Computational Analysis of Waste Management and Entrepreneur using VosViewer application

by E S Soegoto

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Abstract

This study aims at analyzing waste management and its relationship with entrepreneurs through research mapping analysis using the VOSviewer application. This research method used descriptive analysis with a bibliometric quantitative approach based on research terms. The research data obtained is based on search results through Google Scholar by using Publish or Perish software with "Waste Management and Entrepreneur" as the keywords. From the data generated in the last five years (2017-2022), 997 scientific articles were obtained. The study results show that research regarding the "Waste Management and Entrepreneurs" topic in the range of 2018-2019 is numerous. However, the trend of research on this topic began to decline in the following years. In conclusion, research with the "Waste Management and Entrepreneur" topic is currently still a relevant field of research to be studied, and it is not a research field that has been widely discussed. Therefore, this research is expected to be a reference for researchers in determining the research topic to be studied.

1. Introduction

Increasing environmental awareness, such as advancing natural resource depletion and a declining environment, has given rise to the concept of sustainable development, which also entails control because it emphasizes the three main components of development—economic, social, and environmental [1]. Furthermore, the environment is critical to human survival, and entrepreneurs are critical to economic progress. Entrepreneur, as important as it is, requires enterprising individuals to address the environmental consequences and ramifications of their economic activities. Entrepreneurs can improve both societal well-being and the development of an ecologically sustainable economy [2]. Entrepreneur opportunities exist in the role of local initiatives in a changing environment for urban waste management [3]. The amount of urban waste that can be transported and disposed of to the TPA is 60–70% of total urban waste, with the remaining being distributed to pollute the environment [4]. Waste is a defective and unpleasant object that is formed as a result of various human actions and is of no value, damaged, or useless after its primary use [5]. The informal waste management industry may help to recycle resources, generate income, and create employment opportunities [6]. Many scholars have studied waste management and entrepreneurs, such as Mititelu et al., who explored supporting sustainable development and entrepreneurship at universities through waste management. According to the findings, students can be encouraged to participate actively in developing ideas for social and environmental entrepreneurship, as well as in building and strengthening local territorial networks to contribute to the development of a service system that prioritizes responsible and sustainable entrepreneurial development [7]. Jordao et al. investigate the viability of enterprises in the reuse of textile waste in Portugal. According to the findings, business structures that support sustainable growth while balancing economic success with environmental and social benefits should be established [8]. Prasetya et al. study the possibility of creating the One Village Program for MSMEs in Malang City, focusing on waste management as the most effective strategy for enhancing the community's economy. The findings indicate that waste management can promote societal wellbeing and boost the local economy [9]. Besides, green entrepreneurship was analyzed by Ataman et al. in light of the possibilities it presents for entrepreneurship growth in Nigeria. According to the findings, most rich nations as well as many developing countries, have made substantial efforts to meet UNEP's green criteria [10]. However, the previous research indicates a lack of study in the mapping of waste management and entrepreneurial areas. As a result, the focus of this research is to conduct waste management and entrepreneur analysis using the VOSviewer application research mapping analysis. This research method combined descriptive analysis with a bibliometric quantitative approach based on research keywords.

2. Materials and Methods

This research method used a descriptive analysis with a bibliometric quantitative approach based on research terms. The research data obtained is based on search results with the "Waste Management and Entrepreneur" keywords through Google Scholar by using Publish or Perish software. Data collection in this study came from journals that have been published and indexed by Google Scholar. Google Scholar was chosen because it is a scientific article platform that indexes many journals for free so the data obtained is relatively numerous [11]. This research used a literature study using publish or perish software version 8. After that, the data obtained will be processed using VOSviewer software to generate a visualization of the mapping of the research terms. The data obtained from the Publish or Perish software were as many as 997 articles with the "Waste Management and Entrepreneur" keywords. First, the data from Publish or Perish is saved in the ".ris" format to be able to be visualized in the VOSviewer application [12]. After that, the VOSviewer software generates the mapping of interrelated terms in three types of visualization, namely network, overlay, and density visualization. We have filtered the data from the 997 articles in

the converting process so that it does not display irrelevant keywords from the "Waste Management and Entrepreneur" topic.

3. Results and Discussion

3.1. Research developments in waste management and entrepreneur

The data collection in this study was using the publish or perish software. In searching the data, we used the waste management and entrepreneur keywords in the period 2017 to 2022, which have been published on Google Scholar. From the search results, there were 978 articles relevant to these keywords. The total development of publications on the theme of waste management and entrepreneurship is shown in Figure 1.
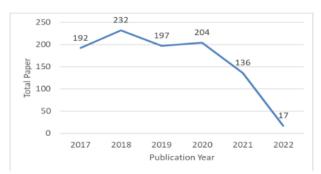

Figure 1. Graphics of scientific articles with the waste management and entrepreneur theme

Figure 1 shows that research is increasing every year, starting from 2017. Although research declined in 2020, in 2021, it increased significantly that the number of papers reached 132. In addition to the search results that have been done on Publish or Perish, we got 132 articles that match the research topic. From these data, we have filtered 20 articles with the most citations from 20 different journals (see Table 1). Table 1 shows data for 10 articles with the highest citations from a total of 978 articles obtained. The highest citations were 1236 in articles published in 2021. While the lowest citations were in 2017 with 136 citations.

3.2. Visualization of waste management and entrepreneur using the vosviewer application

To perform bibliometric analysis, we need software that can provide excellent visualization. VOSviewer application is chosen because it has 3 types of mapping visualization. The mappings are network, overlay, and density visualizations. The mapping results on Vosviewer obtained as many as 68 items divided into 6 clusters. Research related to waste management and entrepreneurship based on visualization mapping analysis is divided into 6 clusters.

In Cluster 1, there are 15 items namely condition, context, example, food waste, infrastructure, part, project, sanitation, service, social entrepreneur, social entrepreneurship, solution, success, transition, and waste management system (see Figure 2). While in Cluster 2, 14 items were obtained including application, benefit, community, concept, consumer, local entrepreneur, organization, paper, perception, researcher, social enterprise, stakeholder, term, and waste management service (see Figure 3). Meanwhile, in Cluster 3, there are 12 items, namely assessment, brazil, business model, china, construction, cost, India, Nigeria, reduction, reuse, solid waste, and solid waste management (see Figure 4). In Cluster 4, there are 10 items, namely challenge, firm, importance, person, plastic, plastic waste, plastic waste management, research, successful entrepreneur, and year (see Figure 5). Furthermore, in Cluster 5, there are 9 items, namely field, focus, order, policy, resource, time, university, use, and waste management practice (see

Figure 6). Lastly, in Cluster 6, 8 items were obtained, namely environmental management, government, influence, market, relationship, smes, type, and way (see Figure 7).

Table 1. The Highest Citation Article Data on the theme of waste management and entrepreneur

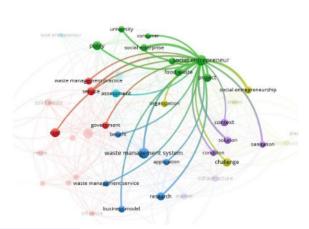| No	Authors	Title	Cites	Year	Source
1	K Kollman	Outside lobbying [13]	1236	2021	Outside Lobbying
2	JA Ottman	The new rules of green marketing: Strategies, tools, and inspiration for sustainable branding [14]	910	2017	Routledge
3	K Witkowski	Internet of things, big data, industry 4.0–innovative solutions in logistics and supply chains management [15]	560	2017	Procedia engineering
4	JG Dees, BB Anderson	Sector-bending: Blurring the lines between nonprofit and for-profit [16]	464	2017	In search of the nonprofit sector
5	T Wry, JG York	An identity-based approach to social enterprise [17]	425	2017	Academy of Management Review
6	O Dedehayir, SJ Mäkinen, JR Ortt	Roles during innovation ecosystem genesis: A literature review [18]	260	2018	Technological Forecasting and Social
7	C Milano, M Novelli, JM Cheer	Over-tourism [19]	184	2022	Encyclopedia of Tourism Management and marketing
8	X Neumeyer, SC Santos	Sustainable business models, venture typologies, and entrepreneurial ecosystems: A social network perspective [20]	178	2018	Journal of cleaner production
9	A Schallmo, R Daniel	Digital Transformation Now! Guiding the Successful Digitalization of YourBusiness Model [21]	148	2018	Springer Science
10	T Wallace, D Gibbons, M O'Dwyer, TP Curran	International evolution of fat, oil and grease (FOG) waste management–A review [22]	136	2017	Journal of environmental management

Figure 2. Cluster 1 network visualization of waste management and entrepreneur
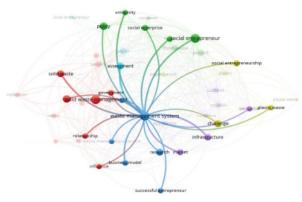

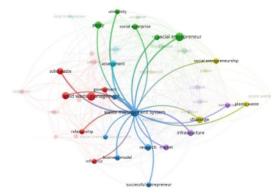**Figure 3.** Cluster 2 network visualization of waste management and entrepreneur

Figure 4. Cluster 3 network visualization of waste management and entrepreneur
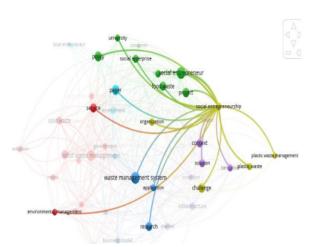
Figure 5. Cluster 4 network visualization of waste management and entrepreneur
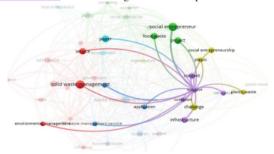

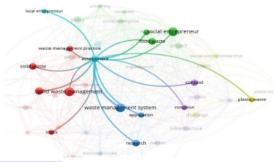**Figure 6.** Cluster 5 network visualization of waste management and entrepreneur

Figure 7. Cluster 6 network visualization of waste management and entrepreneur

3.3. Network visualization of waste management and entrepreneur using vosviewer software

Network visualization is one of the mapping features in the VOSviewer application [23,24]. The network feature serves to provide an overview of the mapping between interconnected terms along with the magnitude of the terms

indicating the research numbers have been done on these terms [25,26]. In this network mapping, it is shown the relationship between terms and what number of clusters are included. Each term described can be connected to more than one other term, which shows the determination of the term on the research topic under study. In Figure 8, it is shown the network visualization on the theme of waste management and entrepreneurship.
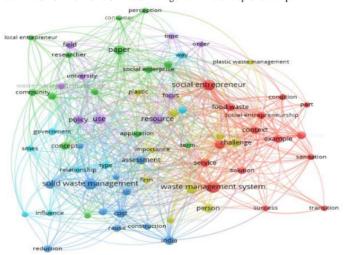

Figure 8. Network visualization of waste management and entrepreneur

In Figure 8, it is shown that the network visualization has many colors, both in terms and the color of the lines connecting them. It illustrates that the theme under study is divided into several sub-study with interrelated terms in it. In Figure 8, there are six colors, namely red, light blue, dark blue, yellow, green, and purple. The six colors represent sub-chapters of the interrelated research.
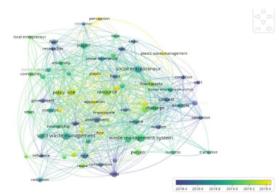
3.4. Overlay Visualization Using VOSviewer

Figure 9. Network visualization of waste management and entrepreneur

Overlay Visualization describes the mapping of research novelty on terms related to time range references [27,28]. In the lower part, there are color parameters ranging from the darkest (purple) to the lightest (yellow). The darker the term or the connecting line means that the year the article was published discussing the topic is in the past years, while the lighter one, such as green or yellow, is a sign that the article will be published in the near future. Figure 9 shows the overlay visualization of Waste Management and Entrepreneur

3.5. Density Visualization

The last mapping visualization type in VOSviewer software is density visualization. In this section, it is shown the popularity of the terms used as research topics. In Figure 10, it is shown that if the color that appears in a term is bright yellow, then the term is very popular in research [29,30]. On the other hand, if the color of the term is dark or faded, then the term is rarely researched. The following is a visualization of the Density Visualization of Waste Management and Entrepreneur. This result also confirms the effectiveness of bibliometric analysis [31-47] to explore and visualize the current literature that can be used for deciding whether further research be done.
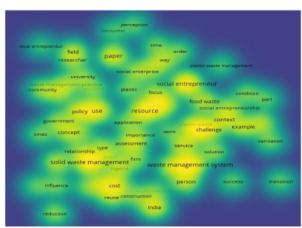

Figure 10. Density visualization of waste management and entrepreneur

Conclusion

Based on the results of the mapping on the VOSviewer software, it can be concluded that the waste management and entrepreneur topic is still relevant for further research. Moreover, the number of studies in 2021 decreased quite dramatically, only 136 compared to the previous 204 articles. Research on the theme of waste management and entrepreneurship is also quite popular for the same research with a total of 1236 citations published in 2021. It means that research in this field has quite a large impact on further research references.

Acknowledgment

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