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RESEARCH ARTICLE

Time flies, waste piles: A bibliometric analysis of solid waste management research

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Abstract – Implementing efficient solid waste management practices is paramount in safeguarding the long-term viability of our planet’s natural resources and ecosystems. In addition, it represents a reasonable approach to future management decisions. This study aims to analyse the trend of solid waste management research publications in the Scopus and Web of Science (WoS) databases. ScientoPy was used to analyse the datasets in this study by defining publication growth, projected subject areas, productive source titles, productive countries, and the most frequently used keywords over time. The findings of this study underscored that the Scopus and WoS databases evince a steady escalation in publications throughout the years, with a marked upswing from the outset of the 21st century. The three subject areas with the most published documents are Environmental Sciences & Ecology, Engineering, and Science & Technology - Other Topics. India has been found to possess the highest count of published documents, amounting to 474 papers, and displays a comparatively high percentage of documents published in 2021 and 2022 (PDLY) of 23%. Based on an analysis of research topics, it has been determined that solid waste management is a multifaceted and interdisciplinary area of research that encompasses a broad spectrum of topics, including but not limited to sustainability and life cycle assessment. This input provides valuable insights that can aid in comprehending issues, addressing gaps, and directing future research endeavours, particularly those related to ecological cycles. Such insights can assist researchers in resolving pressing concerns and generating innovative solutions. Prospective studies in solid waste management may focus on innovative waste treatment technologies, policy analysis, economic implications, and investigation of emerging issues such as sustainability and life cycle assessment. Interdisciplinary collaboration and knowledge sharing can facilitate the resolution of solid waste management issues.

Keywords – bibliometric, solid waste, ecosystem, sustainability, life cycle assessment

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INTRODUCTION

Solid waste management is essential for maintaining the balance of ecological cycles that sustain life on Earth. Human is perilously close to numerous of the planet’s boundaries, such as its ability to absorb waste, provide food and energy, and support an expanding population (Valenčíková & Fandel, 2023). Minimising waste and pollution can aid in preserving crucial natural resources such as water and energy (Deng et al., 2020). Improper disposal of solid waste can result in pollution of the air, water, and soil, leading to negative impacts on human health and the environment (Ifeoluwa, 2019; Massoud et al., 2023; Mekonnen et al., 2020). Consequently, studying solid waste management practices enables informed decisions that promote ecosystem health

and productivity, ensuring the sustainability of our planet’s resources (Abdullah et al., 2021). The importance of efficient solid waste management in preserving public health, preserving resources, mitigating climate change, and safeguarding the environment is undoubtedly evident.

There are five primary categories of solid waste: municipal solid waste, sludge, food waste, electrical waste, and construction and demolition waste (Yang et al., 2013). Municipal solid waste is generated by households and commercial establishments, as Rai et al. (2019) noted, while sludge is a residual material produced by wastewater treatment plants (Wang et al., 2017). The appropriate

handling of food waste is essential to decrease greenhouse gas emissions and preserve resources, as it constitutes a substantial portion of municipal solid waste (Wei et al., 2017). Electrical waste pertains to discarded electronic and electrical equipment (Wang et al., 2021). In contrast, construction and demolition waste encompasses materials like concrete, wood, and metal from building and demolition operations (Devi et al., 2021). Comprehending the composition of diverse solid waste types is crucial in formulating suitable management approaches to tackle their environmental and health repercussions effectively.

Solid waste management is crucial for minimising waste production, encouraging recycling and reusing, and guaranteeing appropriate disposal of hazardous substances (Olukanni et al., 2018). Effective waste management practices can prevent pollution, lower greenhouse gas emissions, conserve natural resources and foster sustainable development (Alsheyab, 2022). Effective waste management entails identifying and applying suitable techniques, technologies, and managerial strategies to attain predetermined waste management objectives (Fatimah et al., 2020). The field regulates solid waste management, including generation, storage, collection, transportation, processing, and disposal. Global solid waste has increased due to population growth, urbanisation, and industrialisation (Gautam & Agrawal, 2021). This has led to environmental deterioration, health risks, and financial damages. Efficient solid waste management is crucial in reducing adverse effects and fostering sustainable development (Ayilara et al., 2020).

Despite extensive research on various aspects of solid waste management, such as landfilling, composting, and incineration, several challenges persist (Abdullah et al., 2021). Further research is needed to explore waste reduction and source separation issues; sustainable waste management practises, and social and economic obstacles to effective waste management, as noted by Kazuva et al. (2021), Kombiok et al. (2021), Govind and Mahongnao (2021), and Orhororo and Oghoghorie (2019). Hence, it is imperative to investigate novel methods and tactics for enhancing solid waste management and mitigating its adverse effects on the environment and human health.

This study aims to conduct a bibliometric analysis using Scopus and Web of Science (WoS) databases to gain insights into solid waste management research trends. The study has the potential to enhance the existing knowledge on solid waste management and offer valuable insights for policymakers, waste management practitioners, and other stakeholders. The study will emphasise the significance of raising public awareness and encouraging participation in waste reduction, reuse, and recycling efforts. It will also thoroughly comprehend solid waste management and its importance in advancing environmental sustainability.

Utilising bibliometric analysis is one of the distinctive and innovative features of the research methodology (Mukherjee et al., 2022). This strategy involves analysing publication trends and anticipated research topics to gain insight into

solid waste management research trends. By adopting the bibliometric technique, the study intends to provide a quantitative analysis of the extant knowledge on solid waste management, which can provide policymakers and waste management practitioners with valuable insights. In addition, by analysing the growth and projected subject areas of solid waste management research, this study aims to provide a holistic understanding of the field and identify areas for improvement. Consequently, the mentioned factors promote the advancement of knowledge within the field and provide significant perspectives for overcoming obstacles and enhancing sustainable waste management measures.

METHODOLOGY AND DATA

“Time Flies, Waste Piles: A Bibliometric Analysis of Solid Waste Management Research” is a title applied in the present study to communicate the investigation’s scope and focus to potential readers and future researchers. The common saying “time flies when we are having fun” instead draws attention to the fact that time has also passed as waste piles up. Also, this title conveys that this study adopted bibliometric analysis, which means it uses statistical methods to analyse patterns and trends in the scientific literature related to solid waste management. Bibliometric analysis is essential for identifying research gaps and potential directions (Abdullah et al., 2023). Therefore, the present bibliometric analysis aims to examine the publication trends to provide potential readers and other researchers with an intriguing insight into the research on solid waste management.

Research questions

This study analyses the trend of solid waste management research publications in the Scopus and WoS databases. The following research questions were constructed to achieve the aim of this study:

1. What has been the trend of solid waste management research publications over the years?
2. What are the projected subject areas and most productive source titles on solid waste management research?
3. Which countries contribute most to solid waste management research?
4. What are the most researched topics concerning solid waste management research?

Datasets retrieval

This study used the Scopus and WoS databases to retrieve a list of publications related to solid waste management research over the years. These databases were chosen due to a few reasons. First, Scopus and WoS have extensive coverage of scientific literature, including peer-reviewed journals, conference proceedings, and books across various disciplines (Aksnes & Sivertsen, 2019). This provides a wide range of sources for bibliometric analysis, ensuring that the study is comprehensive and representative. Second, both databases have rigorous quality control measures to ensure their data are accurate and reliable and can complete one another (Echchakoui, 2020). This ensures that the bibliometric analysis is based on high-quality data, which is vital for making meaningful conclusions.

The keyword “solid waste*”, as used by Fu et al. (2010) and Yang et al. (2013), was searched in Scopus and WoS databases, along with the keyword “manag*”. The search for publications related to solid waste management in the Scopus and WoS databases did not apply any restrictions on publication periods or languages. Hence, the retrieved datasets included publications from all years and languages, ensuring a comprehensive and diverse set of publications for analysis. However, the search process was based on the title field to obtain the publications pertinent to solid waste management research. The retrieval of datasets based on their titles is an essential aspect in emphasising the content-related and structural advancement of research topics, as noted by Tullu (2019). The search process was completed on March 25, 2023. The retrieved datasets returned 3121 publications in Scopus and 2352 publications in WoS, which accumulated 5473 publications in both databases. The initial publication discovered in this investigation was catalogued in the Scopus database in 1966. The scholarly article entitled “Environmental Hazards” was authored by First in 1966. This paper was published in The New England Journal of Medicine.

Datasets analysis

In this study, the retrieved datasets from Scopus and WoS were analysed using ScientoPy. ScientoPy is a Python package for bibliometric analysis that allows researchers to extract and analyse data from various bibliographic databases, including Scopus and WoS (Ruiz-Rosero et al., 2019). Using computerised data synthesis mitigates potential biases in individual investigations, thereby facilitating the analysis of bibliometric data relevant to evaluating contributions made by countries, institutions, and authors (Pabon et al., 2020). Before analysing the datasets, ScientoPy pre-processed the data by merging the Scopus and WoS datasets and eliminating duplicate records. This was necessary to ensure the bibliometric analysis was based on a comprehensive and non-redundant dataset (Ruiz-Rosero et al., 2017). As a result, ScientoPy provides a convenient and efficient way to perform this pre-processing step, saving researchers time and effort. The pre-processed results are indicated in Table 1.

Table 1. Data combination and duplicates exclusion

Data Pre-processing Output	Information	Number	Percentage (%)
Initial results	Raw data from Scopus and WoS	5473	
	Automatic type-filter publication to remove non-related document	526	9.60
	Total publications after selecting document types (Research articles, conference papers, book chapters, review papers, and proceedings)	4947	
	Publications in WoS	2133	43.10
	Publication in Scopus	2814	56.90
Duplicated removal results	Duplicated publications in both databases	1661	33.60
	Duplicated publications from WoS	8	0.40
	Duplicated papers from Scopus	1653	58.70
Final results	Total publications after eliminating duplicates	3286	
	Publications in WoS	2125	64.70
	Publications in Scopus	1161	35.30

Following the categorisation of documents by type, 4947 datasets were identified. After removing duplicate entries, the present investigation procured 3286 dependable and sound datasets for further examination. The numerical value of 3286 was deemed sufficient to facilitate a bibliometric analysis. Glänzel and Moed (2013) recommend a minimum sample size of 50 for approximating features such as the distribution of means and relative frequencies, commonly called “normality”. Glänzel and Moed (2013) reported that a sample size of approximately 100 was employed and produced satisfactory outcomes. Once the data had been pre-processed, ScientoPy extracted various bibliometric indicators, such as the number of publications, citation counts, and author and institution affiliations (Ruiz-Rosero et al., 2017). These indicators were then used for various bibliometric analyses

based on the constructed research questions presented in this study.

RESULTS AND DISCUSSION

Publication growth trends

Comprehending the growth of publications holds significance as it offers valuable insights into the present state of research, facilitates the assessment of the impact of research funding, and enables researchers to remain abreast of the latest advancements in their respective fields (Abdullah et al., 2023). Figure 1 illustrates the growing trend of solid waste management research publications between 1966 and 2022, as indicated in the Scopus and WoS databases. Both databases show a consistent increase in publications over the years, with a noticeable surge from the early 2000s. As of

2022, the WoS database has 2078 publications, while Scopus has 1121 publications. In recent years, researchers have shown an increasing interest in solid waste management, possibly due to the mounting apprehension regarding waste's environmental and human health consequences. A commendable endeavour is the implementation of Pro-environmental interventions that are developed through participatory means to foster ethical propriety, accountability, reverence for the environment, and favourable emotions, which could enable households to segregate waste at its origin (Oduro-Appiah et al., 2022).

The findings suggest that the rise in population and urbanisation has led to a surge in waste production (Gautam & Agrawal, 2021; Valenčíková & Fandel, 2023), thereby

prompting a recent upsurge in research on solid waste management. The escalation in the number of publications concerning the detrimental consequences of waste on the environment and human health has become increasingly conspicuous. This is due to mounting evidence of the adverse effects of waste on the quality of air, water, and soil, as well as the propagation of diseases caused by waste, as reported by Ifeoluwa (2019), Massoud et al. (2023), and Mekonnen et al. (2020). An additional noteworthy factor contributing to the rise in publications is the acknowledgement by the public and private sectors of the significance of sustainable waste management practices, leading to the implementation of policies and regulations aimed at tackling the matter (Mugambe et al., 2022).

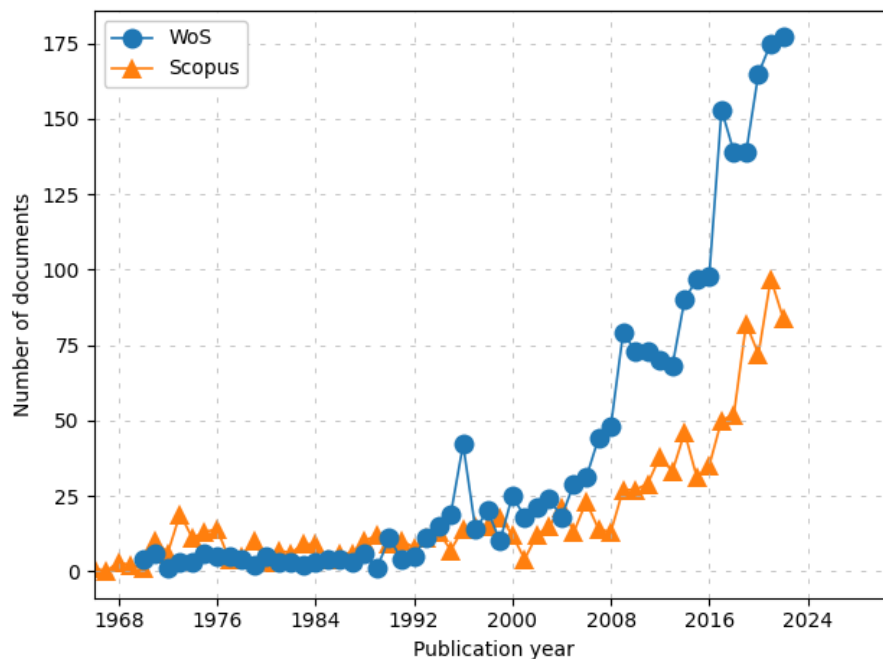


Figure 1. Publication growth trends

From 1966 to 1990, no publications on solid waste management were found in the WoS database. However, the Scopus database had one publication in 1966, three in 1968, and two in 1969. The number of publications increased steadily in the Scopus database, with 19 in 1989 and 11 in 1990. The absence of publications on solid waste management in the WoS database from 1966 to 1990 and a few Scopus publications during this period does not imply that the topic is unappealing. During this period, maybe more papers have been published in other publications and reports on solid waste management, including those by government agencies.

From 1991 to 2000, there was an increasing trend in the number of publications on solid waste management in both WoS and Scopus databases. The WoS database peaked in 1998 with 20 publications, while Scopus peaked in 1997 and 1999 with 15 and 18 publications, respectively. Overall, the number of publications in the WoS database (ranging from 4

to 42) was higher than in the Scopus database (ranging from 7 to 18) during this period. From 1991 to 2000, there was a noticeable increase in publications in both databases, with WoS showing more publications than Scopus. This trend suggests a growing interest in solid waste management research during this period. This study agrees with the bibliometric studies conducted by Abdullah et al. (2021) and Fu et al. (2010); they concluded that a rise in publications during this period indicated that the proper disposal of solid waste had emerged as a significant environmental issue worldwide.

Based on data in Figure 1, in 2000, there were 25 publications in WoS and 12 in Scopus. From 2000 to 2005, there was an overall increase in the number of publications in both databases, with a peak of 29 publications in WoS and 21 in Scopus in 2005. From 2006 to 2009, there was a continued increase in the number of publications, with a peak of 79 publications in WoS and 27 in Scopus in 2010. The trend

from 2000 to 2010 shows a steady increase in publications in both databases, indicating continued growth in the field. This period may have seen increased funding and support for solid waste management research, leading to more publications. The provision of financial resources enables researchers to obtain essential tools, including laboratory apparatus, data sets, and research materials. Increased availability of resources facilitates researchers to conduct more experiments and research studies, resulting in high research output (Abdullah et al., 2023).

From 2011 to 2022, WoS and Scopus databases show an overall increase in publications. WoS has consistently shown more publications than Scopus in this period. There were 73 publications in WoS in 2011, which decreased to 68 in 2013 before increasing again in subsequent years. The highest number of publications in WoS was in 2020, with 165 publications, slightly increasing to 177 in 2022. In Scopus, 29 publications in 2011 increased to 46 in 2014 before fluctuating in subsequent years. The highest number of publications in Scopus was in 2019, with 82 publications, which slightly decreased to 84 in 2022. From 2011 to 2022, both WoS and Scopus databases show an overall increase in publications, with WoS consistently showing more than Scopus. This trend indicates that the interest in research on solid waste management is steadily increasing, and the field

may witness further research. The surge in publications pertaining to solid waste management signifies that this subject is being frequently deliberated on in conjunction with the current population growth. This phenomenon is because the population increase indicates a corresponding increase in solid waste generated, particularly in urban regions. According to Rukundo and Ariho (2022), the swift expansion of urban populations, primarily attributed to elevated rates of immigration and birth, has resulted in substantial quantities of solid waste, posing challenges for authorities in effectively managing the accumulated waste.

Projected subject areas

According to the data presented in Figure 2, the top three subject areas with the highest total number of documents published are Environmental Sciences & Ecology, Engineering, and Science & Technology - Other Topics. This is likely due to the high demand for research in these fields, given the urgent need to address global environmental and technological challenges. When considering the percentage of documents published in 2021 and 2022 (PDLY), Science & Technology - Other Topics (28%), Public, Environmental & Occupational Health (28%), Computer Science (27%), and Energy & Fuels (21%) are the subject areas with the highest PDLY, indicating a recent increase in research in these fields.

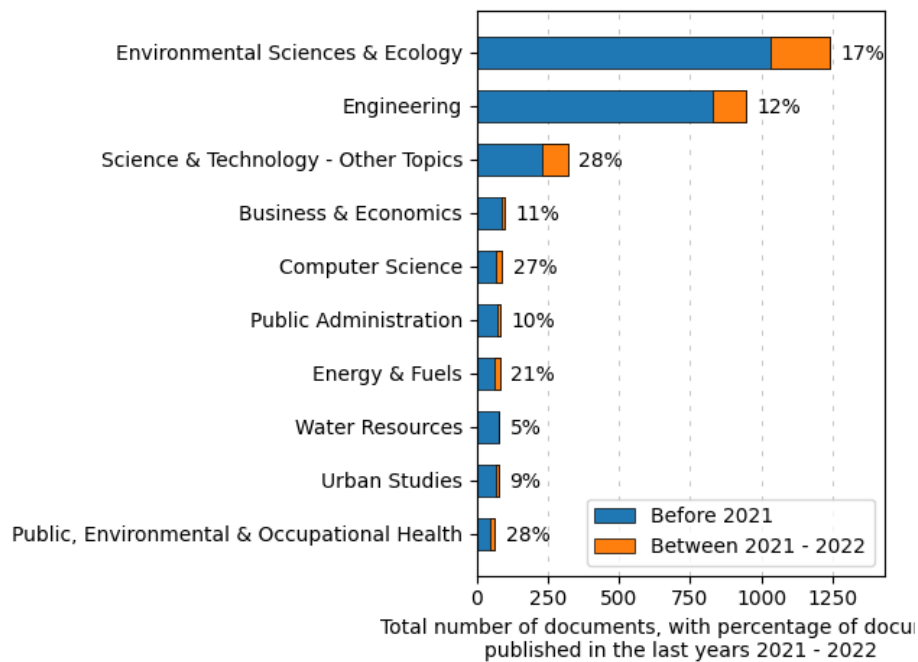


Figure 2. Subject areas

The significant proportion of publications in the Public, Environmental & Occupational Health field indicates an increasing inclination towards comprehending the adverse effects on public health caused by inadequate solid waste management practises. This is especially pertinent as poor solid waste management practices may result in the proliferation of disease-carrying organisms (Chengula et al.,

2015) and the pollution of water resources (Kumar & Prakash, 2020). Likewise, the notable proportion of publications in Computer Science and Energy & Fuels indicates an increasing inclination towards investigating pioneering approaches to enhance solid waste management. This could include the development of new technologies for waste disposal and recycling and using renewable energy

sources to power waste management facilities, which could also be related to the Science & Technology - Other Topics research domain.

Researchers need to be aware of the projected subject areas related to solid waste management, such as Science & Technology - Other Topics, Public, Environmental & Occupational Health, Computer Science, and Energy & Fuels, as indicated by the high percentages of documents published in these fields in 2021 and 2022. By being aware of these subject areas, researchers can tailor their research to address the current trends and needs in the field, which may increase the visibility and impact of their work. Additionally, researchers can identify potential collaborations and interdisciplinary opportunities within these subject areas, which may lead to more innovative and impactful research outcomes.

Productive source titles

Based on the data presented in Figure 3, it is evident that the top 10 sources for solid waste management research are dominated by academic journals, with only one conference series (IOP Conference Series: Earth and Environmental Science). Waste Management and Waste Management & Research are the leading sources with the most published documents, with 158 and 143 papers, respectively. The Journal of Cleaner Production comes in third with 91 papers, and Resources Conservation and Recycling ranks fourth with 71 papers. Regarding the PDLY, IOP Conference Series:

Earth and Environmental Science, with 81%, became the top, followed by Sustainability, with 54% and Journal of Material Cycles and Waste Management, with 27%. This suggests that researchers are increasingly publishing their work in these three source titles in 2021 and 2022, likely due to its focus on sustainable development and environmental issues. In the meantime, the IOP Conference Series: Earth and Environmental Science is likely gaining traction due to its open-access policy and ability to disseminate research to a broad audience effortlessly.

Noteworthy, the findings depicted in Figure 3 indicate that established sources, such as Waste Management and Waste Management & Research, remain prominent in solid waste management research. There is a burgeoning interest in publications like the Journal of Cleaner Production and Sustainability, which concentrates on sustainable production and environmental management. The trends mentioned indicate a transition in solid waste management towards more sustainable practices and a heightened emphasis on environmental impacts. Scholars inclined to publish their research on solid waste management should contemplate submitting their work to these distinguished sources, as they possess a proven history of publishing top-notch research in this domain. This information can be utilised by researchers to strategically focus on journals and conferences that are highly pertinent to their research, potentially enhancing their likelihood of acceptance and dissemination of their work.

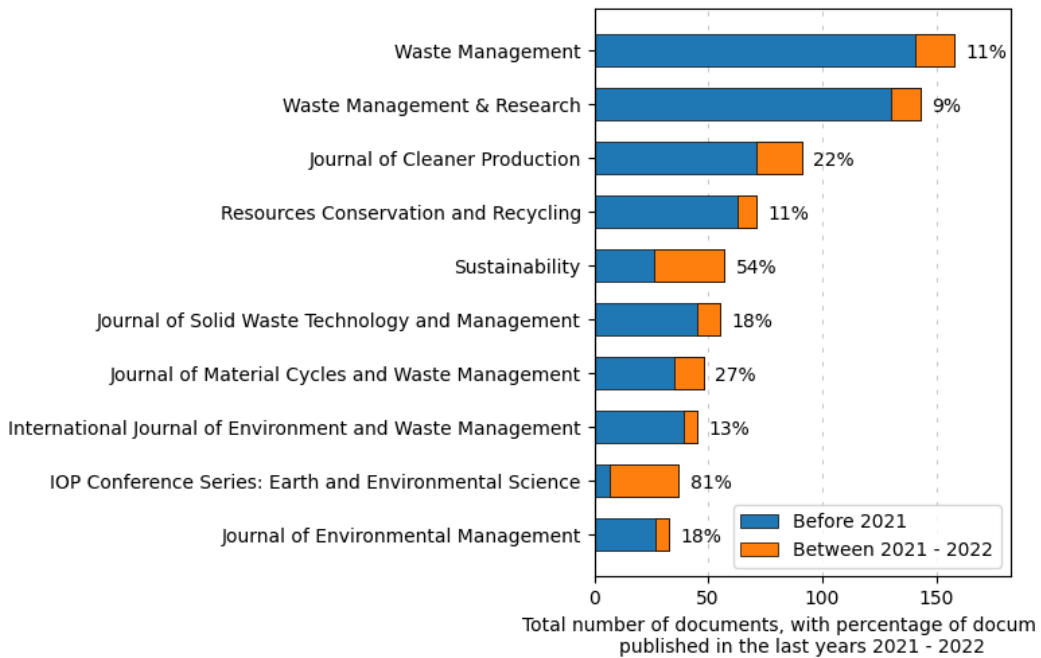


Figure 3. Source titles

Productive countries

Figure 4 shows the top 10 countries regarding the documents published concerning solid waste management research from 1966 to 2022 and PDLY. India has the highest number of

published documents, totalling 474 papers, and exhibits a relatively high PDLY percentage of 23%. The higher generation of solid waste in India compared to other countries may be attributed to its dense population, as Ganguly and

Chakraborty (2021) quantified. Consequently, India has been endeavouring to enhance its solid waste management systems and policies to tackle this predicament, augmenting the number of research publications in this domain.

China and the United States follow closely, with 274 and 249 papers, correspondingly. The Chinese government has implemented various policies and regulations to reduce waste and enhance recycling rates as part of its efforts to enhance solid waste management practices. This is in line with the country’s commitment to improving its waste management practices, as highlighted in the study by Huang et al. (2020). Consequently, there has been a surge in research endeavours within the respective field. The United States is in third place on the list with a PDLY percentage of 9%. It is noteworthy that despite the ample resources accessible to researchers in the United States and the considerable amount of waste produced by the nation, the outcome is somewhat unexpected. It is imperative to acknowledge that the extent of research output may not consistently align with the scale of the issue being attempted. Other variables, including funding,

research priorities, and academic norms, can influence research activity.

Indonesia and Brazil have relatively high PDLY percentages of 39% and 26%, indicating a recent increase in research in these countries. The urgency of waste-to-energy projects and technologies in Indonesia is unprecedented. However, there is still a lack of knowledge regarding Indonesian solid waste management’s physical and chemical properties, as Zhen et al. (2020) noted. This knowledge is crucial for designing and functioning any waste-to-energy system, regardless of whether it is based on combustion or gasification. Brazil is a rapidly developing country experiencing a shift towards more urbanisation, which leads to an increase in solid waste generation (Leite et al., 2021). As depicted in Figure 4, other countries, such as Iran, Malaysia, and the United Kingdom, complete the list of the top 10 countries, with varying total papers and PDLY percentages. These results highlight the global nature of research in solid waste management and the importance of ongoing research to address the pressing environmental and public health issues related to this field.

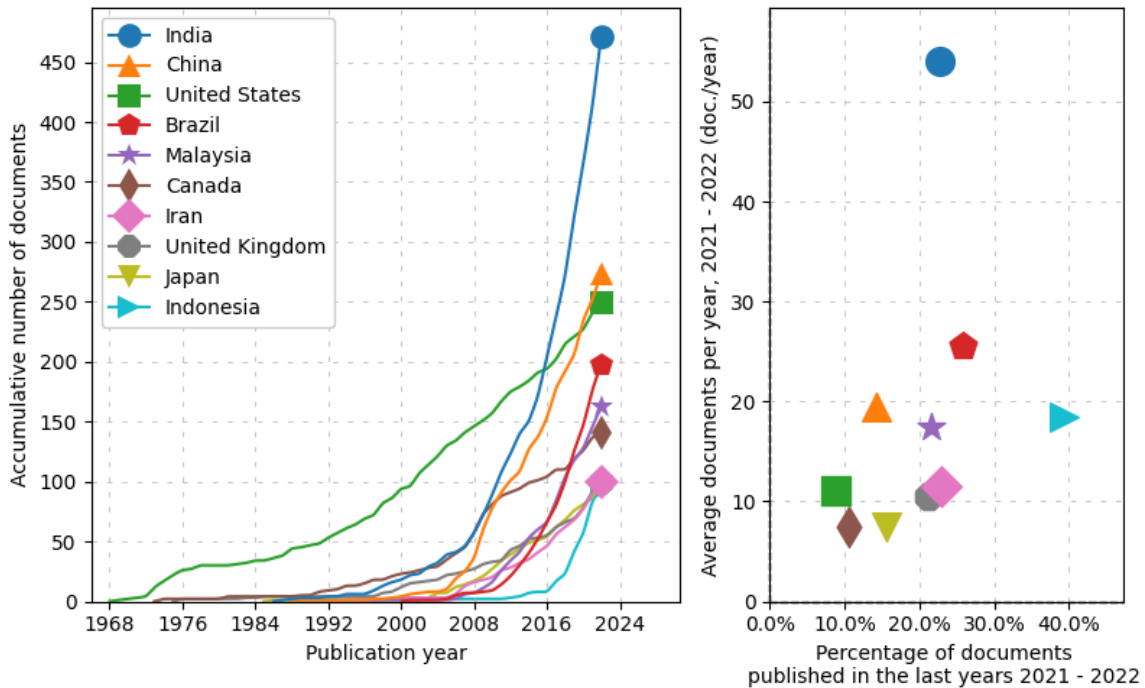


Figure 4. Productive countries

Research topics

The utilisation of keywords by prior researchers can serve as a valuable indicator of the research topics explored. This is because we can better understand the research topics explored in the academic discourse by examining the keywords employed by authors in their scholarly works (Abdullah, 2023). The comprehensive examination of research topics facilitates an understanding of the historical evolution of solid waste management research and identifies research gaps that require further exploration.

Based on the data presented in Figure 5, it can be observed that the most frequent author keyword used in solid waste

management research is “solid waste management”, with a total of 542 publications, accounting for 22% of the documents published in 2021 and 2022 (PDLY). The second most frequent author keyword is “municipal solid waste”, with a total of 348 publications and also accounting for 22% of the PDLY. “Waste management” is the third most frequent author keyword, with 300 publications accounting for 20% of the PDLY. “Solid waste” and “municipal solid waste management” are the fourth and fifth most frequent author keywords, respectively, with 279 and 205 publications, accounting for 19% and 23% of the PDLY, respectively. These results are unsurprising as these keywords are the most common and widely used terms in solid waste management.

These topics are the foundation of solid waste management research and are essential to developing effective systems.

The term “Sustainability” denotes a growing emphasis among scholars on sustainable solid waste management in 2021 and 2022, with PDLY 31%. The concept of sustainable solid waste management encompasses considering environmental, social, and economic factors to ensure the long-term viability of waste management practices (Batista et al., 2021). The second most projected topic in 2021 and 2022 is “life cycle assessment” (106 publications, representing 24% of PDLY). The term “Life cycle assessment” implies that scholars aim to evaluate the ecological consequences of solid waste management schemes across the complete life cycle of waste. This is crucial in identifying the environmental hotspots of a

system and developing strategies to reduce its impact (Othman et al., 2013; Ripa et al., 2017).

Moreover, conducting a life cycle assessment is a crucial step towards promoting improvements aimed at mitigating climate change. This approach can effectively reduce greenhouse gas emissions and enhance adaptation to anticipated changes across all sectors, thereby mitigating the adverse effects of climate change (Biró & Szalmáné Csete, 2023). The present study, which examines research topics spanning from 1966 to 2022, suggests that its diversity and interdisciplinary nature characterise the field of solid waste management. This field encompasses miscellaneous topics, such as recycling, sustainability, life cycle assessment, and landfill.



Figure 5. Research topics cover from 1966 to 2022

CONCLUSION

The findings obtained from analysing datasets in Scopus and WoS databases indicate a steady rise in scholarly works on solid waste management, with a marked upsurge observed since the commencement of the 21st century. From 1966 to 2022, there has been a consistent disparity in the number of publications between WoS and Scopus, with WoS consistently reporting a higher count.

The analysis of subject areas indicates that Environmental Sciences & Ecology, Engineering, and Science & Technology - Other Topics are the three subject areas with the highest aggregate number of published documents. Waste Management and Waste Management & Research are the only scholarly outlets having published over 100 papers in waste management. Regarding productive countries, India has the highest count of 474 papers and a relatively elevated PDLY percentage of 23%. China and the United States follow India in this regard.

The preeminent authors' keywords utilised in research on solid waste management is “solid waste management”, which has been featured in 542 publications, constituting 22% of the PDLY. The term “municipal solid waste” emerges as the second most used author keyword, featuring in 348 publications and constituting 22% of the PDLY. The term “waste management” has been identified as the third most used author keyword, appearing in 300 publications and representing 20% of the PDLY.

The terms “solid waste” and “municipal solid waste management” are among the most used author keywords, ranking fourth and fifth, respectively. These terms have been featured in 279 and 205 publications, representing 19% and 23% of the PDLY. The two most projected terms in the last two years (2021 and 2022) were “sustainability” and “life cycle assessment”, with 31% and 24% of PDLY signifying that these topics have become trending in 2021 and 2022. These outcomes are unsurprising because the keywords represent solid waste management research's most prevalent and extensively employed terminologies. The topics mentioned above constitute the fundamental pillars of

research in solid waste management and are indispensable in creating efficacious systems.

The study outcomes on solid waste management augment the extant corpus of scholarship by furnishing a comprehensive comprehension of diverse facets of this domain. The study's identification of growth trends provides insight into the trajectory of research in solid waste management. This data holds significant value for scholars, decision-makers, and professionals in determining nascent domains of concern and distributing resources appropriately.

Furthermore, the investigation conducted by the study about the subject domains linked with solid waste management facilitates the identification of particular fields of study and subfields that contribute to the comprehension and administration of solid waste. The acquisition of this knowledge has the potential to facilitate interdisciplinary collaborations and the formulation of comprehensive solutions.

The examination of source titles yields valuable information regarding the scholarly journals, conference outlets, and other publication channels that are currently disseminating research on the subject of solid waste management. Researchers can utilise this information to discern credible sources, remain current on recent research, and optimise their publication strategies.

This study elucidates the geographical distribution of research endeavours by scrutinising the countries engaged in solid waste management research. This result is of utmost importance in comprehending regional discrepancies, pinpointing regions that necessitate greater focus, and fostering global partnerships to disseminate optimal methodologies and knowledge transfer.

The study's identification of research topics on solid waste management contributes to comprehending the particular concerns being tackled within the discipline. This aids in identifying research focal points, potential gaps, and areas that necessitate further exploration. This understanding can guide future research pursuits, empowering researchers to tackle the most urgent issues and devise novel remedies.

Limitations

The present study's scope is limited to the Scopus and WoS databases, potentially omitting a comprehensive overview of publications related to solid waste management. The limited presence of solid waste management publications in the WoS database between 1966 and 1990, and a small number of Scopus publications during this timeframe, should not be interpreted as an indication of the topic's lack of interest. During this period, additional papers on solid waste management may have been published in various publications in other databases or reports, including those produced by government agencies. Also, this study did not assess the calibre or influence of the publications analysed, which may be a crucial aspect to contemplate when appraising the research's importance. Finally, the study's analysis was limited to data up to 2022, leaving room for potential future shifts in trends or patterns.

Research contributions

The study's results indicate a consistent rise in the number of publications regarding research on solid waste management, as observed from both Scopus and WoS databases, since the commencement of the 21st century. The observed pattern indicates an increasing inclination towards researching solid waste management. This inclination is presumably motivated by the pressing necessity to tackle worldwide environmental and technological predicaments, particularly concerning population expansion.

Environmental Sciences & Ecology, Engineering, and Science & Technology - Other Topics were the top three subject categories with the highest number of articles published in solid waste management research. There has been a recent uptick in research into public health, environmental health, and occupational health; computer science; and energy and fuels, as shown by the PDLY. Researchers in the field of solid waste management would do well to keep tabs on current topics of inquiry and emerging subfields of study.

Researchers also can fill in knowledge gaps and add to the body of knowledge in their subject by first understanding the existing state of research and the rising areas of interest. Researchers in the field of solid waste management, for instance, could investigate the potential health impacts of current solid waste management practices if there were a growing interest in public health research in this area.

Future research directions

Prospective investigations in solid waste management exhibit significant promise in tackling the dynamic challenges in this realm. An area of potential advancement lies in investigating innovative methods for managing waste. The progress made in the fields of science and engineering has enabled researchers to explore novel methods, including advanced recycling techniques, waste-to-energy conversion, and biodegradable materials, in order to enhance the management of waste. The mentioned studies have the potential to make a valuable contribution towards advancing waste treatment techniques that are both sustainable and efficient.

The domain of policy analysis is deemed to be of paramount importance and warrants significant consideration. Scholars can conduct an in-depth analysis of current waste management policies and regulations to identify deficiencies and recommend viable approaches for enhancing policy efficacy. Decision-makers can make informed choices promoting sustainable waste management practises by comprehending the various socio-economic and environmental implications of various policies.

Examining the economic ramifications of solid waste management is a topic of significant academic interest. Research endeavours can examine the cost-effectiveness of diverse waste management tactics, encompassing waste minimisation, recycling, and disposal. Evaluating the economic feasibility and potential advantages of various strategies can assist policymakers and industry participants make well-informed judgements that balance ecological sustainability and financial factors.

Solid waste management increasingly focuses on emerging topics such as sustainability and life cycle assessment. Scholars may evaluate the ecological consequences of waste management methodologies across their complete life cycle, encompassing waste creation, gathering, conveyance, treatment, and elimination. Adopting a holistic approach facilitates a thorough comprehension of the environmental ramifications. It facilitates the identification of potential avenues for enhancement to mitigate the aggregate environmental impact of waste management procedures.

The effective management of solid waste necessitates interdisciplinary collaboration and knowledge sharing to tackle the complex challenges involved. Interdisciplinary collaboration among researchers, practitioners, policymakers, and industry stakeholders can promote novel solutions and expedite the implementation of optimal methodologies. The dissemination of knowledge and experiences across diverse geographical regions and nations can facilitate the recognition of efficacious waste management models and the transference of successful methodologies.

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