

DEVELOPMENT OF SUSTAINABILITY KEY PERFORMANCE INDICATORS (KPIs): A SYSTEMATIC LITERATURE REVIEW

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Abstract:

This research will review the development of sustainability performance measurement indicators used worldwide. The application of these indicators varies greatly because no standard regulates sustainability performance measurement indicators. The Global Reporting Initiative (GRI) is one of the guidelines for implementing Sustainability Key Performance Indicators (KPIs). However, it does not rule out the possibility of companies adopting other widely developed systems, such as the Sustainability Balanced Scorecard (SBSC). By conducting a Systematic Literature Review (SLR) approach, the study has 8 articles as data. Reference articles from Scopus and Google Scholar database sources with restrictions on publication years 2019-2024. The selected articles discuss factors that become challenges and obstacles, measurement methods, and strategies for formulating sustainability performance indicators. The research results present a literature review of variations in sustainability performance measurement indicators applied to the private sector depending on the entity's objectives, strategies, and the interests of external parties or stakeholders.

Keywords: Global Reporting Initiative (GRI), Sustainability Balanced Scorecard (SBSC), Sustainability Key Performance Indicators (KPIs)

INTRODUCTION

Economic development triggers rapid industrial development. Companies are competing to get as much profit as possible. Often, companies' increased profits ignore social and environmental aspects. The community is slowly feeling the impact of neglecting social and environmental responsibility. Environmental pollution is one example of corporate indifference. It can cause extreme natural damage to the emergence of natural disasters such as floods, pollution, landslides, forest fires, and even global warming. People are increasingly realizing the importance of preserving nature. It is not only the duty of individuals but also companies as triggers of environmental damage to preserve nature. Companies must understand the issue of sustainability. This sustainability issue is not only responded to by planning, implementing, and reporting but also by evaluating performance assessments from environmental, social, and economic aspects (Gbolarumi et al., 2021).

Many ways have been taken by the community, government, and companies to pay more attention to social and environmental issues resulting from the impact of corporate activities. One of them is to disclose information related to sustainability practices. This information disclosure is presented in the annual report issued periodically by the company. Annual reports are important for company stakeholders, especially investors, to see sustainability performance in addition to financial performance. Aspects related to pollution, community movements, and occupational safety are some examples of social activities as a form of corporate social responsibility. (Azmi & Nuraini, 2020).

In Indonesia, Peraturan Otoritas Jasa Keuangan (POJK) No. 51 (2017) has regulated the implementation of sustainability report obligations for financial services institutions, issuers, and public companies. According to the Global Reporting Initiative (GRI), a sustainability report (SR) is





published by a company containing environmental, social and economic impacts caused by the company's operational activities. Several international bodies have issued SR reporting guidelines. The guidelines issued by GRI are the most widely applied in the company's SR (Nichola & Septiani, 2019).

However, standardized methods are not used to assess sustainability and no regulations regarding which performance indicators should be applied (Serzante & Khudozhnyk, 2023). Companies can choose which sustainability key performance indicators are most suitable for their business models. Various methods are used from literature sources to measure sustainability performance in different industries. Companies should carefully select sustainability measurement standards and ensure that the methods align with the company's objectives (Egawati et al., 2023). This research uses a systematic literature review method to examine the development of key performance indicators for sustainability.

METHODS

This literature study uses the Systematic Literature Review (SLR) method through the PRISMA Flow Diagram. SLR is a systematic technique for recognizing, reviewing, and evaluating all relevant research to answer a research set (Fitriani & Putra, 2022). The SLR method is used to conduct an in-depth analysis of various research results regarding sustainability key performance indicators (KPIs). This research starts with formulating research problems, followed by data collection, data processing and presentation, to the conclusion. The data collection method used in this research is collecting literature from various reference sources such as journal publications in electronic databases. The authors used Harzing's Publish or Perish 8 application to facilitate the data collection process. While searching for relevant literature, Authors used searches on Scopus and Google Scholar by entering the keywords "sustainability key performance" OR "sustainability measurement" in the title words search field. The authors also limited the journal's publication year to 2019 to 2024. The journals identified were from electronic databases indexed with Scopus and Google Scholar so that the information from the analyzed articles could be accounted for in terms of quality and standards. The author has created guidelines that serve as a guideline, as seen in Table 1. The research guidelines include the scope of the research, data sources, and information used.

Table 1. Research Guidelines

Scope	Data source	Information used
Review period 1 week	Electronic databases:	Title
Access to full-text articles in English and Bahasa Indonesia	Scopus	Author's name
Research locations worldwide	Google Scholar	Year of publication
Research article		Journal's name and issue
Publication year 2019-2024		Year of publication
		Country of publication
		Research approach
		Data collection method
		Research results

Source: Processed by Author

RESULT AND DISCUSSION

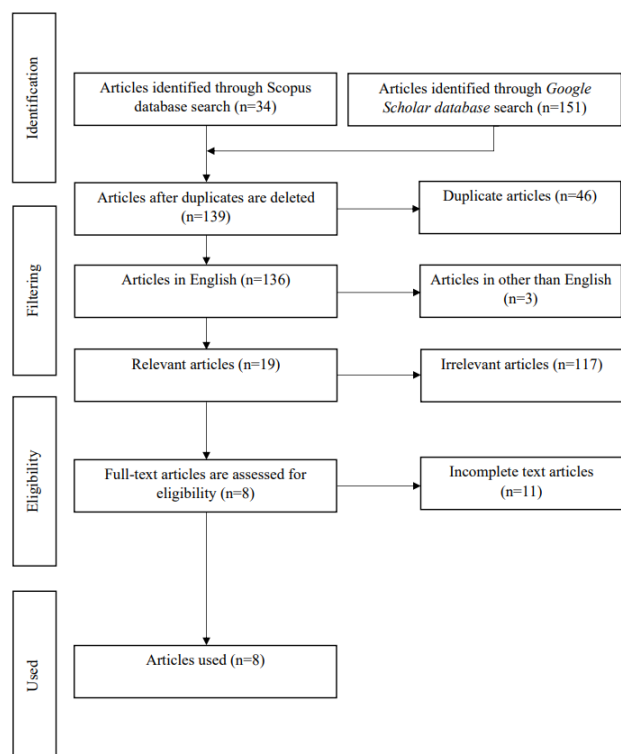
Systematic Literature Review Process. The authors collected research articles following the research objectives based on the previously formulated research guidelines with the help of Harzing's Publish or Perish 8 application. Restrictions were applied to Scopus and Google Scholar



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search filters by entering the keywords "sustainability key performance" OR "sustainability measurement" in the title words search field and filtering the year of publication journal from 2019 to 2024. The flow of the article collection can be seen in Figure 1. below.



Source: Processed by Author
Figure 1. Article Collection Process

Literature Search Results. After going through the identification, screening, and eligibility testing process, as shown in Figure 1, 8 pieces of literature in the form of research articles were obtained that met the objective of the Systematic Literature Review in this study. The selected literature is an article from 2019 to 2024, with the keywords "sustainability key performance" OR "sustainability measurement" in the title, which can be accessed in full text. The articles analyzed are articles the Author believes are relevant to the research objectives, namely to see the extent of the development of sustainability performance measurement indicators in various sectors and their application.

Table 2. Articles used

No	Article Title	Journal Title	Year of Publication
1	Reviewing Sustainability Measurement Methods for Enterprises	Sustainability	2023
2	Corporate Social Responsibility and Sustainability Performance Measurement Systems in Iran: A Levers of Control Perspective	Journal of Management Control	2022
3	Performance Measurement Tools for Sustainable Business: A Systematic	Corporate social responsibility and environmental management	2021



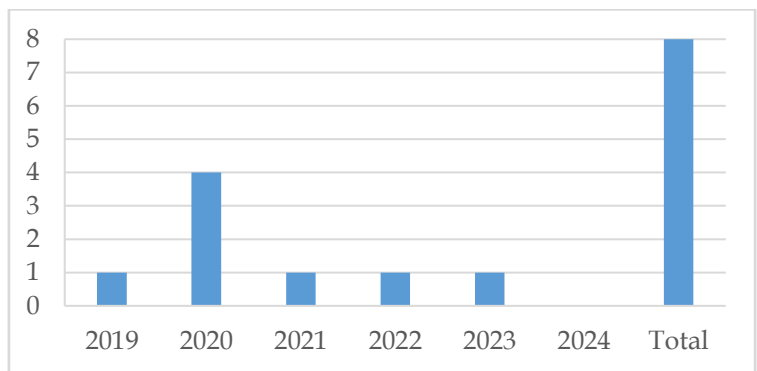
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Literature Review on the Sustainability Balanced Scorecard Use		
4	Interdisciplinary Measurement: A Systematic Review of The Case of Sustainability	Ecological Indicators 2020
5	An Assessment of The Applicability of Sustainability Measurement Tools to Resource-based Economies of The Commonwealth of Independent States	Sustainability 2020
6	Are They Reporting the Right Thing, and Are They Doing It Right? A Measurement Maturity Grid for Evaluation of Sustainability Reports	Sustainability 2020
7	Sustainability Key Performance Indicators and The Global Reporting Initiative: Usage and Challenges in a Developing Country Context	Meditari Accountancy Research 2020
8	The Role of Sustainability Key Performance Indicators (KPIs) in Implementing Sustainable Strategies	Sustainability 2019

Source: Processed by Author

General Characteristics. Figure 2. contains information related to the distribution of the publication year of the articles used. This study mostly uses articles published in 2020, as many as 4 pieces. In addition, there were also articles published in 2019, 2021, 2022, and 2023 with 1 article each. In 2024, no articles were found that met the screening requirements. Although relevant articles were found, they could not be accessed in full text, making it difficult to analyze them. More research on sustainability performance measurement indicators is still needed when viewed through trends. The issue of sustainability is very interesting to discuss, along with the increasing attention of the community and the world to the preservation of nature and social care.



Source: Processed by Author
Figure 2. Year of Article Publication

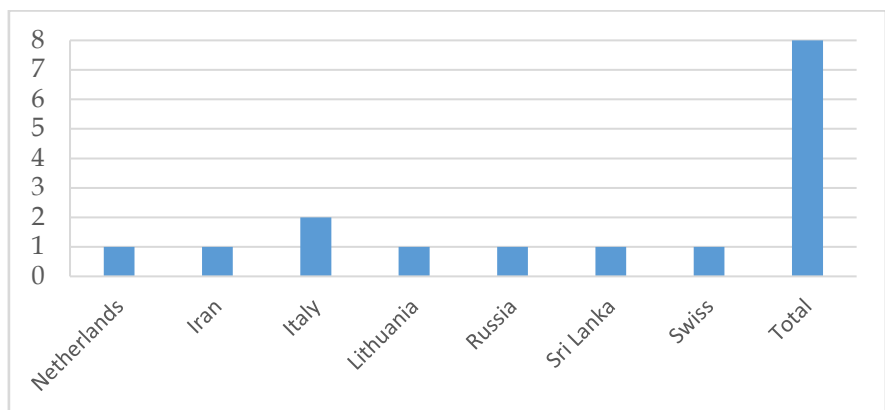
Figure 3 shows the distribution of the countries that are the object of research in the selected articles. Italy is the majority country with 2 articles. Then, the Netherlands, Iran, Lithuania, Russia, Sri Lanka, and Switzerland each have 1 article. It can be identified that the European and Asian regions still dominate the object of research related to sustainability performance measurement



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indicators. Articles that conduct studies in Indonesia still need to be made available. Issues related to sustainability performance measurement indicators in Indonesia are relevant and suitable topics for further research.



Source: Processed by Author
Figure 3. Country of Research Objects

The next aspect used as one of the review materials is the publisher. The articles analyzed in this study were published in international journals indexed by Scopus and Google Scholar. Table 3 shows that MDPI published 4 articles; the rest were published by Elsevier, Emerald, Springer, and Wiley Online Library with 1 article each.

Table 3. Publisher

Publisher	Total
MDPI	4
Elsevier	1
Emerald	1
Springer	1
Wiley Online Library	1

Source: Processed by Author

The author also paid attention to systematic writing, using the approach in each selected article. Table 4 below shows that 2 articles used a quantitative approach, and 6 others used a qualitative approach. The mixed approach needed to be present in the 8 selected articles. The quantitative methods used are regression correlation models and Partial Least squares Structural Equation Modeling (PLS-SEM). The qualitative method used is a case study.

Table 4. Research Approach

Type of Approach	Total
Quantitative	2
Qualitative	6

Source: Processed by Author

The last aspect that was reviewed was the data collection method. Table 5 shows the distribution of data collection methods used in writing articles. Secondary data was used in 2 articles. This secondary data is data obtained indirectly, usually through databases that are already





available and publicly accessible. Literature studies and primary data were used in 3 articles each. The primary data obtained came from the survey process, interviews, and document documentation, in this case, the sustainability report that was compiled independently.

Table 5. Data Collection Methods

Method Type	Total
Secondary Data	2
Literature Study	3
Primary Data	3

Source: Processed by Author

Furthermore, the Authors conducted a descriptive analysis of the information from each article that became the object of this study. The following is a summary of the content of articles indexed by Scopus and Google Scholar with titles containing the keywords "sustainability key performance" OR "sustainability measurement" published in the last five years.

Development of Key Performance Indicators (KPIs). Hristov and Chirico (2019) discuss the role of sustainability key performance indicators (KPIs) in implementing companies' sustainability strategies. The research was conducted by combining data collection methods in literature studies on 82 selected articles indexed by Scopus with keywords related to KPIs on sustainability and primary data in the form of interviews with 25 selected respondents. The selected respondents are managers of companies in Italy with experience related to KPIs and sustainability issues. The development of this research focuses on the selection of KPIs models that incorporate the sustainability dimension into corporate strategy. Often, companies need to include environmental and social aspects in developing their strategies, making it difficult to measure sustainability development using appropriate KPIs. The goal is for companies to align corporate objectives, measurement indicators, and targets in the long term and measure them through the economic dimension. Environmental and social aspects should be integrated to create sustainability value and competitive advantage. In addition, the benefits of this alignment are that it can positively impact the company's performance, namely improving reputation and efficiency in resource use. Companies that implement sustainability strategies can promote the value and reputation of the company by increasing the trust of consumers and other stakeholders. Implementing environmental and social aspects can reduce operational costs and thus increase profits due to increased energy efficiency and a new corporate culture of 'use-recycle-reuse.' One of the most widely used systems is SBSC, which integrates economic dimensions and sustainability strategies.

Brink et al. (2020) conducted research on the topic of measurement in an interdisciplinary manner, namely with different disciplinary approaches. Sustainability is a fairly abstract concept because of the need to measure many different objects without a set measurement standard. Sustainability measurement is an interdisciplinary science that measures environmental, economic and social aspects. Through a literature study research method with 77 articles containing interdisciplinary sustainability measurement by following the Triple Bottom Line (TBL) framework. The TBL framework is a concept that distinguishes between environmental, economic and social dimensions and is sometimes extended with additional dimensions such as institutions. The aim is to look at studies in the environmental field, such as those on the interaction of nature with society. The results show that there are 86 heterogeneous sustainability measurement models, including differences in the level of measurement used, the use of composite scores, weighting schemes, and time synchronization between several indicators. More than half of the measurement models reviewed present a composite score of sustainability aspects. Sometimes, the weighting used to



present a composite score is based on expert opinion, so no standard concept is used in interdisciplinary sustainability measurement (Karsten et al., 2024).

Ponomarenko et al. (2020) compared the Commonwealth of Independent States regarding the application of resource-based sustainability measurement tools. Issues related to the concept of sustainable development (SD) arise to ensure the welfare of people today and future generations. The sustainable development of a country has been measured and compared using various methods to analyze its contribution to the world and the future. This research focuses on research methods on resource-based economies (RBEs) to account for the value and impact of resources on sustainable development indicators. The method used is correlation analysis between Gross National Income (GNI) per capita, aggregate index of Sustainable Society Index (SSI), Human Development Index (HDI), and Environmental Performance Index (EPI). A comparative analysis was then conducted between these indices and the performance of mining companies in Eurasian RBEs. The regression results show a correlation between GNI per capita and the heterogeneous SD indicators. There is no statistically significant correlation between GNI per capita and SSI, a strong correlation with HDI, and a weak correlation with EPI. SSI and EPI do not reflect the specific structure of RBE.

Cöster et al. (2020) review sustainability reports (SR) published by companies. The object to be reviewed is about 50 sustainability reports from companies in Sweden in various industries. The preparation of sustainability reports still varies greatly, although there are already GRI standards that are generally used as guidelines for preparation. This study aims to test a maturity grid for assessing sustainability reports. It is important because external parties, especially stakeholders, require analysis of sustainability reports. The impact is the need for an absolute and relatively relevant indicator to be able to justify a report that is easy to read and compare. The results show that a maturity grid can be used, but assessing sustainability reports is still difficult because of the high variance in measurement methods. Some companies still understand the value of sustainability for their business, so internal sustainability measurement is still low (Setiawan et al., 2023).

Dissanayake's (2021) research aims to see the extent to which the Global Reporting Initiative (GRI) is used as Sustainability Key Performance Indicators (KPIs) in sustainability reports published by companies in Sri Lanka. With a contingency theory approach, the study examines factors that can encourage or hinder using the GRI framework as a reference in determining sustainability KPIs. The data collection method used is primary data obtained from interviews and using primary data in the form of sustainability reports. Respondents interested in preparing sustainability reports were asked questions related to matters that influence the preparation of GRI-based sustainability reports as guidelines for preparing KPIs. The result is that companies in Sri Lanka increasingly use the GRI framework to prepare sustainability reports because of its flexibility, consistency, legitimacy, and focus on continuous improvement. Some respondents mentioned that the KPIs in GRI are challenging because they are difficult for companies operating in developing countries to adopt. This is because the GRI standard framework is not tailored to problems in developing countries.

Mio et al. (2022) discuss performance measurement tools for sustainable businesses by focusing on using the Sustainability Balanced Scorecard (SBSC). The literature study used is an analysis of 65 articles in the period 2000-2020. SBSC is a performance measurement and management control tool that guides companies in determining business strategies. The research highlights the use of SBSC, including factors that influence its use, the approach used, and the results of implementing the SBSC concept. The review found that a sustainability strategy supported by SBSC can improve a company's sustainability performance. The concept of sustainability must be identified as a corporate strategy, the stakeholders' interests, and the company's objectives. Interests,

corporate culture, commitment from top management, company structure and size. This integration process is key to the successful use of SBSC.

Asiaei et al. (2023) conducted quantitative research on corporate social responsibility (CSR) and its performance measurement in Iran. The study aimed to see the extent to which companies rely on diagnostic and interactive performance measurement systems (PMS) to identify CSR in superior performance. The data collection method used is secondary data from a survey dataset of public companies in Iran. Data testing used Simons' lever control model. The model was tested using partial least-squares structural equation modeling (PLS-SEM), run through the SmartPLS 3.0 application, assuming sample size normality. The findings show that CSR is positively related to PMR and organizational performance. CSR is indirectly related to organizational performance through the mediating effect of PMS. PMS is needed to assist managers in formulating sustainability strategies by developing core values and measuring sustainability performance. In addition, PMS can act as an instrument in strategy formation to address the strategic risks of sustainability initiatives.

Research (Serzante & Khudozhnyk, 2023) uses literature study data collection methods to identify the most appropriate performance measurement methods for companies. The trend of sustainability performance measurement leads to a more comprehensive and integrated approach that considers environmental, social, and economic factors. Asia and Europe are the most researched regions with a focus on the secondary sector of the company. The research results summarize several sustainability performance measurement methods suggested by experts. Companies can have and evaluate performance measurements according to business processes. This is because evaluation models vary widely, so companies must choose the most appropriate evaluation model tailored to the company's objectives.

Limitation. This research has several limitations. First, it only uses secondary data in articles that match the research objectives through journal databases and other sources limited to Scopus and Google Scholar. Due to time constraints, many other data sources still cannot be explored further. Second, this research's subjectivity level is high because the method used is only through literature studies without additional primary data. Third, this research focuses on companies or the private sector due to data limitations, and the issue of sustainability is highly developed in this sector.

Recommendations for Further Research. Future research is expected to explore sustainability performance measurement indicators further. Data collection methods are more varied to bring out the objectivity of the research. This research can help the private sector, especially companies, to develop corporate sustainability strategies by including performance measurement indicators. It is intended to measure and compare the practice of implementing sustainability in companies. This issue has yet to be developed much in the public sector, even though sustainability issues are not only the responsibility of corporations. The government plays an important role in holding regulatory control. In the future, to compare sustainability reports, sustainability performance measurement indicators need to be set as standards suitable for each industry sector. The public sector, in this case, government organizations, may adopt sustainability performance measurement indicators that have been widely developed in the private sector.

CONCLUSION

Indicators of sustainability performance measurement for each entity depend on the entity's objectives, strategies, and the interests of external parties or stakeholders. Research focusing on finding the most appropriate indicators used as sustainability performance measurement did not



succeed in providing a single-method conclusion because the application of these indicators tends to be relatively varied. The absence of standards governing the use of one measurement method is a strong enough reason. Sustainability performance measurement is based on management initiative. Some articles write that sustainability performance affects the company's financial performance. Disclosure of sustainability practices in sustainability reports is mandatory. Most companies adopt the KPIs listed in the generally accepted GRI framework. Others develop SBSC to formulate corporate strategies integral to environmental, social, and economic aspects. Development related to sustainability performance measurement indicators continues to be carried out because issues related to sustainability have become a concern of society and the world.

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