioned tools.

In the following sections, we will go through the proposed steps again by means of the various AI tools applied and the described protocol as well.

3. First Step of SLNA Application: Systematic Literature Review (SLR)

3.1. Scope of the Analysis

Clarifying the objective of the study as well as its boundaries, based on the extant literature, is considered to be the very first step for performing an appropriate systematic literature review. In fact, unlike traditional literature analyses, which do not follow specific guidelines, SLR must conform with the defined rigid protocol [14].

Examining previous and well-established theories that represent the state of the art of a specific research area and providing suggestions for further investigations are, in general, activities that would justify the exercise of a literature review. Compared with traditional review methodologies, however, the application of newer methods that screen the extant literature, selecting only the most relevant contributions [13] is justified by the highlighting of a common issue identified among different research areas, i.e., the confusion at times generated when investigating a particular topic by the massive number of academic articles. This is particularly true in terms of analysing the accounting research realm, due to the coexistence of qualitative and quantitative works and the absence of precise guidelines [14,21].

In order to tackle these criticalities, this paper depicts the scholarly state of the art concerning the role of accounting for ESG dynamics under disruptive events by applying the SLNA methodological approach. Moreover, some potential avenues for further research are proposed.

3.2. Locating Study

The identification and location of studies begins by choosing the pertinent keywords synthesising the main topic areas of the research sub-field under investigation. Combining the keywords to determine the 'search string' to use in Scopus—as it is the chosen database for the purposes of this study—represents the following step. This is a very delicate and crucial phase for the actual success of the overall analysis, since slightly different search strings might result in very different outcomes. The trade-off to be reached at this stage lies, therefore, in the assumption that specific search strings would not lead to generic results, while they could provoke the exclusion of relevant past contributions.

Having said that, the simultaneous (i.e., connected by 'AND' function) components of the search string chosen to perform in Scopus for the mentioned SLNA are:

- Crisis OR pandemic OR 'COVID-19 OR' 'COVID-19' OR COVID OR coronavirus OR 'disruptive event' OR 'disruptive events' OR disruptive OR disruption;
- Accounting OR reporting OR disclosure;
- Esg OR 'non-financial' OR 'non financial' OR 'nonfinancial' OR sustainability.

All of these were searched in the '*article title, abstract and keywords*' (i.e., 'TITLE-ABS-KEY' function) field. The search string proposed is deemed as optimal because fewer keywords would have led to an extremely wide database, and just one more to an acute reduction of selected articles. Hence, this choice allowed us to perform an appropriate SLNA based on a sufficient number of papers [16], making relevant trends in the studied research field emerge.

3.3. Study Selection and Evaluation

The search was finalised in January 2023. In order to further include only those pieces of research deemed relevant and appropriate for the scholarship review, other Scopus functions were considered so as to include or exclude articles from the final article data set, which initially was equal to 780 documents. For example:

- Studies published in a language other than English can be excluded (which, in this case, equalled 23);
- The type of academic paper can be targeted: for instance, limiting the search to 'articles', 'books' and 'reviews' could be more appropriate in that they clearly contain citations, allowing for the achievement of ideal results (in so doing, another six documents were excluded);
- The major research areas are reported. Hence, after having carefully assessed their pertinence to the research focus, the following might generally be included (for studies pertaining to accounting): 'business, management and accounting', 'social sciences' and 'economics, econometrics and finance' (this filter led to 114 documents being excluded).

The data set obtained by means of these further functions was, then, entirely searched, including the titles and abstracts and, in cases where other papers did not match the expected result, excluding them. In fact, at times, the same term is used in the literature for defining different phenomena and could also mean something diametrically different when used in different contexts and research fields.

The final sample, thus, consists of 637 academic papers. This sample of articles represents the basis on which the SLNA was performed. In the following sections and steps, the most relevant papers will be isolated and further analysed.

4. Second Step of SLNA Application: Bibliographic Network Analysis (BNA)

4.1. Sample Description and Static Analysis

In this section, the extracted sample is first described as well as the methodological features of citation network analysis (CNA). Finally, this section offers the main results stemming from this specific analysis, leading to the identification of the 'main path'.

That said, two perspectives can be mentioned when it comes to analysing a citation network:

1. Static perspective: analysing the network as it simply is—some results of which are presented below;

2. Dynamic perspective: conducting, over the identified network, the main path analysis—this perspective will be investigated in depth in the following paragraph (Section 4.2).

As far as the static analysis is concerned, Figure 2 shows that, based on the publishing year, the number of published studies on the topic under investigation increased over the period 1992–2023. Hence, it may be maintained that this specific research area is in expansion. Though the sample and the analyses carried out include data concerning 2023, this latter year was excluded (i.e., 13 publications) from the depiction since it has not ended yet; nevertheless, studies published in 2023 will be presented in following sections (see Sections 4.2, 5 and 6). What stands out from the above is the increasing consideration that the topic in this analysis is receiving from researchers, hence justifying this study and its aim of organizing and synthesizing what has been achieved so far in academia, so as to determine possible research avenues and to legitimize deeper investigation in the future. For the sake of completeness, Figures 3 and 4 allow us to further extend the static analysis by presenting the most prolific academics in the field of ESG reporting in disrupted domains and the most 'interested' journals (in terms of number of publications). We extrapolated the first ten positions for both data sets; however, the tables only show the first four and seven because the tenth places were both defined by ex aequo outcomes. As a result, information in this respect is supplied in the figure captions.

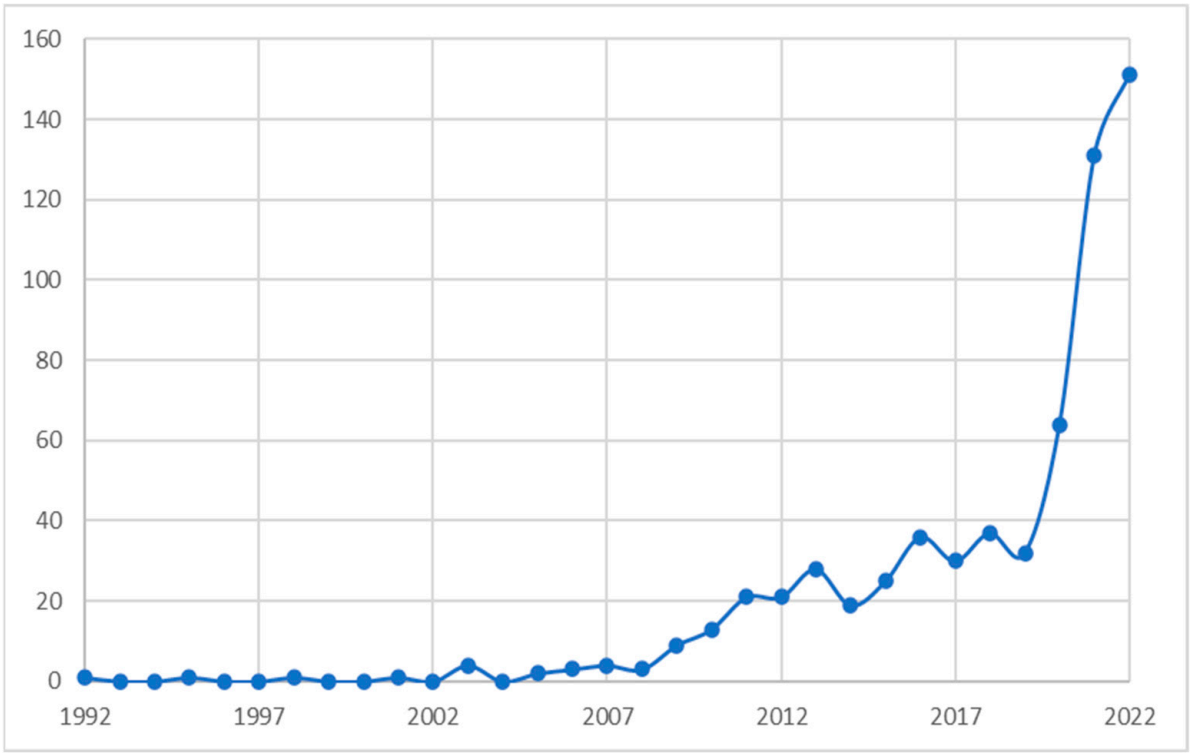

Figure 2. Distribution of 624 scientific studies published in the 1992–2022 time span.

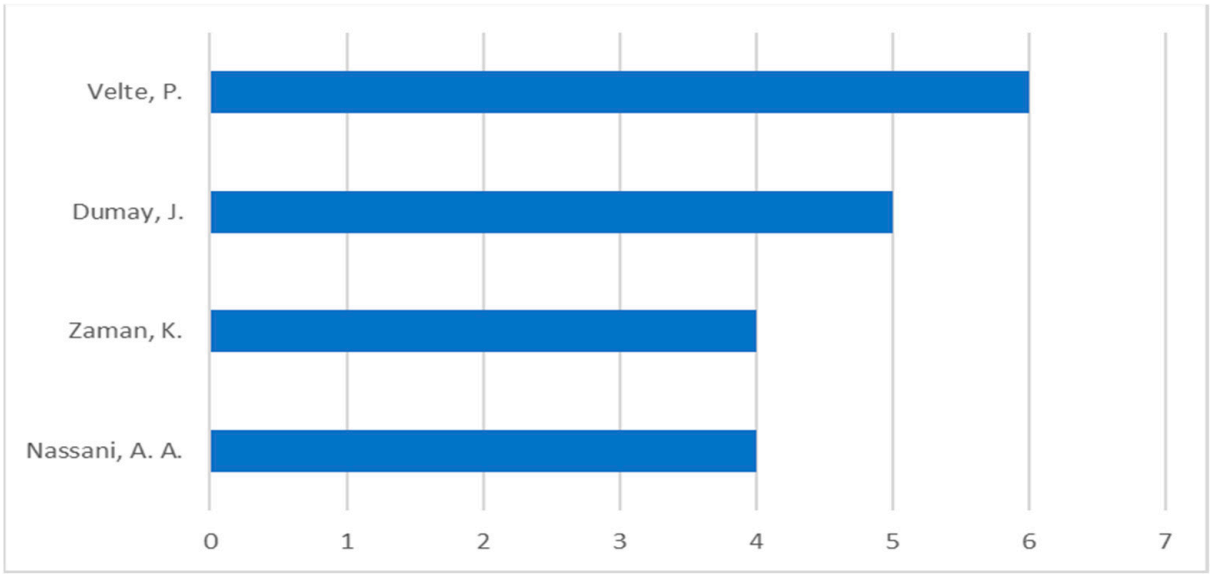

Figure 3. The 10 most 'prolific' authors—in terms of publication numbers—in accounting for ESG dynamics and disruptive events. Note: The 10th place belongs to (in alphabetical order) to: Abed, Abro, Al-Najjar, Anser, Aureli, Bollas-Araya, Branco, Craig, Elmarzouk, Manzaneque-Lizano and Polo-Garrido (with three publications each).

Figure 4. The 10 most 'interested' journals—in terms of publication numbers—in accounting for ESG dynamics and disruptive events. Note: The 10th place belongs to (in alphabetical order) Business Strategy and the Environment, Corporate Governance—Bingley, Critical Perspective on Accounting and Plos One (with five publications each).

4.2. Dynamic Analysis, Main Path Identification and Study Discussion

In short, a 'citation network' consists of nodes (which are the visual representation of the selected papers) and links (which embody the identified citations). Academic articles which have been proved to be associated with one another by means of citations are visually connected via links with arrows. The so-called 'flow of knowledge' is extrapolated by investigating the direction of the arrow that essentially goes from the cited to the citing articles [16].

Moreover, in a network, there are two major identifiable elements:

1. Connected components: set of nodes joined by links (i.e., citations);
2. Isolated nodes: studies and documents that neither cite nor are cited by the other selected pieces of research.

From the dynamic standpoint, the citation network of 637 academic studies consists of a few connected components (i.e., six clusters) and many isolated nodes (i.e., 492 clusters made of one or two items at most). As mentioned, the isolated nodes are the visual representation of articles (in this case) both those not citing and those not cited by any other paper. Thus, CNA excludes them from the network as this kind of analysis is only applicable to connected components. In order to do so, the threshold equal to '0' (the minimum optionable) was chosen by means of VOSviewer so that both more recent studies and less relevant works were not excluded at this stage. The mentioned software is applied to visualize the networks as well as to perform the co-word network analysis (KNA)—which will be presented in a subsequent section. Moreover, VOSviewer is used in conjunction with Pajek to determine the main stream(s) of research (if any). These two software applications are essential because they can handle large networks, graphically visualising the results in an intuitive way [21]. Relevant outcomes are obtained when the focus is set over connected components made of an extensive number of nodes, providing a greater amount of information.

Having said that, in this case, the largest set of connected items consists of 26 nodes. This result prompted us to first focus the analysis on this set but then also to identify those minor connected components that could somehow contain further relevant information that would be lost otherwise.

The fragmentation of works in this scholarship realm might be due to the relative 'newness' of the field itself—accounting for ESG with a focus on disruptions, disasters and crises—associated with its importance/relevance in the current international debates, which has prompted academics, somehow 'independently', to conduct research in this

respect. For this reason, in the following section, the 'main path' is essentially presented and discussed, bearing in mind that it might also be of interest to further explore the residual 'minor paths' that have been identified, so as to extend and extrapolate other potential avenues for research.

Moreover, the main path is extracted through the application of the Pajek software algorithm [22]. This investigates the advancements within a certain research sub-field, allowing for the emergence of its backbone [20]. The main path provides a dynamic overview concerning the papers involved (i.e., connected to one another) through which the most pertinent ones are identified—this essentially helps locate the incremental evolution of knowledge over time [21]. To do this, Pajek computes the 'key route' algorithm on the most connected items, identifying the nodes that are cited or cite the most: this should represent the most consolidated studies in the analysed research area.

The analysis in this discussion is performed by means of two steps:

1. The computation of the traversal weights concerning citations, via the Pajek search path count method. This 'weighs' the citations based on a ratio determined by dividing the sources (i.e., those studies that do not cite any others) and the sinks (i.e., the ones that are not cited by the others);

2. The extraction of the main path with a cut-off value equal to 0.5 (default), removing the arcs in the network of citations with lower traversal weight values.

Figure 5 shows the main path of the largest identified connected nodes which is composed of 26 papers.

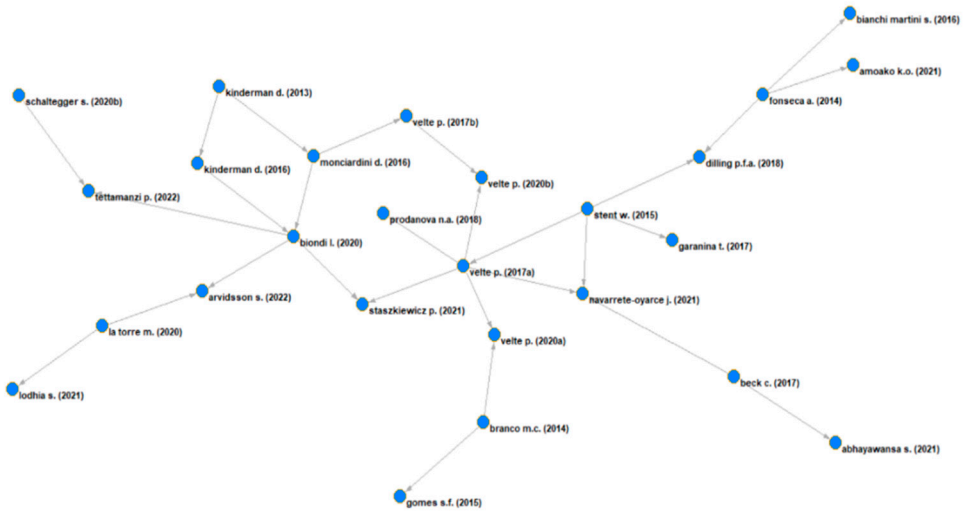

Figure 5. Main path of largest connected components (i.e. 26 publications) within the citation Network (CN).

The extrapolated papers date from 2013 to 2022, and the most researched topic pertaining originally to corporate social responsibility in the history of the European Union (EU), remains the most researched topic today. Overall, 50% of the linked publications are empirical, relying on both qualitative (e.g., semi-structured interviews, case studies, and content analyses) and quantitative (e.g., longitudinal assessments and bivariate/multivariate non-parametric statistics) research approaches. Seven of these are literature reviews (the most recent was published in 2020), and only one of them used bibliometric tools (though only based on <IR>). Six pieces of research are critiques that analysed a few specific aspects of ESG-related topics. In the following table (Table 1), the major characteristics of the 26 'main path' items are synthetically described.

Table 1. 26 'Main Path' items description in terms of authors, year of publication, type of paper and main topic.

N°	Authors (Year)	Type of Paper	Main Topic
1	Fonseca et al., 2014 [23]	Critique	Sustainability in mining sector
2	Bianchi Martini et al., 2016 [24]	Empirical analysis	Human rights, CSR and reporting
3	Amoako et al., 2021 [25]	Empirical analysis (case study)	Informal reporting for ESG
4	Dilling & Harris, 2018 [26]	Empirical analysis (longitudinal assessment)	Long-term value creation reporting
5	Stent & Dowler, 2015 [27]	Empirical analysis	Gap between IR and corporate reporting
6	Garanina & Dumay, 2016 [28]	Empirical analysis	IR, IC disclosure research and IPO prospectus
7	Navarrete-Oyarce et al., 2021 [29]	Literature review	IR as academic topic in business
8	Beck et al., 2017 [30]	Empirical analysis (case study)	IR as single source of truth
9	Abhayawansa & Adams, 2021 [31]	Empirical analysis	Pandemic and climate change risk disclosure evaluation
10	Velte & Stawinoga, 2017 [32]	Literature review	Overview on IR as of 2016/17
11	Prodanova et al., 2018 [33]	Empirical analysis	Implementation of IR in Russia
12	Gomes et al., 2015 [34]	Empirical analysis	Sustainability reporting assurance (SRA)
13	Branco et al., 2014 [35]	Empirical analysis	SRA engagement and factors
14	Velte, 2020 [36]	Literature review	Institutional ownership role in ESG performance/disclosure
15	Staszkiewicz & Werner, 2021 [37]	Empirical analysis and review	Measuring sustainability framework
16	Velte & Stawinoga, 2020 [38]	Literature review	CSR committees and CSO impacts on CSR performance
17	Velte, 2017 [39]	Literature review	Influence of board composition on the quality of CSR reporting
18	Monciardini, 2016 [40]	Empirical study	EU directive on NFR process
19	Kinderman, 2013 [41]	Critique	EU CSR History
20	Kinderman, 2016 [42]	Critique	Voluntary and regulatory measures in CSR private governance
21	Biondi et al., 2020 [43]	Critique	IR problems and compliance with EU NFI and diversity
22	Tettamanzi et al., 2022 [44]	Critique	EFRAG vs IFRS on sustainability disclosure
23	Schaltegger, 2020 [6]	Literature review	Sources of epidemics and impact on accounting and reporting
24	La Torre et al., 2020 [45]	Literature review	Accountability and EU directive on NFR
25	Lodhia et al., 2021 [46]	Critique	Pandemic and accounting for non-financial issues
26	Arvidsson & Dumay, 2022 [1]	Empirical study	Trends in ESG reporting: quality and corporate ESG performance

In more detail, the topics within the research domain concerning accounting for ESG under disruptive events and that constitute the main path are:

a. Non-financial reporting (NFR) processes, EU directives, European Financial Reporting Advisory Group (EFRAG) activities and sustainability;

b. Integrated reporting (<IR>) and intellectual capital (IC) disclosure;

c. Corporate governance and ownership structure impacts on corporate social responsibility (CSR) reporting;

d. Pandemic and climate change, risk disclosure evaluation and accounting for non-financial issues;

e. Long-term value creation and ESG reporting and frameworks;

f. Sustainability reporting assurance (SRA);

g. Accounting and ESG reporting practices in specific sectors and/or geographic areas.

Methodologically, the synthetic outcomes (in terms of contribution achievements, identified gaps, and research designs) regarding the 'main path' articles will be shown in the following paragraphs. Those relating to literature reviews are offered first. Following that, the critiques' results are proposed, followed by an in-depth investigation of each of the topics listed above. Furthermore, publications within the same group (among the three presented) are discussed chronologically.

As far as the extant literature reviews are concerned, these relate to the timeframe spanning from 2017 to 2021 (covering a 1994–2019 scholarship interval).

Ref. [32] specifically focused their attention on <IR>. According to them, further research could be of significant use regarding whether or not investors also use <IR> for financial evaluation and whether they react in a positive way if an assured IR is presented in comparison with a stand-alone SR (i.e., sustainability reporting). Another issue pertaining to <IR> regards the current limited quality of IR, which can lead to a higher risk of greenwashing and labelling to meet the stakeholders' expectations. The concept of integrated thinking needs a reorganization of management control and reporting systems, otherwise these requirements might imply that current integrated reports could be seen as a formal addition to traditional financial reports.

In 2020, four additional literature reviews were published and, in these studies, the link with disruption was strengthened even more. For instance, [45], analysing contemporary studies on non-financial reporting (NFR) and the EU Directive on non-financial disclosure, demonstrated that accountability is a fundamental concept for building trust: in short, that regulation and practices of NFR need to move away from an accounting-based conception of accountability to promote accountability-based accounting practices, thus highlighting the essential links between trust, accountability and accounting/reporting practices. Moreover, the authors stressed the importance of guidance, or even regulation, on the technology and systems, such as web 2.0 and extensible business reporting language (XBRL), that enable the actual dialogue between companies and stakeholders: the EU needs to give firm directions not only on what to report, but how to report and how to produce 'non-financial information' (NFI). That said, [36] conducted a structured review of empirical–quantitative (archival) studies, further investigating the role of a specific stakeholder in ESG performance and disclosure, i.e., the institutional owners. Following the financial crisis, non-financial-related shareholder activism increased in order to strengthen their ESG activities, and institutional ownership (IO) appears to impact ESG performance and disclosure and vice versa. That said, the European 'Green Deal' is highly likely to promote IO activism in the future, and executive directors and audit committees should be aware of the increased power of institutional investors in ESG activities. In any case, demand for successful integration of financial and ESG key performance indicators (KPIs) is likely to increase. Ref. [38] explored the role of CSR committees and chief sustainability officers (CSOs) on the same topic.

From a different standpoint, [6] specifically proposed some conclusions for sustainability and ecosystem accounting in order to combat key sources of epidemics and pandemics. As conventional accounting practices only consider direct costs of producers and exclude external costs to others, to reduce the likelihood of future pandemics the paths of epidemic development need to be broken. In this context, standard setters and regulators require the monitoring, assessment and reporting of external costs, of planned and actual business operations, including information on the whole supply chains, potential, unknown effects, and the likelihood of increased risks in order to develop standards and regulations. Instead

of mirroring the impacts of the already existing pandemic, accounting for sustainability would need to support governments, international organizations and management in preventing epidemics, guiding a sufficiently substantial change of economic, social and business patterns. Yet only a few external accounting approaches to improve the acknowledgement and assessment of the social and economic value of ecosystems services have been sketched so far, in spite of the relevant links [9].

As far as the identified past critiques are concerned, these relate to the timeframe spanning from 2013 to 2022. The authors focused their attention on the following topics:

- The history of CSR in EU [41];
- Sustainability in the mining sector [23];
- Voluntary and regulatory measures in CSR private governance [42];
- <IR> problems and compliance with EU Directives on non-financial and diversity disclosure [43];
- Pandemic and accounting for non-financial issues [46];
- EFRAG and International Financial Reporting Standards (IFRS) Foundation activities pertaining to sustainability disclosure [44].

In short, [41] argues that CSR, at the EU level, has changed from being a social-liberal standard setter to a neo-liberal cheerleader. In this context, neo-liberal CSR reflects a concentration of agenda-setting power in the hands of one actor: business. Hence, future research should further probe the relationship between CSR policy and business legitimacy.

Based on the above, to make a significant contribution to society, the research community would need to do more to address the challenges of tomorrow, finding global not local solutions to the emerging crisis. In fact, the crisis highlights the importance of advancing knowledge that has the potential to contribute to our collective welfare—despite being aware of the risk of global pandemics, we were ill-prepared. It seems the lessons learned from past financial crises and past pandemics have been simply ignored. In this panorama, people cannot afford any more reporting facades, as <IR> is deemed to be in the study in analysis [43]. Ref. [46] essentially corroborate this statement, further exploring the implications of this pandemic on accounting for non-financial issues, especially in relation to sustainability accounting research and practice. In essence, barriers to sustainability reporting are due to lacks in awareness and knowledge, inadequate regulatory support, and the significance of sustainability accounting education to the improvement of sustainability reporting practices. Yet accounting practices that go beyond monetary issues with non-monetary measurement are deemed crucial [44].

The examination of components related to the 'main path' continues with the third and final group of articles, which are all empirical investigations (based on both quantitative—for the most part—and qualitative methodological approaches).

As previously stated, the first collection of articles focuses on (a) **non-financial reporting (NFR) processes, EU directives, EFRAG activities and sustainability**. Most of these studies have already been presented since they were literature reviews or critiques. Ref. [40] further explored the impact of EU Directives on NFR processes. In short, EU CSR policy should be seen, according to the author, as a cleavage between business and civil society. In fact, CSR has often been (mis)represented as a win-win situation between business and society as it represents the possibility of reconciling the instances of all the stakeholders or the idea that, in the long term, all interests will coincide. However, though CSR has been often in denial about conflicts, conflicts are CSR's engine: the convergence of interests between investors, trade unions and non-governmental organizations (NGOs) would have indeed been impossible without the political pressures originating from the financial crisis. Therefore, CSR and 'Standards, Ethics and Regulations' (SER) could be studied as part of broader changes not just in corporate governance but also in the governance of the economy and even of society at large [24]. The second group of papers regards the topic of (b) **integrated reporting (<IR>) and intellectual capital (IC) disclosure**. Stent and Dowler, 2015 have highlighted, for instance, the gap between <IR> and corporate reporting. Through reporting checklist, gap analysis and systems thinking approaches, the

authors demonstrated that the necessary changes to corporate reporting would contribute towards resolving major problems such as financial and environmental crises. In fact, lacking the integration, oversight and due attention to future uncertainties required by IR, current reporting processes—with scores ranging from 70 to 87 percent—are characterised by small gaps in systems thinking. This indicates that these deficiencies may be critical to sustainability and financial stability since corporate reporting will remain sub-optimal and contribute little to resolving major problems pertaining to disruption and natural disasters. If a company indeed has a prior commitment to non-financial reporting, it will already have predetermined drivers and/or KPIs for reporting, modes of stakeholder engagement, and—more significantly—a current agenda for reporting this kind of information through a flexible adoption. Hence, organizations will use voluntary frameworks and other reporting guidelines as they see fit. Standardised means of informing investors and other stakeholders about the true short-, medium- and long-term values of the organization might never be put in practice, however, as standardization might be inconsistent with the uniqueness and singularity of a specific entity.

The focus of the third group of papers was, once again, on the topic of (c) **corporate governance and ownership structure impacts on CSR reporting**. These studies have all been presented above since they were literature reviews and/or critiques [36,38,39,42]. The fourth group of academic articles revolves around (d) **pandemic and climate change, risk disclosure evaluation and accounting for non-financial issues**. Ref. [31] argue in favour of a conceptual framework for non-financial reporting that is inclusive of pandemic and climate risk reporting. Examining the adequacy of climate- and pandemic-related risk reporting in industries that were both significantly impacted by the COVID-19 pandemic and at risk from climate change, the authors showed their pervasiveness. Moreover, the deficiencies identified in reporting two of the most pressing sustainable development risks, pandemic and climate related issues, might represent the basis for developing a reporting framework that places sustainable development risks and the impact of the organization on achieving the sustainable development goals (SDGs) at the centre of corporate thinking. The fifth group of academic articles concerns (e) **long-term value creation and ESG reporting and frameworks**. According to [26], companies do not seem to be in a situation to prepare an efficient long-term value creation report and their reporting language is generic rather than company-specific and lacks substance. The authors show scepticism towards the currently available disclosure frameworks regarding risk and disruption disclosure. In this unsatisfactory context, ref. [37] presents a method to integrate sustainability and financial accounting at the level of transaction recording and introduce the concept of environmental debit and credit entry, essentially exploring the quest for a sustainable measuring method. Furthermore, ref. [1] has highlighted recent trends in ESG reporting, in terms of quantity, quality and corporate performance. The authors assert that the recently launched and upcoming disclosure initiatives, standards and regulations, such as the CSRD (former NFRD), TCFD, EU taxonomy on sustainable activities, and IFRS's and Sustainability Accounting Standards Board's (SASB) sustainability standards should not have been necessary.

As has hopefully been made clear, the topics—despite the effort made to gather them in groups—are strictly interrelated. In fact, the sixth set of published papers concerns a current thorny issue: (f) **sustainability reporting assurance (SRA)**. Ref. [34] has shed some light on SR and its assurance after the onset of the most recent economic crisis. Moreover, few studies on SRA in peripheral countries have been conducted [47].

To conclude this first analysis, references regarding (g) **accounting and ESG reporting practices in specific sectors and/or geographic areas** have proposed [25,33].

5. Third Step of SLNA Application: Additional Analysis Techniques (AAT)

5.1. Citation Score Analysis (CSA)

One shortcoming of the main path analysis is that, despite their importance, certain articles may be omitted in the citation network due to a lack of citation linkages with other

studies. In other words, the 'main' path ignores publications unrelated to its nodes. This might result in the loss of significant material information in the realm of ESG accounting/reporting for disruptions. Previous research has found that articles with a high **global citation score** (GCS) are pivotal or, at least, significant for the evolution of knowledge in a specific study field because they are used by other authors to create their contributions. As a result, the previous analysis is integrated with two others, the GCS and the author keywords analysis, in order to limit the influence of the aforementioned constraints. The former (known as GCS) considers a paper's total number of citations across the whole Scopus database, regardless of whether it is part of a citation network or the main path. A higher number of citations may be seen as a proxy for its influence and significance in a certain field of research, though this does not guarantee that the work is of good quality [15]. However, older articles are evidently cited more than more recent ones.

When the CNA and the GCS are combined, their separate restrictions are reduced. Furthermore, the findings are paired with a **global–local citation score** (GLCS) analysis, which is based on the total number of citations and is applied solely to papers produced in the 2019–2023 timeframe. This additional study, which covers a period that spans from an ante-COVID-19 world to now, is useful for finding current changes in the research field that may not have been included in the main path. Furthermore, based on the reasonable assumption that older papers are more cited than more recent ones, the citation scores for the entire database have been normalised based on the publication 'age' of each study (based on the difference between publication year and 2022, and adding a unity to the final result so that papers published in 2022 could be included as well) using a computed **influence citation index** (INCEX). In summary, given the number of citations for each publication, the division between this number and the publication 'age' was calculated. The publications were then ranked based on the calculated INCEX, and the first ten were extrapolated. This index, while undoubtedly imperfect, may provide an intriguing proxy of a single study's influential capacity in terms of citation rate and, thus, of the most prominent (both consolidated and developing) works within a certain research topic, regardless of their publication 'age'. The information offered above has been synthesised into three tables, where any affiliation to the main path is also displayed (in the last columns by an 'x' in the related cells). Table 2 shows the top ten most cited articles ranked by their GCS, which equals the total number of citations in Scopus, whereas Table 3 shows the top ten most cited papers published between 2019 and 2022. Finally, Table 4 lists the top ten most 'influential' studies based on their computed INCEX. The study titles in the tables might appear not to specifically fit accounting research topics (e.g., accounting, reporting, disclosure, assurance, etc.) due to the interdisciplinary inclination that has been given to this study. In fact, due to the deep and vast reconsideration the field of accounting and corporate reporting has been undergoing, these studies—though they would belong more directly to other research domains—do have a significant influence on accounting research, specifically from a forward-looking perspective.

Table 2. GCS of the ten most cited papers (out of 637), together with title, author(s), journal, and year of publication.

Rank	Title	Author(s)	Journal	Pub. Year	GCS	Main Path
1	Crisis or Opportunity? Economic Degrowth for Social Equity and Ecological Sustainability.	Schneider, Kallis & Martinez-Alier [48]	Journal of Cleaner Production	2010	521	
2	Overfishing of Inland Waters	Allan et al. [49]	BioScience	2005	452	
3	Inter-Linking Issues and Dimensions in Sustainability Reporting	Lozano & Huisingh [50]	Journal of Cleaner Production	2011	324	

Table 2. *Cont.*

Rank	Title	Author(s)	Journal	Pub. Year	GCS	Main Path
4	Corporate Governance and Risk Reporting in South Africa: A Study of Corporate Risk Disclosures in The Pre- and Post-2007/2008 Global Financial Crisis Periods	Ntim, Lindop & Thomas [51]	International Review of Financial Analysis	2013	169	
5	Sustainability Reporting Among Mining Corporations: A Constructive Critique of the GRI Approach	Fonseca, McAllister & Fitzpatrick [23]	Journal of Cleaner Production	2014	136	x
6	From Resource Extraction to Outflows of Wastes and Emissions: The Socioeconomic Metabolism of the Global Economy, 1900–2015	Krausmann et al. [52]	Global Environmental Change	2018	117	
7	Problematising Accounting for Biodiversity	Jones & Solomon [53]	Accounting, Auditing and Accountability Journal	2013	116	
8	The Economic Impact of More Sustainable Water Use in Agriculture: A Computable General Equilibrium Analysis	Calzadilla, Rehdanz & Tol [54]	Journal of Hydrology	2010	116	
9	Integrated Reporting: The Current State of Empirical Research, Limitations and Future Research Implications	Velte & Stawinoga [32]	Journal of Management Control	2017	114	x
10	Assessment of Fuel Properties on the Basis of Fatty Acid Profiles of Oleaginous Yeast for Potential Biodiesel Production	Patel et al. [55]	Renewable and Sustainable Energy Reviews	2017	112	

Table 3. GLCS of the ten most cited 2019–2023 papers (out of 401), together with title, author(s), journal, and year of publication.

Rank	Title	Author(s)	Journal	Pub. Year	GLCS	Main Path
1	Analysis of Mobility Trends During the COVID-19 Pandemic: Exploring the Impacts on Global Aviation and Travel in Selected Cities	Abu-Rayash & Dincer [56]	Energy Research and Social Science	2020	92	
2	Food Waste in Italian Households during the COVID-19 Pandemic: A Self-Reporting Approach	Amicarelli & Bux [57]	Food Security	2021	47	
3	Social Distancing and Stigma: Association Between Compliance with Behavioral Recommendations, Risk Perception, and Stigmatizing Attitudes during the COVID-19 Outbreak	Tomczyk, Rahn & Schmidt [58]	Frontiers in Psychology	2020	45	

Table 3. *Cont.*

Rank	Title	Author(s)	Journal	Pub. Year	GLCS	Main Path
4	Research Streams on Digital Transformation from a Holistic Business Perspective: A Systematic Literature Review and Citation Network Analysis	Hausberg et al. [59]	Journal of Business Economics	2019	44	
5	COVID-19 and Healthcare System in China: Challenges and Progression for a Sustainable Future	Sun et al. [60]	Globalization and Health	2021	39	
6	Urban Agriculture—A Necessary Pathway towards Urban Resilience and Global Sustainability?	Langemeyer et al. [61]	Landscape and Urban Planning	2021	39	
7	Environmental Consequences of Economic Complexities in the EU amidst a Booming Tourism Industry: Accounting for the Role of Brexit and other Crisis Events	Adedoyin et al. [62]	Journal of Cleaner Production	2021	35	
8	Advanced Approaches and Applications of Energy Footprints toward the Promotion of Global Sustainability	Chen et al. [63]	Applied Energy	2020	31	
9	Perspective of Comprehensive and Comprehensible Multi-Model Energy and Climate Science in Europe	Nikas et al. [64]	Energy Research and Social Science	2021	30	
10	Rebuilding Trust: Sustainability and Non-Financial Reporting and the European Union Regulation	La Torre et al. [45]	Meditari Accountancy Research	2020	30	x

Table 4. INCEX of the first ten papers (out of 637), together with title, author(s), journal, and year of publication.

Rank	Title	Author(s)	Journal	Pub. Year	INCEX	Main Path
1	Crisis or Opportunity? Economic Degrowth for Social Equity and Ecological Sustainability. Introduction to this Special Issue	Schneider, Kallis & Martinez-Alier [48]	Journal of Cleaner Production	2010	40.1	
2	Analysis of Mobility Trends during the COVID-19 Coronavirus Pandemic: Exploring the Impacts on Global Aviation and Travel in Selected Cities	Abu-Rayash & Dincer [56]	Energy Research and Social Science	2020	30.7	
3	Inter-Linking Issues and Dimensions in Sustainability Reporting	Lozano & Huisingh [50]	Journal of Cleaner Production	2011	27.0	
4	Overfishing of Inland Waters	Allan et al. [49]	BioScience	2005	25.1	

Table 4. *Cont.*

Rank	Title	Author(s)	Journal	Pub. Year	INCEX	Main Path
5	Connecting the COVID-19 Pandemic, Environmental, Social and Governance (ESG) Investing and Calls for 'Harmonisation' of Sustainability Reporting	Adams & Abhayawansa [65]	Critical Perspective on Accounting	2022	25.0	
6	Food Waste In Italian Households During The COVID-19 Pandemic: A Self-Reporting Approach	Amicarelli & Bux [57]	Food Security	2021	23.5	
7	From Resource Extraction to Outflows of Wastes and Emissions: the Socioeconomic Metabolism of the Global Economy, 1900–2015	Krausmann et al. [52]	Global Environmental Change	2018	23.4	
8	Spain: Health System Review	Bernal-Delgado Et al. [66]	Health Systems in Transition	2018	20.4	
9	COVID-19 and Healthcare System in China: Challenges and Progression for a Sustainable Future	Sun et al. [60]	Globalization and Health	2021	19.5	
10	Urban Agriculture—A Necessary Pathway towards Urban Resilience and Global Sustainability?	Langemeyer et al. [61]	Landscape and Urban Planning	2021	19.5	

Due to the aforementioned 'pulverisation' of literature on the topic in analysis, only three papers have already been reviewed within the 'main path' analysis, whilst the remaining papers have not. That said, a few articles overlap in the GCS, GLCS and INCEX tables, thus counting and being analysed just once. Furthermore, because the GCS refers to the publications with the most citations, it is not surprising that the list contains the oldest contributions in terms of time. Yet the analysis of ESG reporting for disruptions in general, and especially in this part of our literature review, appears to be characterised by topics clearly and outstandingly intertwined over the years, as if they integrate and compensate each other from a multitude of perspectives. As a result, reading these articles might help in recognising the fresher topics, the state of the art of the sustainability accounting research domain and its related limitations as it currently appears.

5.1.1. Main Path Content Integration and CSA 'New' Topical Research Areas

Overall, starting from the topics listed in Section 4.2, where the research areas within the domain of ESG reporting for disruptions pertaining to the main path were indicated, a few more topical issues emerge crossing the other extrapolated papers via the computations of GCS, 2019–2023 GLCS, and INCEX.

In fact, in addition to, and partially compensating, the previously indicated research topics (see Section 4.2), the following issues have been examined by sustainability (and) accounting scholars (from 2005 to 2022):

a. Economic degrowth, inter-linking issues, harmonisation and long-term environmental accounting role in addressing crises;

b. Energy footprints, climate science, wastes and socioeconomic metabolism;

c. Transportation and accounting for tourism crises;

d. Global fisheries, biodiversity, food and water management and accounting for animals;

e. Health care systems and safety disruptions;

f. Blockchain and digital transformation influences on sustainability;

g. Sustainable corporate governance, diversity and risk reporting.

Having stated that, we present, in groups, the major results, gaps, and particular research methodologies (if any) emerging from the extra selected studies below. If a topical group has previously been investigated in Section 4.2, the related materials will be analysed only in their innovativeness so as to avoid repetitions. Hence, the reader should see Section 4.2 for more information.

With regards to the topic of (a) **economic degrowth, inter-linking issues, harmonisation and the long-term environmental accounting role in addressing crises**, five papers' insights are subsequently proposed.

Ref. [48] reported, for instance, on the crucial topic of 'sustainable degrowth' as the equitable downscaling of production and consumption that increases human well-being and enhances ecological conditions at the local and global level due to the fact that economic growth, on the contrary, is not sustainable. Moreover, it must be distinguished from depression (which is an unplanned degrowth within a growth regime) in that sustainable degrowth is a voluntary, smooth and equitable transition to a regime of lower production and consumption. Crises are the result of unsustainable growth, irresponsible borrowing and the cultivation of false expectations. Take the housing market or the 'burn out' phenomenon as examples: these were not accidents, but systematic failures of a system struggling to keep up with growth rates that could not be sustained by its biophysical base (i.e., the 'real' economy and/or human performance).

The COVID-19 pandemic has heightened awareness of the risk posed by systemic issues and existential threats, such as climate change, to the stability of the financial system, triggering investors and securities regulators to call for greater transparency, comparability and consistency of ESG-related information. However, the current 'harmonisation' movement and the establishment of a standards-setting body within the IFRS Foundation reveal deception, misunderstandings and a disregard for academic research and the views of sustainability practitioners [65]. Ref. [5] reiterates the idea, from a different perspective, proposing considerations of the urgency and (in)action in terms of the environmental and COVID-19 crises.

To conclude this first block of studies, [67] discussed the 'illusionary' positive and negative effects of the crisis on the environment, its management and recovery.

Within the realm of (b) **energy footprints, climate science, waste and socioeconomic metabolism**, we gathered four documents.

Analysing the sustainable production process of biomass-based biofuels (biodiesel) to fulfil the existing energy demand and simultaneously reduce the environmental deterioration, [55] interestingly proposes an actual evaluation of non-financial parameters, providing hints for complexity and specificity towards which accounting will be increasingly pushed. In fact, global energy threats have emerged due to robust population expansion, imbalanced food and fodder supply, reduction of fossil fuel reserves, receding natural resources, and the ongoing Russo-Ukrainian War. Hence, it is crucial to maintain sustainable and economic growth with the utilization of domestic and renewable sources of energy to control oil imports.

From another perspective, [63] ponders the ever-increasing energy demands which pose huge environmental challenges globally, leading to the energy crisis and the impossibility of fulfilling the 1.5-degree global warming target set by the Paris Agreement. In this context, action for environmental and energy sustainability has increasingly required the harmonisation of state-of-the-art energy accounting frameworks, models, and metrics which, consequently, would also benefit the promotion of global sustainability. Hence, further investigation should shed light on accounting approaches in the promotion of energy sustainability and how they can improve our understanding of related environmental challenges. Moreover, new research paradigms are needed: for instance, the energy footprints across different scales should be tracked and quantified, through systems-based approaches such as life cycle assessment (LCA), input–output analysis (IOA), and ecological network analysis (ENA), to assist in decoupling economic growth from energy

consumption. Among the indicators, we find (1) the concept of energy footprint, which is either directly applied as an indicator or implied in the life-cycle perspective; and (2) the scarcity-weighted fossil fuel footprint, which is proposed as a promising tool to address the scarcity issue in relation to exploiting and transferring fossil fuels via trade. In short, the measurement of energy footprints should be undertaken both at life-cycle level or from the whole-supply-chain perspective. Ref. [64], in this regard, proposes a study on multi-model energy and climate science.

Before proposing the findings in relation to another substantial 'new' (i.e., different from those reported in the main-path analysis) ESG reporting for disruptions theme, a subgroup of papers which somehow connect to the previous batch concerns (c) **transportation and accounting for tourism crises** [56,62].

Another relevant topic (within a 2005–2022 timespan) pertains to the domain of (d) **global fisheries, biodiversity, food and water management and accounting for animals**. There are six scientific documents analysing this issue (one of which is about critical, provocative perspectives on making the invisible visible and accounting for animals as a part of a 'healthy' and not anthropocentric view of sustainability [10]). For instance, [49] investigated the global fisheries crisis, while [54], on the other hand, investigating the evident trade-off between economic welfare and environmental sustainability, studied the sustainability of water usage. Based on the global general equilibrium model Global Trade Analysis Project for Water (GTAP-W), they offer a method for investigating the role of green (rain) and blue (irrigation) water resources in agriculture and within the context of international trade. To model water supply and demand at the basin scale, the concept of maximum allowable water withdrawal (MAWW) was also employed, exploring three alternative scenarios: (1) business as usual; (2) water crisis; and (3) sustainable water use.

From a different perspective, [53] pondered the role of accounting in preserving and enhancing biodiversity on planet Earth. In fact, 'how to' account for biodiversity and how to establish an accountability mechanism for corporations to discharge their accountability to stakeholders for their impact on biodiversity are still open questions. To conclude this problematic section, [10] studied the plight of non-human animals: in fact, farmed animals are slaughtered each year to produce food and clothes, while wild animals experience various degrees of human-induced harm. In this regard, sustainability and associated accounting efforts should effectively consider how to make animals visible in sustainability (and) accounting.

As far as (e) **health care systems and safety disruptions** are concerned, we collected three documents (including one book [66]). *Health Systems in Transition* (HiT) is, in fact, a country-based review book which facilitates comparisons between countries. These reviews are based on a template, revised periodically, that provides detailed guidelines and specific questions, definitions and examples needed to compile a report. In this peculiar context, [58] proposes findings concerning the challenge that sustainability has posed during the COVID-19 pandemic to regulatory measures and public stigma.

Before proposing the findings in relation to the last identified stream of research regarding ESG reporting for disruptions, which partially overlaps one main path topical group, another relevant and new set of papers, which somehow influence all of the previous batches, concerns the difficult topic of (f) **blockchain and digital transformation influences on sustainability** [3].

In fact, ref. [59] demonstrated that, even though scholars have investigated the antecedents, contingencies, and consequences of these disruptive technologies (DT) by examining the use of single technologies or of digitization in general, some fields are still underrepresented. In short, in contrast with finance, DT is still lacking in the areas of accounting and sustainability. A structured literature review with citation analysis was conducted using an implementation of Gephi for analysis.

Digital technologies imply a multitude of concepts, such as blockchain (which is still a matter of debate), the internet of things (IoT), big data, cloud computing and artificial intelligence (AI). In the field of finance in particular, new abilities to work with big data

(BD) and analytics for trading and predicting markets have shaped the research field. Data management methods and the application of data analysis methods have now become more important, as they can be used for prediction and prognosis of e.g., bankruptcy. In further detail, ref. [59] reviewed existing research on BD in accounting and finance, supporting the fact that the research stream in auditing is still lagging behind, and, therefore implying future research directions. Ref. [68], further explored the topic of blockchain by using a systematic review approach and the Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) protocol, and in so doing proposed some provocative thoughts. Other studies have also established a few negative effects of blockchain, which should not, by any means, be underestimated. Technologies can indeed generate increasing energy consumption and consequent CO_2 emissions, acting negatively on other SDGs (Climate Action, SDG 13).

To conclude, issues regarding (g) **sustainable corporate governance, diversity and risk reporting**, once again, emerged [51,69].

5.1.2. Remarks on CSA Results

From a methodological standpoint, the main path confirms the supremacy of, and calls for the use of, quantitative and qualitative approaches to conduct research on ESG reporting for disruptions, with a specific focus on corporate governance dynamics, auditing, sustainability reporting harmonisation, energy and food, the digital transformation, and so forth [28,31,38,46,48,63,65,68].

Overall, the GCS, INCEX, and GLCS analyses show that there is a shift throughout the period studied, moving away from studies pertaining to more basic and, to a certain extent, vague concepts in sustainability and accounting for disruptions toward studies pertaining to new more problematic issues. These include crisis, emergency and long-term environmental accounting and related need for harmonisation, energy footprints and sustainability, accounting for biodiversity and food waste management, health care systems, corporate risk reporting and blockchain.

Given previous scandals and failures in prevention activities and procedures at the national and international level, as well as the growth of global sustainability concerns, this is an expected outcome. These further studies, which effectively summarize the trend of research within this field, initially explored by the researchers at a molecular level, definitely validate and expand on the tendencies brought out by the 'main path' analysis.

5.2. Keyword Network Analysis (KNA)

5.2.1. Co-Occurrence Analysis of Authors' Keywords

The results of previous tests (i.e., CN, GCS, GLCS, and INCEX analyses) can be improved by using the authors' keywords network of a collection of articles extracted using SLR techniques. This includes not only the largest and most connected component, but also the isolated nodes. In brief, the fundamental notion underlying co-occurrence analysis is that the authors' keywords should serve as a proxy for the substance of the selected articles [21]. This approach may, thus, contextualize the growth of research trends over time: multiple co-occurrences revolving around a given term would be likely to suggest a sub-field study pattern. It is thus useful in the locating of research themes and new trends in a certain subject field.

VOSviewer was used to finish the study, making it possible to map the keywords by dividing them into discrete clusters [70]. The first stage involved extracting the authors' keywords from Scopus publications chosen during the previously stated SLR phase. Then, using the VOSviewer, and based on similarity metrics, a co-word network was built and evaluated, visually presenting the item placements on a map.

The minimum number of keyword occurrences parameter is set at six, since a higher value may result in the removal of the most current relevant keywords and a lower value diminishes the importance of the analysis by including non-relevant phrases [16]. Furthermore, the limited sample size has an impact on parameter selection. In reality, if the number

of articles under consideration is tiny, using a greater value as the minimum keyword occurrence may provide an unduly restricted result.

Having stated that, the objective is to ensure that clusters are content consistent. As a result, thesaurus file approaches were utilised in tandem with VOSviewer to replace equivalent phrases with the same meaning, such as 'COVID-19 pandemic' or 'coronavirus' with 'COVID-19' or 'CSR' with 'corporate social responsibility.' This prevents the display of synonym duplications among terms.

Figure 6 illustrates the results of the test on the keywords used by the authors of the Scopus articles. The VOSviewer programme discovered 23 keywords and grouped them into four primary clusters. The network nodes correspond to the most frequently used keywords, and their connection weights indicate the number of times the phrases appear in the articles. The wider the circle (or node), the more widespread (and, hence, relevant) the phrase should be among the studies under consideration. Furthermore, the various colours visually distinguish the terms belonging to one sub-cluster from those belonging to others, while the size of each node indicates the overall link strength. The keyword clusters are examined below in order to give evidence regarding the most significant research patterns discovered through the literature review.

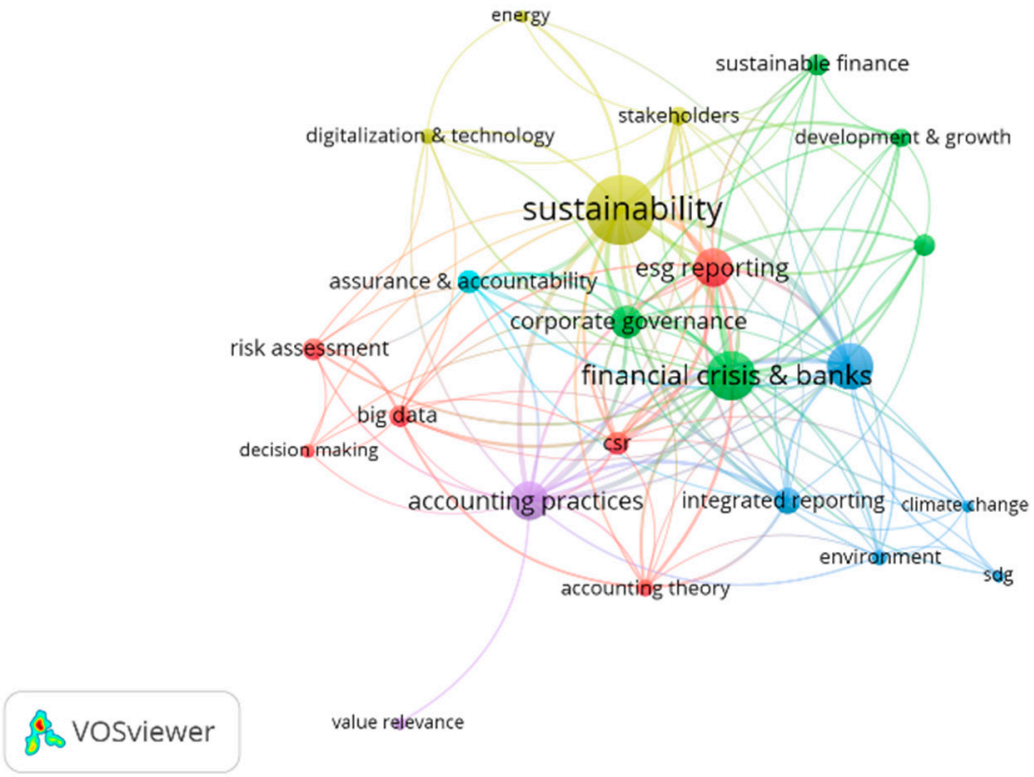

Figure 6. Co-occurrence author keyword network analysis in thematic clusters.

Finally, using a VOSviewer overlay visualization approach, it is feasible to construct a classification of the aforementioned keywords based on their average year of publication (see Figure 7): a darker colour signifies the oldest publications, while lighter ones suggest the most recent.

Table 5 summarizes the phrases corresponding to each detected cluster, for which a brief overview is proposed as follows.

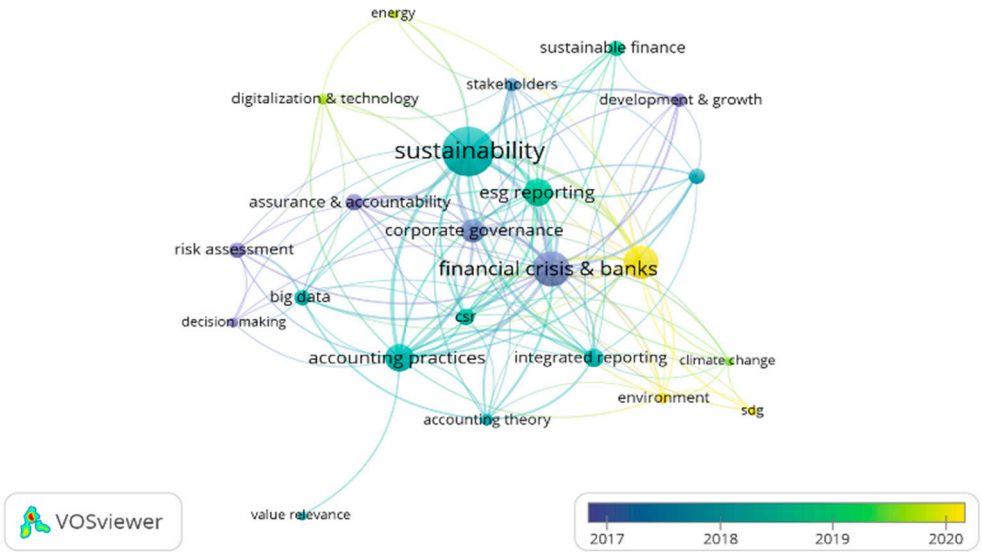

Figure 7. Co-occurrence author keyword network analysis according to publication year.

Table 5. Clusters of the co-occurrence author keyword analysis and related average publication year.

Keyword	Avg. Pub. Year
Cluster 1	
Accounting practices	2018.24
Accounting theory	2018.00
Assurance and accountability	2017.00
Decision making	2016.88
ESG reporting	2018.67
Risk assessment	2015.38
Value relevance	2018.00
Cluster 2	
Corporate governance	2017.19
CSR	2018.44
Development and growth	2016.42
Financial crisis and banks	2017.16
Performance measurement	2017.94
Stakeholders	2017.50
Sustainable finance	2018.69
Cluster 3	
Climate change	2019.43
COVID-19	2021.02
Environment	2020.40
Integrated reporting	2018.17
SDG	2021.17
Sustainability	2018.19
Cluster 4	
Digitalization and technology	2019.60
Big data	2018.19
Energy	2019.71

Note: In bold, the most cited keywords.

Cluster 1 is primarily concerned with the accounting, reporting and disclosure interrelationships with ESG dynamics and disruptions. In reality, the most often used phrases were 'assurance', 'risk assessment' and 'ESG reporting', highlighting their effects on specific scenarios or contexts (such as the EU directive on NFR process, EFRAG vs. IFRS initiatives on sustainability reporting, SRA engagement and factors, and risk reporting). It also includes a recommendation for what would be required to enhance the effectiveness of these initiatives (i.e., through policies and regulations which take into consideration the overall chain of accounting practices, from the gathering/production of information to their assurance, and their use for investment/decision-making purposes). *Cluster 2* is largely concerned with the organizational/management elements of corporations and businesses during disruptions, from a sustainability perspective, offering concepts such as 'corporate governance', 'performance measurement', 'CSR', and 'sustainable finance'. The emphasis in this area is on what happened in the past (e.g., 'financial crisis') and what should be done (e.g., 'development and growth'). Furthermore, *Cluster 3* keywords focus on some pending and current concerns worldwide. In fact, issues such as 'climate change' and 'COVID-19' are proposed, with an emphasis on the implications they would have on humanity. In this regard, the relevance of 'integrated reporting' and the SDGs of the 2030 United Nations (UN) Agenda emerges. Finally, *Cluster 4* highlights the key emphasis of research on, at least, two other relevant concepts concerning the transition to a sustainable/green economy as well as the anticipation/prevention of future disruptions, emphasising concepts such as 'big data' and 'digitalization and technology' as well as pertaining to the energy industry. The last two clusters gather, ceteris paribus, the latest research topics in terms of average publication years.

5.2.2. Kleinberg's Burst Detection Algorithm

Some concepts in a research field may exist at one point, then expand, and then perish. When a topical issue (in this case synthesised by 'keywords') becomes a research stream, it causes a 'burst of activity' [16,21]. Ref. [71] established the idea of bursts reflecting a transitory situation. Each burst, for instance, corresponds to a certain phrase, following the progress of a research topic through the use of keywords (cf. Figure 8).

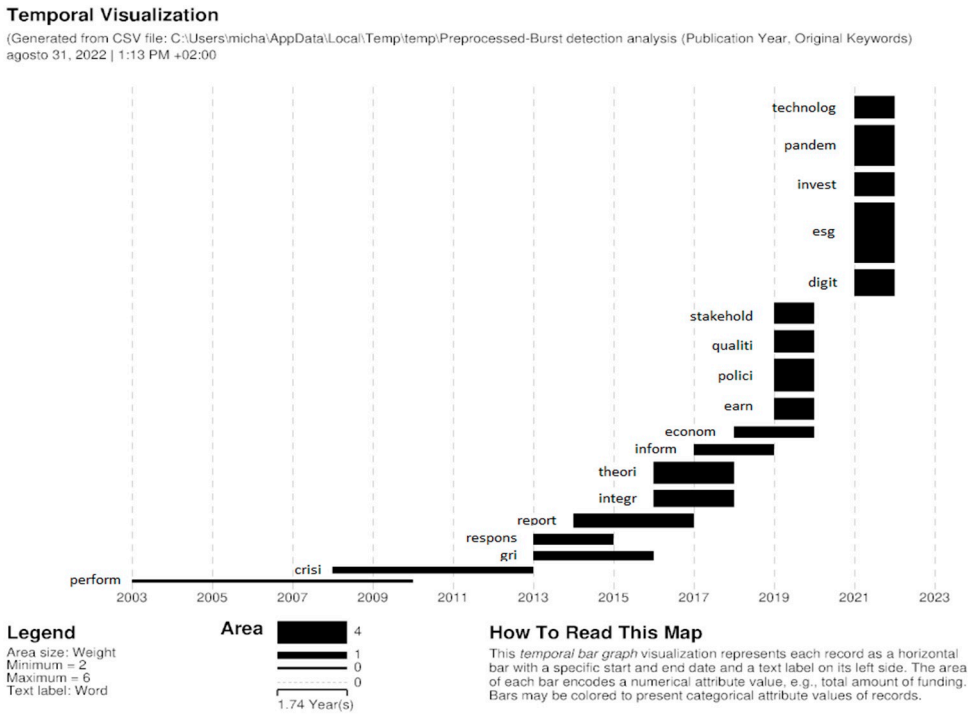

Figure 8. Burst detection techniques on normalised author keywords.

Furthermore, the height of the burst indicates the frequency with which keywords are used: the greater the burst, the more frequently a term is used. The lengths of the bars, on the other hand, indicate the historical period in which they were and/or are most commonly used.

Kleinberg's approach is used in this study to determine the author keywords of the manuscripts using the extrapolation keywords from the prior section. The purpose is to broaden the keyword analysis conducted using VOSviewer in order to confirm previous findings and/or gather more information. In so doing, the Sci2 programme is used to extract and pre-process (i.e., normalize) author keywords from the sampled articles. The results of the burst detection approach implementation are shown in Figure 8: the visualization was generated using GIMP software re-elaborations.

In summary, the above illustration features a plethora of bursts. This should imply that something is happening inside the study area and that the research field in analysis is not stagnant. Moreover, the specific topics, within the research field, explored by researchers are changing. According to the findings of this analysis, the early bursts are linked to performance and crisis concerns when talking about disruptions in the business world: this implies the predominance of the economic standpoint when it came to speaking of financial (but not only financial) turmoil. This tendency characterised research for a long time. With that in mind, starting from 2013, and with a frequent pace of evolution, the focus of researchers shifted to the accounting and/or corporate governance solutions to these problems and their related effectiveness at the international level, with a particular emphasis on GRI standards, corporate social responsibility, integrated reporting, and information asymmetry issues, emphasising the importance of developing and implementing appropriate theories to practice. Moreover, in the context of disruptions and related ESG reporting, attention has moved from the shareholder's perspective to a wider one, i.e., the stakeholder's perspective. The latest topical research themes now try to highlight the power and importance of digitalization in making the world smarter and more sustainable on multiple levels with the ongoing pandemic and the Russo-Ukrainian war still affecting our lives.

6. Identifying New Research Directions

Previous tests (such as the main-path network, citation scores, and keyword analyses) allowed us to analyse the dynamic evolution of the research domain, revealing new research trends.

A growing number of studies on ESG reporting for disruptive events have been published, and it is worth noting that academics' emphasis has shifted from general concepts primarily pertaining to financial and/or economic crisis impacts and performance measurement in a broader sense, to more specific and diverse issues, ranging from the achievement of SDGs, global reporting initiative (GRI) and <IR> adoption, sustainability reporting assurance and risk assessment to energy industry crises, food and waste management and the AI/digitalization revolution.

All of these are examples of current disruptions which we are all called on to confront.

More efforts are needed to improve ESG reporting and to eradicate (or, at the very least, contain) bad practises, green/rainbow washing and misconduct on multiple levels as well as to transform reporting practices to a forward-looking and anticipatory tool for strategic management and decision making [1,3,31]. Academic research should assist the ESG reporting activities in identifying the best solutions to the aforementioned problems. As a result, more research is needed. Hence, based on the result of our findings, we suggested twelve alternative ideas for further research.

The following table (see Table 6) provides the prospective research subjects, a brief description (in terms of potential analyses suggested by past studies), and the primary references.

Table 6. Research gap overview on ESG reporting, sustainability accounting and disruptions as of 2023.

N°	Topic Gap	Description	References
1	Non-financial reporting (NFR) process, EU context and directives, and Green Taxonomy	- Longitudinal and cross-national studies, with different subjects (both corporations, entities and small/medium enterprises). - Interviews and case studies. - SEM-PLS studies and regression technique analysis for panel data. - Ground theory and computer-aided qualitative analysis data software (CAQDAS) implementation.	Lozano & Huisingh, 2011 [50] La Torre et al., 2020 [45] Amoako et al., 2021 [25] Abhayawansa & Adams, 2021 [31] Staszkiewicz & Werner, 2021 [37] Arvidsson & Dumay, 2022 [1]
2	<IR>, GRI and SDGs achievement: the COVID-19 pandemic and climate change	- Need for a determined framework or several contextual frameworks for 'good' ESG reporting practices and their quality assessment. - Gap analysis and systems thinking approach. - Need for a determination of what, how and why decisions were made throughout the COVID-19 pandemic period, helping a forward-looking perspective to emerge. - Further investigation into the concept of sustainability reporting.	Stent & Dowler, 2015 [27] Garanina & Dumay, 2016 [28] Adams & Abhayawansa, 2022 [65] Tregidga & Laine, 2022 [5] Rüger & Maertens, 2023 [9]
3	Risk disclosure evaluation/assessment, long-term value creation and forward-looking information	- Qualitative studies (surveys, case studies, interviews, and experimental studies). - Two-stage methodology (content analysis combined with market data regression analysis). - Action research.	Dilling & Harris, 2018 [26] Cho et al., 2022 [67]
4	Sustainability reporting assurance (SRA)	- Qualitative studies (surveys, case studies, interviews, and experimental studies). - In-depth analysis and bivariate/multivariate non-parametric statics. - Action research.	Branco et al., 2014 [35] Gomes et al., 2015 [34]
5	Voluntary and regulatory measures in CSR private and corporate governance	- Empirical studies on choice determinants and impacts on performance. - Interviews and case studies. - SEM-PLS studies and regression technique analysis.	Ntim et al., 2013 [51] Velte, 2020 [36] Naeem et al., 2022 [69]
6	Economic degrowth, harmonisation and long-term environmental accounting role in addressing crises	- Qualitative studies (both archival and interviews). - Interpretivist approach by publicly available secondary data sources. - Generalised method of moment (GMM) model and pooled ordinary least squares (pooled-OLS) regression.	Biondi et al., 2020 [43] Adedoyin et al., 2021 [62] Bigoni & Mohammed, 2023 [2]
7	Energy, transportation, tourism and other industry disruptions	- Assessment model for specific sector in smart city extension. - Energy footprint measurement. - Life cycle assessment (LCA) from a whole-supply-chain perspective. - Multi-model framework and collective science approach.	Abu-Rayash & Dincer, 2020 [56] Chen et al., 2020 [63] Nikas et al., 2021 [64]

Table 6. *Cont.*

N°	Topic Gap	Description	References
8	Ecosystems, biodiversity and accounting for animals	- Cross-field research among management, governance and business researchers and natural science departments. - Framework problematising biodiversity. - Examination of reporting and valuation models in a real-life context to test predictability.	Jones & Solomon, 2013 [53] Schaltegger, 2020 [6] Vinnari & Vinnari, 2022 [10]
9	Food, water and waste management	- Cross-field research among management, governance and business researchers and natural science departments. - GTAP-W model and the concept of maximum allowable water withdrawal (MAWW) extension. - Assessment of the development of material flows through the global economy. - Food diary and Sankey diagram. - Focused literature reviews.	Allan et al., 2005 [49] Calzadilla et al., 2010 [54] Krausmann et al., 2018 [52] Amicarelli & Bux, 2021 [57] Langemeyer et al., 2021 [61]
10	Health care systems and safety disruptions	- Examination of reporting and valuation models in a real-life context to test predictability. - SEM-PLS studies and regression technique analysis for panel data. - Multinomial logistic regression model.	Bernal-Delgado et al., 2018 [66] Sun et al., 2021 [60]
11	Blockchain and digital transformation influences on sustainability	- Gephi analysis and cluster. - Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) protocol implementation. - Focused literature reviews.	Hausberg et al., 2019 [59] Parmentola et al., 2022 [68] Saxena et al., 2023 [3]
12	Sustainable corporate governance and diversity: socio-economic crises and psychological consequences	- Cross-field research among management, governance and business researchers and sociology or psychology departments. - Sociodemographic and psychosocial predictor testing. - Compromise and/or latent conflicts between the environment and the social in ESG dynamics.	Tomczyk et al., 2020 [58] Lodhia et al., 2021 [46]

The authors believe it is especially important to investigate the following topics: (a) non-financial reporting (NFR) processes and global harmonisation, EU context and directives, and green taxonomy implementation side effects; (b) risk assessment and forward-looking information reporting and disclosure, and sustainability accounting assurance; (c) sustainable corporate governance and diversity: humanitarian emergencies and psychological consequences; (d) energy industry crises and climate change; and (e) blockchain, cybersecurity risks and digital transformation influences on ESG/sustainability. In truth, these topics have received multiple calls for more research, and their impact is relevant on a worldwide scale. Furthermore, from a methodological standpoint, many academics advocate qualitative and quantitative investigations, highlighting the importance of results that are more accurate as a consequence of interviews, case studies, action research, and experimental designs. However, there is also a shortage of quantitative and empirical investigations in this field of study, analysing cross-national, longitudinal studies using regression techniques, or even more robust and complex methodology which allow for more sophisticated analysis (see Table 6 under 'Description'). To the best of our knowledge, very few studies within the field of ESG reporting for disruptions have used methodologies such as 'partial least squares—structural equation modelling' (PLS-SEM), Gap and Gephi

analysis, 'computer-assisted qualitative data analysis software' (CAQDAS), 'generalized method of moments' (GMM), LCA, GTAP-W and MAWW, and PRISMA, which might result in intriguing theoretical conclusions to adopt in practice as well as in the actual construction of a solid theoretical framework, beneficial both for theory and real-world processes and activities.

7. Discussion and Conclusions

The ultimate goal of this literature analysis is to provide a thorough account of the most recent state of knowledge on accounting and reporting for ESG dynamics under disruptive events. In addition, some potential future study directions are suggested.

Despite the importance of this area of study, only few studies have examined it extensively and methodically, and their findings have led to disputed conclusions [3,31,72]. The SLNA was created in this context to explain earlier contributions on this topic and to gather evidence of new developments. This technique combines an SLR with a BNA. The SLNA was also coupled with other methods, such as citation score and index analysis, keyword analysis, and burst detection [21].

More specifically, the main path analysis enables the localization of seminal works that serve as a reference point for more recent studies to be conducted [16,20], as well as the generation of a dynamic representation of the evolution of a specific research field, whereas keyword analyses aid in identifying the most relevant contributions in the field (see also INCEX analysis).

In short, starting from the scientific evidence for which the environment is in an evident state of crisis, with climate science and biodiversity loss indicators, for instance, illustrating the extent of environmental degradation and the concerns with the sustainability of Earth, or perhaps more specifically, the ability of Earth to sustain (human) life, we have managed to understand how scholars in accounting, sustainability and corporate governance disciplines have contributed relevantly to tackle this and potentially other future 'negative' scenarios. This is justified by their crucial role in influencing—though these processes are admittedly slow and complex—corporate reporting, disclosure and strategic decision-making and orientation [6]. In this context, the ongoing pandemic and the energy industry crisis will make the 'net zero carbon' goal by 2050 for the EU even more difficult to achieve. Looking back to the UN's 2030 Agenda for Sustainable Development, we as a population are indeed not where we need to be, and most countries are falling short of the UN's SDGs targets [3,67]. The intimate relations between humans and the non-human world suggest that we are now living in the Anthropocene. The human imprint on the ecological processes has become so large and active that it impacts the planet's system on a scale never seen before in its history and will determine the future geological evolution of the Earth. However, when investigating what kind of 'crisis' or 'disruptions' researchers have had in mind, these were, most of the time, associated with overstepping the planetary boundaries [31], especially in the form of the climate emergency and biodiversity loss. Hence, the vocal and visible expressions of concern are, at the moment, largely anthropocentric. Decisive and urgent action must be taken so that natural systems are able to support not only the flourishing of our species, but also—in order to make it truly sustainable—the wider preservation of societal, environmental and animal conditions. In essence, moving on from a nature–society dichotomy and abolishing any structures that uphold an artificial view of human exceptionalism, we could, once again, restore the metaphor of a collective inhabited by both human and non-human beings. In fact, feeling the desire to have non-human animals welcomed and given shelter in our collective is not only legitimate, but the only scientific and political cause worth living for [10]. In this quite philosophical panorama, accounting does play a unique and crucial role in ensuring that species discovered by scientists are not destroyed by organizational activities, hence providing a pivotal link between humanity and nature. Unless this link is used to improve both corporate accountability and the state of biodiversity, the future does not look bright.

Another crucial concept, i.e., 'sustainable degrowth', is derived from this. It is the equitable downscaling of production and consumption that increases human well-being and enhances ecological conditions at the local and global level due to the fact that, on the contrary, economic growth as-is does not appear to be sustainable anymore. Moreover, distinguished from depression, which is an unplanned degrowth within a growth regime, sustainable degrowth is a voluntary, smooth and equitable transition to a regime of lower production and consumption. Crises are the result of unsustainable growth, irresponsible borrowing and the cultivation of false expectations. Taking the housing market collapse, the energy industry crisis or the 'burn out' phenomenon as examples: these were and are not accidents, but a systematic failure of a system struggling to keep up with growth rates that could not be sustained by its biophysical base (i.e., the 'real' economy, natural resources and/or human performance).

To put it bluntly, we argue that a shift of mindset and paradigm is pivotal, and that this is more likely to happen at the training and education stage; the topics and the way we, as academics, teach, for instance, accounting and corporate governance constitute a crucial juncture. We need to push for substantial changes in education paths, courses, programs and curricula to allow systems and promote outside the box thinking [67], with a focus that goes beyond mere financial performance [11,44]. Moreover, this transition will be effective only by means of a strong intervention at the institutional and global level, calling for and acting towards a definitive harmonisation of the various accounting frameworks, models, and metrics that are essential for promoting globally the sustainability of climate change, energy crises and other current (and future) disruptions.

The overall findings show that, despite an increase in the number of research papers published over time, the specific issues pertaining to the ESG reporting study domain remain important and leave room for future inquiry, albeit shifting the focus to other criticalities (compared with the initial related studies). Future research should provide empirically comparable studies across time, settings, and sectors [1], as well as take into account the realities of small- and medium-sized businesses [5], with a focus on a qualitative methodological approach (by means of top management interviews and action research) and a quantitative approach (mainly involving regression techniques and, possibly, SEM-PLS designs). These studies should also take into account new data sources, such as yearly and online reports—which would, then, allow for a triangulation of results—as well as other forms of analysis, particularly qualitative forms, such as case studies, interviews, and surveys, since these methodologies might provide more robust evidence for practice [11,25]. Furthermore, it may be worth analysing the impact of the COVID-19 pandemic, climate change, as well as the energy industry crisis due to the ongoing Russo-Ukrainian War, on the overall prospects of the implementation of sustainable development practices throughout the value chain, the introduction of the so-called 'Green Taxonomy' in the EU context, and the digital transformation [63,68]. In fact, disruptions should not be seen only as negative phenomena, but they might also represent a critical success factor. Additional studies might revolve around sustainable corporate governance and diversity, risk disclosure assessment and forward-looking information provision, sustainability reporting assurance (SRA), and food, water and waste management.

Finally, this work makes several contributions. First, it broadens knowledge on the subject of ESG reporting under disruptions, with an emphasis on the latest research trends (such as initial COVID-19 pandemic impacts, gender diversity issues, climate change and energy crises). Second, the use of a novel strategy (i.e., SLNA techniques) to perform the literature analysis reduces subjectivity by including a precise procedure and set of criteria [14]. To the best of our knowledge, no earlier implementations of SLNA approaches in the domain of accounting for ESG dynamics under disruptions have been fully deployed. Third, it provides an idea of how the area of research could evolve in the future. Fourth, it demonstrates the SLNA's ability to conduct dynamic investigations on a research topic, especially in an evolving setting such as sustainability.

In addition to these contributions, which are largely theoretical, significant practical implications are provided. To date, as has indeed been revealed by previous research, a significant limitation of ESG reporting is represented by the low quality of disclosure and governance dynamics on several levels (in terms of accountability, integrity and transparency) and the lack of harmonisation among the existing sustainability accounting tools which, in turn, render dialogue with stakeholders ineffective and unable to achieve the sustainable development goals [1,11,73]. The examination of the sampled academic articles also allows for the identification of certain other criteria that corporations and leaders must consider in order to ease these pathologies and improve the overall quality of their governance and accounting for ESG practices. Having said that, the study is not without flaws. For example, the citational information is collected primarily from Scopus and, as a result, does not include all academic works relevant to the study topic in the analysis. It is also worth noting the 'Matthew effect', which states that academics are more likely to reference articles that have a high number of citations since they are thought to be more reputable. Furthermore, the analysis may suggest some degree of subjectivity, even if it is still lower than other review methodologies would imply. Finally, the main path analysis consists of only a few papers, which may be insufficient to indicate genuine new research avenues. However, the 80/20 principle might well explain this strategy from a methodological standpoint [74]. To circumvent this limitation, the SLNA has been combined with additional research approaches: global citation score and index analyses, keyword analysis, and burst detection [16].

To conclude, sustainability starts with individuals, not only at the farm/processing, SME, corporate or multinational levels, but also at the domestic consumption stage. Hence, it is not only accounting and reporting, but, now more than ever, it is also—if not only—a matter of strategically and consciously doing [27,29,30,35,50,52,57,60,61,75–79].

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