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Integrated Reporting and Group Decision-Making for Sustainable Development: A Bibliometric Review

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ABSTRACT:
The demands of society are constantly evolving, imposing significant pressures on business organizations within the context of sustainable development policy. As a result, organizations have begun to move towards promoting information disclosure through integrated reporting, transitioning from sustainability reports to financial reports. Simultaneously, decisions made to address specific problems are no longer the sole responsibility of a single individual. Challenges now revolve around group decision-making with the aim of achieving a consensus solution. To comprehend the landscape of integrated reporting and group decision-making in the scientific literature concerning sustainable development, a bibliometric review was conducted across major scientific databases from 2008 to 2023. The analysis utilized Bibliometrix, based on the R language, and Biblioshiny for graphic generation. The results indicate a quantitative increase in publications addressing integrated reporting and group decision-making in the context of sustainable development. However, a thematic isolation among existing studies was evident, pointing to an opportunity for future research to bridge the gap and establish more robust connections between the subjects.

Keywords: integrated reporting, group decision-making, sustainable development, bibliometric review

1. Introduction

Companies have been adopting new business models that transform competition rules unprecedentedly (Schweizer, 2005). Simultaneously, choices related to corporate governance have been guided to meet shareholder expectations (Salvioni & Astori, 2013). However, society's demands on businesses are rising, and stakeholders are urging companies to adopt a more conscious stance towards their interests (Pinelli & Maiolini, 2017). As a result of this context, it is inherent that the search for management models transcends boundaries and intensifies as new needs arise, such as moving towards sustainable development. In this sense, the pursuit of sustainability poses significant challenges to organizations, demanding a redefinition of their practices and objectives. Recognizing sustainability as a challenge of high and fundamental importance, organizations face questions in dealing with different dimensions of sustainability (Gimpel et al., 2020).

Recently, there has been a growing practice in organizations of disclosing information that goes beyond the traditional limits of conventional reports. This trend is because traditional financial reports are not able to meet the complex information needs of various stakeholders (Velte, 2023). In addition to financial reports, sustainability reports were introduced as a means of attracting investors. Progressively, this practice evolved into

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merging sustainability reports with financial reports, culminating in the conception of integrated reporting (Reimsbach et al., 2018). Thus, the goal was to harmonize information related to sustainability with financial information, promoting a more holistic and comprehensive approach to organizational communication.

Integrated Reporting (IR) was created by the International Integrated Reporting Council (IIRC). As stated by IIRC (2013), IR is outlined as a concise communication that covers the strategy, governance, performance, and prospects of an organization, contextualizing these elements in the external corporate environment. The underlying purpose of IR is to guide organizations in transmitting information that is essential for both investors and other stakeholders. Furthermore, its role was also to break the traditional paradigm of reports, providing a unified narrative that encompasses social, environmental, and economic aspects. With this information, everyone would be able to assess the organization's long-term prospects clearly, concisely, comparably, and connectedly. Thus, the organization, its investors, and other stakeholders can make better short- and long-term decisions (Pinelli & Maiolini, 2017). Therefore, IR emerges as a vital tool to effectively communicate not only the financial results of an organization but also its real commitment to the environment and society. This narrative integration not only responds to the growing demand for transparency but also strengthens the connection between corporate decisions and the principles of sustainable development. However, despite the expected benefits for stakeholders, it seems that IR is having difficulties spreading across companies. There are several reasons that explain this evidence. This may be mainly due to some critical problems underlying the implementation of IR, such as difficulties in fully applying its framework (Songini et al., 2020).

In organizational environments, solving specific problems requires the mobilization of various resources. In this context, individuals, notably referred to as experts, emerge as elements of significant importance. In the face of this, challenges associated with group decision-making aim to facilitate the management of situations in which two or more experts need to reach a consensus solution to a decision-making problem (Palomares et al., 2014).

From a conceptual standpoint, Group Decision-Making (GDM) represents a process in which a group of people acts collectively. Its purpose is to select one or more alternatives to solve a particular problem or issue (Carneiro et al., 2021). Thus, GDM is configured as a response to the characteristic complexity of contemporary challenges. By bringing together diverse minds, this process seeks to optimize the analysis of variables, enabling consideration not only of financial aspects but also of associated social and environmental impacts, in addition to considering the expertise of participants in the decision-making process.

GDM, by incorporating a diversity of perspectives, proves to be a crucial catalyst for addressing these challenges. Since collective decisions reflect a multiplicity of values and views, the integration of sustainability is not only an ethical choice but also a strategic necessity. Consequently, in a world more focused on sustainable development and concerned with enhancing the image of organizations, the keywords "Integrated Reporting" and "Group Decision-Making" emerge in this dynamic context. The interconnection of these concepts not only reflects the evolution of corporate governance

practices but also points to a more holistic approach oriented towards sustainable development.
Given the presented context, it is evident that GDM and IR can play fundamental roles in the pursuit of sustainable development. In this sense, the objective of this article is to conduct a meta-analysis through a bibliometric review, addressing research conducted in the period from 2008 to 2023, to explore the use of IR and GDM from the perspective of sustainable development. To achieve the goal, it is imperative to answer the following questions: What is the state-of-the-art panorama of group decision-making and integrated reporting in sustainable development over the last fifteen years? And how are these keywords related?
In order to answer these questions, this study was structured into distinct sections, comprising this Introduction, followed by Materials and Methods, Results, and finally, Conclusion. In this Introduction, the research problem and the questions to be answered are outlined. The Materials and Methods section presented the bases adopted in the research and the steps followed to compile the base file with the selected articles for analysis. Next, in the Results section, the collected information was presented and discussed to illustrate the scientific panorama of the conducted research. Finally, the Conclusions section highlighted the relevant information obtained throughout the study.

2. Materials and Methods

2.1. Research Strategy and Data Collection

In order to achieve the objectives of this study, the research strategy and data collection were outlined in four distinct stages: selection of the type of analysis, determination of the research databases to be used, definition of relevant keywords for the research, and selection and implementation of specific tools for bibliometric analysis. Figure 1 schematizes the stages conducted throughout this study.

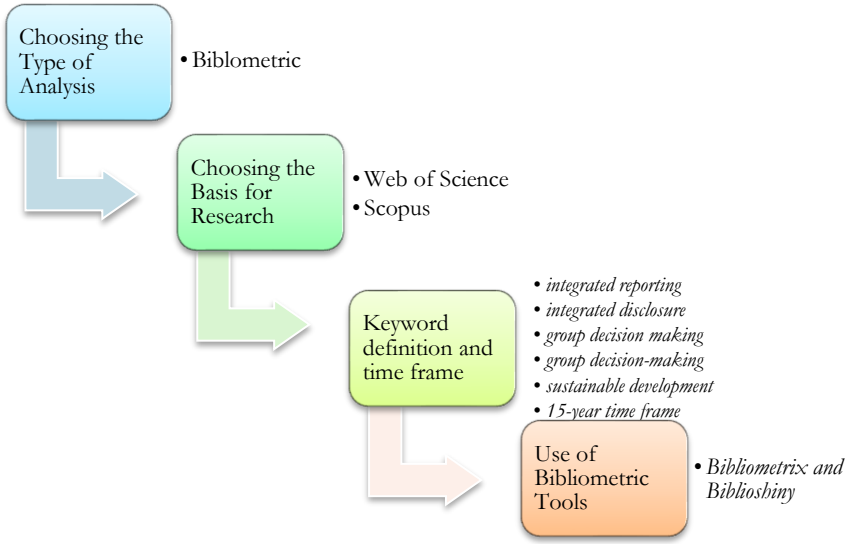


Figure 1 – Research strategy and data gathering.

In the first stage, emphasis is placed on selecting the type of review to be employed in the development of this article. The choice fell upon a bibliometric review, focusing on the analysis of scientific publications relevant to the use of Integrated Reporting (IR) and Group Decision-Making (GDM) for sustainable development. The bibliometric analysis method is characterized as a quantitative approach based on literature data, as Wang (2024) emphasizes. Thus, bibliometrics allows for the presentation of an overview of the existing literature in a specific field of study, with the advantage of being more rigorous and less biased. Moreover, the review is used in academic environments to discover emerging trends in subjects and high-performing journals, report a collaborative network among authors, and explore the intellectual structure of a particular knowledge domain (Demir et al., 2024).

In the second stage, the selection of databases for conducting the research was carried out. Thus, the two bibliographic "titans of information" in the current academic world, Web of Science (WoS) and Scopus, were employed (Pranckutė, 2021). These research databases play a fundamental role in advancing scientific communication as they allow for the evaluation, preservation, and dissemination of research results (Asubiaro & Onaolapo, 2023).

In the third stage, the definition of keywords and the determination of the temporal analysis period were performed. The keywords intended to investigate the interconnection between Group Decision-Making and Integrated Reporting, from the perspective of sustainable development, were inserted into the search fields, covering the title, abstract, and keywords. The databases were analyzed considering an approximate time frame of 15 years, spanning from 2008 to 2023. This approach ensures a relevant temporal delimitation to capture the development and trends over the analyzed period, contributing to a comprehensive overview of the state of the art on the subject.

The search procedure was conducted considering the following keywords: "integrated reporting," "integrated disclosure," "group decision making," "group decision-making," and "sustainable development." For the WoS Core Collection, the following search structure was used with the keywords: TS=("integrated reporting") OR TS=("integrated disclosure") AND TS=("group decision making") OR TS=("group decision-making") AND TS=("sustainable development"). In WoS, the TS field searches for keywords in the title, abstract, and author keywords. After entering the criteria into the WoS database, 1,054 results were obtained.

In the Scopus database, the search was conducted using the following structure: TITLE-ABS-KEY ("integrated reporting") OR TITLE-ABS-KEY ("integrated disclosure") AND TITLE-ABS-KEY ("group decision making") OR TITLE-ABS-KEY ("group decision-making") AND TITLE-ABS-KEY ("sustainable development") AND PUBYEAR > 2007. After entering the criteria into the database, no results were obtained.

After collecting the search results in the WoS database and exporting the file in Bibtex format, the research progressed to the fourth stage. In this phase, the Bibliometrix tool was employed, developed for the R statistical programming environment. The bibliometric analysis features in this tool are well-known for being strong, allowing a thorough and statistically sound evaluation of the traits and trends present in the chosen publications. The use of the R environment and the Bibliometrix tool contributes to an effective and

in-depth analysis, providing relevant insights into the state of the art of research related to IR, GDG, and sustainable development.

2.2. Data Analysis

Data analysis was conducted in the Results section and was based on the use of the Bibliometrix tool. This open-source tool is designed to perform a comprehensive analysis of scientific literature mapping (Asubiaro & Onaolapo, 2023). In the initial data screening phase, the tool identified and eliminated four duplicate records in terms of titles found in the WoS database. With this correction, the total number of collected articles was adjusted from 1,054 to 1,050. Additionally, the tool provided valuable information based on the metadata of publications, including the quantitative evolution of publications over the temporal period from 2008 to 2023, the top ten journals in the research, the top ten countries with the most publications, the five authors and their institutions with the most published articles, the three most cited articles, the categories of the top ten journals that published the most, a thematic map of keywords, and the analysis of keyword co-occurrence.

3. Results

3.1. The quantitative evolution of publications over the temporal period from 2008 to 2023

The graph shown in Figure 2 illustrates the quantity of publications over the period considered in the temporal cut. Three articles were located in the first year of the study. The first, titled "Multi-Region Game for Water Resource Management of River Basin" (Fenghui, 2008), addressed keywords such as water resource conflict, multi-objective game, interactive decision-making, and public choice. The second article, titled "Data quality of 5 years of central norovirus outbreak reporting in the European Network for food-borne viroses" (Kroneman et al., 2008), included keywords such as epidemiology, food safety, and public health. Finally, the third article, titled "Application of data mining for supply chain inventory forecasting" (Ellis et al., 2008), did not specify keywords. However, upon analysis of the title and abstract, keywords such as data mining, inventory management, supply chain, integrated reporting, and business intelligence were identified. Therefore, considering the three titles, it is noteworthy that the first and third articles explored the field of management, while the second focused on the field of health.

Until the year 2011, the quantity of publications remained stagnant at a low level, in the order of units. During these four years, as indicated in Figure 2, the group of queried keywords did not attract significant interest from the scientific community. However, in 2012, the quantity quadrupled, possibly due to the establishment of the International Integrated Reporting Council (IIRC) in 2010. The foundation of this entity solidified the idea that the cycle of integrated reporting and thinking results in efficient and productive capital allocation, acting as a force for financial stability and sustainable development. In other words, integrated thinking in conventional business practice began in that year (Mans-Kemp & van der Lugt, 2020).

From 2013 onwards, there has been a growth trend in publications, reaching its first peak in 2019 with 141 records. In 2020 and 2021, the number of publications experienced a

decline, possibly due to the SARS-CoV-2 epidemic. In 2022, the number of publications reaches its peak with 174 items. In that year, the most cited article obtained 42 references and was titled "Nonfinancial Reporting Research And Practice Lessons From The Last Decade" (Turzo et al., 2022). After reading the article, it became evident that its objective was to expand on the results of previous research and literature reviews, using a broader definition of Non-Financial Reports (NFR) as "a broad term that applies to all information reported to shareholders and other stakeholders that is not defined by an accounting standard or a calculation measure based on an accounting standard." As a result of the analysis, the authors identified eight clusters with topics such as "Content of non-financial reports," "The Integrated Reporting framework," "The effect of NFR on company-level accounting variables," "The relationship between governance and NFR practices," "The theoretical perspective underlying NFR practices," "NFR assurance practices," "The relationship between institutional factors and NFR decoupling practices," and "Environmental reports." In 2023, and up to the data collection date of the research (11/27/2023), there are already 144 published articles. It is estimated that this number may increase, following the trend presented between 2008 and 2019 and the resurgence in 2022. Additionally, the annual growth rate for the queried keywords stands at 29.44%.

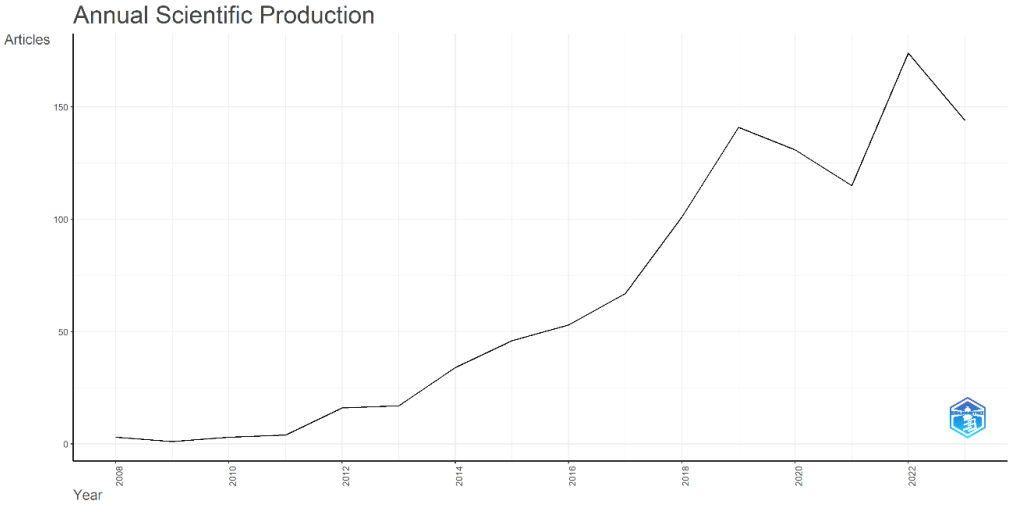


Figure 2 – Number of Publications throughout the period from 2008 to 2023.

3.2. Top Ten Journals from the Research

Figure 3 presents the top ten journals obtained through the research, along with the number of publications. These journals represented 29.05% of the total publications found, totaling 305 articles out of the universe of 1,050. The journal that led in the number of articles was "Sustainability," with 58 publications, followed by "Meditari Accountancy Research" with 51. It can be concluded that the most prominent journals were those addressing the thematic areas of "sustainability" and "accounting.

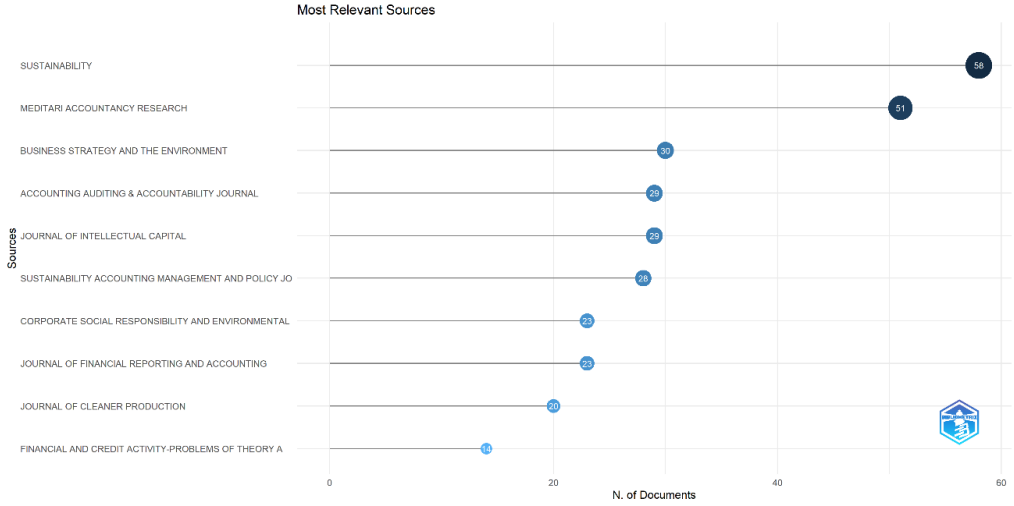
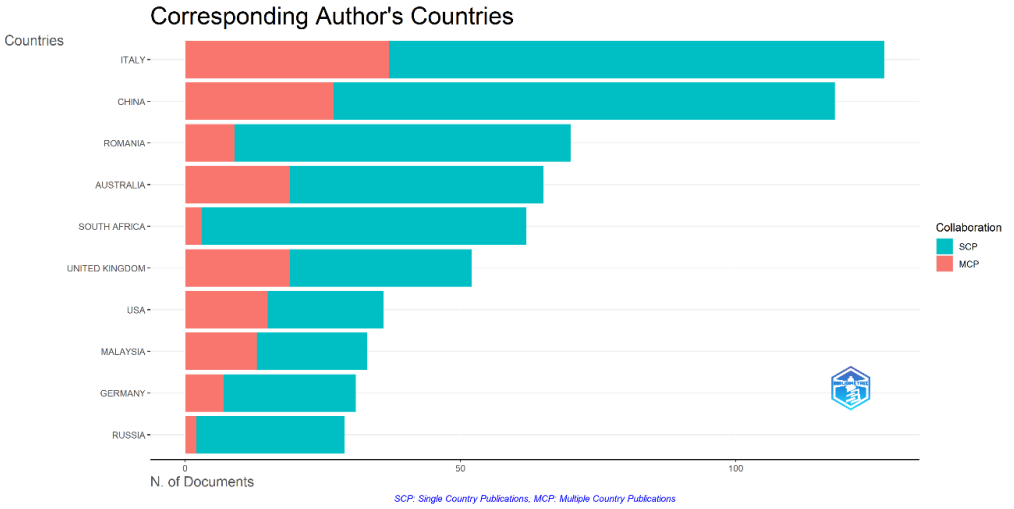


Figure 3 – Top Ten Journals from the Research.

3.3. Top Ten Countries with the Most Publications

The research identified publications related to the keywords in a total of 30 countries. Figure 4 illustrates the distribution between Single Country Publications (SCP) and Multiple Country Publications (MCP) for the top ten countries with the highest production. Combining the quantities of SCP and MCP, Italy stood out as the country



with the highest volume of production, followed by China, Romania, Australia, and South Africa. Additionally, as shown in Figure 5, Italy was the country with the highest number of citations.

Figure 4 – The Ten Countries Corresponding to Authors.

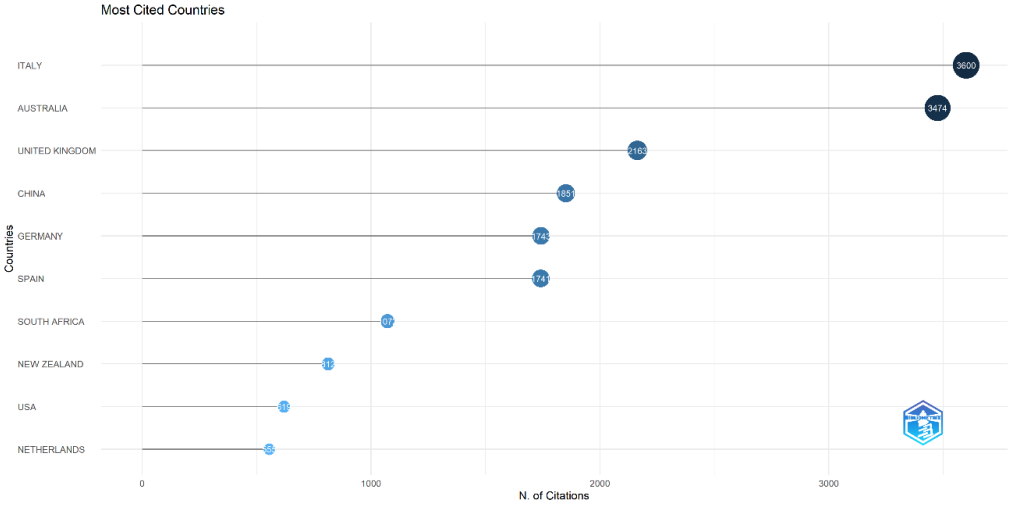


Figure 5 – The Ten Countries with the Most Citations.

3.4. The three most cited articles

The most cited article, titled "Determinants of Sustainability Reporting: A Review of Results, Trends, Theory, and Opportunities in an Expanding Field of Research" by HAHN and KÜHNEN, recorded a total of 687 citations. In second place is the article by QIN, LIU, and PEDRYCZ, titled "An extended TODIM multi-criteria group decision-making method for green supplier selection in interval type-2 fuzzy environment." Finally, the third place was occupied by the article produced by DE VILLIERS, RINALDI, and UNERMAN, titled "Integrated Reporting: Insights, gaps, and an agenda for future research.".

The primary objective of the first article was to identify the determinants of sustainability reports examined in the literature, analyzing (in)consistencies, gaps, and opportunities for future research. The second article's goal was to use the Technique for Order of Preference by Similarity to Ideal Solution (TODIM), which is a Portuguese acronym for multi-criteria decision-making, to solve Multiple Criteria Group Decision-Making (MCGDM) problems in the context of Interval Type-2 Fuzzy Sets (IT2FSs) and to use this technique to choose a green supplier. Finally, the third most cited article aimed to synthesize research insights into accounting and accountability in the emerging field of integrated reporting, proposing a comprehensive agenda for future research. As a result, looking at the most-cited articles shows that they talk about topics like sustainability reporting, using multiple criteria to choose suppliers, and understanding the literature on integrated reporting. Figure 6 presents the globally most cited documents.

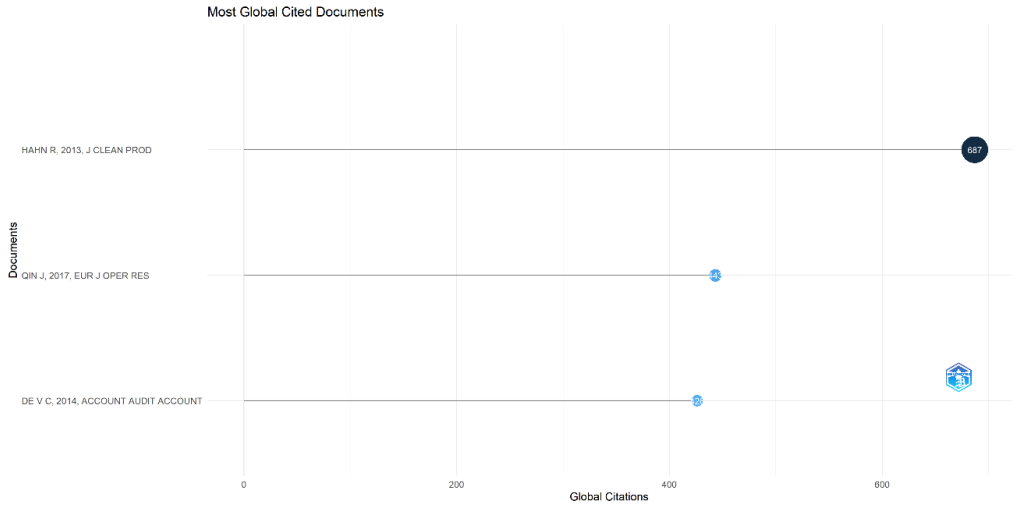


Figure 6 – The three most cited articles.

3.5. The categories of the top ten journals that published the most

As shown in Table 1, WoS distributed the categories. The category "Business, Finance" predominated in relation to the journals in which the articles were published. In second place, the category "Environmental Studies" appeared in five instances, followed by the "Management" category with four journals. Considering that the keywords IR and GDM were used to explore the topic of sustainable development, a significant prevalence of these three categories among the top ten journals is observed, indicating a strong association, as expected.

Table 1 – Categories covered by the Journals.

Categories	**Occurrences**
Business, Finance	7
Environmental Studies	5
Management	4
Green & Sustainable Science & Technology	2
Environmental Sciences	1
Engineering, Environmental	1
Computer Science, Artificial Intelligence	1

3.6. The ten most relevant author keywords

To analyze the co-occurrence of author keywords, those provided by the authors in the "Keywords" field were considered. The words entered in this field are intended to highlight an article during searches in the databases. Using a set of fifty-eight words, the RStudio software, through the Biblioshiny package, generated the word cloud presented

in Figure 7. To provide greater clarity in the figure, the square root parameter was applied during the generation of the results, aiming to reduce distortions in the image.

Figure 7 – Author Keywords Word Cloud.

From Figure 7, it is observed that the occurrence of the keyword "integrated reporting" stood out the most in the word cloud. Following that, the word "sustainability reporting" came next. Thus, there is a strong presence of these words in article publications, indicating that this topic is of great interest in the scientific community.

Table 2 lists the top 10 most relevant author keywords identified in the research, providing a quantitative overview of the scenario. Consistent with the previous discussion, the term "integrated reporting" ranked first with 557 occurrences. Other keywords related to the scope of this research, such as "sustainable development," held the sixth position with 66 occurrences, tying with the word "integrated." The words "group decision-making" and "group decision making" took positions 56 and 57 in the list with ten occurrences each.

Table 2 – Top Ten Most Relevant Author Keywords.

Author Keywords	Articles
Integrated Reporting	557
Sustainability	114
Sustainability Reporting	96
Reporting	93
Integrated	66
Sustainable Development	66
Disclosure	56
Integrated Thinking	48

Corporate Governance	47
Content Analysis	42

3.7. Thematic map of keywords

The resulting thematic map from the search for keywords in the present study is presented in Figure 8. In this figure, there are two axes: horizontal and vertical. The horizontal axis indicates centrality, and the vertical axis indicates density. The horizontal axis highlights the degree of relevance or importance of the keyword, while the vertical axis represents the degree of development of the theme (Çil Koçyiğit et al., 2023). These axes are divided into four quadrants: upper left (niche themes), upper right (driving themes), lower left (emerging or declining themes), and lower right (basic themes). According to the figure, the keywords "group decision making" and "group decision-making" fall into the Niche Theme quadrant. Based on their position in the quadrant, they have a high degree of development (high density) but a low degree of relevance (low centrality). Thus, their positions indicate that they are stagnant in terms of sustainable development due to a lack of relevance. The keywords "sustainable development" and "integrated reporting" are in the Basic Themes quadrant. The only difference between the two is that the second had higher degrees of relevance and development than the first. Being in this quadrant, these themes can be classified as relevant to the research field but need further development (Çil Koçyiğit et al., 2023).

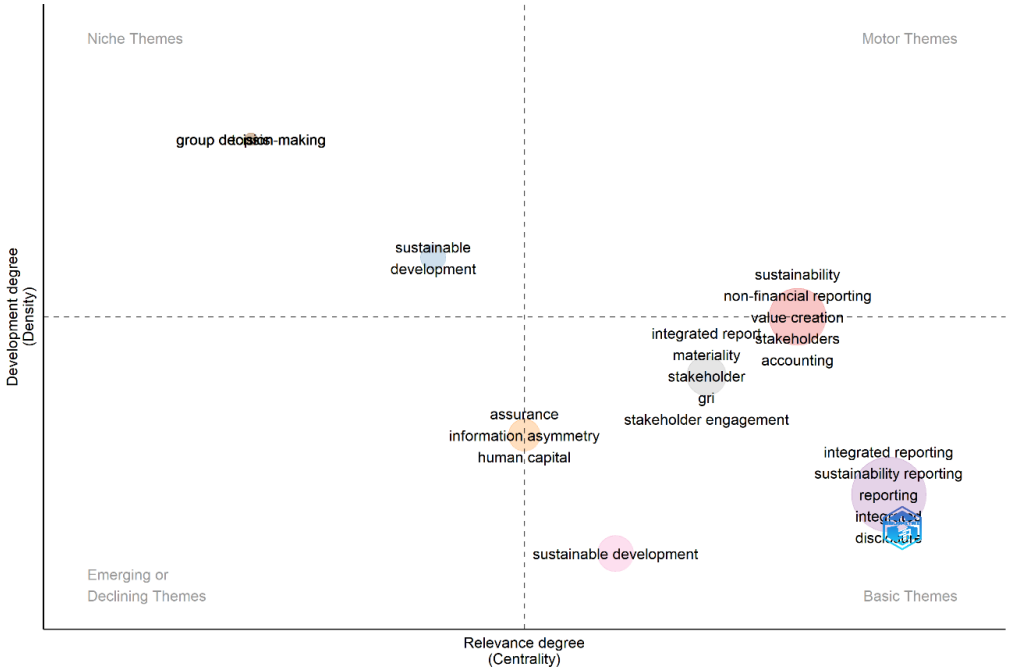


Figure 8 – Thematic map of the consulted keywords.

3.8. Keyword Co-occurrence Analysis

Keyword co-occurrence analysis aims to represent patterns of keyword co-occurrence, providing insights into the relationships between different terms based on their frequency. In the context of Bibliometrix, keywords are represented as nodes, and the proximity between these nodes indicates the strength of their co-occurrence (Fatma & Haleem, 2023). Figure 9 illustrates the co-occurrence network found.

The lack of interconnected nodes in Figure 9 indicates that there are no connections between the keywords "group decision making" and "group decision-making" or with other keywords. Additionally, these keywords were considerably distant from the others in this study, standing out with distinct colors (clusters). The analysis of the figure suggests that only the keywords 'integrated reporting' and 'sustainable development' are located in the red cluster and maintain a relationship with each other. Another noteworthy point is the interconnection among other keywords, suggesting correlated and explored themes. Given this scenario, it can be concluded that there is an association between the author keywords 'integrated reporting' and 'sustainable development', while no connection is observed with the keywords 'group decision making' and 'group decision-making.' This highlights a gap in the literature, as there are few studies exploring the relationship between group decision making, integrated reporting, and sustainable development.

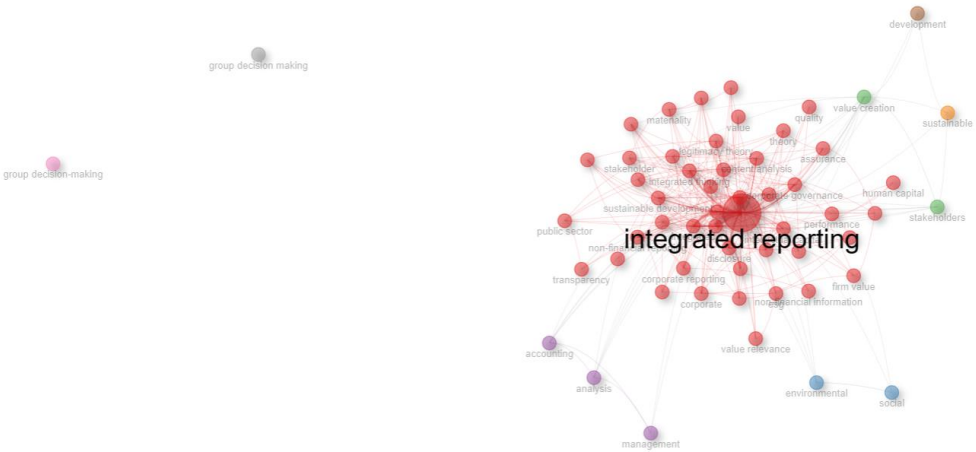


Figure 9 – Keywords Co-occurrence Network.

3.9. Future Research Trends

Bibliometric analysis plays a crucial role in the interpretation and understanding of vast sets of information available today. The concept of this analysis is based on the quantitative disclosure of parameters within a defined set of articles (bibliographic portfolio) for information and scientific knowledge management on a specific subject (Lacerda et al., 2012). In this scenario, the most commonly studied types of relationships are citation relationships, co-occurrence of keyword citation relationships, and co-authorship relationships.

Co-occurrence analysis focuses on the analysis of counts of co-occurring entities within a collection of units. Typical data in co-occurrence analysis include the co-occurrence matrix, where items form row and column headers, and the intersection of the row and column represents co-occurrence. The keywords extracted from a publication's title, abstract, or keyword list serve as nodes in bibliometric co-occurrence keyword networks (De Moraes & Kafure, 2020). Therefore, in bibliometrics, co-occurrence analysis is used to study the potential relationship between two bibliographic items appearing in the same study (Zhou et al., 2022) and to understand patterns of trends in certain studies (Kumar Jalal, 2019).

By understanding the patterns of study trends, i.e., future research trends, the strategic application of keyword co-occurrence promises to significantly enhance the understanding of underlying linguistic dynamics in various fields. Thus, the ability to identify patterns of association between keywords will not only enrich the analysis of scientific documents but also highlight semantic relevance in specific areas of study. Consequently, keyword co-occurrence is expected to play a fundamental role in setting research priorities, identifying knowledge gaps, delimiting emerging topics, and, most importantly, serving as a guiding compass for future investigations.

To explore information indicating future trends through data obtained from the WoS (Web of Science) database, the Bibliometrix/Biblioshiny package was used. Bibliometrix is a tool that allows for a comprehensive analysis of scientific literature mapping (Aria & Cuccurullo, 2017), combining its features with Biblioshiny, which aims to present analyzed information in a more intuitive way (Silva et al., 2022). Thus, with the incorporation of machine learning techniques and advanced algorithms, these analyses have the potential to elevate their effectiveness, allowing for a deeper understanding of semantic relationships between keywords.

As presented, the Bibliometrix/Biblioshiny package offers the possibility of identifying future research trends through scientific mapping. In this research, the first step was to have access to files from the databases for mapping. With the base file, the years 2021–2023 were selected to examine the trend since, according to Figure 2, it was where the second peak in the quantity of publications with a high indication occurred. Thus, by applying the year filter, Table 3 was generated, which includes "nodes," "clusters," "interconnections," "proximities," and "PageRank." According to Table 3, 8 clusters were obtained. In Cluster 1, the keyword "determinants" was mandatory in terms of interconnection, node proximity, and PageRank. The keywords "market," "disclosure," "sustainability," and "Group Decision-Making" were predominant for nodes 2 to 5, respectively. Regarding the other clusters, interconnection values were equal to 0, and proximity values were equal to 1, as only the word combinations "feedback - mechanism," "framework - qualitative research," and "adoption - disclosures" appeared.

Table 3 – Clusters obtained through keywords.

Node	Cluster	Betweenness	Closeness	PageRank
Determinants	1	54	0,032258065	0,047187007
South-Africa	1	36	0,025641026	0,023886728
Directors	1	0	0,022222222	0,013751811

Firm	1	0	0,027777778	0,021368891
Market	2	26	0,027777778	0,043218522
Impact	2	0	0,020408163	0,022612536
Diversity	2	0	0,020408163	0,022612536
Disclosure	3	66,87692308	0,035714286	0,085132068
Information	3	16,12307692	0,028571429	0,054589671
Consensus Model	3	0	0,020408163	0,012572246
Corporate Governance	3	0	0,023809524	0,012455789
Corporate Social-Responsibility	3	0	0,025641026	0,031914174
Quality	3	0	0,025641026	0,027939911
Sustainability	4	26	0,020408163	0,035770296
Insights	4	0	0,016129032	0,030558422
Gaps	4	0	0,016129032	0,030558422
Group Decision-Making	5	25,66666667	0,125	0,114195879
Selection	5	0	0,071428571	0,035165723
Term Sets	5	0	0,071428571	0,024948197
Management	5	0	0,066666667	0,015056236
Model	5	0,333333333	0,076923077	0,040731604
Operators	5	0	0,066666667	0,015056236
Supplier Selection	5	0	0,066666667	0,015056236
Aggregation	5	0	0,066666667	0,015056236
Fuzzy	5	0	0,066666667	0,015056236
Feedback	6	0	1	0,032258065
Mechanism	6	0	1	0,032258065
Framework	7	0	1	0,032258065
Qualitative Research	7	0	1	0,032258065
Adoption	8	0	1	0,032258065
Disclosures	8	0	1	0,032258065

Based on Table 3, which presents all the resulting numerical elements, Figure 10 was created, where related keywords are grouped into clusters and appropriately identified by colors. The figure originated from selecting the "Co-occurrence Network" item in the submenu of the Biblioshiny platform. Analyzing Table 3 combined with Figure 10 makes it possible to establish trends for future research. For the specific study, over the last three years, eight clusters with related keywords were identified. Among these eight clusters, three showed isolated nodes (6, 7, and 8), and five stood out with keywords linked to more than one pair of words, with the predominant clusters being: "determinants" (cluster 1),

"market" (cluster 2), "disclosure" (cluster 3), "sustainability" (cluster 4), and "group decision-making" (cluster 5). For example, in Cluster 5, the term "group decision-making" was associated with words such as "management," "model," "selection," and others.

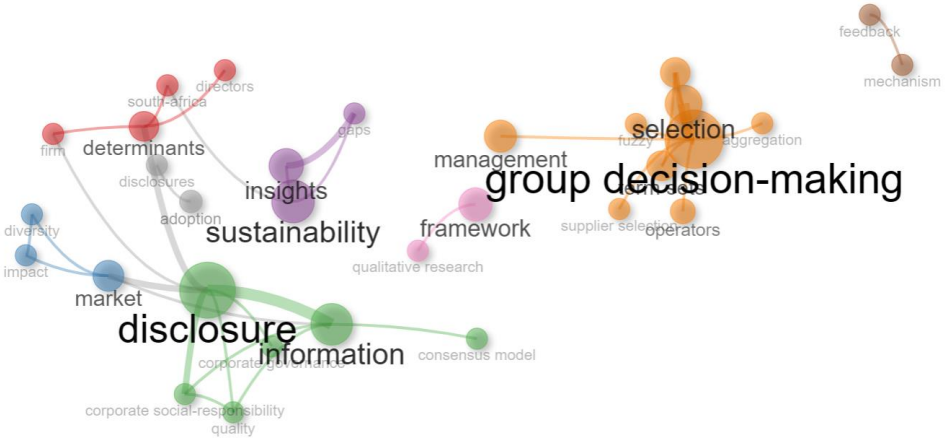


Figure 10 – Keywords Co-occurrence Network.

Considering the findings presented in the text, it is evident that future research should focus on integrating group decision-making within the context of integrated reporting and sustainable development. The identification of Cluster 5, centered around "group decision-making," emphasizes the importance of this aspect in research dynamics. Alongside key clusters such as "disclosure," and "sustainability," it is clear that the intersection between group decision-making and essential themes like sustainability and disclosure represents a promising area for further investigation. In order to better understand and use these ideas, more research should be done on how to effectively include group decision-making in discussions about integrated reporting and sustainable development. This will lead to more comprehensive business practices that are in line with sustainable goals.

In conclusion, the analysis clearly showed that keyword co-occurrence becomes an indispensable tool for future research trends. Its strategic application not only enhances the analysis of academic texts but also provides a valuable guide for researchers exploring new horizons and presenting themes in scientific fields in the future.

4. Conclusions

The purpose of this research was to conduct a meta-analysis on the application of Integrated Reporting (IR) and Group Decision Making (GDM) from the perspective of sustainable development. To achieve this goal, a bibliometric review was employed, covering articles published from 2008 to 2023, sourced from the WoS database. After defining the research protocol, relevant keywords, and applying appropriate tools, results amenable to analysis were generated.

Based on the obtained results, a significant increase in production related to the research keywords was observed, with an annual growth rate of 29.44% in article production over the analyzed period.

The thematic areas were related to sustainability and accounting research, with the three predominant categories in publications being "Business Finance," "Environmental Studies," and "Management.

Italy had the highest production volume and was the leading country in terms of citations. Additionally, Italian universities ranked second and third in author representation.

Analyzing keywords revealed that the themes "integrated reporting" and "sustainable development" are relevant but need further development. On the other hand, the keywords "group decision-making" and "group decision making" have a high degree of development but limited relevance.

Additionally, there was a lack of interconnection between the keywords "group decision-making" and "group decision making" with the terms "integrated reporting" and "sustainable development." This evident discrepancy between the first two themes and the last two suggests a disconnect in existing studies, pointing to an opportunity for future investigations to fill this gap and establish more robust connections between the fields of Group Decision Making (GDM) and the domains of Integrated Reporting (IR) and sustainable development.

Considering the co-occurrence analysis of keywords for the period from 2021 to 2023, during which there was a resurgence in publication growth, it was possible to observe the existence of eight clusters. Among these eight clusters, five stood out with related keywords (clusters 1 to 5) because they had non-isolated nodes. Therefore, due to the fact that the words "group decision-making," "disclosure," and "sustainability" have prominently emerged in the trend research, it is recommended that further studies be explored as a means to effectively integrate group decision-making into discussions, leading to more sustainable business practices.

Nevertheless, it is critical to emphasize the limitations discovered throughout the research. It is important to note that the results were only collected from the Web of Science database. Another limitation to consider was the non-utilization of synonyms for the researched keywords in the search field of the databases. Furthermore, because the concepts of sustainable development and sustainability are constantly change, it is important to note that the research's conclusion is specific to the time period in which it was conducted. For future investigations, it is suggested that researchers investigate additional databases and integrate a greater number of keywords in order to acquire a more varied selection of articles and themes over time. This would consequently improve the interpretive and quantitative dimensions of the results.

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