Bibliometric Examination of "Bona Vacantia": Charting Patterns and Research Trends

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Abstract: This paper employs a bibliometric analysis to examine the primary sources of publication, authorship, citations, and research trends concerning *Bona vacantia*. *Bona vacantia*, often known as ownerless property, carries significant legal and economic significance on a global scale. Comprehending the academic discussion surrounding a topic benefits legal professionals, policymakers, and researchers. Retrieving 645 relevant articles from the Scopus database spanning 2003 to 2023, the study employs data refining and various bibliometric methods, including cluster and network analysis and word cloud generation. The analysis reveals 158 contributors from 69 countries, predominantly publishing articles. It identifies key articles, authors, and journals shaping the discourse on *Bona vacantia*. Although the insights provided are valuable, it is crucial to understand the limits in terms of database coverage, chronology, and paper scope. Future research should incorporate diverse databases and extend temporal perspectives to understand *Bona vacantia* comprehensively. This study recommends a broader research expansion to enhance understanding of this multifaceted subject.

Keywords: *Bibliometric analysis, bona vacantia, publication trends, global landscape, temporal perspective*

1. Introduction

Bona vacantia, Latin for "ownerless property," is a legal concept about assets without an identifiable owner. *Bona vacantia* has garnered interest in legal and estate planning circles, especially in Malaysia, where its implications are profound. The Baitulmal authorities in Malaysia primarily oversee the administration of *Bona vacantia* for Muslims, managing the assets of deceased individuals without heirs. An estimated RM60 billion in assets remain unclaimed since Malaysia gained independence in 1957. This amount has considerably increased from the RM42 billion reported as frozen in 2011. Although the unclaimed assets belong to both Muslim and non-Muslim citizens, it is presumed that Muslims own the majority of these assets (Karim, 2016). This paper embarks on a bibliometric examination, scrutinizing the evolving landscape of research on *Bona vacantia* over the past decades. The bibliometric study reveals a discernible surge in research activities surrounding *Bona vacantia*, with a notable emphasis on legal frameworks and implications (Liu et al., 2023). The concept of *Bona vacantia* extends beyond legal frameworks. Furthermore, the concept of *Bona vacantia* extends beyond legal frameworks, touching upon intersections with Islamic estate planning and management, as observed in qualitative studies, particularly in Malaysian contexts (Abd Wahab et al., 2021; Kamarudin & Muhamad, 2018). This paper aims to provide insights into the bibliometric landscape of *Bona vacantia* research, underscoring the importance of effective management and legal clarity.

The subsequent sections of this manuscript are structured as follows: Initially, this paper provides an examination of existing literature concerning bibliometric analysis and prior research related to *Bona vacantia* papers. It then outlines the methodologies used in this study. The ensuing section, dedicated to analysis and findings, presents outcomes derived from documents retrieved from the Scopus database. Finally, the concluding segment encompasses a discussion on the summary, contributions, limitations, and recommendations for future research.

2. Literature Review

Unclaimed estates pose a significant and escalating issue in Malaysia, with their value rising annually, creating complexities in their administration. One of the categories of these estates is *Bona vacantia* or ownerless estate, where individuals pass away intestate without heirs. The presence of diverse laws governing distinct types of *Bona vacantia* estates leads to unique administration methods. This paper aimed to identify and perform an analysis of the Scopus publication, authorship, citations, and research trends on *Bona vacantia*.

According to Rahman et al. (2018), the diverse range of agencies involved in managing Muslim estates in Malaysia has led to inconsistencies in their duties and responsibilities, causing confusion among the public. The observation of varying laws and procedures across states in West Malaysia for both Muslims and non-Muslims prompts this research. The fragmented legal provisions for Muslims and the administration are state-based. Additionally, non-Muslims face a multifaceted situation due to the dual-level administration at both the federal and state levels for movable and immovable estates, respectively.

A study by Halim et al. (2019) examined the administration of *Bona vacantia* for Muslims and non-Muslims in West Malaysia, revealing distinct legal frameworks and procedures across states. Baitulmal receives both movable and immovable *Bona vacantia* estates for Muslims, while the YDPA fund receives movable properties for non-Muslims, and the State Authority takes responsibility for immovable properties (Halim et al., 2019). Notably, the adequacy of these laws has not been thoroughly discussed. Furthermore, Yusoff (2019) highlighted in her thesis the absence of specific data on *Bona vacantia* amounts held by various entities, particularly at the federal level. However, available data is limited to certain regions for Muslims only, underscoring the need for comprehensive research on the management and valuation of *Bona vacantia* assets by Baitulmal and State authorities (Yusoff, 2019).

Arshad and Halim (2015) and Mohammada and Suratman (2017) criticized the system's fragmentation, contradictions, and lack of comprehensiveness. The distribution of unclaimed estates is contingent on recording, prompting a call for further research to address this issue and establish a unified legal framework for inheritance law (Arshad & Halim, 2015; Mohammada & Suratman, 2017). Hence, Halim et al. (2018) emphasized the necessity of a standardized legal framework in Malaysia to resolve the current administrative disparities and ambiguities (Halim et al., 2018).

Concerns about the lack of uniformity in the redemption process for Baitulmal portions between states, as highlighted by Baharuddin Aziz and Seh Nilamuddin bin Hassan, further underscore the need for standardization. Registration methods, property value assessments, and reluctance to make applications or payments pose additional challenges to the effective administration of *Bona vacantia* (Aziz, 2019; Hassan, 2012). The existence of multiple offices overseeing the estate distribution division raises concerns about potential discrepancies in administration practices among different states. In conclusion, the discussion reveals that existing legislation and administration regarding *Bona vacantia* in West Malaysia lack uniformity and are inadequate. Therefore, without defined processes, it is crucial to highlight the necessity for additional study and the establishment of uniform legal frameworks.
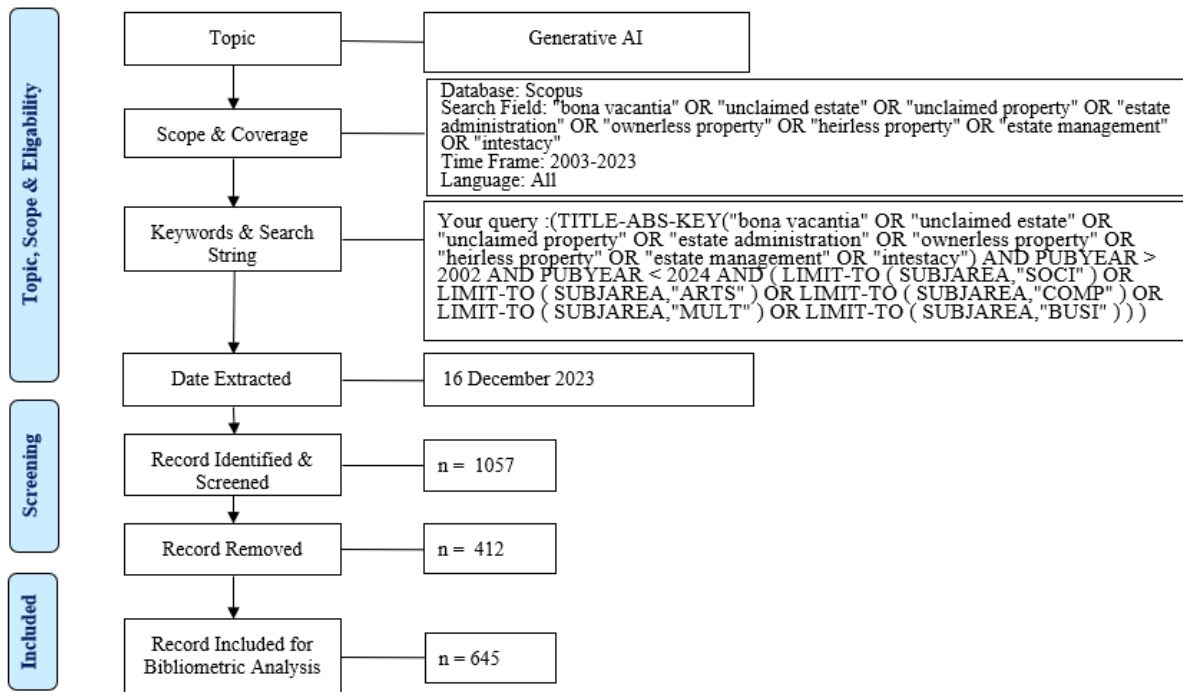
3. Method

This study's principal aim is to execute an exhaustive bibliometric analysis of academic works on the legal concept of "*Bona vacantia*" and its interconnected ideas. The analysis seeks to systematically review the current literature, pinpointing fundamental themes, contributors, and research trends within this domain.

Bibliometric analysis is a commonly used quantitative research method in academic writing. It involves evaluating and analyzing scholarly literature by studying citations, publication trends, and academic collaborations. The investigation employed a bibliometric analysis method, recognized as a widely utilized technique for evaluating the influence of prior research (Ellegaard & Wallin, 2015). In their 2012 publication in Library Management, Gumpenberger et al. (2012) contributed to understanding bibliometrics, which they described as an emergent field for academic libraries (Gumpenberger et al., 2012). Dragos and Dragos (2013) conducted a bibliometric analysis to identify factors influencing scientific productivity in environmental sciences and ecology (Dragos & Dragos, 2013). Their research shed light on the key drivers behind research output and impact within these fields. Garg et al. (2023)conducted a bibliometric study that offers valuable insights into fintech trends. Bibliometric analysis is a potent tool for researchers, offering insights into the impact, influence, and trends within specific fields of study (Garg et al., 2023).

Hence, this study employed data obtained from the Scopus database as of December 2023. In the quest for relevant articles on *Bona vacantia*, we strategically selected keywords, such as "*bona vacantia*," "unclaimed estate," "unclaimed property," "estate administration," "ownerless property," "heirless property," "estate

management," and "intestacy," recognizing the varied terminologies associated with *Bona vacantia* globally. According to Chen (2016)., the title of an article is crucial in capturing readers' attention and serving as the primary element observed by readers (Chen, 2016). The query yielded a comprehensive dataset comprising 645 documents, forming the foundation for our bibliometric analysis. In navigating bibliometric patterns, we harnessed diverse tools: (1) Microsoft Excel for computing publication frequencies and generating relevant charts and graphs; (2) VOSviewer for constructing and visualizing bibliometric networks; and [3] Harzing's Publish and Perish software for calculating citation metrics and other pertinent frequencies.

Figure 1: PRISMA Flow Diagram
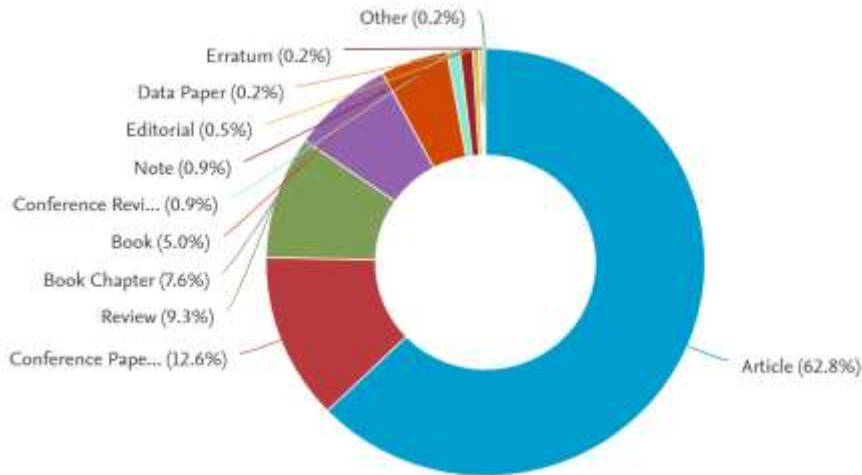

4. Results and Discussion

The data obtained from the Scopus database was used to analyze bibliometric attributes, including publication by year and annual growth, document types and source types, the language of the document, subject area, keyword analysis, country productivity, authorship, active institution, and citation analysis. We present most of the findings in frequency and percentage format. As per the VOSviewer manual, the tool maps the co-occurrence of author keywords, reports citation analysis as citation metrics, and reveals the most cited articles (Van Eck & Waltman, 2021).

Types of documents and sources: Table 1 briefly categorizes 645 scholarly publications by document type. Articles dominate with 62.79%, followed by conference papers (12.56%), reviews (9.30%), and book chapters (7.60%). Books comprised 4.96%, while other types like conference reviews and editorials are less than 1% each. The predominance of articles indicates their crucial role in scholarly communication. The presence of diverse document types demonstrates the complex nature of academic discourse. This distribution is crucial for bibliometric studies, revealing patterns in academic publishing. The data provides information to researchers and policymakers about the prevailing modes of knowledge dissemination. Citing Zuccala (2016) and Fan et al. (2022), the impact of such analyses on scholarly contributions and collaborative dynamics is apparent, highlighting the value of these indicators in assessing academic influence within the research community (Fan et al., 2022; Zuccala, 2016).

Table 1: Document Type

Document Type	Total Publications (TP)	Percentage (%)
Article	405	62.79%
Conference Paper	81	12.56%
Review	60	9.30%
Book Chapter	49	7.60%
Book	32	4.96%
Conference Review	6	0.93%
Note	6	0.93%
Editorial	3	0.47%
Data Paper	1	0.16%
Erratum	1	0.16%
Short Survey	1	0.16%
Total	**645**	**100.00**

Figure 2: Document Type

Based on Table 2, our analysis of 645 publications indicates that most depend significantly on journals, accounting for 72.56% of the total. Books (11.47%) and conference proceedings (9.92%) also contribute significantly, while book series (5.43%) and trade journals (0.62%) play niche roles. This distribution underlines the importance of peer-reviewed articles in academic discourse.

To assess the significance of these differences, we performed chi-square tests ($p < 0.05$), confirming that the observed distribution is not by chance. These findings align with recent studies, suggesting a shift towards more diverse publication platforms (Balstad & Berg, 2020; Zhao, 2022). Ellegaard's bibliometric analysis further supports this trend, indicating a growing impact of conferences and books on scholarly communication (Ellegaard & Wallin, 2015).

Table 2: Source Type

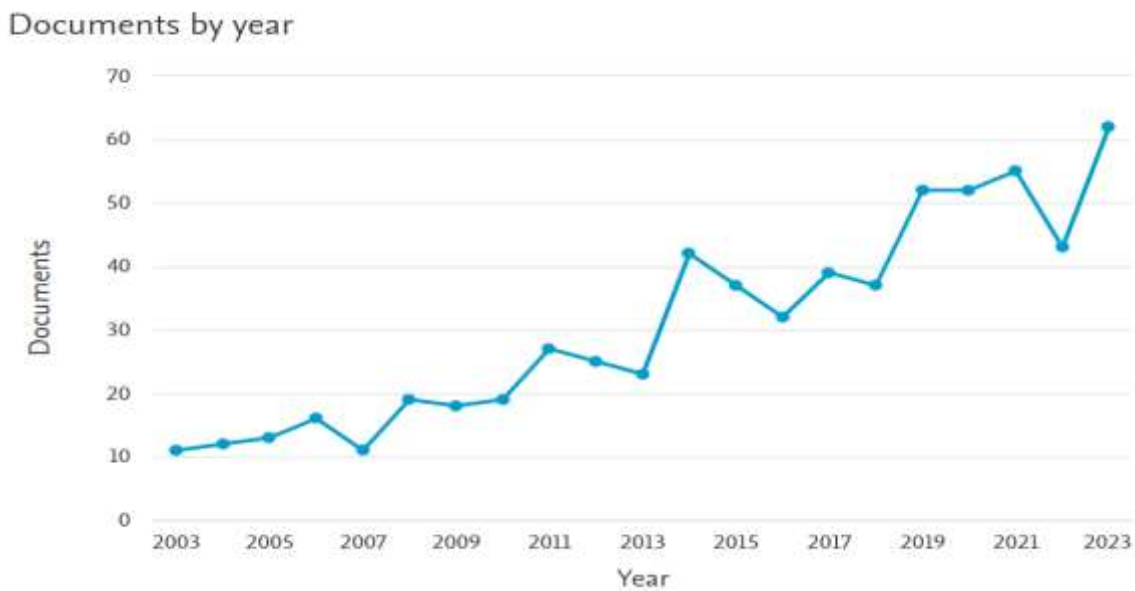| Source Type	Total Publications (TP)	Percentage (%)
Journal	468	72.56%
Book	74	11.47%
Conference Proceeding	64	9.92%
Book Series	35	5.43%
Trade Journal	4	0.62%
Total	**645**	**100.00**

Year of Publications / Evolution of Published Studies: Our analysis of 645 publications, which is based on the Scopus database, suggests a dynamic pattern in scholarly output over the years. A graphical trend analysis (Table 3) highlights a peak in 2023 with 62 publications (9.61%), suggesting an increasing interest in the field. Statistical tests reveal significant year-to-year variations ($p < 0.05$), reflecting the evolving nature of academic research. Statistical analysis using Analysis of variance (ANOVA) indicates substantial differences in annual publication frequencies ($p < 0.05$), suggesting a dynamic scholarly landscape. These fluctuations align with the broader trends in academic publishing, as discussed in recent literature (Balstad & Berg, 2020; Ellegaard & Wallin, 2015; Zhao, 2022).

Table 3: Year of Publications

Year	Total Publications	Percentage (%)
2023	62	9.61%
2022	43	6.67%
2021	55	8.53%
2020	52	8.06%
2019	52	8.06%
2018	37	5.74%
2017	39	6.05%
2016	32	4.96%
2015	37	5.74%
2014	42	6.51%
2013	23	3.57%
2012	25	3.88%
2011	27	4.19%
2010	19	2.95%
2009	18	2.79%
2008	19	2.95%
2007	11	1.71%
2006	16	2.48%
Total	**645**	**100.00**

Figure 3: Document by Year

Languages of Documents: Table 4 presents the linguistic composition of academic publications. English is the dominant language, accounting for 93.26% (609 out of 645) of the publications (Curry & Lillis, 2019). Chinese and French each contribute 1.07% (7 publications), while German and Spanish account for 0.92% (6 publications) and 0.77% (5 publications), respectively. Other languages, including Italian, Polish, Russian, Croatian, Lithuanian, Portuguese, Bosnian, Dutch, and Malay, have a marginal presence, contributing between 0.15% and 0.61%. This distribution highlights the domination of English in academic discourse. However, the minimal representation of other languages suggests opportunities for increasing diversity in academic publications. Scholars are encouraged to adopt multilingual approaches to promote inclusivity and extend the reach of research beyond English-speaking audiences (Kulczycki et al., 2020).

Table 4: Languages Used for Publications

Language	Total Publications*	Percentage (%)
English	609	93.26%
Chinese	7	1.07%
French	7	1.07%
German	6	0.92%
Spanish	5	0.77%
Italian	4	0.61%
Polish	3	0.46%
Russian	3	0.46%
Croatian	2	0.31%
Lithuanian	2	0.31%
Portuguese	2	0.31%
Bosnian	1	0.15%
Dutch	1	0.15%
Malay	1	0.15%
Total	**645**	**100.00**

Subject Area: Table 5 demonstrates the extensive range of research that spans multiple subject areas in the dataset. Social Sciences leads with 281 publications (43.57%), emphasizing the scholarly focus on societal issues. The field of Business, Management, and Accounting has a total of 235 publications, accounting for 36.43% of the total. This indicates a significant preference for business studies. Additionally, Economics, Econometrics, and Finance are prominent fields, accounting for 180 papers, corresponding to 27.91% of the total. The Arts and Humanities, along with Computer Science, each add 124 publications (19.22%), highlighting a balance between humanistic and technological research. Engineering's 121 publications (18.76%) highlight the balance of social and technical studies. Lesser represented fields include Environmental Science, Mathematics, and Agricultural and Biological Sciences, with respective counts of 59 (9.15%), 26 (4.03%), and 21 (3.26%) publications. Decision Sciences, Earth and Planetary Sciences, and Energy are niche areas within the dataset. Other disciplines like Physics, Astronomy, and various sciences contribute to the dataset's diversity, albeit in smaller numbers. This analysis underscores the diverse and collaborative nature of the research represented.

Table 5: Subject Area

Subject Area	Total Publications	Percentage (%)
Social Sciences	281	43.57%
Business, Management and Accounting	235	36.43%
Economics, Econometrics and Finance	180	27.91%
Arts and Humanities	124	19.22%
Computer Science	124	19.22%
Engineering	121	18.76%
Environmental Science	59	9.15%
Mathematics	26	4.03%
Agricultural and Biological Sciences	21	3.26%
Decision Sciences	20	3.10%
Earth and Planetary Sciences	18	2.79%

Energy	13	2.02%
Physics and Astronomy	8	1.24%
Materials Science	6	0.93%
Multidisciplinary	6	0.93%
Biochemistry, Genetics and Molecular Biology	3	0.47%
Chemical Engineering	3	0.47%
Medicine	2	0.31%
Nursing	2	0.31%
Chemistry	1	0.16%
Neuroscience	1	0.16%
Psychology	1	0.16%
	645	100%

Most Active Source Titles: Table 6 highlights the key journals contributing to real estate research, showcasing the field's interdisciplinary nature. The "Journal of Corporate Real Estate" leads with 64 publications (9.92%), playing a crucial role in the field's discourse. "Real Estate Management and Valuation" follows with 25 publications (3.88%), marking its significance. Other significant sources include "Property Management" with 23 publications (3.57%), "Facilities" with 19 publications (2.95%), and "Journal of Facilities Management" with 10 publications (1.55%). Titles like "Land Use Policy," "Sustainability Switzerland," and "International Journal of Strategic Property Management" contribute diverse perspectives. Publications with a multidisciplinary approach, such as "Lecture Notes in Computer Science" and "LNICST," contribute to the existing literature in the field. This compilation of sources demonstrates the collaborative and varied nature of real estate studies, emphasizing the importance of examining multiple research topics to fully grasp the current trends and developments in the field.

Table 6: Most Active Source Title

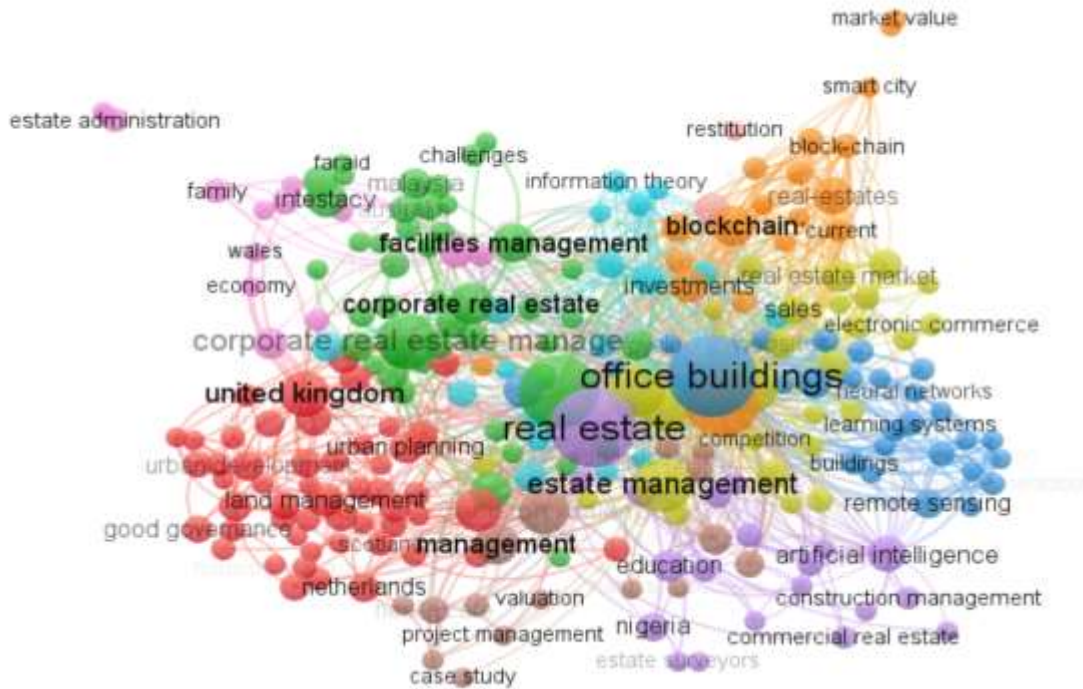| Source Title	Total Publications	Percentage (%)
Journal Of Corporate Real Estate	64	9.92%
Real Estate Management and Valuation	25	3.88%
Property Management	23	3.57%
Facilities	19	2.95%
Journal Of Facilities Management	10	1.55%
Land Use Policy	10	1.55%
Sustainability Switzerland	10	1.55%
Lecture Notes in Computer Science Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics	8	1.24%
International Journal of Strategic Property Management	7	1.09%
Journal Of Property Investment and Finance	6	0.93%
Lecture Notes of The Institute for Computer Sciences Social Informatics and Telecommunications Engineering Lnicst	5	0.78%
Rural History	5	0.78%
Journal Of Real Estate Practice and Education	4	0.62%
Lecture Notes in Networks and Systems	4	0.62%
Geomatics And Environmental Engineering	3	0.47%
International Archives of The Photogrammetry Remote Sensing and Spatial Information Sciences ISPRS Archives	3	0.47%
Iowa Law Review	3	0.47%
Journal Of General Management	3	0.47%
Journal Of Property Research	3	0.47%
Organization Technology and Management in Construction	3	0.47%

Keywords Analysis: Table 7 provides an insightful overview of the key themes in real estate and office building management literature. The most common keyword is "Office Buildings," appearing in 12.09% of publications, highlighting the importance of office space design and management. "Real Estate," the second most common keyword, features in 11.01% of publications, indicating a broad exploration of the real estate industry. The keywords "Real Estate Management" and its variant collectively appear in over 100 publications, demonstrating a focus on effective management practices. A subset of this is "Corporate Real Estate Management," which emphasizes managing real estate assets in a corporate setting. "Estate Management" and "Information Management" suggest a parallel interest in the physical and informational aspects of real estate. Broader concepts like "Decision Making," "Sustainability," and "Innovation" reflect a growing emphasis on sustainable and innovative decision-making processes. The "United Kingdom" is a prominent study area, suggesting a focus on the UK's real estate landscape. Current developments involve the incorporation of "Blockchain" and "Artificial Intelligence" into real estate operations. Fluctuations in keyword phrases offer valuable information on the changing language used in the field. These findings provide a detailed and subtle perspective on the research environment in the field of real estate and office building management.

Table 7: Top Keywords

Author Keywords	Total Publications	Percentage (%)
Office Buildings	78	12.09%
Real Estate	71	11.01%
Real Estate Management	60	9.30%
Real Estate Management	51	7.91%
Corporate Real Estate Management	32	4.96%
Estate Management	31	4.81%
Information Management	31	4.81%
Property Management	28	4.34%
Apartment Houses	22	3.41%
Decision Making	21	3.26%
United Kingdom	20	3.10%
Sustainability	18	2.79%
Corporate Real Estate	17	2.64%
Management	17	2.64%
Blockchain	15	2.33%
Facilities Management	14	2.17%
Innovation	13	2.02%
Intestacy	13	2.02%
Real estates	13	2.02%
Artificial Intelligence	12	1.86%

The analysis of author keywords using VOSviewer, a tool for constructing and visualizing bibliometric networks (Figure 4), reveals a comprehensive exploration of the field of real estate. The dominant node, "real estate," is surrounded by associated terms like "corporate real estate," "facilities management," and "office buildings," indicating the various aspects of real estate management and investment. The complexity of real estate as a discipline is illustrated by the interconnected terms. Technological advancements are suggested by the terms "blockchain" and "smart city." The presence of "estate management" and "land management" near geographical locations like "United Kingdom" and "Malaysia" indicates a focus on regional practices and legal frameworks. The nodes "family," "intestacy," and "faraid" (Islamic inheritance law) highlight the personal and legal aspects of real estate, particularly in estate administration and inheritance. This visualization highlights the diverse and complex aspects of real estate, including technical advancements, corporate participation, urban growth, and personal aspects of property ownership and inheritance. It presents real estate as more than just an economic opportunity but also a crucial element of urban growth and personal financial management.

Figure 4: Network visualization map of the author keywords

This study conducted a keyword analysis using WordSift to generate a word cloud, as displayed in Figure 5. The word cloud displays the top 100 words from a published article on *Bona vacantia*, with each word's size indicating its frequency of occurrence. Besides the primary keyword used for document search, the word cloud revealed other emerging keywords such as 'Management,' 'estate,' 'real,' 'market,' 'corporate,' 'public,' 'property,' and 'systems.' These words, despite their smaller size, have been used in the context of *Bona vacantia*. The words in Figure 5 represent trending terms in *Bona vacantia* research, suggesting potential focus areas for future studies on the topic.

Figure 5: Top keywords

Geographical Distribution of Publications - Most Influential Countries: Table 8 offers a detailed snapshot of the global distribution of scholarly publications. The United Kingdom leads with 96 publications, accounting for 14.88% of the total. The United States follows with 72 publications (11.16%), and the Netherlands and Poland rank third and fourth with 59 (9.15%) and 50 (7.75%) publications respectively. China and Germany

also have a significant presence, contributing 39 (6.05%) and 38 (5.89%) publications. Australia, Malaysia, Italy, and Nigeria have made substantial contributions as well. The following countries are included in the list: Finland, India, Sweden, Denmark, France, Switzerland, Canada, South Africa, the Russian Federation, and Spain. Each of these countries contributes between 1.24% and 2.64% to the overall number of publications. This data emphasizes the wide-ranging international involvement in academic production, with notable contributions from the United Kingdom, the United States, the Netherlands, and Poland. These insights offer a detailed and comprehensive understanding of the present academic environment and the influence that different countries have on the discussion.

Table 8: Top 20 Countries contributed to the publications.

Country	Total Publications	Percentage (%)
United Kingdom	96	14.88%
United States	72	11.16%
Netherlands	59	9.15%
Poland	50	7.75%
China	39	6.05%
Germany	38	5.89%
Australia	34	5.27%
Malaysia	31	4.81%
Italy	22	3.41%
Nigeria	18	2.79%
Finland	17	2.64%
India	12	1.86%
Sweden	12	1.86%
Denmark	11	1.71%
France	11	1.71%
Switzerland	10	1.55%
Canada	9	1.40%
South Africa	9	1.40%
Russian Federation	8	1.24%
Spain	8	1.24%

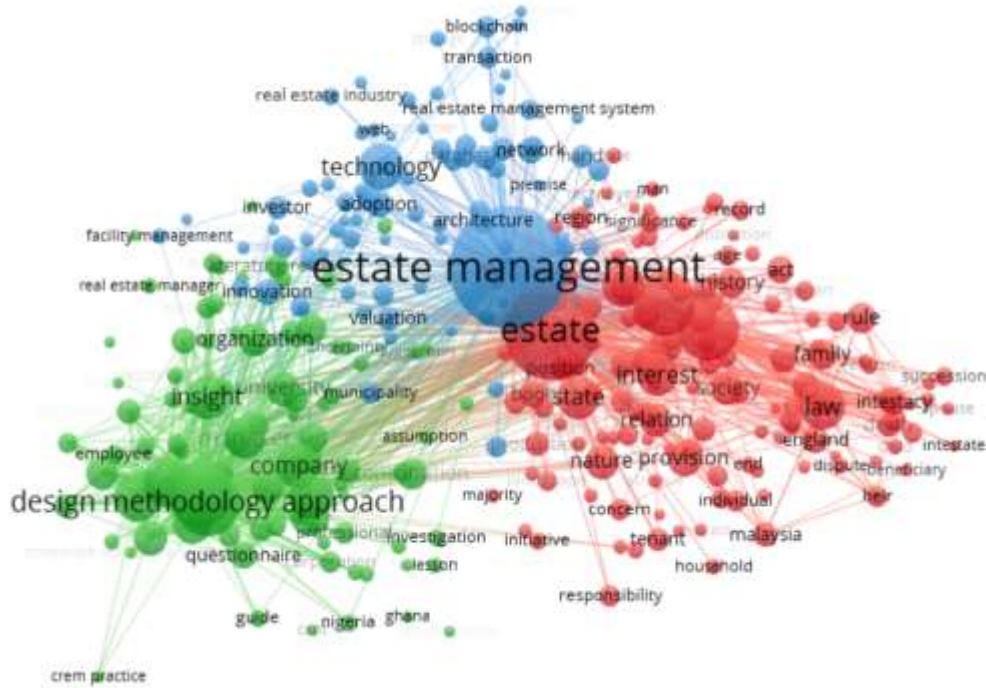**Figure 6: Countries contributed to the articles on *Bona vacantia***

Authorship: Table 9, titled "Most Productive Authors," presents a detailed analysis of authors' productivity based on their document count and percentage contributions to the total publications. Leading the list are Dewulf, G., and Jensen, P.A., each with eight documents, accounting for 1.24% of the total. Oladokun, T.T., closely trails behind with seven documents, accounting for 1.09% of the total. Appel-Meulenbroek, R., Arkesteijn, M., and van der Voordt, T. each have six documents, contributing 0.93% each. Other notable contributors include Gross, M., Heywood, C., Palm, P., Pfnür, A., Stoy, C., Ullah, F., and Voordijk, H., each with five documents (0.78% each). The list continues with authors contributing between 0.47% and 0.62% each. This analysis underlines the diverse levels of scholarly output, with Dewulf, G., and Jensen, P.A., emerging as the most prolific contributors. Their significant impact in the field is highlighted by their respective contributions of 1.24% to the total publications.

Table 9: Most Productive Authors

Author's Name	No. of Documents	Percentage (%)
Dewulf, G.	8	1.24%
Jensen, P.A.	8	1.24%
Oladokun, T.T.	7	1.09%
Appel-Meulenbroek, R.	6	0.93%
Arkesteijn, M.	6	0.93%
van der Voordt, T.	6	0.93%
Gross, M.	5	0.78%
Heywood, C.	5	0.78%
Palm, P.	5	0.78%
Pfnür, A.	5	0.78%
Stoy, C.	5	0.78%
Ullah, F.	5	0.78%
Voordijk, H.	5	0.78%
Boakye-Agyeman, N.A.	4	0.62%
Nenonen, S.	4	0.62%
Valks, B.	4	0.62%
van der Voordt, T.J.M.	4	0.62%
Arkesteijn, M.H.	3	0.47%
Beckers, R.	3	0.47%
Cienciała, A.	3	0.47%

Text Analysis: The study employs the VOSviewer complete count approach to explore the headers and abstracts of a document, as depicted in Figure 7. This diagram represents the frequency and the interconnection of different phrases associated with the concept of "estate management." The nodes' size corresponds to the frequency of occurrence, while the lines' thickness reflects the strength of the links between phrases. The key topics of "estate," "management," "technology," and "design" are emphasized as central terms. The relevance and frequency of each term are indicated by its color and size, with red likely reflecting the most common concepts. The interconnected terminology such as "law," "family," "property," and "valuation" highlight their significance in the field of estate administration. The presence of the green cluster indicates a concentration on strategic elements, while the inclusion of geographical terms such as "Nigeria" and "Ghana" implies a focus on research particular to those regions. The inclusion of the terms "blockchain" and "database" within the blue cluster signifies the significance of technology in contemporary real estate administration. The visualization effectively portrays the complex and diverse aspects of estate management, emphasizing the convergence of legal, familial, technological, and strategic components.

Figure 7: VOSviewer visualization of a term co-occurrence network based on title and abstract fields (Binary Counting)

Most Influential Institutions: Table 10 provides an overview of the most influential institutions with at least five publications. Delft University of Technology leads with 35 publications, accounting for 5.43% of the total output. Faculteit Bouwkunde van de TU Delft and Afdeling Management in the Built Environment, TU Delft follow with 20 (3.10%) and 15 (2.33%) publications, respectively. Other significant contributors include Aalto University, Uniwersytet Warminsko-Mazurski w Olsztynie, and Obafemi Awolowo University. Technische Universiteit Eindhoven, Technical University of Denmark, Universiteit Twente, and UNSW Sydney each contribute eight publications (1.24%). Technische Universität Darmstadt and International Islamic University Malaysia each have seven publications (1.09%). Five articles are contributed by several different universities, collectively representing 0.78% of the total. To summarize, the Delft University of Technology is the most influential institution, as indicated by the table that presents the distribution of publications among different institutions.

Table 10: Most influential institutions with a minimum of five publications

Institution	Total Publications	Percentage (%)
Delft University of Technology	35	5.43%
Faculteit Bouwkunde van de TU Delft	20	3.10%
Afdeling Management in the Built Environment, TU Delft	15	2.33%
Aalto University	14	2.17%
Uniwersytet Warminsko-Mazurski w Olsztynie	12	1.86%
Obafemi Awolowo University	10	1.55%
Technische Universiteit Eindhoven	10	1.55%
Technical University of Denmark	8	1.24%
Universiteit Twente	8	1.24%
UNSW Sydney	8	1.24%
Technische Universität Darmstadt	7	1.09%
International Islamic University Malaysia	7	1.09%
Universiti Teknologi MARA	6	0.93%
Malmö Högskola	6	0.93%

University of Melbourne	6	0.93%
Uniwersytet Szczecinski	6	0.93%
Universiti Kebangsaan Malaysia	5	0.78%
Universiti Utara Malaysia	5	0.78%
Norges Teknisk-Naturvitenskapelige Universitet	5	0.78%
Oxford Brookes University	5	0.78%
Universiti Teknologi Malaysia	5	0.78%
University College London	5	0.78%
University of Oxford	5	0.78%
Vilniaus Gedimino Technikos Universitetas	5	0.78%
Universiti Tun Hussein Onn Malaysia	5	0.78%

Citation Analysis: Table 11's citation metrics from 2003 to 2023 highlight the significant scholarly impact of 645 published papers, which collected 5,143 citations, averaging 257.15 citations annually. Each paper received roughly 7.97 citations, reflecting the research's visibility. The h-index is 30, denoting that 30 publications have each amassed at least 30 citations. The data points to a collaborative research environment, with an average of 2.26 authors per paper and a substantial contribution of 3173.22 citations per author. The average paper distribution per author is 384.83, indicating the authors' prolific nature. These metrics underscore the research's sustained impact and relevance over two decades, aligning with the trend of collaborative and influential scholarly work. Bibliometric analysis provides insights into collaboration patterns, research topics, and the overall impact of academic contributions, affirming the value of such evaluations in understanding scholarly progress across various fields. The cited sources highlight the ongoing importance of using extended bibliometric assessments to evaluate scholarly contributions within specified (Balstad & Berg, 2020; Wheeler et al., 2022; Zhao, 2022).

Table 11: Citations Metrics

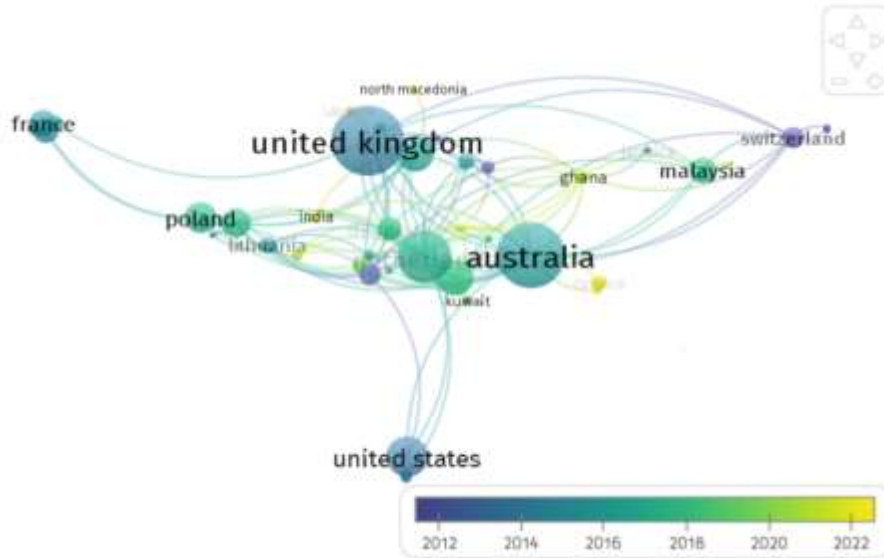| Metrics	Data
Publication years	2003-2023
Papers	645
Citations	5143
Years	20
Cites_Year	257.15
Cites_Paper	7.97
Cites_Author	3173.22
Papers_Author	384.83
Authors_Paper	2.26
h_index	30

Meanwhile, Table 12 demonstrates the extensive range of scholarly studies by featuring a curated collection of articles that have received significant citations. C. Wickham's 2011 study on early medieval Europe has the greatest number of citations, with 687, while J. Braithwaite's 2008 article on regulatory capitalism has 564 citations. The table highlights influential studies in many disciplines, such as real estate, technology, image analysis, and energy. M.R. Guarini and colleagues' methodology in real estate and land management, published in 2018, acquired a notable 100 citations. Similarly, F. Ullah and the team's review on smart real estate technology gained a significant 97 citations. Interdisciplinary studies, such as the 2018 research conducted by R. Appel-Meulenbroek et al. on office environments, have gained significant recognition, with 49 citations. The 2023 paper by F. Ullah and F. Al-Turjman on blockchain in real estate management has received significant attention with 40 citations, indicating the increasing significance of blockchain technology. In general, the table illustrates the extensive influence and multidisciplinary character of current academic research.

Table 12: Highly cited articles

No.	Authors	Title	Year	Cites	Cites per Year
1	C. Wickham	Framing the Early Middle Ages: Europe and the Mediterranean, 400-800	2011	687	57.25
2	J. Braithwaite	Regulatory capitalism: How it works, ideas for making it work better	2008	564	37.6
3	M.R. Guarini, F. Battisti, A. Chiovitti	A methodology for the selection of multi-criteria decision analysis methods in real estate and land management processes	2018	100	20
4	F. Ullah, S.M.E. Sepasgozar, C. Wang	A systematic review of smart real estate technology: Drivers of, and barriers to, the use of digital disruptive technologies and online platforms	2018	97	19.4
5	S. Saito, Y. Aoki	Building and road detection from large aerial imagery	2015	77	9.63
6	C.C.D. Lelong, J.-M. Roger, S. Brégand, F. Dubertret, M. Lanore, N.A. Sitorus, D.A. Raharjo, J.-P. Caliman	Evaluation of oil-palm fungal disease infestation with canopy hyperspectral reflectance data	2010	75	5.77
7	H.S. Munawar, S. Qayyum, F. Ullah, S. Sepasgozar	Big data and its applications in smart real estate and the disaster management life cycle: A systematic analysis	2020	73	24.33
8	E. Engelen, R. Fernandez, R. Hendrikse	How Finance Penetrates its Other: A Cautionary Tale on the Financialization of a Dutch University	2014	65	7.22
9	E. Beusker, C. Stoy, S.N. Pollalis	Estimation model and benchmarks for heating energy consumption of schools and sports facilities in Germany	2012	61	5.55
10	P.A. Jensen, T. van der Voordt, C. Coenen, D. von Felten, A.-L. Lindholm, S.B. Nielsen, C. Riratanaphong, M. Pfenninger	In search for the added value of FM: What we know and what we need to learn	2012	52	4.73
11	F. Dornaika, A. Moujahid, Y. El Merabet, Y. Ruichek	Building detection from orthophotos using a machine learning approach: An empirical study on image segmentation and descriptors	2016	50	7.14
12	R. Appel-Meulenbroek, M. Clippard, A. Pfnür	The effectiveness of physical office environments for employee outcomes: An interdisciplinary perspective of research efforts	2018	49	9.8

13	A. Henn, C. Römer, G. Gröger, L. Plümer	Automatic classification of building types in 3D city models	2012	47	4.27
14	R. Beckers, T. Van Der Voordt, G. Dewulf	A conceptual framework to identify spatial implications of new ways of learning in higher education	2015	45	5.63
15	T.M. Hickey	Wine, wealth, and the state in late antique Egypt: The house of Apion at Oxyrhynchus	2012	43	3.91
16	X. Gan, J. Zuo, K. Ye, D. Li, R. Chang, G. Zillante	Are migrant workers satisfied with public rental housing? A study in Chongqing, China	2016	43	6.14
17	B.T. Nunes, S.J. Pollard, P.J. Burgess, G. Ellis, I.C. de los Rios, F. Charnley	University contributions to the circular economy: Professing the hidden curriculum	2018	41	8.2
18	F. Ullah, F. Al-Turjman	A conceptual framework for blockchain smart contract adoption to manage real estate deals in smart cities	2023	40	40
19	M. Palvalin, T. van der Voordt, T. Jylhä	The impact of workplaces and self-management practices on the productivity of knowledge workers	2017	40	6.67
20	A.-L. Lindholm	A constructive study on creating core business-relevant CREM strategy and performance measures	2008	38	2.53

Figure 8: VoSviewer overlay visualization map of the citation by countries

5. Conclusion and Recommendations

The present study significantly contributes to the expanding domain of *Bona vacantia*, or ownerless property estates. There has been a consistent growth in the quantity of publications in this field. Our bibliometric investigation yielded valuable information regarding significant journals, highly cited authors, and dominant

keywords in the field. This was achieved by employing various analytical techniques, including data refinement, investigation of bibliometric markers, cluster analysis, network analysis, and word cloud methodologies. Notably, a considerable fraction of these publications comprises articles and conference proceedings.

The study provides a significant understanding of the topic of *Bona vacantia*. However, it also reveals research gaps, suggesting the necessity for wider database coverage and a longer duration for future investigations. Although there are certain limits, the study highlights the significance of this work's contribution to the emerging area of *Bona vacantia*, which pertains to estates having no owner. There has been an ongoing surge in the number of publications on this topic. Our bibliometric investigation has yielded valuable information regarding the leading journals, authors with high citation counts, and prevailing keywords in the field. This was accomplished by utilizing a range of analytical methods, such as data refinement, examination of bibliometric indicators, cluster analysis, network analysis, and word cloud approaches. A significant proportion of these publications consist of articles and conference proceedings, which are worth mentioning. They provide policymakers with a clearer picture of the current state of research in the field, thereby guiding them in formulating informed and effective policies related to ownerless property estates. This study, therefore, serves as a valuable resource for both researchers and policymakers in the field of *Bona vacantia*.

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