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BIBLIOMETRIC ANALYSIS OF STYROFOAM MIXTURE TRENDS IN LIGHTWEIGHT SOUNDPROOF CONCRETE WALLS

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Abstract
This research is to analyze Styrofoam mixtures in soundproof concrete walls based on classified material properties and their trends and to find out what topics can be used as research variables in the future. A literature review using a bibliometric analysis approach starts from defining the keywords 'Styrofoam Lightweight Concrete' and 'Journal' in the Publish or Perish application with the Google Scholar data base and narrowing the results by selecting the special topic 'Styrofoam Lightweight Concrete is soundproof with Styrofoam, obtained 97 articles from 500 articles from initial search results. Then meta data was compiled using the Vosviewer application, which was used to create research trend visualizations. The research results show that the classification of research regarding soundproof lightweight concrete with Styrofoam is divided into 8 clusters with topics centered on Styrofoam and lightweight concrete. From the bibliometric analysis of the Styrofoam mixture in soundproof lightweight concrete walls, it can be concluded that this research aims to analyze the material properties of the mixture and their trends. This research also aims to identify topics that can be used as research variables in the future. The results of the bibliometric analysis show increasing interest in the use of Styrofoam mixtures in soundproof lightweight concrete construction, with a focus on acoustic properties, mechanical strength and environmental sustainability. The most cited articles highlight Styrofoam's ability to improve the acoustic properties of concrete. It is hoped that the results of this analysis can provide guidance for researchers to continue further research in this field.

Keywords: *bibliometric analysis, Styrofoam, Lightweight Concrete, Soundproofing*

INTRODUCTION

Plastic waste is an environmental disturbance that cannot be considered an impactful problem. Marine organisms, humans and the environment that are polluted and exposed to waste have become a public concern and require saving the ecosystem and life within it. Looking at it from a positive angle, plastic is very useful in everyday life. To ensure environmental and health safety against toxic chemicals contained in plastic, there needs to be thorough monitoring so that exposure to toxins from these materials can be avoided, which will increase

the creation of a healthy society and environment. clean.[1]

However, it appears that this material can be considered as perpetual waste, posing significant challenges for soil decomposition. Styrofoam, essentially composed of expanded polystyrene (EPS), can pose hazards due to its chemical composition. Expanded polystyrene, a dense cellular plastic, is manufactured by molding small beads of expandable polystyrene, forming a structure with approximately 96-98% trapped air, often referred to as a closed-cell structure.[2]

EPS granules can be added to concrete mixes to create lightweight concrete. Styrofoam concrete blocks, though they have lower compressive strength, can serve as substitutes for bricks in non-structural components, reducing partition wall dead loads by approximately 50%. By incorporating recycled styrofoam into concrete blocks, there's an indirect reduction in environmental pollution and emissions from brick burning. Blocks composed of cement, styrofoam, and sand exhibit decreased water absorption and enhanced strength compared to mixes with total sand substitution by EPS. While complete aggregate replacement with Styrofoam slightly diminishes strength, substituting 30% of fine aggregate with EPS actually strengthens the mixture. Moreover, production costs are relatively cheaper than traditional bricks..[3]

Low density Styrofoam has lower mechanical properties compared to high density Styrofoam, poplar panels produced using high density have the lowest thermal conductivity results..[4]The reduced mass of the composite mold causes the composite Styrofoam ball to increase in its insulating behavior. Because of the consequent change in thermal conductivity, the compressive strength can be investigated.conductivity and compressive strength were investigated. Different volume fractions of particulates in concrete molds and ways to achieve uniform distribution rates of lightweight foam concrete are also worked out. The thermal conductivity at a certain volume fraction of lightweight foam which causes a loss in compressive strength at a concentration of 12% gains in thermal insulation behavior at a concentration of 30%. As a consequence of concrete, the acquisition of smaller mass molds can be achieved. Thus, with composite lightweight foam concrete, favorable advantages in insulating behavior and smaller mass casts are achieved at the expense of some losses in the compressive strength of cast composites.[5] identified the concrete mix proportions by determining that polystyrene beads as a substitute for coarse particles in concrete which are used to mix the material composition so that you get a light composition [6] Practical use of light aggregates in the construction sector is only effective after considering factors such as pre-wetting of the aggregate , sealing all pores/holes with polymer to minimize adsorption, Prior studies have demonstrated that lightweight aggregate (LWA) can substitute coarse aggregate in self-compacting concrete (SCC) without adversely affecting its performance. However, numerous findings suggest that LWA is also viable as a replacement for fine aggregate in SCC, with or without the addition of cement additives.[7]The concrete flexural strength values with varying volumes of Styrofoam (0%, 10%, and 30%) were determined, yielding averages of 7.00 MPa, 6.59 MPa, and 6.07 MPa respectively at 28 days. The percentage decrease in flexural strength when adding 10% and 30% volume of Styrofoam to regular concrete is 5.85% and 13.28% respectively. Consequently, as the volume of Styrofoam incorporated into the concrete increases, there is a corresponding decrease in compressive, split tensile, and flexural strength values.[8]

In terms of compressive strength, the 60% and 80% Styrofoam substitute concrete that has been tested meets the minimum limit for the compressive strength of lightweight concrete for lightweight structures. In the referencein this article is 7 - 17 MPa, while the test results obtained were 10.54 MPa. for 60% styrofoam substitution and 80% styrofoam substitution, 7.57 Mpa was obtained. Meanwhile, 100% styrofoam substitute concrete obtained a compressive strength value of 5.27 Mpa where it is used in non-structural areas such as

partition walls, canopies andothers. [9]The study experimented with fine aggregate compositions of 1:4 and 1:6 cement mixtures, incorporating varying percentages (0%, 20%, 40%, 60%, and 80%) of polystyrene waste. The evaluation of the mixture's acoustic performance was conducted through sound absorption coefficient tests using an Impedance Tube (ISO 140-3). Results indicated that the highest sound absorption coefficient values occurred at 800 Hz frequency. Specifically, with an 80% styrofoam addition in the 1:4 composition, the coefficient reached 0.4100 dB, while in the 1:6 composition, a 40% styrofoam addition yielded a coefficient of 0.5870 dB at the same frequency.[10]

The study employed a Sound Level Meter to measure the intensity both before and after passing through gypsum, plywood, and Styrofoam. The average absorption coefficient from largest to smallest for the frequency range 600-1000 Hz was gypsum, plywood and styrofoam. So it can be concluded that the best damping level for these three materials is gypsum. [11]The use of noise-absorbing materials is often used by researchers in their methods [12]. In particular, much research has been carried out to develop soundproof materials [13] and identify parameters closely related to sound absorption for numerical simulations [14].Based on the description above, the author is interested in studying "Bibliometric Analysis of Trends in the Effectiveness of Styrofoam Mixtures on Soundproof Light Concrete Walls"**)**with the main problem of researching the combination of mixtures using Styrofoam granules by comparing thicknesses to obtain concrete with a light weight and soundproof. thereby minimizing the impact of noise and health problems and reducing the impact of soil pollution

METHODOLOGY

Literature study with a bibliometric approach is used as a research method, using a method that is systematic, explicit and reproducible by looking at literature reviews. [15] [16] or emphasizing the limits of knowledge with mind mapping [17]. The bibliometric analysis method in this research was used with five steps [18]. Searching for articles and searching for keywords are initial search results, sorting and refining the results obtained by narrowing the topic, creating and analyzing them statistically

2.1 Defining Initial Search Keywords (Defining Search Keywords)

Used to collect literature on the topic "Soundproof Lightweight Concrete Using Styrofoam". The time range is between 2019 and 2024. Several popular databases include Scopus, Google Scholar and Mendelay for combined bibliometric analysis. Among them, Scopus is claimed to be “the largest single abstract and indexing database ever created”, consisting of 27 million abstracts with citations since 1966. [19] Research output states that Scopus contains a collection of quality peer-reviewed papers and is best known for its bibliometrics. wider. the latest coverage and information compared with the existing web [20]. Therefore, the data set used in this research is Scopus

2.2 Initial Search Results (Initial Search Results)

Documents were collected with five years of citations from 500 papers, the number of citations was 24,581 with 4,916 citations per year and 49 citations from papers per year. Data records were analyzed using bibliometric tools that focus on various aspects. The comprehension of the subject matter is pursued by examining keywords, authors, institutional affiliations, journals, and citations from gathered data. Visualization of extensive academic literature's statistical outcomes is conducted utilizing bibliometric tools such as PoP 8 Software and VOSviewer (version 1.6.18). Data visualization by entering queries into PoP software about"Styrofoam Light Concrete" by setting special conditions for journals by excluding newspapers, books, and institutional book references, authors, and keywords are displayed in image form. Literature on the target topic is analyzed based on the Google

Scholar database. Data obtained (searched March 22, 2024). initial search results (Initial Search Results), shown in the top twenty articles identified by PoP (Unrefined search) as shown in Table 1.

Table 1 Top Twenty Articles Identified by PoP (Unrefined Search)

Cites	Authors	Title	GSRank	Cites PerYear	Cites PerAuthor
2	F Handayani, HP Adi, SI Wahyudi	Mathematical analysis and experimental testing of floating building platform prototypes made from expanded polystyrene system (Styrofoam) and lightweight concrete.[40]	2	0.67	1
3	MN Asnan, R Noor, R Azzahra	Utilization of styrofoam-matrix for coarse aggregate to produce lightweight concrete.[41]	3	0.6	1
8	M Solikin, R Widiyanto, A Asroni, B Setiawan, ...	High content Styrofoam as partial substitution for fine aggregate in SCC lightweight concrete brick.[42]	4	1.6	2
4	DB Cahyono, HP Adi, SI Wahyudi	Lightweight concrete as covers on floating house platforms made from expanded polystyrene system (EPS) material.[43]	5	2	1
0	W Lukman, S Sumirin, A Antonius	Experimental Study of Lightweight concrete mechanical quantity with heated Styrofoam material.[44]	6	0	0
0	CW Park, SS Lee	Properties of Lightweight Foamed Concrete with Waste Styrofoam and Crude Steel Cement.[45]	7	0	0
0	L Abiansyah, A Rifdah	Compressive Strength of Structural Lightweight Concrete Using Styrofoam as an Aggregate Substitution.[46]	8	0	0
1	MHBINM NASRI, NM Noor	Use of Styrofoam Concrete in Construction Industry–A Review.[47]	9	0.5	1
24	HA Mahdi, KA Jasim, AH Shaban	Manufacturing and improving the characteristics of the isolation of concrete composites by additive Styrofoam particulate.[48]	10	4.8	8
31	H Liu, Y Xu, X Zhao, D Han, F Zhao, Q Yang	Lightweight leaf-structured carbon nanotubes/graphene foam and the composites with polydimethylsiloxane for electromagnetic interference shielding.[49]	11	15.5	5
55	M	Preparation and characterization of	12	11	11

	AbdElrahman, ME El Madawy, SY Chung, P Sikora, ...	ultra-lightweight foamed concrete incorporating lightweight aggregates.[50]			
85	PR Agrawal, R Kumar, S Teotia, S Kumari, ...	Lightweight, high electrical and thermal conducting carbon-rGO composites foam for superior electromagnetic interference shielding .[51]	13	17	17
64	T Jia, X Qi, L Wang, JL Yang, X Gong, Y Chen, Y Qu, ...	Constructing mixed-dimensional lightweight flexible carbon foam/carbon nanotubes-based heterostructures: an effective strategy to achieve tunable and boosted [52]…	14	64	8
97	Saheed, Sanusi Amran, Y H Mugahed El-zeadani, Mohamed Nora, Farah Aziz, A	Structural behavior of out-of-plane loaded precast lightweight EPS-foam concrete C-shaped slabs.[53]	15	19.4	49
82	T Wu, W Xu, K Guo, H Xie, J Qu	Efficient fabrication of lightweight polyethylene foam with robust and durable superhydrophobicity for self-cleaning and anti-icing applications.[54]	16	27.33	16
87	W Zhou, Y Zhang, J Wang, H Li, W Xu, B Li, ...	Lightweight porous polystyrene with high thermal conductivity by constructing 3D interconnected network of boron nitride nanosheets.[55]	17	21.75	12
143	J Li, Y Ding, N Yu, Q Gao, X Fan, X Wei, G Zhang, Z Ma	Lightweight and stiff carbon foams derived from rigid thermosetting polyimide foam with superior electromagnetic interference shielding performance.[56]	18	35.75	16
72	O Olofinnade, S Chandra, P Chakraborty	Recycling of high impact polystyrene and low-density polyethylene plastic wastes in lightweight based concrete for sustainable construction.[57]	19	24	24

2.3 Refinement of the Search Results

Article selection is carried out by selecting articles that do not comply with the screening criteria, based on the results of the data selection process which can be shown by citations of

articles that meet the requirements. From the initial number of 500, 97 articles were taken. It can be seen that the initial citation data was 24,581 after screening, it became 1,352. Table 3 depicts the metric data from the initial search and selective search. Because the main aim of this research is to analyze the trendiest research developments, a total of 24581 trendiest articles were selected from 2019 to 2024 from 500 articles. As Table 2,. This trend is associated with an increase in living standards seen through GDP growth of 2.9% [21] and population growth that emphasizes sustainable development [22]. This is a period of development in soundproof lightweight concrete research. The articles used for discussion and study were taken between 2019 and 2024

Table 2 Article Screening Results

Matriks Data	Initial Search	Refinement Search
Kata kunci	Lightweight Styrofoam	Lighthweight Styrofoam Soundproof
Source	Google Scholar	Google Scholar
Articel	500	97
Citation	24581	1352
Cites peryear	4916.20	270.40
Cites perauthor	49.16	13
Autthor per articel	4.77	2.67

2.4 Compile Statistics on the Initial Data

The results of the search after being refined and selected are then , they are then downloaded and saved as information data and we save them in Publish or Perish, Mendeley and export them into RIS format. This aims to explore and examine important information from the paper, title, author's name, abstract, keywords, then we can process the data by sorting and selecting in detail the journal specifications, year of publication, volume, issue and pages of the article.

2.5 Data analysis

The research report is presented using bibliometric analysis with the keyword 'Styrofoam Lightweight Concrete' then the search is narrowed to 'Soundproof Styrofoam Lightweight Concrete' from the Scopus and Google Scholar databases. The analysis in this paper used the Publish or Perish application and obtained 500 articles with initial search data of 24,581 citations (4916.20 citations/year). Refining search results based on predetermined categories left 97 articles (80.6% reduction). The topic narrowing process caused citations to change, namely 4916.20 citations and 270.40 citations/year.

RESULT AND DISCUSION

From the results of research and articles and citation levels based on Google Scholar rankings from authors J Li, Y Dingdan and other authors with the title Lightweight carbon foam [23] is an article that is widely cited with 143 citations on research trends in the field of lightweight concrete made from Styrofoam. in the materials field. The second most cited article is Saheed's article entitled Research on Lightweight Concrete Containing Foam Aggregate which has a total of 97 citations. Judging from the GS ranking, the article in first place is taken from the top level to the bottom. The Floating Building Platform Prototype Experiment Made from Styrofoam and Lightweight Concrete received citations per year of 0.67. [25], the article Utilizing Styrofoam in coarse aggregate was ranked second out of the top 20 articles with 0.6 citations [26]. To determine what keywords frequently appear, the results from the Publish or Perish application are taken by combining them into the VOSviewer application. In this description, it can be explained that the words that frequently appear are the word foam with a total of 9 and a connectedness of 0.964, followed by compound words with a total of 6

with a connectedness. 0.888. This data is based on looking at the frequency of quotationsThe key points of a particular study, which provide insight into research trends and topics of interest in a particular field are keywords. The frequency of publications reflects the aims and direction of the research. The 20 keywords most frequently mentioned in publications are listed in table 3, including “Foam” in publications (9), “Composite” (6), “panel” (6), “mixture” (5), “embodiment” (4), “porous material” (4), “aerogel” (3), “chracterization” (3),“lightweight aggregate ” (3), dan “insulating material” (3). The keywords “composite”, “mixture”, and “embodiment” reveal research on mixing concrete materials, and many studies conducted experiments on a small scale and used simulated aggregates. Cited topic keyword articles from CW Park,ssuses the keywords "lightweight foamed concrete," "waste polystyrene," "recycled content," and "cement.", look for article rank 17[24] is seen using the keyword ". Polystyrene foam”, “Boron nitride nanosheets”, “Thermal conductivity”. The article rank 2 in table 1 uses the keywords "Styrofoam", "Aggregate", "Lightweight-Concrete".[13]. In the article, authors Mahdi and Jasim used the search words "Styrofoam", Aggregate", and "Lightweight Concrete" [28]. The number of keywords that frequently appear can be seen in Table 3.

Table 3 Frequently Appearing Words

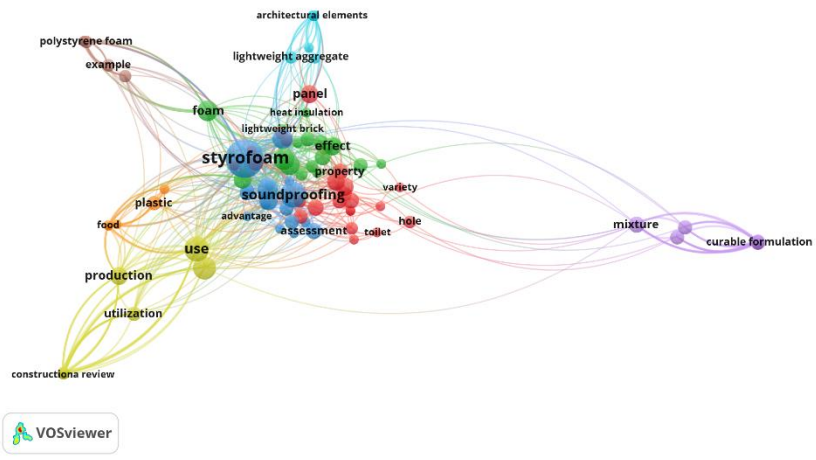
Term	Occurrences	Relevance score
foam	9	0.964
composite	6	0.8882
panel	6	0.7769
assessment	5	1.6555
mixture	5	0.6722
embodiment	4	0.7887
porous material	4	1.1902
aerogel	3	1.0925
characterization	3	0.7145
curable formulation	3	0.7887
curable mixture	3	0.7887
example	3	0.8572
hole	3	0.9269
insulating material	3	0.8489
invention	3	2.1072
lightweight aggregate	3	0.7784
noise	3	1.2684
non structural application	3	0.7887
poliuretan	3	0.8573
paper	3	0.8586

To visualize bibliometric maps in the form of three different visualizations, it is necessary to use the VOSviewer application. To describe the relationship between clusters and the items in them, network visualization is used, to determine the latest research, overlay visualization is used, and density visualization is used to determine the position of research density on the topic being searched .The number of events that appear is set to 2 and produces 103 keywords and a threshold, using the Publish or Perish application to get the full results. Of the 103 items, 8 clusters were found. The first cluster consists of 24 items, namely acoustic material, characterization, composite, development, door, hole, insulating material, noise,

panel, paper, shaft material property, recycling, sound proof, variety and wall. The cluster for the first cluster in Figure 1 is shown in red. For the second cluster it consists of 19 items such as foam, effect, building, head insulation, insulation, lightweight brick. For the representative of this cluster it is green, then the cluster in blue is the third cluster which consists of 17 items composition, construction, fabrication, lightweight concrete, polystyrene, soundproofing, Styrofoam, polyurethane. The fourth yellow cluster consists of 11 items, namely construction review, production. Cluster five consists of 9 items such as mixture, embodiment, water, curable formulation and purple. Cluster Six in blue consists of 9 items, namely durable, binder, architectural elements, lightweight aggregate, Cluster Seven in orange consists of 7 items such as plastic, plastic packaging, natural fiber. Cluster eight in brown consists of seven items consisting of polystyrene foam, resin, polyurethane foam. The division of clusters can be seen based on different colors as shown in Figure 1, which shows a visualization of the Vosviewer network. This network consists of nodes and lines connecting these nodes. Nodes represent keyword entities in a network, and edges represent relationships between these entities. The color and thickness of the nodes in the visualization have the following meaning: different colors represent different clusters (groups) of nodes. Nodes in the same cluster have the same color.Lighter colors indicate larger clusters with more nodes.Darker colors indicate smaller clusters with fewer nodes.Nodes with greater thickness indicate a higher level of connectivity, being linked to more nodes, whereas thinner nodes denote lower connectivity, connected to fewer nodes. In the depicted figure, blue nodes denote clusters related to "polystyrene foam". This node has a high level of connectivity, as it is connected to many other nodes in the network. The "lightweight aggregate" cluster is green and has a lower level of connectivity. The figure shows a diagram illustrating the relationships between items from clusters. Keywords are grouped into clusters, and the relationships between clusters are shown by thick lines. The main cluster in the figure is materials: This cluster includes words such as "polystyrene foam", "lightweight aggregate ", "panel", and "foam". Properties:

This cluster includes words such as "lightweight", "heat insulation", "soundproofing", and "variety".Usage: This cluster includes words such as "construction", "production", "utilization", and "assessment" .Advantage: This cluster includes words such as "advantage", "effect", and "property".Bold lines indicate strong relationships between clusters. For example, a thick line between the “Material” and “Property” clusters indicates that the material has strong properties. The thick line between the clusters "Use" and "Advantage" shows that the use of the material has advantages.Polystyrene foam is a light material.Panels have heat insulating properties. Use of polystyrene foam inconstruction can provide benefits in the form of sound insulation.

Fig1 Visualization of Research Trend Map



Overlay visualization and network visualization techniques are employed simultaneously, with network analysis conducted using VOSviewer software. Each node represents a single keyword, with node size indicative of the number of publications associated, while the relationships between keywords are depicted by connecting lines. Colored images highlight related studies that have similar aims. According to Overlay, the research items carried out are based on color brightness, the more recent the research year, the brighter the colors appear. The evolution of this research is reviewed during the period 2019 - 2024. Based on Figure 2 Overlay visualization, the distribution of green and yellow colors in research using Styrofoam can be interpreted to mean that the green areas on the map indicate areas with a lot of research conducted using Styrofoam. This happened between 2019 - 2021. Research can be characterized by the keywords "foam", "Styrofoam", "Sound proofing", Panel", "effect", "plastic". The yellow area on the map shows the latest research development areas. This will occur in the period 2022 - 2024. It can be seen that researchers have carried out new developments using the keywords "Lightweight aggregate", heat insulation, architectural elements, variety" and "production". The relationship between green and yellow shows variations in density and connection. both of them. occurrence, the keyword "panel" is 6. Resonance can be absorbed by perforated panel materials [29 the internal resonance effect underlies the sound absorption function which is different from porous materials [30] to expand the absorption frequency range various porous materials have been used such as perforated plates [31] [29] malleable materials [32] or permeable [33] At a low price polyurethane foam is a porous material that is often called “Polyurethane foam” [34]. Sound waves are obtained from connected polymer cellular structures with the ability to absorb frequencies of 1600 Hz [35], which are caused by vehicle and engine noise. Recent sound absorption research has focused on changing the size of polyurethane cavities to increase effectiveness [36]

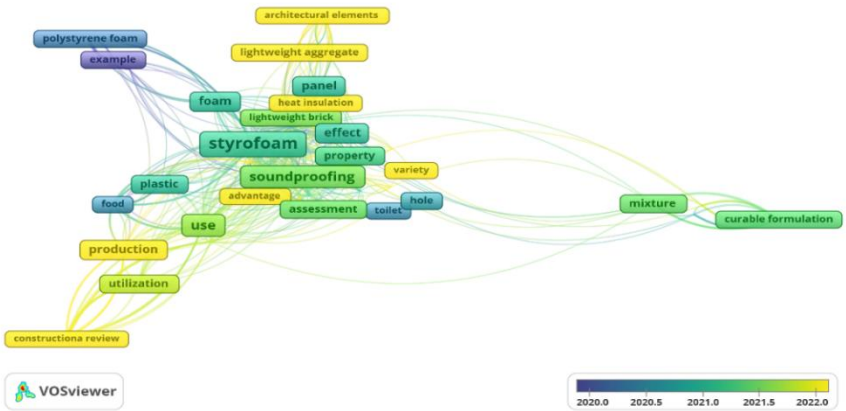


Fig 2 Overlay visualization

Based on Figure 3, the visualization of Styrofoam research trends shows that the popularity of Styrofoam continues to increase. This is demonstrated by the increasing number of studies conducted on styrofoam in recent years. Research on Styrofoam covers a wide range of topics, including production, use, and construction.Research Topics based on Styrofoam depth visuals is the main research topic, and research on Styrofoam has increased in recent years. Polystyrene foam: This is another term for styrofoam, and is also a popular research topic. Panels: Styrofoam is often used to make panels, and research on styrofoam

panels is also increasing. Lightweight aggregate: Styrofoam can be used as a lightweight aggregate in construction, and research on the use of styrofoam for this purpose is also increasing. Heat insulation: Styrofoam is a good heat insulator, and research on the use of styrofoam for heat insulation is also increasing. Lightweight brick: Styrofoam can be used to make lightweight bricks, and research into using styrofoam for this purpose is also increasing.

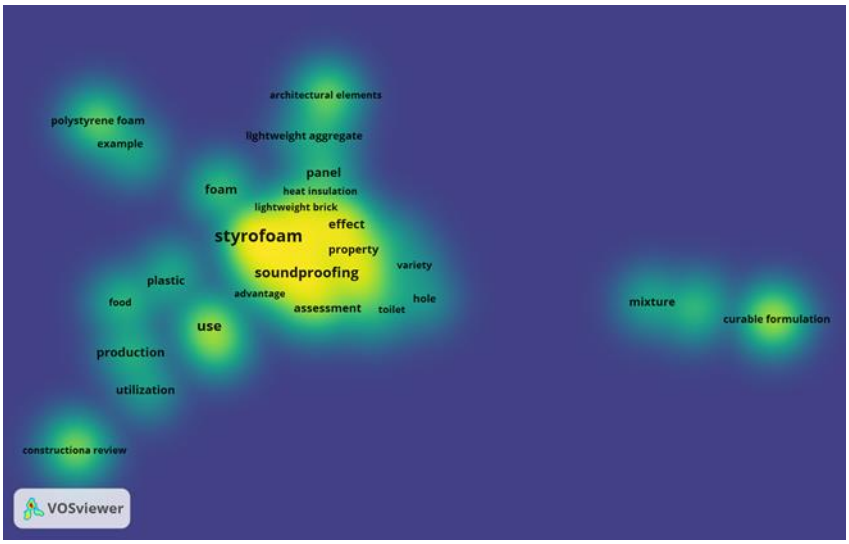


Fig 3 Depth (density) Research Trends

Styrofoam concrete, an innovative construction material, is renowned for its lightweight properties and durability. Even though it is environmentally friendly, styrofoam poses challenges in waste management because it is not biodegradable. Satisfactory mechanical strength and durability can be combined in civil engineering work made from styrofoam[19]. By incorporating waste materials like Styrofoam, there's a potential to enhance concrete's sound absorption capacity, thus promoting environmental sustainability within the construction industry.
[26]. Styrofoam's soundproofing capabilities, excellent thermal conductivity, and lightweight nature render it well-suited for use in concrete applications.[27]. With this context in mind, Styrofoam presents itself as a promising material for further investigation, particularly concerning its capacity to absorb sound within buildings.

From the results of the bibliometric analysis of Styrofoam mixtures in soundproof lightweight concrete walls, it can be concluded that there has been a significant increase in the number of publications discussing this topic, indicating increasing interest in the use of Styrofoam mixtures in soundproof lightweight concrete construction. The identified topic clusters highlight the research focus on acoustic properties, mechanical strength, environmental sustainability, and applications of Styrofoam materials in lightweight concrete. The most cited articles demonstrate the high interest in this topic, with research highlighting Styrofoam's ability to improve the acoustic properties of concrete. Bibliometric analysis offers a thorough perspective on research patterns and pertinent subjects concerning the utilization of Styrofoam blends in soundproofing lightweight concrete walls.

Discussion of the results of this analysis shows that Styrofoam mixtures have great potential in improving the performance of lightweight concrete in terms of soundproofing and environmental sustainability. With a focus on developing materials that are environmentally friendly and efficient in attenuating sound, further research in this area could make a

significant contribution to the construction industry. It is hoped that collaboration between researchers, industry and government can encourage innovation and practical application of the findings in this research to create more comfortable and sustainable buildings.

CONCLUSION

This research reviewed 500 articles on topics related to Styrofoam and soundproof lightweight concrete, initial search results with 24,581 citations (4916.20).Refining the search results based on predetermined categories left 97 articles (80.6% reduction); Data regarding citations also experienced changes, namely 4916.20 citations and 270.40 citations/year. Based on the bibliometric analysis of the Styrofoam mixture on soundproof lightweight concrete walls, several conclusions can be drawn as follows Research into Styrofoam admixtures in soundproofing lightweight concrete has become a significant topic in recent years, with an increasing number of publications reflecting increased interest in this area. The identified topic clusters show a research focus on Styrofoam, lightweight concrete, acoustic properties, and the application of this material in construction for soundproofing purposes. There is great potential in further exploration of Styrofoam's ability to improve the acoustic properties of concrete, as well as the application of this material for sustainability environment in the construction industry. Bibliometric analysis provides valuable insights into research trends and interesting topics in the field of Styrofoam mixtures in soundproof lightweight concrete walls, which can serve as a guide for researchers to pursue further research., this research provides an important contribution to the understanding and further development of the use of Styrofoam mixtures in soundproof lightweight concrete, as well as providing direction for future research agendas.

The differences in this research indicate the direction of future research with the theme of soundproof lightweight concrete panels mixed with Styrofoam. Overall, the material discussed tends to increase, so special attention is needed for more research collaboration regarding Polystyrene foam, Panels, Styrofoam, lightweight aggregates. , Heat insulation so that renewable research will emerge.

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