

## **Navigating the Intersection: A Systematic Review and Bibliometric Analysis on Affordable Green Sustainable Housing**

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### **Abstract**

The realization of affordable housing remains to be a challenge. The housing industry has emerged as a hub for innovation and growth in the shift towards a future that is more ecologically conscious and sustainable. The demand for housing that is both economically accessible and ecologically responsible has given rise to a significant body of research focusing on affordable green sustainable housing. This systematic review and bibliometric analysis investigate the expanding intersection of affordability and sustainability in the residential sector, offering a panoramic view of the academic terrain and identifying seminal works, prevailing themes, and emergent trends. The study aims to examine the extent of research conducted on materials by employing a bibliometric review and data mapping methodology. Methodological approach entailed a comprehensive database search, yielding a corpus of literature from which we extracted from scopus data points for bibliometric mapping. The analysis encompasses bibliographic data, citation patterns, authorship trends, and the geographical distribution of research contributions. The study provides a roadmap for future research areas and policy concerns in the pursuit of environmentally conscious and sustainable housing finance practices through the use of bibliometric analysis. The mapping process is done via Prisma framework and VOS viewer. The synthesis of these inquiries presents a comprehensive roadmap for policymakers, stakeholders, and researchers to further innovation in developing housing that can accommodate the twin imperatives of ecological responsibility and economic accessibility.

**Keywords:** Affordable Housing, Green Sustainable Housing, Bibliometric Analysis, Systematic Review, Innovative Housing

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### **Introduction**

A significant body of literature has emerged in the realm of green construction activities and interests. Developers and experts, including builders and architects, are increasingly focusing on incorporating green building requirements and energy-efficient features to optimize material usage in housing development. The shift has also impacted the building of inexpensive housing, resulting in benefits. The green construction standard and certification have been elevated to a new level known as Green Affordable Housing (GAH) to promote sustainability and combat global warming. The most recent version of BREEAM in the United Kingdom is known as Eco Homes. It is a style of home that incorporates green criteria and features, aiming to be sustainable and cost-effective (Hayles, 2005; Building Research Establishment (BRE), 2012). In the United States, the LEED version of GAH is referred to as Green

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Communities. Green Communities aims to assist developers in constructing environmentally friendly houses in a cost-efficient manner.

Trassos (2005) explained that the Green Communities provides developers with guidance on incorporating green standards and features into affordable homes utilizing design and decision-making tools. In Australia, the Green Star version of inexpensive housing with green elements is known as Ecocents Living. It incorporates an assessment system that integrates green principles with affordable housing criteria as part of the green construction standards and characteristics (Pullen et al., 2009). For instance, in Japan, the concept involves constructing housing with zero utility costs utilizing solar (PV) technology and designing it to reduce each house's energy use (Konami, 2009; Sekisui, 2005). In China, the Future Home Project aims to combine green building standards and Feng Shui principles to develop cost-effective housing.

Howe et al. (2007) suggested that the green standards and elements in this project adhere to indoor environmental quality. In Singapore, the Green Mark program assesses standards for green housing that are tailored to the country's tropical environment. The mechanical and electrical engineering aspects are designed and implemented according to the guidelines from the United States and Europe (Solidiance, 2010). In Malaysia, the National Housing Policy has established the "affordable housing criteria," while the Green Building Index Malaysia has defined the "green housing criteria." Currently, there is no existing combination of "GAH criteria and features" because there has been a lack of a basic approach in identifying the appropriate methodologies and standards to establish GAH criteria and features. Initial research has shown that these two basic elements create a gap in this study and hinder the proper adoption of GAH criteria and characteristics (Geng, 2004 and Metibogum and Raschid, 2013). Elforгани and Rahmat (2011) suggested that further research is needed to address green design creation and approaches in Malaysia. Green building design in Malaysia is considered below the recognized average.

Green Affordable Housing involves providing housing at a fair price that includes environmentally friendly building standards to enhance sustainability and quality of life for all individuals regardless of their economic levels. Green affordable housing is becoming more prevalent in the United States, United Kingdom, and Australia due to state and local legislation mandating green building standards for publicly owned or supported structures. Green affordable housing offers a chance to unite many players in the housing business, including as designers, developers, community advocates, and policy makers, to address the comprehensive issue of global warming (Global Green USA, 2007). Retsinas (2005) reported that over 14 million American households allocate over 50% of their income to housing, primarily low-income households, whereas 6.3 million households benefit from rental subsidies. Despite receiving financial assistance, about three million people still allocate more than 30 percent of their income towards housing costs. Financial constraints are linked to shelter poverty, which is associated with a household's incapacity to fulfill essential non-housing requirements, such food, clothing, medical care, and transportation, after paying for housing (Stone, 2006). Spending a high percentage of a household's income on housing will decrease affordability and hinder families from meeting fundamental requirements (Schwartz, 2009). This detrimentally impacts the financial stability of the family and could result in numerous relocations. For instance, a research conducted in Ohio revealed that 42% of families who allocated over half of their income on housing relocated within a six-month timeframe. Consequently, these frequent relocations can disrupt work routines, endanger job stability, and have adverse effects on children by

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impeding the development of fundamental abilities and raising the likelihood of school dropout. Inadequate housing is associated with health issues in families, such as higher rates of asthma, respiratory disease, lead poisoning, and poor nutrition, which can hinder a child's physical and intellectual growth (Sard & Waller, 2002). Thus, offering high-quality housing units should enhance equal social, educational, and economic possibilities and foster a more egalitarian environment for everyone.

It is essential to integrate sustainability into affordable housing communities to create a healthier environment and more cost-effective households. Leadership in Energy and Environmental Design for Neighborhood (LEED ND) employs many tactics that enhance the concepts of smart growth and new urbanism. This involves rejuvenating current metropolitan areas, minimizing land usage, decreasing reliance on automobiles, encouraging pedestrian movement, enhancing air quality, reducing contaminated stormwater runoff, and constructing more habitable communities for individuals of various income brackets (USGBC, 2009). These strategies focus on the following: 1) Promoting location efficiency involves encouraging new building in areas with accessible services and facilities like public transportation, walkable commercial areas, and existing municipal services. Additionally, redevelopment of Brownfield and infill areas; 2) Environmental conservation involves safeguarding waterways, wildlife habitats, endangered species, and valuable agricultural lands. 3) Resource efficiency entails utilizing technology and design expertise in various sectors such as construction materials, electricity, water treatment, and waste management to enhance effectiveness (Tsenkova & Syal, 2009). Although sustainable strategies have a good impact on affordable housing, there are issues that could reduce its effectiveness.

The challenges can be summarized as follows: Smart growth and compact development could lead to future development being concentrated inward, limiting the availability of land for homes and potentially driving up house prices (Voith & Crawford, 2004). An Environmental Impact Statement (EIS) is necessary for Brownfield developments contaminated sites. Reusing buildings will involve extensive cleanup efforts that might potentially delay construction, raise housing costs, and reduce affordability (Edwards & Haines, 2007). Design problems and limits are managing new technology, eco-friendly materials, trained labor, and construction rules that might raise the development cost and, consequently, the home price (Downs, 2005). This paper focussed on bibliometric analysis of affordable green sustainable housing.

## **2. Methodology**

### **2.1 Data Collection and Retrieval Strategy**

This study was conducted using the complete data gathering and data filtering procedures. At the beginning of this bibliometric evaluation, it is crucial to define the research objectives. This study focuses on analyzing the publishing trends of leadership excellence-related publications in the Scopus database. The research was conducted through a descriptive analysis approach utilizing document examination. The Scopus database was queried for the keywords "green sustainable housing" to collect data on February 20, 2024. The Scopus database was chosen for its huge collection of documents in comparison to Web of Science and Pubmed, as well as its frequent citation in prior studies (Sweileh et al., 2017). The bibliometric review follows the selection strategy and research process derived from the PRISMA flow diagram (Moher et al., 2010), depicted in Figure 1.

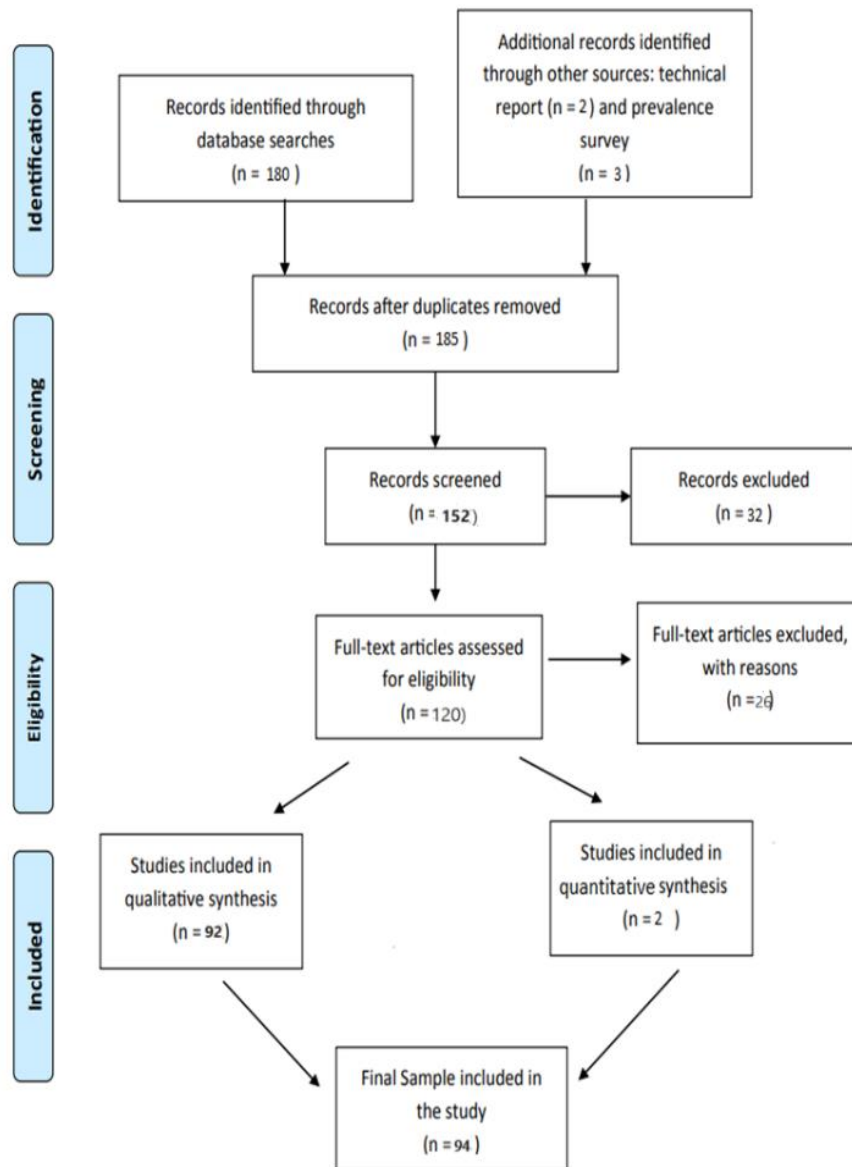


Figure 1: Selection strategy and research protocol

94 publications on leadership excellence were identified between 1980 and 2023. Among the 94 publications, there were 71 articles from different journals, 10 books, 3 conference papers, 6 commercial journals, and 4 book series. There were 90 publications in English, one in Afrikaans, two in Serbian, and one in Spanish. The review data was converted from Comma-separated Values (CSV) and Research Information Systems (RIS) formats to Microsoft Excel, Publish or Perish (PoP), and VOSviewer software for additional analysis. The gathered data comprised the author's name, publication year, and nations. VOSviewer software, created by Van Eck and Waltman in 2010, enables bibliometric analysis and visualization of leadership excellence articles. Van Eck and Waltman (2010) stated that VOSviewer utilizes visual features derived from mapping approaches to convert CSV data into diagrams or clusters. The mapping technique frequently assisted the researcher in assessing pertinent information such as authors, places, cocitations, and other refined aspects (Khalil & Crawford, 2015).

### 3. Results and Discussion

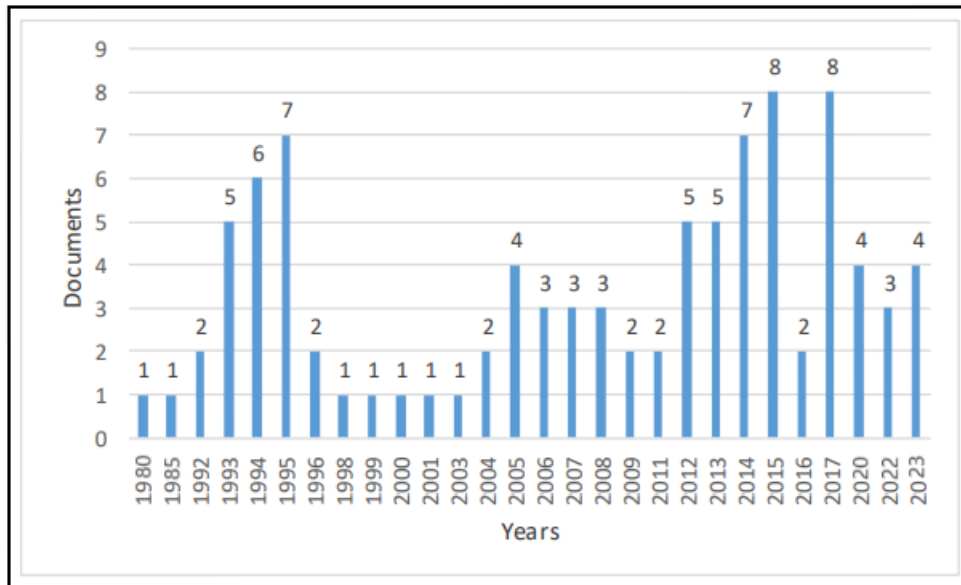


Figure 2: Global trend of publications

Figure 2 showed that 94 publications were released over a span of 43 years, with only four being publicly accessible. This suggests that the majority of the publications are not available for free and users would need to pay to access the content. It is suggested that publishing articles in open access will lead to a higher number of citations. The initial publication occurred in 1980, with no more records until 1985. Between 1985 and 1992, there was a shortage of leadership excellence publications, with less than five texts being released each year. The number of publications that began in 1993 with more than five papers. The number of publications increased by seven in 1995 and varied until 2023. There was only one publication between 1998 and 2003, showing a lack of growth in the number of publications. The peak number of articles occurred in 2015 and 2017, with eight publications each.

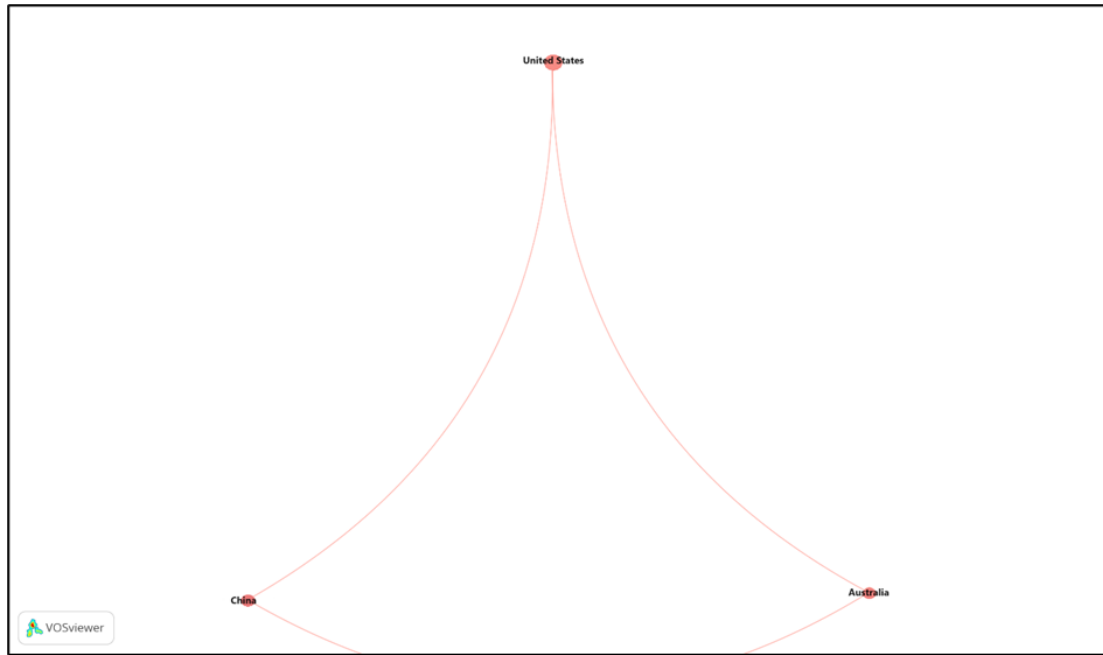


Figure 3: Citation network of the countries

Figure 3 shows a citations network comprising three countries: the United States, China, and Australia. The countries represented by the nodes with larger sizes

generated several articles. In this situation, the United States had more prominent nodes compared to the others. The United States has a significant amount of citations. China holds the second spot, while Australia is in third position. Therefore, those countries have been identified as crucial in advancing green sustainable housing and serving as a portal for knowledge.

Table 1: Status of the most prominent countries

Rank	Countries	Publications
1	United States	38
2	China	14
3	Australia	6
4	Canada	3
5	India	2
6	Germany	2

Table 1 displays the six most productive countries based on at least two publications. The United States is the most productive country in leadership excellence publications, with 38 scholarly books. China is second in productivity with 14 publications, while Australia ranks third with 6 publications. Researchers in underdeveloped nations are consistently assessing sustainable housing to address the challenges they face in improving the quality of their work. Figure 4 shows network visualization of most influential authors and Figure 5 shows density visualization of influential authors. Here Hsia, Elizabeth C., deodar, Atul, Sheng, Shihong etc. are shown high degree of density in co-authorship.

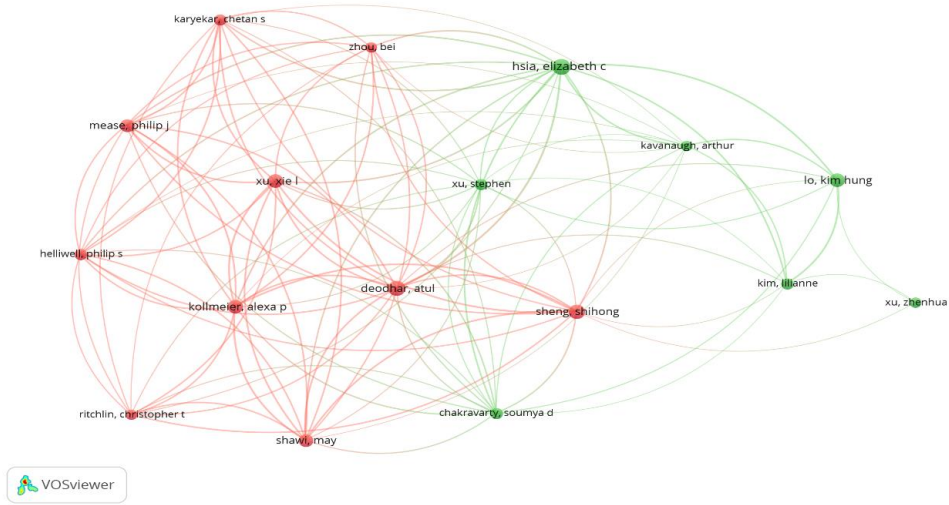


Figure 4: VOS Viewer Network Visualization of influential authors

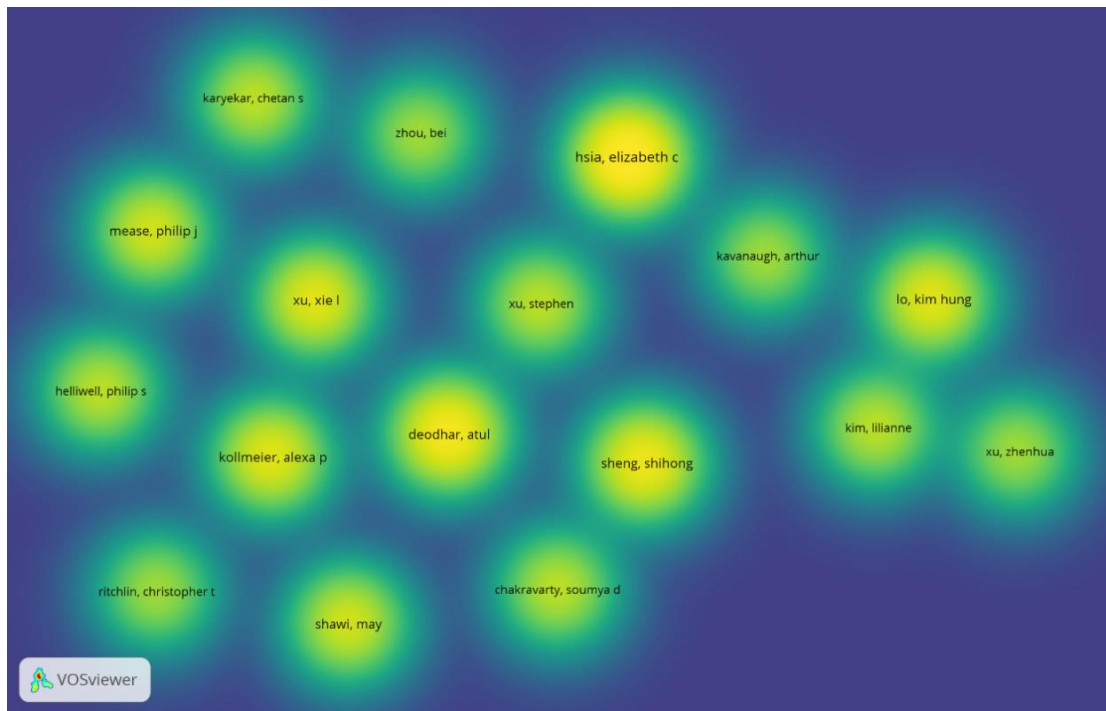


Figure 5: VOS Viewer Density Visualization of influential authors

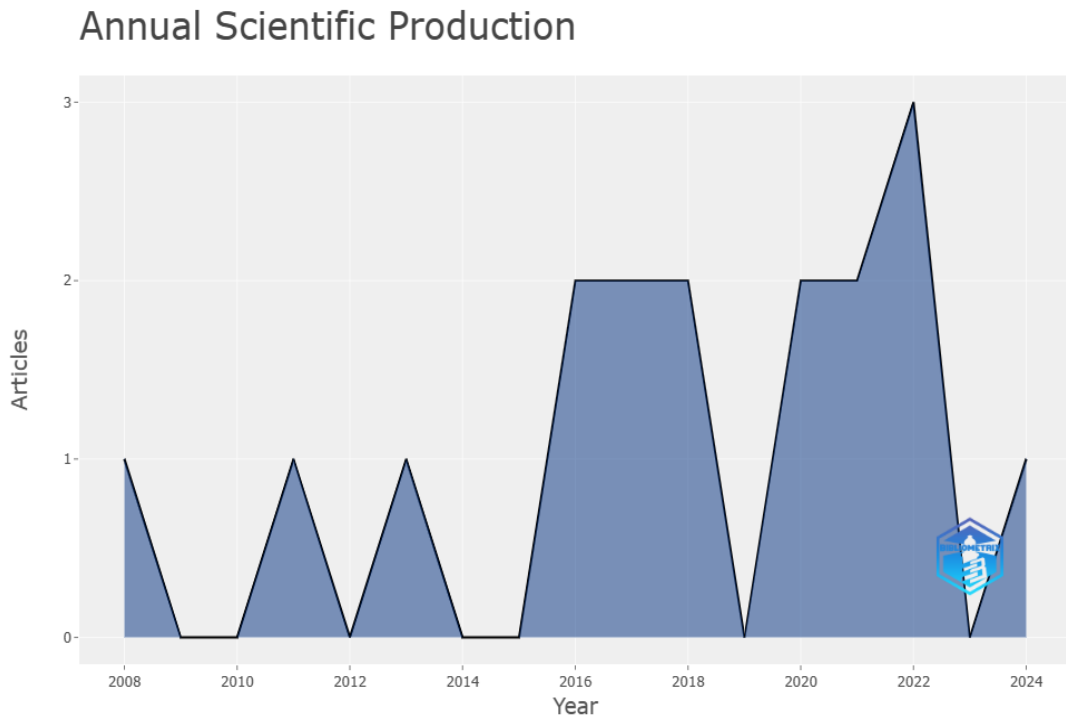


Figure 6: Annual Scientific Production

Figure 6 illustrates the yearly output of scientific papers from 2008 to 2024, perhaps for a certain topic or nation. From 2008 to 2013, the output of science seems to have stagnated, with only one paper released per year. Two publications published in 2016 seem to indicate a rise in scientific output, which continues through 2021. With three publications released in 2022, production seems to be increasing. There is just one article published in 2024, but without data from earlier years, it is hard to determine if this is an exception or a continuation of the pattern.



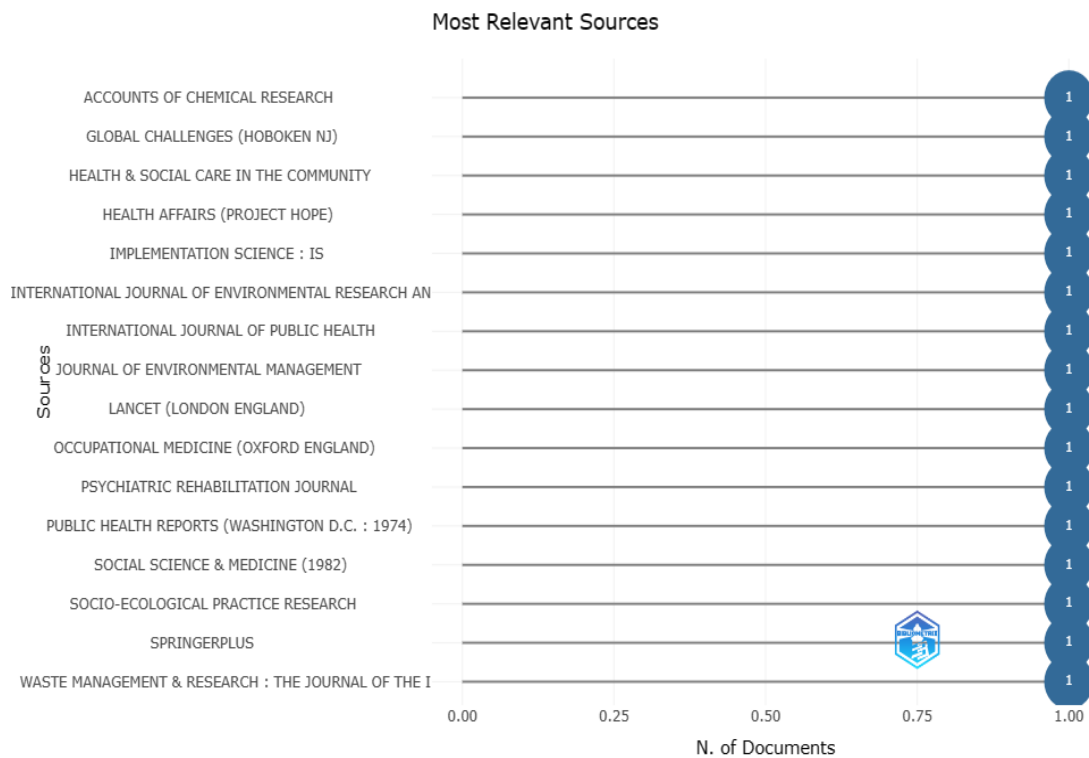


Figure 7: Most Relevant Sources

Figure 7 shows the "Most Relevant Sources" and shows a list of sources along with the number of articles each source contributed. There are 16 sources listed, and each source contributed one article. The sources listed include various academic journals across a range of fields, including public health, environmental science, social science, and medicine.

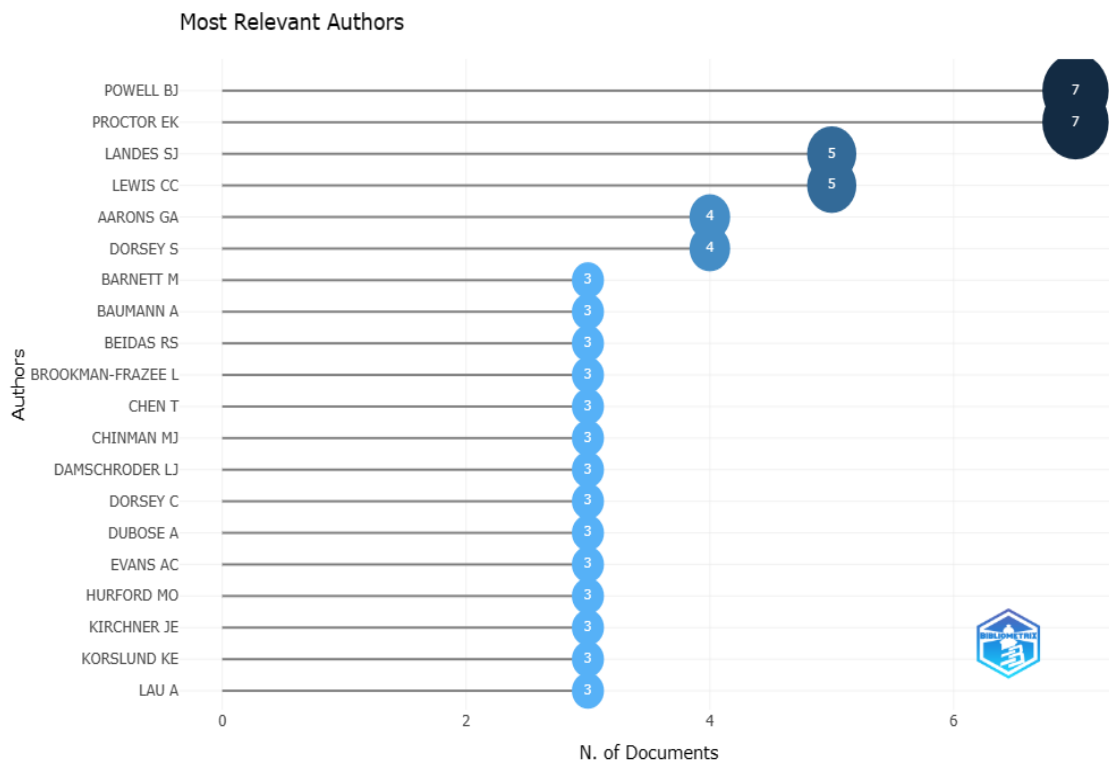


Figure 8: Most Relevant Authors

Figure 8 displays the "Most Relevant Authors" list of authors who have published the most articles on a particular topic and the number of articles each author has written. The two authors who have written the most articles on the topic are Powell BJ and Proctor EK, each with seven articles. Landes SJ, Lewis CC, and Aarons GA have each written 5 articles. The remaining authors have written three or fewer articles. The "Articles Fractionalized" column is likely included to account for situations where a single author contributes to a multi-authored paper. The fractionalized value is likely the same for all the authors because it is unclear how many articles each author has co-authored and how many they have written as the sole author.



Figure 9: Word Cloud

The word cloud in Figure 9 is associated with housing and human well-being. Given that the word cloud most likely relates to issues that impact people, it makes sense that the most prevalent term is humans (9). Another major issue is housing (3), indicating that the cloud is oriented toward housing and its implications. Cost-benefit analysis (3), quality of life (3), middle-aged (3), adult (4), and environment (2) are other phrases that crop up frequently. According to these words, the cloud may be examining how housing affects various age groups' quality of life and how environmental variables affect housing choices.



Figure 10: Tree Map

The tree map shows the frequency of terms used in a document related to housing and human well-being. The most frequent term is "humans" (9), followed by "adults" (4). This suggests that the document is focused on the general impact of housing on people. Housing: This term appears three times and branches out to related terms like "ill-housed persons" (2), suggesting the document may discuss the issue of poor-quality housing and its impact on people. Age: The term "adult" (4) appears and branches out to "middle-aged" (3) and "aged" (2), indicating that the document may consider the effects of housing on different age demographics. Quality of life: This term (3) appears on its own branch, suggesting it is a separate area of focus but likely related to housing. Cost-benefit analysis: This term (3) also appears on its own branch and may indicate that the document considers the financial implications of housing decisions. Environment: This term (2) appears with a single branch term "ecosystem" (1), suggesting the document may touch on the environmental impact of housing.

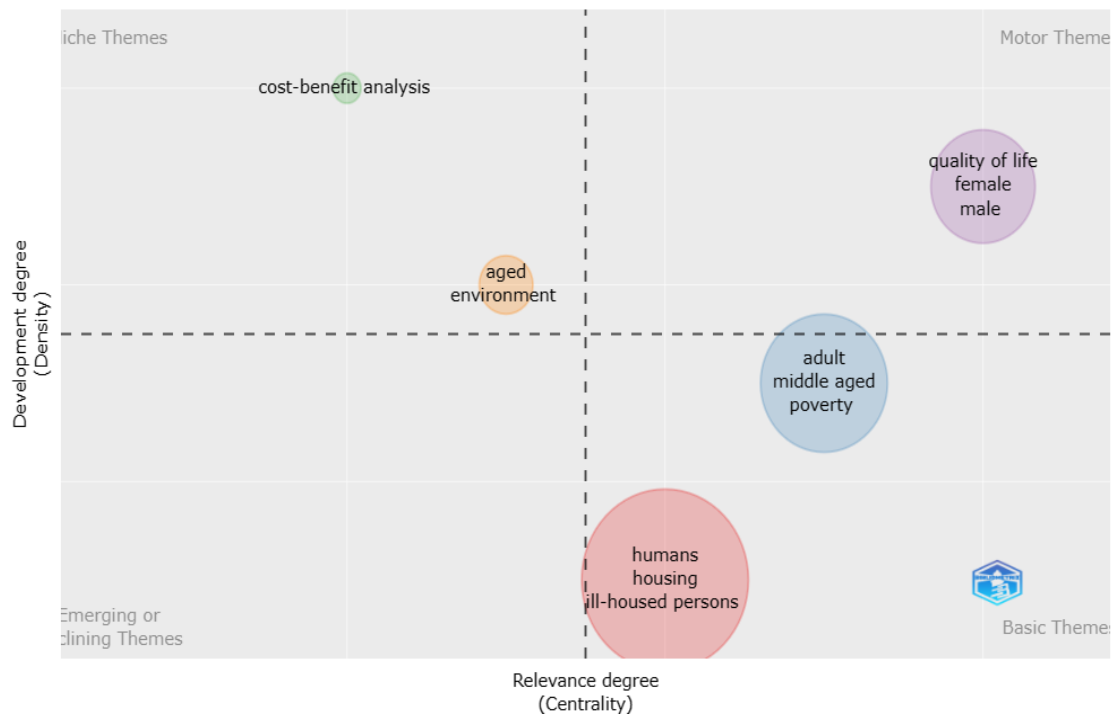


Figure 11: Thematic Map

The map centers around the theme of homelessness, which is positioned between the two broader themes of “Social Issues” and “Built Environment.” Themes related to social issues include poverty, age, and male/female. Themes related to the built environment include housing, ill-housed persons, and environment. The circles on the map represent the different themes and their connections to each other. The size of the circle indicates the centrality of the theme, or how important it is to the overall topic.

#### 4. Conclusion

This bibliometric evaluation advocates for the exploration and incorporation of traditional paths in leadership excellence research while new trends are appearing. This study offers valuable insights derived from a bibliometric analysis of 43 years of publications. The number of publications on sustainable greenhouses has varied over a span of four decades, reaching a peak of eight publications in both 2015 and 2017. The United States, China, and Australia were prolific publishing nations. Additionally, India has been recognized as one of the countries in Asia engaged in the study of leadership excellence. This analysis provides a clear depiction of the most significant authors. The study indicates that sustainable green housing will continue to be popular in the future if adjustments are made to accommodate changes in eco-friendly settings.

The bibliometric evaluation allows for projecting or offering insight into the current status of a certain field or topic concerning sustainable green housing. Several restrictions regarding the chosen research approach and the categorization of materials must be acknowledged. It is important to note that there are alternative databases available for this study, such as Google Scholar or Microsoft Academic. Additional research is needed to analyze the trends of sustainable green housing articles within certain organizations or nations utilizing Google Scholars or Microsoft Academic. This bibliometric evaluation will help readers, educators, and researchers find crucial information for evaluating sustainable green housing in their future study.

## References

- Building Research Establishment (2012). Environmental Impact Assessment and Whole Life Costing. BRE's BREEAM, Ecohomes and invest 2. Available online at: <http://www.bre.co.uk> [retrieved 19 May 2012].
- Downs, A. (2005). Smart Growth: Why We Discuss It More than We Do I. *Journal of the American Planning Association*, 71(4), 367-378. <http://dx.doi.org/10.1080/01944360508976707>
- Edwards, M., & Haines, A. (2007). Evaluating Smart Growth: Implications for Small Communities. *Journal of Planning Education and Research*, 27, 49-64. <http://dx.doi.org/10.1177/0739456X07305792>
- Elforgani, M. S. A., & Rahmat, I. (2011). Green Design Performance of Malaysian Building Projects- Descriptive Study, 6(11), 68–78.
- Geng, L. (2004). The Application of Information and Incentives as Tools to Promote Green Affordable Housing Development.
- Global Green USA. (2007). *Blueprint for Greening Affordable Housing*. Island Press.
- Hardiman, D. L., Lynch, C., Martin, M., Steffen, B. L., Vandenbroucke, D. A., Gann, Y., & Yao, D. (2010). Worst Case Housing Needs 2007. Prepared for U.S. Department of Housing and Urban Development (HUD). (pp. 1-51). Retrieved from [http://www.huduser.org/Publications/pdf/worstcase\\_HsgNeeds07.pdf](http://www.huduser.org/Publications/pdf/worstcase_HsgNeeds07.pdf)
- Hayles, C. S. (2005). An Examination of the Relationship between Sustainability and Affordability in residential Housing Markets, 1-13.
- Howe, J., Bowyer, J., and Fernholz, K. (2007). What's New in Eco-Affordable Housing? Combining green building innovations with affordable housing needs. Minneapolis.
- Khalil, G. M., & Crawford, C. A. G. (2015). A bibliometric analysis of US-based research on the behavioral risk factor surveillance system. *American Journal of Preventive Medicine*, 48(1), 50- 57.
- Konami, H. (2009). Japanese Efforts to Supply Low Cost Housing. EAROPH Regional Seminar. Ulaanbaatar, Mongolia.
- Metibogum, L., & Raschid, M. Y. M. (2013). Green Building Technology in the Context of Sustainable Housing Affordability in Malaysia: An Overview. *International Journal of Engineering*, 1(1), 12–29.
- Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2010). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *International Journal of Surgery*, 8(5), 336- 341.
- Pullen, S., Zillante, G., Arman, M., Wilson, L., Zuo, J., & Chileshe, N. (2009). *Ecocents Living: Affordable and Sustainable Housing for South Australia*. South Australia.
- Retsinas, N. (2005). Affordable Housing Today. *Affordable Housing: Designing An American Asset* (pp. 24-29). ULI-the Urban Land Institute.
- Sard, B., & Waller, M. (2002). Housing Strategies to Strengthen Welfare Policy and Support Working Families. The Brookings Institution Center on Urban and

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Metropolitan Policy and Center on Urban and Metropolitan Policy, 1-12.

- Schwartz, A. F. (2009). Trends, Patterns, Problems. Housing Policy in the United States: an Introduction (pp.11-47). Routledge, Taylor and Francis group.
- Sekisui Chemical Co. (2005) Annual Report 2005, <http://www.sekisuichemical.com/ir/pdf/ar2005e.pdf>.
- Solidiance (2010). Will it pay to build green? Singapore as a green building hub. Solidiance Partners with the Singapore Green Building Council to Review Singapore's Market Potential to be ASEAN's Green Building Hub. Singapore.
- Stone, M. E. (2006). Housing Affordability: One-Third of a Nation Shelter-Poor. In R. Bratt, M. E. Stone, & C. Hartman (Eds.), *A Right to Housing: Foundation for A New Social Agenda* (pp. 38-60). Blackwell Publishing.
- Sweileh, W. M., Al-Jabi, S. W., Abu Taha, A. S., Sa'ed, H. Z., Anayah, F. M., & Sawalha, A. F. (2017). Bibliometric analysis of worldwide scientific literature in mobile-health: 2006–2016. *BMC Medical Informatics and Decision Making*, 7(1), 1-12.
- Tawil, N. M., Suhaida, M. S., Hamzah, N., CheAni, A. I. & Tahir M. M. (2011). Housing Affordability in Two University Towns in Selangor, Malaysia. 31.
- Trassos, J. (2005). *A Greener Plan for Affordable Housing: How States are using the Housing Credit to Advance Sustainability*. The Enterprise Foundation. Available online at: [http://www.enterprisefoundation.org/majorinitiatives/cdl/gpa\\_print.asp](http://www.enterprisefoundation.org/majorinitiatives/cdl/gpa_print.asp) [accessed 15 May 2012].
- Tsenkova, S., & Syal, B. (2009). Planning Sustainable Communities: Implementing the Vision. In S. Tsenkova (Ed.), *the Planning Sustainable Communities: Diversity of Approaches and Implementation Challenges* (pp. 1-14). University of Calgray.
- U.S. Green Building Council (USGBC). (2009). LEED 2009 for Neighborhood Development Rating System (pp. 1-122).
- Van Eck, N. J., & Waltman, L. (2010). Software survey: VOSviewer, a computer program for bibliometric mapping. *Scientometrics*, 84(2), 523-538.
- Voith, R., & Crawford D. L. (2004). Smart Growth and Affordable Housing. In Anthony Downs (Ed.), *the Growth Management and Affordable Housing* (pp. 82-116). Brooking Institution Press.
- Zulkepli, M. Sipan, I., & Jibril, J. D. (2013). Conceptual Framework for Green Affordable Home in Malaysia. *Advanced Materials Research*, 689, 86–89. <http://doi.org/10.4028/www.scientific.net/A MR.689.86>.