

Zero-Waste Management and Sustainable Consumption in 2011-2021

Subjects: Management

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The growth of waste generation is a global problem. Developing effective waste management methods is challenging for companies and the government. There is a growing trend in the number of zero-waste management's publications and citations during 2011-2021. Regarding the h-index, the five most relevant journals are the Journal of Cleaner Production, Resources Conservation and Recycling, Waste Management, Waste Management Research, and Sustainability.

Keywords: zero-waste management ; sustainable consumption ; sustainable development

1. Introduction

Waste management has become a phenomenon that has changed since, in the past, waste was perceived as a cost with landfilling as a typical management approach, but now there has been growing recognition of its potential value ^[1]. However, waste is still a significant problem in many countries, despite increased outlays on rational waste management ^[2]. Hence, changing people's mentality and pro-environmental concepts is still necessary to develop waste management systems.

In this sense, waste management considers collection, transportation, sorting, treatment, final disposal of waste, and monitoring ^[3]. In this context, waste hierarchy (prevention, reuse, recycling, recovery, and—in the case of the last option—disposal) is crucial to conserve natural resources and protecting the environment ^[4]. Therefore, the concept of zero waste approach involves redesigning the resource supply chain, so that end products or derived materials are reused or recycled ^[1]. In this sense, waste recycling has grown, and a green business strategy can be a challenge and a fruitful opportunity to develop more innovative business models, products, and/or services. Thus, sustainability has become increasingly crucial for the development of society, industry, and scientific research ^{[5][6][7][8]}, since a global concern is precisely the accelerated consumption of resources that ignores the finite capacity of the planet ^[8], neglecting consumption and sustainable development.

One of the first widely accepted definitions of sustainability is the “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” ^[9]. Olawumi and Chan ^[10] have presented three unified areas of society, the economy, and the environment in a model to define the concept of “sustainable development”. Therefore, sustainability is a multidisciplinary concept that spans industry, economy, agriculture, and consumption ^{[11][12][13]}. Viewed from the business perspective, sustainability states the importance of integrating economic, environmental, and social themes in business management ^[14]. On the other hand, the Circular Economy (CE) is also trending and a concept of great interest to academics and experts, because it is considered an operationalization for businesses to implement the considerably debated notion of sustainable development ^{[15][16][17][18][19]}. The circular economy definition is well-known as an alternative to the linear economy, with many different meanings for the other stakeholders of society ^[20]. One of the most accepted definitions, as conceptualized by Ellen MacArthur Foundation ^[16], understands CE as an economy that is either restorative or regenerative by its intention and design. This conception leads to the practical extension of CE perspectives, whereby all economic activities—including reuse, remarketing, repair, remanufacturing, and technological updating of products—extend the service lives of items, components, and materials, ^{[16][21]} allowing added value to the products and contributing to waste reduction ^[22].

2. General Structure of Publication and Citation

According to the Web of Science database, 2534 papers have been published on zero-waste management and sustainable consumption, only considering articles, reviews, letters, and notes. During the last decade, the growth of publications related to this area was exponential. In more detail, from 2011 to 2014, the number of published articles remained stable. However, since 2015, the increase has been drastic, standing out with greater emphasis during 2019–

2021, with 54.61% of the total publications. This evolution demonstrates the significance of this topic in contemporary literature.

Regarding the total number of citations received, the WoS database shows that between 2011 and 2021, the 2534 articles received 54,253 citations, with a ratio of 21.41 citations per article.

3. Keywords

VOSviewer (version 1.6.18, Centre for Science and Technology Studies, Leiden University, The Netherlands) finds 6989 keywords for the topic from the 2534 articles that are connected to it. However, in this assessment and standardization, only 50 keywords have attained at least 19 repetitions. Therefore, the amount was rectified, and the keywords were divided into five groups based on similarity.

According to the VOSviewer (version 1.6.18, Centre for Science and Technology Studies, Leiden University, The Netherlands) findings, the three most relevant clusters are red, yellow, and blue. In the red cluster, the most used keywords are waste management, sustainability, and sustainable development, with 301, 261, and 255 occurrences, respectively. This group of articles is grouped by the direct relationship between waste management and sustainable development, in how changes in environmental behavior have modified the behavior of individuals when making decisions with a sustainable approach. In the case of the yellow cluster, the circular economy concept is the most influential, with 255 repetitions. This group focuses on articles highlighting the importance of a sustainable and friendly economy with society and the economy in how new environmental policies and strategies of society and institutions contribute to a more environmentally friendly world. Finally, the most relevant term in the blue cluster is life cycle assessment, with 130 occurrences. This group of articles focuses on the systematic analysis and evaluation of the cycle of life in the face of environmental impact, focusing specifically on the stages of waste disposal and environmental impact.

Additionally, VOSviewer (version 1.6.18, Centre for Science and Technology Studies, Leiden University, The Netherlands) indicates chronologically which are the most current research trends. For example, the direct and strong relationship between the circular economy and sustainable development goals presents new challenges for environmental studies in recent years. For instance, the studies focused on absorption capabilities related to the organizational ability to innovate in processes that acquire, assimilate, transform, and explore environmental knowledge ^[23].

4. Leading Most Cited Papers

Another interesting aspect is analyzing the most cited and influential papers on Zero-Waste Management and Sustainable consumption during the last decade. This indicator shows an article's contribution to the research approach ^[24]. However, it may happen that the most cited article is not necessarily the most influential ^[25]. There is a possibility that a new investigation with strong potential has been published recently, but it needs time to be a consolidated reference ^[24].

Based on these results, it can be suggested that both pieces of research stand out for their importance and influence. On the other hand, when considering the highest ratio of average citations per year, the situation changed, since two articles published during the last few years stand out. The paper with the best rate is 324.50 citations per year, written by Kirchherr, Reike, and Hekkert ^[20], followed by Ferronato and Torretta with 143.50 citations per year ^[26]. Additionally, it is observed that 8 of the 25 most influential articles of the last decade have been published in the Journal of Cleaner Production ^{[27][28][29][30][31][32][33][34]}.

The bibliographic coupling method performs a second analysis of the most cited articles. For this analysis, documents with at least 150 citations have been considered in VOSviewer (version 1.6.18, Centre for Science and Technology Studies, Leiden University, The Netherlands). As a result, 50 papers have been classified and grouped into 5 clusters. In addition, these articles have been grouped concerning their content similarity in keywords, titles, and abstracts. The article by Kirchherr, Reike, and Hekkert is the first of the red cluster's 19 publications ^[20]. The most significant piece in the green cluster, which consists of 9 papers, is Al-Oqla and Sapuan ^[30]. The most notable article of the eight investigations in the blue cluster was written by Papargyropoulou, Lozano, Steinberger, Wright, and Ujang ^[27]. In the instance of the yellow cluster, which consists of five articles, Ferronato and Torretta's work is the most often mentioned ^[26]. Finally, the research by Mourad ^[35], which comprises just two publications, sits at the top of the purple cluster.

5. Leading Journal

When analyzing the most influential journals, it is possible to evaluate the impact and preference according to the number of articles published, total citations, and indexing ^[36]. According to the WoS database, 2534 articles have been published in 269 journals. Specifically, the Journal of Cleaner Production, which has 443 articles and 15,573 citations, is the most influential journal—followed by Resources Conservation and Recycling, with 302 papers and 11,619 citations. Both journals account for 50.12% of citations and 29.40% of published articles between 2011 and 2021. In addition, both publications are part of Elsevier and have a quartile 1 (Q1) impact factor.

6. Leading Authors

An additional method of analyzing the author is through bibliographic coupling. This analysis is helpful in structuring the research collaboration networks ^[37]. Studies, Leiden University, The Netherlands) was used to produce a map that reveals the structure of the most influential authors. The results illustrate the number and relationships of references the analyzed articles have in common with authors who have participated in at least 6 publications and obtained at least 40 citations. As a result, 5 clusters of authors have been created (28 authors in total). The articles with the highest link strength were written by collaborative group leaders Vincenzo Torretta and Ferronato Navarro (Green cluster). In addition, the leaders of each cluster are Tsang (Red cluster), Ruben Aldaco and Jinhui Li (Yellow cluster), Ming-Lang Tseng (Blue cluster), and Neven Duic (Purple cluster).

7. Leading Universities Affiliation

Universities play a crucial role in generating, promoting, and disseminating knowledge. As a result, it is vital to examine the essential institutions worldwide that have contributed to the theoretical and empirical literature in the discipline field being studied across time ^[38].

According to the Web of Science database, 2756 institutions have contributed at least 1 article on zero-waste management and sustainable consumption studies. However, the results reveal more affiliations than the number of papers because some publications have been written by a group of researchers affiliated with different institutions.

On the other hand, a relational analysis has been developed for those institutions with more than fourteen associated articles through the VOSviewer (version 1.6.18, Centre for Science and Technology Studies, Leiden University, The Netherlands) software ^[39]. As a result, the research institutions have been grouped into three clusters. This map helps people know which universities collaborate and create knowledge together. According to the results, the Chinese Academy of Sciences is the principal institution in the green cluster, which comprises nine institutes (China). Hong Kong Polytechnic University (China) leads the red cluster of ten institutions, and Tsinghua University oversees the blue cluster of seven institutions (China). Therefore, the results can affirm that Chinese institutions are at the forefront of the current research on zero-waste management and sustainable consumption.

8. Leading Regions

Previous studies have indicated that geographic distribution allows for measuring the research location's concentration or diversification ^[40]. For example, according to WoS records, there are 2576 affiliations in 115 countries or regions on 5 continents. It is suggested that zero-waste management and sustainable consumption is a topic that attracts the attention of researchers from different locations. Still, it is not possible to consider a diversified area worldwide.

References

1. Awasthi, A.K.; Cheela, V.R.S.; D'Adamo, I.; Iacovidou, E.; Islam, M.R.; Johnson, M.; Miller, T.R.; Parajuly, K.; Parchomenko, A.; Radhakrishnan, L.; et al. Zero waste approach towards a sustainable waste management. *Resour. Environ. Sustain.* 2021, 3, 100014.
2. Mesjasz-Lech, A. Reverse logistics of municipal solid waste—Towards zero waste cities. *Transp. Res. Procedia* 2019, 39, 320–332.
3. Gharfalkar, M.; Court, R.; Campbell, C.; Ali, Z.; Hillier, G. Analysis of waste hierarchy in the European waste directive 2008/98/EC. *Waste Manag.* 2015, 39, 305–313.

4. Singh, A.; Sushil. Developing a conceptual framework of waste management in the organizational context. *Manag. Environ. Qual. Int. J.* 2017, 28, 786–806.
5. Armindo, J.; Fonseca, A.; Abreu, I.; Toldy, T. Perceived importance of sustainability dimensions in the Portuguese metal industry. *Int. J. Sustain. Dev. World Ecol.* 2019, 26, 154–165.
6. Joseph, J.; Orlitzky, M.; Gurd, B.; Borland, H.; Lindgreen, A. Can business-oriented managers be effective leaders for corporate sustainability? A study of integrative and instrumental logics. *Bus. Strat. Environ.* 2018, 28, 339–352.
7. Szopik-Decpczyńska, K.; Kędzierska-Szczepaniak, A.; Szczepaniak, K.; Cheba, K.; Gajda, W.; Ioppolo, G. Innovation in sustainable development: An investigation of the EU context using 2030 agenda indicators. *Land Use Policy* 2018, 79, 251–262.
8. Mura, M.; Longo, M.; Zanni, S. Circular economy in Italian SMEs: A multi-method study. *J. Clean. Prod.* 2020, 245, 118821.
9. Sustainability Plan. Available online: https://www.latrobe.edu.au/__data/assets/pdf_file/0005/554927/Sustainability-Plan-2013-2017.pdf (accessed on 14 September 2022).
10. Olawumi, T.O.; Chan, D.W.M. A scientometric review of global research on sustainability and sustainable development. *J. Clean. Prod.* 2018, 183, 231–250.
11. Hopton, M.E.; Cabezas, H.; Campbell, D.; Eason, T.; Garmestani, A.S.; Heberling, M.T.; Karunanithi, A.T.; Templeton, J. J.; White, D.; Zanowick, M. Development of a multidisciplinary approach to assess regional sustainability. *Int. J. Sustain. Dev. World Ecol.* 2010, 17, 48–56.
12. Phillis, Y.A.; Andriantiatsaholiniaina, L.A. Sustainability: An ill-defined concept and its assessment using fuzzy logic. *Ecol. Econ.* 2001, 37, 435–456.
13. Sauvé, S.; Bernard, S.; Sloan, P. Environmental sciences, sustainable development and circular economy: Alternative concepts for trans-disciplinary research. *Environ. Dev.* 2016, 17, 48–56.
14. Schaltegger, S.; Burritt, R. Chapter 5: Corporate Sustainability. In *The International Yearbook of Environmental and Resource Economics 2005/2006*; Edward Elgar Publishing Limited: Cheltenham, UK, 2005.
15. Murray, A.; Skene, K.; Haynes, K. The Circular Economy: An Interdisciplinary Exploration of the Concept and Application in a Global Context. *J. Bus. Ethics* 2017, 140, 369–380.
16. Ghisellini, P.; Cialani, C.; Ulgiati, S. A Review on Circular Economy: The Expected Transition to a Balanced Interplay of Environmental and Economic Systems. *J. Clean. Prod.* 2016, 114, 11–32.
17. Camilleri, M.A. Sustainable Production and Consumption of Food. *Mise-en-Place Circular Economy Policies and Waste Management Practices in Tourism Cities. Sustainability* 2021, 13, 9986.
18. Tamasiga, P.; Miri, T.; Onyeaka, H.; Hart, A. Food Waste and Circular Economy: Challenges and Opportunities. *Sustainability* 2022, 14, 9896.
19. Rodrigo-Illarri, J.; Vargas-Terranova, C.-A.; Rodrigo-Clavero, M.-E.; Bustos-Castro, P.-A. Advances on the Implementation of Circular Economy Techniques in Rural Areas in Colombia under a Sustainable Development Framework. *Sustainability* 2021, 13, 3816.
20. Kirchherr, J.; Reike, D.; Hekkert, M. Conceptualizing the circular economy: An analysis of 114 definitions. *Resour. Conserv. Recycl.* 2017, 127, 221–232.
21. Kirchherr, J.; Piscicelli, L.; Bour, R.; Kostense-Smit, E.; Muller, J.; Huibrechtse-Truijens, A.; Hekkert, M. Barriers to the Circular Economy: Evidence from the European Union (EU). *Ecol. Econ.* 2018, 150, 264–272.
22. Aranda-Usón, A.; Portillo-Tarragona, P.; Scarpellini, S.; Llana-Macarulla, F. The progressive adoption of a circular economy by businesses for cleaner production: An approach from a regional study in Spain. *J. Clean. Prod.* 2020, 247, 119648.
23. Sehnem, S.; Queiroz, A.A.F.S.L.; Pereira, S.C.F.; Santos Correia, G.; Kuzma, E. Circular economy and innovation: A look from the perspective of organizational capabilities. *Bus. Strat. Environ.* 2021, 31, 236–250.
24. Merigó, J.M.; Gil-Lafuente, A.M.; Yager, R.R. An overview of fuzzy research with bibliometric indicators. *Appl. Soft Comput.* 2015, 27, 420–433.
25. Martorell Cunill, O.; Socías Salvá, A.; Otero Gonzalez, L.; Mulet-Forteza, C. Thirty-fifth anniversary of the International Journal of Hospitality Management: A bibliometric overview. *Int. J. Hosp. Manag.* 2018, 78, 89–101.
26. Ferronato, N.; Torretta, V. Waste Mismanagement in Developing Countries: A Review of Global Issues. *Int. J. Environ. Res. Public Health* 2019, 16, 1060.

27. Papargyropoulou, E.; Lozano, R.; Steinberger, J.K.; Wright, N.; bin Ujang, Z. The Food Waste Hierarchy as a Framework for the Management of Food and Food Waste. *J. Clean. Prod.* 2014, 76, 106–115.
28. Su, B.; Heshmati, A.; Geng, Y.; Yu, X. A review of the circular economy in China: Moving from rhetoric to implementation. *J. Clean. Prod.* 2013, 42, 215–227.
29. Merli, R.; Preziosi, M.; Acampora, A. How do scholars approach the circular economy? A systematic literature review. *J. Clean. Prod.* 2018, 178, 703–722.
30. Al-Oqla, F.M.; Sapuan, S.M. Natural fiber reinforced polymer composites in industrial applications: Feasibility of date palm fibers for sustainable automotive industry. *J. Clean. Prod.* 2014, 66, 347–354.
31. Kefeni, K.K.; Msagati, T.A.M.; Mamba, B.B. Acid Mine Drainage: Prevention, Treatment Options, and Resource: A Review. *J. Clean. Prod.* 2017, 151, 475–493.
32. Lim, S.L.; Lee, L.H.; Wu, T.Y. Sustainability of using composting and vermicomposting technologies for organic solid waste biotransformation: Recent overview, greenhouse gases emissions and economic analysis. *J. Clean. Prod.* 2016, 111, 262–278.
33. Notarnicola, B.; Sala, S.; Anton, A.; McLaren, S.J.; Saouter, E.; Sonesson, U. The role of life cycle assessment in supporting sustainable agri-food systems: A review of the challenges. *J. Clean. Prod.* 2017, 140, 399–409.
34. Bosmans, A.; Vanderreydt, I.; Geysen, D.; Helsen, L. The Crucial Role of Waste-to-Energy Technologies in Enhanced Landfill: A Technology Review. *J. Clean. Prod.* 2012, 55, 10–23.
35. Mourad, M. Recycling, recovering and preventing “food waste”: Competing solutions for food systems sustainability in the United States and France. *J. Clean. Prod.* 2016, 126, 461–477.
36. del Río-Rama, M.; Maldonado-Erazo, C.P.; Álvarez-García, J.; Durán-Sánchez, A. Cultural and Natural Resources in Tourism Island: Bibliometric Mapping. *Sustainability* 2020, 12, 724.
37. Reyes-Gonzalez, L.; Gonzalez-Brambila, C.N.; Veloso, F. Using co-authorship and citation analysis to identify research groups: A new way to assess performance. *Scientometrics* 2016, 108, 1171–1191.
38. Valenzuela Fernandez, L.M.; Nicolas, C.; Merigó, J.M.; Arroyo-Cañada, F.-J. Industrial marketing research: A bibliometric analysis (1990–2015). *J. Bus. Ind. Mark.* 2019, 34, 550–560.
39. Garrigos-Simon, F.J.; Narangajavana-Kaosiri, Y.; Lengua-Lengua, I. Tourism and sustainability: A bibliometric and visualization analysis. *Sustainability* 2018, 10, 1976.
40. Veloutsou, C.; Ruiz Mafe, C. Brands as relationship builders in the virtual world: A bibliometric analysis. *Electron. Commer. Res. Appl.* 2020, 39, 100901.

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