



ISSN 2621- 458X

Bibliometric Exploration of Sustainable Development Goals (SDGs) in the Agricultural Sector

M.Rasda
STIA Al Gazali Barru
rasdarais207@gmail.com
Mukmin Muhammad
STIA Al Gazali Barru
orcid.org/0000-0002-1582-9706
Adrianah
adrianahidris@gmail.com
S.Rifatullah Akil
STIA Al Gazali Barru
reinsbat@gmail.com

ABSTRACT

This research aims to explore developments and research trends related to Sustainable Development Goals (SDGs) in the agricultural sector through a bibliometric approach. Using academic databases such as Scopus, Web of Science and Google Scholar, bibliometric analysis was carried out to identify publication patterns, author collaborations, institutions, as well as the main themes discussed using Vosviewer. It is hoped that the results of this research will provide insight into academic contributions to achieving SDGs in the agricultural sector and identify research gaps that still need to be explored further. By using major academic databases such as Scopus, Web of Science and Google Scholar, this research aims to identify and analyze publications relevant to SDGs in the agricultural sector. Through this analysis, we can understand the distribution of publications per year, leading journals and authors, as well as the collaboration map between authors and countries. In addition, co-word and co-citation analysis will be used to identify key themes and research trends emerging in this context. It is hoped that the results of this research will provide insight into academic contributions to achieving SDGs in the agricultural sector and identify research gaps that still need to be explored further. The results of this research are expected to provide in-depth insight into academic contributions in achieving SDGs through the agricultural sector. In addition, this research also aims to identify existing gaps in the literature, provide recommendations for future studies, and encourage further collaboration between researchers from various disciplines and countries. Thus, this research not only serves as an academic study, but also as a guide for policy makers and practitioners in their efforts to achieve global sustainability.

Keywords: SDGs, agriculture, bibliometrics, development

A. INTRODUCTION

Sustainable Development Goals (SDGs) is a global development agenda that contains 17 goals and is divided into 169 targets with an achievement period of up to 2030 (Handoyo et al., 2023). The SDGs follow from the Millennium Development Goals (MDGs), which represented the first attempt to create strategies to ease the development of the poorest countries. However, the MDGs have been criticized for their inadequate results, caused by the inequality states. To avoid a similar shortfall, the SDGs' introduction has been followed by an ex-ante evaluation to identify possible innovations that will make their achievement more likely (Sachs, 2012) (Pizzi et al., 2020). Sustainable Development Goals (SDGs) is a global development agenda that contains 17 goals and is divided into 169 targets, but they are interconnected and influence each other, inclusive and integrated so that they are mutually exclusive, universal or not a single person is overlooked (Leave No One Behind) , with an achievement period of up to 2030. 17 goals and 169 SDG targets are described in the National Medium Term Development Plan (RPJMN) for 2015-2019 and 2020-2024 (Handoyo et al., 2023). Agriculture plays a key role in achieving many of the 17 Sustainable Development Goals (SDGs) set by the United Nations (UN). From poverty alleviation (SDG 1) to environmental sustainability (SDG 15), this sector is an important pillar in global efforts to achieve sustainable prosperity. The inception of SDGs has triggered many systematic studies to understand, prioritize, and evaluate the progress of goals adopted by countries (Mishra et al., 2023).

The SDGs were considered to determine the international development agenda and the countries' development policies and programs. Although the SDGs are universal, member states are free to adopt the goals of their choice based on available resources, socioeconomic priorities, and their decided pace of transformation (Eisenmenger et al., 2020) (Mishra et al., 2023). The agricultural sector not only contributes to food availability but also to economic stability, public health and climate change mitigation. One of the challenges in achieving the SDGs is to reconcile the contradiction between the scarcity of resources such as water, energy and food and the ecological needs of human socio-economic development. Future research should continue to focus on how to ensure water, energy and food security and how the water–energy–food nexus can provide a mechanistic tool for achieving the SDGs. Climate change is one of the greatest challenges facing humanity today. Climate change and the SDGs should be better linked to

maximise the effectiveness of action in both areas. How to reconcile carbon emission reduction and economic growth in the context of climate change mitigation, and how to integrate climate change mitigation strategies into sustainable development planning, are important elements to focus on in subsequent studies (Xin et al., 2024). Therefore, it is important to understand how research in this sector contributes to achieving the SDGs. Therefore, it is important to understand how research in the agricultural sector contributes to achieving the SDGs. A bibliometric approach can provide a comprehensive overview of research developments, identify trends and gaps in existing literature. The notion of MFA is thus a way of operationalizing sustainable development and reintroducing a range of different perspectives on agricultural development. However, the question of what types of functions are accepted as components of multifunctional agriculture for sustainable development remains open (Esquivel-Marín et al., 2023).

Research on the contribution of the agricultural sector to the SDGs has increased significantly in the last decade. However, there is still a need for a comprehensive analysis of how these studies developed, the main themes raised, and collaboration between researchers and institutions. Indicators are being used in many agricultural sustainability assessment methods, but disputes about a common indicator for the definition of sustainability have resulted in so many various indicators and methods of measurement. The objective of this review is to provide a bibliometric analysis of sustainability pillars and indicators that are significantly prevalent. In addition, this paper evaluates the impact of pillars and indicators on scientific research through the analysis of their citation and trend (Asma & Perna, 2021). Bibliometric analysis offers a systematic approach to exploring publication patterns, research trends, and collaboration networks in the scientific literature. This approach allows the identification of research gaps as well as areas that have received special attention from the academic community.

Using major academic databases such as Scopus, Web of Science and Google Scholar, this research aims to identify and analyze publications relevant to the SDGs in the agricultural sector. Through this analysis, we can understand the distribution of publications per year, leading journals and authors, as well as the collaboration map between authors and countries. In addition, co-word and co-citation analysis will be used to identify key themes and research trends emerging in this context. The software packages, VOSviewer, were used to map scientific collaboration networks.

The results made it possible to identify the authors, journals, and countries that had given rise to the current structure of knowledge (Esquivel-Marín et al., 2023).

It is hoped that the results of this research will provide in-depth insight into the contribution of academics in achieving SDGs through the agricultural sector. In addition, this research also aims to identify existing gaps in the literature, provide recommendations for future studies, and encourage further collaboration between researchers from various disciplines and countries. Thus, this research not only serves as an academic study, but also as a guide for policy makers and practitioners in their efforts to achieve global sustainability.

B.RESEARCH METHODS

This research uses a bibliometric analysis method with the following steps:

1. **Data Collection:** Data for this research was obtained from major academic databases, namely Scopus, Web of Science and Google Scholar. These two databases were selected for their broad coverage and credibility in providing high-quality scientific literature. The data collection process is carried out using specific keywords relevant to the research topic, such as "SDGs", "agriculture", "sustainable development", and variations of these keywords in various combinations. Choosing the right keywords is critical to ensuring that all relevant publications are captured in searches. Thus, this step aims to obtain comprehensive and representative data for further analysis in this bibliometric study.
2. **Data Analysis:** The data that has been collected is analyzed using bibliometric software such as VOSviewer. These software tools were chosen for their ability to effectively visualize and analyze bibliometric data. The analysis includes several important aspects, namely the distribution of publications per year to see temporal trends in research, identification of leading journals which are the main publication media, and assessment of the most productive authors and institutions involved in related research. Harzing's Publish or Perish and VOSviewer software have been used to analyze and visualize the results (Amira et al., 2022). In addition, a collaboration map between authors and countries was also created to understand the collaborative network in this research. Using this analysis, we can identify key patterns in the literature and gain deep insight into the dynamics of SDGs-related research in the agricultural sector.

3. Identification of Themes and Trends: To identify the main themes and emerging research trends related to SDGs in the agricultural sector, co-word and co-citation analysis was carried out. Co-word analysis is used to reveal relationships between keywords that frequently appear together in publication titles and abstracts, which helps in identifying the most frequently discussed research topics. Meanwhile, co-citation analysis evaluates the frequency and pattern of citations between publications to identify influential works and group research into major themes. Through this approach, we can gain a clearer picture of research focus, the evolution of topics over time, and identify emerging or underexplored research areas. The results of this analysis provide important insights into research directions and priorities in the context of the SDGs in the agricultural sector, and help in guiding future research efforts.

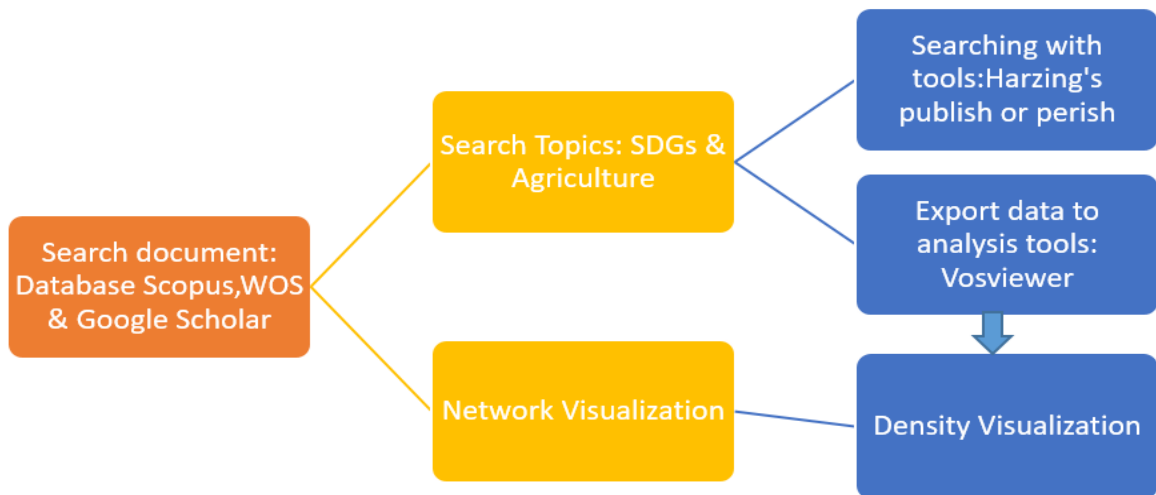


Figure1 Data analysis process

C. RESEARCH RESULTS AND DISCUSSION

1. Research and publication trends

Research and publication trends related to Bibliometric Exploration of SDGs in the Agricultural Sector have shown a significant increase in recent years. Bibliometric analysis reveals that academic interest in the relationship between SDGs and agriculture is increasing, along with global awareness of the importance of sustainable agriculture in achieving sustainable development goals. Publications discussing this topic cover various aspects, from agricultural technology innovation to policy analysis that supports poverty alleviation in agricultural communities.

One of the main trends observed is the increase in the number of publications exploring the relationship between modern agricultural technologies and the achievement of the SDGs. These studies cover the applications of technologies such as IoT (Internet of Things), big data, and artificial intelligence in increasing agricultural production efficiency, reducing waste, and increasing food security. In addition, research is also increasingly paying attention to the impact of climate change on the agricultural sector and the adaptation strategies that can be implemented.

Additionally, there is a clear trend in increasing publications discussing sustainable and environmentally friendly agricultural practices in the context of the SDGs. These studies highlight the importance of practices such as organic farming, waste management, and natural resource conservation in achieving sustainability goals. Additionally, there has also been an increase in research exploring the role of agricultural policy in improving farmer welfare, reducing inequality, and promoting gender inclusion in the agricultural sector.

In the overall trend, it can be seen that research and publications related to bibliometric exploration of SDGs in the agricultural sector reflect the evolution of thinking and approaches in responding to global challenges. From increased use of technology to a focus on sustainable practices and inclusive policies, this scientific literature plays an important role in shaping a holistic and diverse narrative in efforts to achieve sustainable development goals in the agricultural sector.

Through this research, we can identify important research directions and priorities in supporting the sustainability of the agricultural sector and achieving the Sustainable Development

Goals (SDGs). These findings provide valuable insights for researchers, practitioners and policy makers to formulate effective strategies to improve the performance of the agricultural sector holistically. By understanding research and publication trends related to bibliometric exploration of the SDGs in the agricultural sector, we can identify knowledge gaps that need to be closed, highlight themes of particular concern, and develop a more robust framework to guide future efforts . Thus, this research not only provides information about current conditions, but also provides a strong foundation for sustainable planning and action for the advancement of an inclusive and resilient agricultural sector.

The results of this research provide a basis for researchers and practitioners to develop more effective strategies and solutions in supporting the sustainability of the agricultural sector and achieving the Sustainable Development Goals (SDGs). With a deeper understanding of research and publication trends related to bibliometric exploration of the SDGs in the agricultural sector, researchers can direct their research efforts in a more productive and relevant direction. They can identify knowledge gaps that need to be closed, analyze themes of particular concern, and develop better frameworks to address complex challenges in sustainable agriculture.

For practitioners, the results of this research provide valuable insights for implementing more efficient and sustainable practices in daily operations. They can utilize the findings from this research to increase the effectiveness of agricultural production, reduce environmental impacts, and improve farmer welfare. In addition, the results of this research also provide a broader view of the relationship between agricultural policy, food security and sustainable development, which can help practitioners in designing more adaptive and solution-oriented policies.

Thus, the results of this research not only provide information, but also provide tools and frameworks that can be used by researchers and practitioners to create positive change in the agricultural sector. With close collaboration between the academic community, industry and government, we can accelerate steps towards a more sustainable and resilient agriculture, in line with the global vision of sustainable development. Several research trends based on the topics studied and interrelated in the documents look as follows (Figure 2)

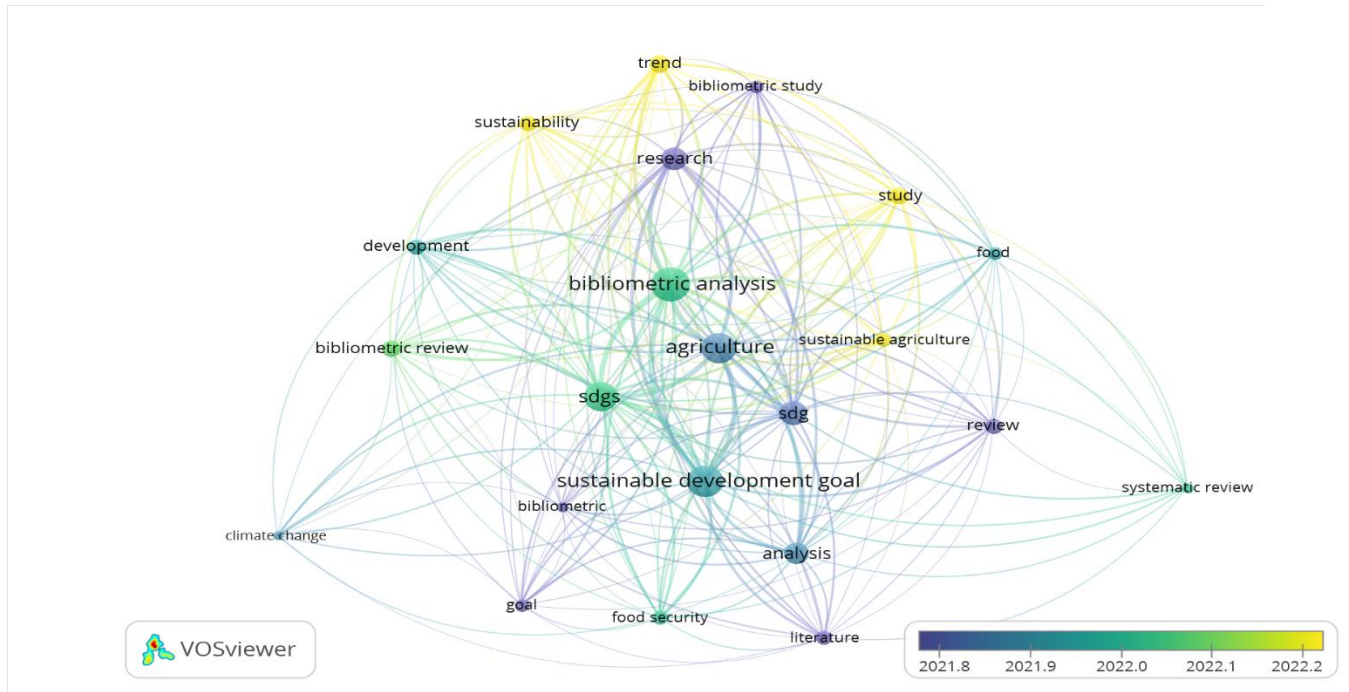


Figure 2 Research and Publication Trends

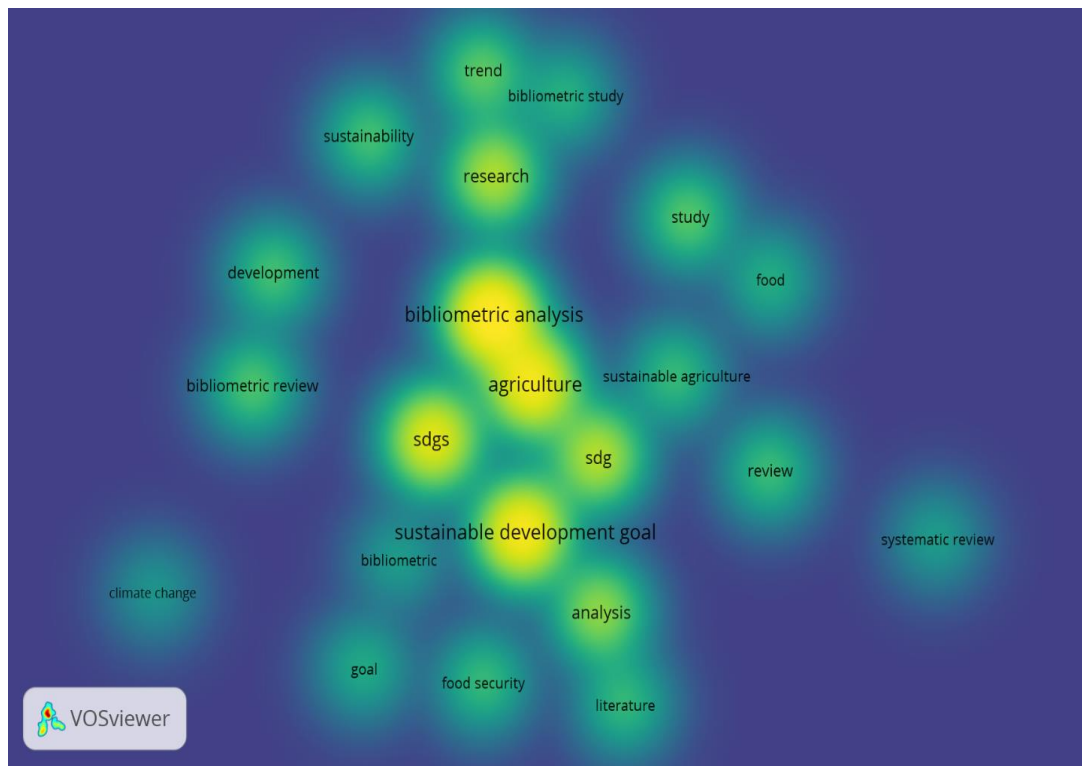


Figure 3 Density Visualization of Research and Publications

Some related research topic trends include: SDGs, bibliometric, agriculture, sustainable agriculture, bibliometric analysis, study, bibliometric study, trend, development, food security, research, review, food, bibliometric review. Several research trends related to bibliometric exploration of SDGs in the agricultural sector include: Bibliometric Analysis of Research Hotspots and Frontiers in Progress towards the Sustainable Development Goals (Xin et al., 2024) His research focus includes SDGs practice on various responsible subjects, comprehensive assessment of SDGs progress, scientific research on SDGs indicators, and research on interactions between SDGs goals. 3 (three) Environmental issues, indicators, energy transition, education and agriculture are the main focus of SDGs research and A bibliometric analysis of sustainable development goals (SDGs): a review of progress, challenges, and opportunities (Mishra et al., 2023) his research focus aims to investigate the progress, challenges, opportunities, trends and prospects of the SDGs through bibliometric analysis from 2015 to 2022, providing insight into the evolution and maturity of scientific research in the field. The Web of Science core collections citation database was used for bibliometric analysis, which was performed using VOSviewer and RStudio. We analyzed 12,176 articles written in English to evaluate current progress, as well as challenges and opportunities around the SDGs (Mishra et al., 2023).

Sustainable agriculture is the center of attention in achieving sustainable development goals (SDGs) in the agricultural sector. Through a bibliometric exploration approach, related studies have revealed a number of closely related topics. One of them is agricultural adaptation to climate change, which is important in facing challenges such as increasing global temperatures and fluctuations in rainfall which can have a negative impact on agricultural productivity. Technological innovation is also a major concern, where the application of technologies such as IoT, big data and artificial intelligence aims to increase production efficiency, reduce waste and strengthen food security.

Apart from that, agricultural policy is also a focus in the context of achieving SDGs in the agricultural sector. The study of policy interventions that support poverty alleviation, improving farmer welfare, and gender inclusion in the agricultural sector is an important part in developing a policy framework that supports sustainable agriculture. This includes analysis of access to resources, prices, and support for small farmers and other vulnerable groups.

Apart from that, related research also includes studies on the impact of agriculture on ecosystems and the environment. In this context, environmentally friendly agricultural practices, ecosystem sustainability and the value of agricultural ecosystems are in the main spotlight. Through a deeper understanding of the interactions between these factors, the academic and practitioner communities can develop holistic strategies and solutions to support positive transformation towards more sustainable and resilient agriculture.

The novelty of this research lies in the bibliometric exploration approach used to uncover research trends related to SDGs in the agricultural sector. This method provides deeper insight into academic contributions, publication trends, international collaborations, and key themes emerging in scientific literature related to sustainable agriculture and achieving the SDGs. This research also emphasizes identifying knowledge gaps that can become the basis for future studies that are more focused and relevant in supporting sustainable agricultural development. Apart from that, the uniqueness of this research also lies in the analysis of special interrelated themes, such as agricultural adaptation to climate change, agricultural policies for poverty alleviation, and environmentally friendly agricultural practices, which together form a holistic picture in achieving SDGs in the sector. agriculture. In addition, this research also integrates a multi-disciplinary approach that covers various key aspects in understanding the complexity of the challenges and opportunities faced by the agricultural sector in achieving sustainable development goals. This approach involves collaboration between agricultural experts, ecologists, policy experts, and other stakeholders to develop a holistic and diverse framework. Thus, this research does not only limit itself to technical or policy aspects, but also considers interrelated social, economic and environmental aspects in the context of sustainable agriculture.

This integration provides a competitive advantage in providing a more comprehensive understanding of the complexity of agricultural systems and their linkages to sustainable development goals. Through this multi-disciplinary approach, this research is able to identify important points that can be used as a basis for developing innovative and integrated solutions to support positive transformation in the agricultural sector. This also allows this research to provide more precise and evidence-based recommendations for policymakers, practitioners and the academic community to guide steps towards more sustainable and resilient agriculture.

2.Distribution of Publications from 2018 to 2024 Regarding SDGs in the Agricultural Sector

Bibliometric analysis shows that the number of publications discussing SDGs in the agricultural sector has increased significantly in the last decade. This increase indicates that issues related to sustainability and agriculture are increasingly attracting the attention of the academic community. As global awareness of the importance of achieving the SDGs increases, researchers from various disciplines are increasingly involved in studies linking agriculture to sustainable development goals.

This increase in the number of publications can also be interpreted as a response to increasingly pressing global challenges, such as climate change, food security and environmental degradation. The increased publications reflect a collective effort to find science-based solutions that can be applied to agricultural practices. In addition, this trend shows that the agricultural sector is seen as the main key in achieving various SDGs, considering its crucial role in providing food, alleviating poverty and preserving the environment.

Furthermore, analysis of the distribution of publications by year reveals an acceleration in the number of studies published following the official adoption of the SDGs by the UN in 2015. The attainment of SDGs will lead to simultaneous betterment of human lives, environment and economic prosperity. Therefore, the adoption and implementation of SDGs in the supply chain (SC) activities is the need of the hour (Agrawal et al., 2022). This momentum shows that these global goals have succeeded in encouraging more intensive research and a focus on how agriculture can support sustainable development. This trend also reflects increasing support from various research institutions, universities and governments for research oriented towards achieving the SDGs.

Table 1 Distribution of Publications from 2018 to 2024

Harzing's Publish or Perish (Windows GUI Edition) 8.12.4612.8838

File Edit Search View Help

My searches

Trash

Search terms	Source	Papers	Cites	Cites/year	h	g	hl,norm	hl,annual	hA	acc10	Search date	Cache date
SDGs, agriculture, bibliometrics,...	Google Sch...	199	5390	898.33	37	68	20	3.33	24	68	23/05/2024	23/05/2024
Civil Servant Performance in Po...	Google Sch...	200	450	75.00	10	14	5	0.83	6	2	20/05/2024	20/05/2024
Strategy, Village, Inclusion, Soci...	Google Sch...	200	1503	375.75	15	37	10	2.50	10	10	07/05/2024	07/05/2024
Relativism, culture, human right...	Google Sch...	200	10188	1698.00	58	92	35	5.83	24	96	01/05/2024	01/05/2024
Transparency, Implementation, I...	Google Sch...	200	7563	1512.60	25	86	21	4.20	17	22	27/04/2024	27/04/2024

Google Scholar search

Authors: _____ Years: 2010 - 2024 Search

Publication name: _____ ISSN: _____ Search Direct

Title words: _____ Clear All

Keywords: SDGs, agriculture, bibliometrics, agriculture Revert

Maximum results: 200 Include: CITATIONS Patents Only review articles New

Authors	Title	Year	Publication	Publisher	Type
J Zhu, S Kang, W Zhao, Q Li, X Xie, X Hu	A bibliometric analysis of food-en...	2020	Land	mdpi.com	HTML
H Xie, Y Zhang, Z Wu, T Lv	A bibliometric analysis on land de...	2020	Land	mdpi.com	HTML
X Li, K Wu, Y Liang	A Review of Agricultural Land Func...	2023	Land	mdpi.com	HTML
OL Malapane, W Musakwa, N Chanza...	Bibliometric analysis and systemati...	2022	Land	mdpi.com	HTML
CC Okolie, G Danso-Abbeam, O Groupson...	Climate-smart agriculture amidst c...	2022	Land	mdpi.com	HTML
D Yan, L Liu, X Liu, M Zhang	Global trends in urban agriculture ...	2022	Land	mdpi.com	HTML
L Liu, B Liu, W Song, H Yu	The Relationship between Rural Su...	2023	Land	mdpi.com	HTML
K Ariyanto	Rural Development Research Trend...	2023	Journal of Social, Culture...	journal.medidigitalpublika...	
Y Fomina, A Glińska-Noweś, A Ignasiak-Szulc	Community supported agriculture:...	2022	Journal of Rural Studies	Elsevier	
EV Zahaikvitch, L Medina Macedo, LB Telle...	Contemporary public policies to st...	2022	Journal of Open ...	mdpi.com	HTML
X Lyu, W Peng, W Yu, Z Xin, S Niu...	Sustainable intensification to coor...	2021	Journal of Land Use ...	Taylor & Francis	
G Dzhunushalieva, R Teuber	Roles of innovation in achieving th...	2024	Journal of Innovation &Kn...	Elsevier	HTML
H Xiong, Y Wang, X Guo, J Han, C Ma, X Zh...	Current status and future challeng...	2022	Journal of Hydrology	Elsevier	
J Luo, H Han, F Jia, H Dong	Agricultural Co-operatives in the w...	2020	Journal of cleaner producti...	Elsevier	

Authors	Title	Year	Publication	Publisher	Type
EK Şimşek, M Kara, MB Kalıpçı, R Eren	Sustainability and the Food Indust...	2024	Sustainability	mdpi.com	HTML
A Hamidov, K Helming	Sustainability considerations in wa...	2020	Sustainability	mdpi.com	HTML
S Yu, Y Mu	Sustainable agricultural developm...	2022	Sustainability	mdpi.com	HTML
E Prieto-Jiménez, L López-Catalán, B López...	Sustainable development goals an...	2021	Sustainability	mdpi.com	HTML
J Martínez-Falcó, B Marco-Lajara, E Sánchez...	Sustainable Development Goals in...	2023	Sustainability	mdpi.com	HTML
JF Velasco-Muñoz, JA Aznar-Sánchez...	Sustainable water use in agricultur...	2018	Sustainability	mdpi.com	HTML
M Gialeli, AY Troumbis, C Giaginis, SK Papa...	The Global Growth of 'Sustainable ...	2023	Sustainability	mdpi.com	HTML
P Tamasiga, H Onyeaka, A Akinsemolu, M ...	The inter-relationship between cli...	2023	Sustainability	mdpi.com	HTML
C Meschede	The sustainable development goal...	2020	Sustainability	mdpi.com	HTML
Z Lakner, B Plasek, G Kasza, A Kiss, S Soós, ...	Towards understanding the food c...	2021	Sustainability	mdpi.com	HTML
G Fusco	Twenty years of common agricultu...	2021	Sustainability	mdpi.com	HTML
R Agrawal, A Majumdar, K Majumdar...	Attaining sustainable developmen...	2022	... Strategy and the ...	Wiley Online Library	
A Kumari, MP Singh	A journey of social sustainability in...	2023	Socio-Economic Planning ...	Elsevier	
R Jain, A Sharma, D Sharma	Mapping the Literature on Implem...	2023	Smart Analytics, Artificial In...	emerald.com	

Authors	Title	Year	Publication	Publisher	Type
L Judijanto, A Chatra, S Rahayu...	Bibliometric Analysis of the Impact...	2023	West Science ...	repository.stie-sak.ac.id	
S Sutiharni, IF Mariay, LY Andriyani...	Mapping the Progress and Directi...	2024	West Science ...	wsj.westscience-press.com	
JF Velasco-Muñoz, JA Aznar-Sánchez...	Advances in water use efficiency in...	2018	Water	mdpi.com	HTML
JF Velasco-Muñoz, JA Aznar-Sánchez...	Sustainable irrigation in agriculture...	2019	Water	mdpi.com	HTML
M Basu, R Dasgupta	Where do we stand now? A biblio...	2021	Water	mdpi.com	HTML
VJPD Martinho	Bibliometric analysis on era 4.0: m...	2022	Trends of the Agricultural S...	Springer	
AC Danila, CE NASTASE	A bibliometric analysis of the glob...	2021	The USV Annals of Econo...	annals.feaa.usv.ro	
M Nilashi, RA Abumalloh, S Mohd, SNFS A...	COVID-19 and sustainable develo...	2023	Telematics and ...	Elsevier	
N Niknejad, W Ismail, M Bahari, R Hendradi...	Mapping the research trends on bl...	2021	... Technology &Innovation	Elsevier	
M Mohamed	Agricultural Sustainability in the A...	2023	Sustainable Machine Intelli...	sciencesforce.com	
A Singh, A Kanaujia, VK Singh...	Artificial intelligence for Sustainabl...	2024	Sustainable ...	Wiley Online Library	
AK Opejin, RM Aggarwal, DD White, JL Jon...	A bibliometric analysis of food-en...	2020	Sustainability	mdpi.com	HTML
R Vatananan-Thesenvitz, AA Schaller, R Sha...	A bibliometric review of the knowl...	2019	Sustainability	mdpi.com	HTML
TM Shah, S Tasawwar, R Otterpohl	Agroecology for food and water s...	2021	Sustainability	mdpi.com	HTML

Authors	Title	Year	Publication	Publisher	Type
CS Armitage, M Lorenz, S Mikki	Mapping scholarly publications rel...	2020	Quantitative Science Studies	direct.mit.edu	
KK Punjani, K Mahadevan, A Gunasekaran...	Cloud computing in agriculture: a ...	2023	Quality &Quantity	Springer	
A Kucher, L Kucher	DEVELOPMENT OF A SUSTAINABL...	2024	Publishing House "Baltija P...	baltijapublishing.lv	PDF
G Herrera-Franco, N Montalván-Burbano...	Scientific research in Ecuador: A bi...	2021	Publications	mdpi.com	HTML
T Chankoson	Analysis of the Impact of COVID-1...	2022	Przestrzeń Społeczna (Soci...	socialspacejournal.eu	
S Del-Aguila-Arcentalles, A Alvarez-Risco...	Bibliometric analysis of current sta...	2022	Processes	mdpi.com	HTML
VC Turcea, M Constantin	Convergence Points in the Literatur...	2021	Proceedings of the 7th BA...	basiq.ro	PDF
R Misara, D Verma, N Mishra, SK Rai, S Mis...	Twenty-two years of precision agri...	2022	Precision Agriculture	Springer	
PR Bhagat, F Naz, R Magda	Artificial intelligence solutions ena...	2022	PloS one	journals.plos.org	HTML
L Chivu, M Constantin, D Privitera, JV Andrei	Land grabbing, land use, and food...	2021	... patterns of agricultural ...	Springer	
D Kumar, S Choudhuri, AK Shandilya...	Food Waste &Sustainability Throu...	2022	... on Innovations in ...	ieeexplore.ieee.org	
B Ruiz-Morales, IC Espitia-Moreno...	Agri-food sustainable marketing r...	2023	... of Innovation and ...	inderscienceonline.com	
M Lafuente-Lechuga, J Cifuentes-Faura...	Sustainability, big data and mathe...	2021	Mathematics	mdpi.com	HTML
Z Lin, A Brychko	Bibliometric Analysis of Research ...	2023	Management Theory and S...	sciendo.com	

Source: Publish or Perish

This table provides a clear picture of the number of publications published each year, allowing us to identify trends and patterns in SDGs-related research in the agricultural sector over time. By analyzing this data, we can see how interest and attention to this topic is developing, as well as identify specific periods where there is a spike or decline in the number of publications. For example, the significant increase in the number of publications after 2018 can be attributed to the adoption of the SDGs by the UN in that year, which encouraged more research in this area.

Overall, this increasing distribution of publications not only indicates quantitative growth, but also signals qualitative developments in research. Research themes are becoming more diverse and cover various aspects of the SDGs, ranging from agricultural technology innovation, sustainable agricultural practices, to policies and governance that support sustainability. Thus, this increase in the number of publications serves as an important indicator of scientific progress in support of global development goals.

Bibliometric analysis shows that journals such as Agriculture And environment Journal and Sustainability are the main outlets for research related to SDGs in the agricultural sector. In addition, other journals such as the Journal of Cleaner Production, and Frontiers in Sustainable Food Systems also play an important role in publishing research focused on sustainability in agriculture. The popularity of these journals reflects their credibility and impact within the scientific community, as well as their relevance to pressing global issues.

In addition, the analysis shows that some authors and institutions have a very significant contribution to the volume of publications and citations. These leading authors are not only prolific in number of publications, but also have high citation rates, indicating their great influence in the field. Leading institutions, such as major universities and research institutes specializing in agriculture and sustainability, also play an important role in advancing this research.

The presence of these leading authors and institutions creates centers of excellence that serve as a driving force for innovative and collaborative research. They are often pioneers in exploring new and complex topics relevant to the SDGs, as well as developing new methodologies that can be applied in further studies. This collaboration between authors and institutions also strengthens global research networks, enabling more effective exchange of knowledge and resources.

Overall, these findings about leading journals and authors provide a picture of a dynamic and diverse research ecosystem in the field of SDGs in the agricultural sector. Influential journals and significant contributions from leading authors and institutions demonstrate that there is a strong collective effort to address global challenges through science. It also underscores the importance of continued support for academic research as a basis for better policy and practice in the agricultural sector. Achieving the goals of global food security and sustainable agricultural land use requires research that understands the processes and mechanisms of change in agricultural land systems. Agricultural land function is a suitable research area. HistCite, CiteSpace, and VOSviewer were used as the bibliometrics analysis tools to study basic information, research progress, hotspots, and frontiers in agricultural land function (Li et al., 2023). HistCite, CiteSpace, and VOSviewer were used as the bibliometrics analysis tools to study basic information, research progress, hotspots, and frontiers in agricultural land function. This study could help researchers further understand the research status on agricultural land function, playing a fundamental role in

the sustainable utilization of the agricultural land system and the realization of global food security goals (Li et al., 2023)

3.Collaboration and Networking Between Authors on the Topic: Bibliometric Exploration of SDGs in the Agricultural Sector

The collaboration map produced from bibliometric analysis shows that there is strong international collaboration in research related to SDGs in the agricultural sector. The main research centers are located in developed countries such as the United States, the European Union, China, Korea, and Japan. These countries play an important role in driving research and innovation in the field of sustainable agriculture, as well as making significant contributions to the scientific literature discussing this topic. The existence of these strong research centers shows that international collaboration is indispensable to address complex global challenges.

Cooperation between developed countries not only includes the exchange of knowledge and technology, but also involves collaboration in large research projects funded by governments and international organizations. Research centers in the United States, for example, often collaborate with institutions in the European Union to develop environmentally friendly and efficient agricultural practices. Likewise, collaboration between China, Korea, and Japan indicates a strong regional effort to address agricultural sustainability issues specific to Asia.

This collaborative network also includes collaboration between individual researchers and research groups at various institutions. Much research has been produced through cross-country collaboration, which enriches perspectives and approaches in dealing with sustainable agricultural issues. The bibliometric approach facilitated the identification of key terms and countries from previous research. We used VOSviewer to map and analyze data obtained from three databases: Scopus, Web of Science, and PubMed (Ramezani et al., 2023). Researchers from various scientific disciplines work together to integrate science and technology into agricultural practices that can support the achievement of the SDGs. This kind of collaboration is critical to driving innovation and applying research results on a wider scale.

Collaboration Network Graph Between Authors Related to a Topic: Bibliometric Exploration of SDGs in the Agricultural Sector In this research, we analyzed collaboration between a number of authors related to a certain topic. The graph below shows the collaboration between some of the authors and collaborators in the context of our study:

Figure 4 Collaboration Network Graph Between Authors



Source: Research data processing 2024

Table 2 Author Collaboration Network in Research Related to Topic: Bibliometric Exploration of SDGs in the Agricultural Sector

Author	Collaborator
Nancy Harlet	José María
Marta Lorenz	Susanne Mikki
Mónica Duque	Luis Belmonte
Natalia Yakovleva	Francisco Camacho
Gulnara Dzhunushalieva	Ramona Teuber
Andrea Pezzuolo	Abdul-Sattar Nizami
Francesco Marinello	Ramona Teube
Priyanka Lal	Ravinder Kumar
Manoranjan Mishra	Kabita Baral
Adenike K. Opejin	Hessam S. Sarjoughian
Sushmita Saini	Smruti Ranjan Padhan
Shuqi Xin	Chaofeng Shao
Shu Yu	Yongtong Mu
Jing Zhu	Xiangping Hu
Simone Pizzi	Andrea Caputo
Leticia Myriam	Octavio Tadeo
Juan Antonio	José María
Jaehyun Ahn	Bruce Herbert
Mathew Baker	Bruce Herbert
Sinazo Ajibade	Barbara Simon
Miklos Gulyas	Csaba Balint
Caroline S. Armitage	Marta Lorenz
Antonio Corvino	Andrea Venturelli

Source: Results of 2024 research data processing

In this table, the "Authors" column presents the names of authors involved in various collaborations, while the "Collaborators" column shows with whom they collaborated. This data provides an overview of the collaboration networks that exist in a particular research environment, which we will explore further in our research. Overall, the collaboration map resulting from this bibliometric analysis shows how important international collaboration is in SDGs-related research in the agricultural sector. Developed countries play a key role in establishing a strong and dynamic global research network. By continuing to strengthen this collaboration, the scientific community

can be more effective in developing innovative and practical solutions to achieve sustainable development goals around the world.

The main themes that emerge in the bibliometric analysis related to SDGs in the agricultural sector include four important aspects, namely sustainable agricultural technology, the impact of climate change, environmentally friendly agricultural practices, and agricultural policies for poverty alleviation. Sustainable agricultural technology is the main focus in efforts to increase productivity and sustainability in the agricultural sector. Research discussing technologies such as the use of drones for crop monitoring, energy efficient irrigation systems, and the development of crop varieties that are resistant to climate change are frequently raised topics. This reflects efforts to integrate technological innovation in agricultural practices that can reduce negative impacts on the environment.

The impact of climate change has become a critical focus in scientific literature related to SDGs in the agricultural sector. These studies explore how climate changes such as increasing global temperatures, rainfall fluctuations, and drought affect agricultural productivity and the sustainability of agricultural ecosystems. Science-based adaptation and mitigation solutions are the main focus in efforts to overcome this challenge. Furthermore, environmentally friendly agricultural practices are becoming an increasingly important theme in the literature related to the SDGs. This research considers sustainable farming methods, such as organic farming, crop rotation, and agricultural waste management. The main goal is to reduce the negative impact of agriculture on the environment, including water use, biodiversity loss, and soil and water pollution.

Agricultural policy for poverty alleviation is a central theme in this literature. This research discusses the role of policy in supporting small farmers, increasing access to agricultural resources, and strengthening food supply chains. Nowadays the agrifood system requires major transformations aimed at promoting sustainability, reducing waste and stimulating a change toward healthy sustainable diets (Agnusdei & Coluccia, 2022). Recently, several studies have focused on certain aspects of supply chain, such as traceability or decision-making frameworks, but a systematic review of the role of sustainability within the agrifood supply has never been carried out (Agnusdei & Coluccia, 2022). By focusing on the social and economic dimensions of sustainability, this research contributes to global efforts to reduce poverty and inequality in the agricultural sector. The scientific literature on the transition to sustainable food models continues

to develop rapidly and there is an urgent need to systematize its knowledge structure and thus make future research more vigorous (Agnusdei & Coluccia, 2022)

Overall, these main themes reflect the complexity of the challenges and opportunities associated with achieving the SDGs in the agricultural sector. Emerging research in this area provides an important knowledge base for formulating more effective policies and practices in achieving sustainable development goals.

Table 3 List of Most Cited Journals and Articles Related to Bibliometric Exploration of SDGs in the Agricultural Sector

No	Type	Journal/Article Title
1.	Journal	Agriculture And environmentJurnal
2.	Journal	Sustainability
3.	Journal	Journal of Cleaner Production
4.	Journal	Akuntansi Trisakti
5.	Journal	Frontiers in Sustainable Food Systems
6.	Article	Exploring potato seed research: a bibliometric approach towards sustainable food security
7.	Article	Multifunctional agriculture in the framework of the Sustainable Development Goals (SDGs): Bibliometric review
8.	Article	A Bibliometric Analysis of Food-Energy-Water Nexus Literature
9.	Article	Mapping the research trends of migration behavior in agricultural households: a bibliometric analysis
10.	Article	Bibliometric Analysis of Research Hotspots and Frontiers in Progress towards the Sustainable Development Goals
11.	Article	Sustainable Agricultural Development Assessment:A Comprehensive Review and Bibliometric Analysis
12.	Article	A Bibliometric Analysis of Food–Energy–Water Nexus: Progress and Prospects

This table lists the serial number, type (journal or article), and title of the most cited journals/articles in the context of bibliometric exploration of SDGs in the agricultural sector. This

table provides an overview of significant reference sources in this field of research. In addition to the main themes already mentioned, it is also important to note that literature related to SDGs in the agricultural sector is also starting to raise new issues related to animal welfare, systems local food, and gender inclusion in agriculture. In recent years, the importance of energy efficiency in the agricultural sector has become increasingly apparent (Benedek et al., 2023).

As the world faces challenges such as climate change, resource scarcity, and population growth, the need for sustainable and efficient agricultural practices has intensified (Benedek et al., 2023). These studies highlight the importance of addressing well-being in modern agricultural practices, promoting the sustainability of food systems at the local level to increase food security, and strengthening the role of women in decision-making and access to agricultural resources. These themes show the evolution and complexity in the research agenda related to SDGs in the agricultural sector which increasingly reaches more holistic and inclusive aspects.

D. CONCLUSION

This research also shows that international and regional collaboration plays a key role in accelerating research progress related to SDGs in the agricultural sector. Cross-border collaboration not only expands access to research resources and technology, but also enables the valuable exchange of ideas and experiences between different academic communities. This provides a strong foundation for closer cooperation in the future, which can accelerate innovation and adoption of sustainable solutions in agricultural practices.

In this context, this research also provides a deeper understanding of how agricultural research and policy can act as a key catalyst in achieving broader sustainable development goals. By strengthening our commitment to research, international collaboration and a holistic approach to solving agricultural challenges, we can ensure that the sector can make a significant contribution to realizing the global sustainability vision. This research also shows that international and regional collaboration plays a key role in accelerating progress of research related to SDGs in the agricultural sector. Cross-border collaboration not only expands access to research resources and technology, but also enables the valuable exchange of ideas and experiences between different

academic communities. This provides a strong foundation for closer cooperation in the future, which can accelerate innovation and adoption of sustainable solutions in agricultural practices.

Additionally, the study highlights the importance of investing in local research capacity and building adequate infrastructure in developing countries. In this way, they not only become beneficiaries of global knowledge and technology but also actively contribute to producing locally relevant innovations. This capacity building will ensure that solutions increase the effectiveness and sustainability of SDGs implementation in the agricultural sector.

BIBLIOGRAPHY

- Agnusdei, G., & Coluccia, B. (2022). Sustainable agrifood supply chains: Bibliometric, network and content analyses. *Science of the Total Environment*, *Query date: 2024-05-23 18:28:43*. <https://www.sciencedirect.com/science/article/pii/S0048969722007963>
- Agrawal, R., Majumdar, A., Majumdar, K., & ... (2022). Attaining sustainable development goals (SDGs) through supply chain practices and business strategies: A systematic review with bibliometric and network analyses. ... *Strategy and the ...*, *Query date: 2024-05-23 18:28:43*. <https://doi.org/10.1002/bse.3057>
- Amira, M., Man, N., Haris, N., Ismail, I., & ... (2022). Examining the Trend of Social Science Research on Urban Agriculture: A Bibliometric Review. *Central Asia & the ...*, *Query date: 2024-05-23 18:28:43*. <https://search.ebscohost.com/login.aspx?direct=true&profile=ehost&scope=site&authtype=crawler&jrnl=14046091&AN=158215488&h=nlmsm2NnmWVyGjhFDpQedebuJGF G4VltIXrO9CQR1wJ9I%2F%2FjzT3fNkSDPy610nTvXp3kvIF5%2B3%2BtHOduajHw%3D%3D&crl=c>
- Asma, A., & Perna, S. (2021). Sustainability indicators in Agriculture: A Review and Bibliometric analysis using Scopus database. *Journal of Agriculture and Environment for ...*, *Query date: 2024-05-23 18:28:43*. <https://air.unimi.it/handle/2434/956214>
- Benedek, A., Rokicki, T., & Szeberényi, A. (2023). Bibliometric evaluation of energy efficiency in agriculture. *Energies*, *Query date: 2024-05-23 18:28:43*. <https://www.mdpi.com/1996-1073/16/16/5942>
- Esquivel-Marín, N. H., Sagarnaga-Villegas, L. M., Barrera-Perales, O. T., Leos-Rodríguez, J. A., & Salas-González, J. M. (2023). Multifunctional agriculture in the framework of the Sustainable Development Goals (SDGs): Bibliometric review. *Acta Universitatis Sapientiae, Agriculture and Environment*, *15*(1), 36–51. <https://doi.org/10.2478/ausae-2023-0004>

- Handoyo, R., Sofie, S., & Wardhani, N. (2023). Implementasi Sustainable Development Goals (Sdgs), Goal 8 Pada Pelaku Usaha Mikro Di Desa Padas, Kecamatan Karangnom Dan Desa Bonyokan, Kecamatan Jatinom, Kabupaten Klaten. *Jurnal Akuntansi Trisakti*, 10(1), 107–116. <https://doi.org/10.25105/jat.v10i1.16234>
- Li, X., Wu, K., & Liang, Y. (2023). A Review of Agricultural Land Functions: Analysis and Visualization Based on Bibliometrics. *Land*, *Query date: 2024-05-23 18:28:43*. <https://www.mdpi.com/2073-445X/12/3/561>
- Mishra, M., Desul, S., Santos, C. A. G., Mishra, S. K., Kamal, A. H. M., Goswami, S., Kalumba, A. M., Biswal, R., Da Silva, R. M., Dos Santos, C. A. C., & Baral, K. (2023). A bibliometric analysis of sustainable development goals (SDGs): A review of progress, challenges, and opportunities. *Environment, Development and Sustainability*, 26(5), 11101–11143. <https://doi.org/10.1007/s10668-023-03225-w>
- Pizzi, S., Caputo, A., Corvino, A., & Venturelli, A. (2020). Management research and the UN sustainable development goals (SDGs): A bibliometric investigation and systematic review. *Journal of Cleaner Production*, 276, 124033. <https://doi.org/10.1016/j.jclepro.2020.124033>
- Ramezani, M., Takian, A., Bakhtiari, A., & ... (2023). A Bibliometric Analysis of Artificial Intelligence Revolutions in Health-related SDGs. *Health Technology ...*, *Query date: 2024-05-23 18:28:43*. <https://htainaction.tums.ac.ir/index.php/hta/article/view/201>
- Xin, S., Dong, R., Cui, C., Yang, T., Zhan, X., Wang, F., & Shao, C. (2024). Bibliometric Analysis of Research Hotspots and Frontiers in Progress towards the Sustainable Development Goals. *Sustainability*, 16(5), 2005. <https://doi.org/10.3390/su16052005>



lisensi CC BY