

Bibliometric Study With Systematic Literature Review On Architectural Palimpsest: Methods And Applications

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Abstract:

Background: An architectural palimpsest discusses the layered history that emphasises that structures and urban areas are not static objects but collections of many cultural and architectural historical influences that have accumulated over time. The present study examined the application and prevailing trends of architectural palimpsest research through a bibliometric analysis of descriptive, intellectual, and thematic studies and a systematic literature review to establish the methodologies and implementation of the architectural palimpsest across diverse fields within the built environment.

Materials and Methods: Forty-one (41) articles were meticulously curated and extracted from the esteemed Scopus database, spanning 1998 to 2023. The analysis of architectural palimpsest or usage articles demonstrates a persistent and steady upward trend, characterised by an annual growth rate of 6.65 per cent. The bibliometric investigation unveiled that the *International Journal of Conservation of Science and Urban Planning* emerged as the most prolific publication, producing two scholarly articles within this timeframe, with *Antiquity* as the preeminent journal of global influence.

Results: The present analysis reveals a conspicuous prevalence of the terms "Historic buildings," "historical perspectives," and "Urban design" in the scholarly discourse on architectural palimpsest research. These terms have emerged as dominant themes, reflecting the ongoing research trend in this field. The studies examined in this analysis reveal a notable lack of utilisation when integrating qualitative and quantitative methods to address the inherent limitations of each research approach. The prevailing usage of "architectural palimpsest" is primarily observed within archaeological and preservation studies, as indicated by the analysis's findings. This study focuses on scientific advancements and trends in scholarly collaboration in architectural palimpsest research.

Conclusion: Examining research methodologies and their application in different areas of the built environment can provide valuable insights to researchers seeking a comprehensive understanding of the architectural palimpsest in diverse ways.

Key Word: Architectural Palimpsest, Methodology, Applications, Scopus, Bibliometrics, Systematic Review.

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I. Introduction

The term "palimpsest" originates from the Latin word "palimpsestus," which is derived from the Greek word "palimpsestos," which means "scraped again"(1). In English, 'palimpsest' refers to a document that has been scraped and rewritten several times. The process of erasing prior writing was known as "palimpsest" between the seventh and sixteenth centuries, and "palimpsest" was used to describe this process(2). In handwritten documents, the term "palimpsest" refers to a circumstance in which the original text has not been completely obliterated, but parts of it remain(2). The previous one needed chemically removed to apply a new text layer. Each successive layer is not required to be linked to the previous one. Due to the ineffectiveness of the chemical method intended to eradicate the earlier layers of writing, these text layers would ultimately reappear over time(2). This rediscovery revealed the underlying layer, creating a palimpsest that might interact with additional levels. As a result, superimposing or layering may be considered removing one layer and adding another, which is essential to understanding the nature of a palimpsest(2,3). A significant current example of a palimpsest, "The Archimedes Palimpsest", is the most well-known copy of a Greek religious book that dates to the latter 12th and early 13th centuries(4). Palimpsests are made through layered erasure and superimposition, which involves

writing twice on a piece of parchment or other writing medium and then erasing or rubbing off the first writing to make room for the second(1,5).

According to Dillon (2007), in many cases, the original writing on the vellum was only partially obliterated after being treated, making palimpsests fascinating to future researchers. The iron in the residual ink interacted with the oxygen in the air to produce a reddish-brown oxide, which resurfaced in subsequent centuries, giving the writing a spectral appearance(4,6). The narrative of the Archimedes Palimpsest, which dates from the third century BC to the present, attests to the magical and spectral character of the palimpsest phenomena(6). Moreover, the manuscript that lies underneath the Archimedes Palimpsest is the one that includes the first documented translation of mathematical monographs written by Archimedes in Constantinople in the tenth century(6). Palimpsests are not dusty paleographic objects but uncanny harbingers to the present of the murdered texts of former ages with the highest relevance in paleography and history. Again, the phenomena of palimpsests can be traced back to antiquity, and the story of the Archimedes Palimpsest is but a footnote within the larger narrative of this phenomenon, which extends up to the modern day(2,6).

The palimpsest has since been extensively employed as a metaphor in several different fields, including building heritage, archaeology, architecture, literature, and theoretical debate, to analyse the progression of time and history to unite the past, present, and future(2,3,7–9). However, there is no theoretical approach to the palimpsest concept, which provides a poetic and explanatory system that respects and conveys the idea of transformation through time and history from an architectural perspective(10). By linking the past, present, and future with time, a palimpsest is a metaphor for a dynamic revision process(9,10).

In architecture, "palimpsest" has been used by architects such as Bernard Tschumi, Peter Eisenman, and Rem Koolhaas to describe a structure that has been written over, partly erased, and then written over again, with each rewriting leaving traces behind(10). This indicates that structures have many levels, preserving a different aspect of the building's past(10–12). The depth and significance of architectural design are revealed by deciphering these remnants. Therefore, the palimpsest represents how landscapes, structures, and artefacts accumulate layers over time(12–15). Consequently, structures reveal the physical demonstration of the multiple phases and layers created through modifications and are referred to as 'architectural palimpsest'(9–11,16). This study aims to investigate the utilization and current patterns of architectural palimpsest research employing a bibliometric analysis encompassing descriptive, intellectual, and thematic studies. Additionally, a systematic literature review is conducted to ascertain the methodologies and execution of architectural palimpsest in various domains within the built environment.

The bibliometric analysis is an indispensable instrument for quantitatively examining a substantial corpus of scholarly literature, thereby facilitating the identification and evaluation of the evolutionary trajectory and performance within a specific domain(17,18). Whilst the analysis of bibliometrics may present inherent complexities in terms of its analytical nature, it is noteworthy that the bibliometric approach has been widely employed across various academic domains. For instance, (Park & Lee, (2022) and (20) have successfully applied this methodology in architectural studies. Furthermore, (Usman & Ho (2021) and (Li et al. (2021) have effectively employed bibliometric analysis within the domain of environmental studies, and (Diaby et al. (2013) and (24) have demonstrated its utility in the healthcare field.

The systematic literature review is a widely recognised and esteemed methodology employed to discern and evaluate research focal points within a given field with a discerning and critical lens(25,26). The scholarly utilisation of the concept has been observed across diverse domains, encompassing but not limited to the fields of construction and building (27,28), environmental studies (Moraes et al., 2021), as well as computer science (29–31). The amalgamation of bibliometric and systematic literature reviews has garnered significant traction in the realm of scholarly inquiry, particularly within the domains of building and construction (Karimi & Iordanova, 2021; Zhao & Taib, 2022), healthcare (34,35), construction and sustainability (36,37).

To explicate the extant body of research about bibliometric systematic literature review within the domain of architectural palimpsest, prominent digital repositories, including but not limited to Scopus, Science Direct, Springer Link, and Web of Science (WoS), were meticulously scrutinised. The phenomenon of the architectural palimpsest has garnered considerable scholarly attention in the contemporary era. The extant body of scholarly work about the architectural palimpsest has yet to undergo comprehensive critical analysis and definitive conceptualisation. Consequently, it becomes imperative to undertake a systematic review methodology to discern the prevailing research focal points within this field of study and ascertain the various applications and methodologies employed therein. Identifying disciplinary hotspots, encompassing the contemporary trend of employing architectural palimpsest in multidisciplinary contexts, illuminates the progression and practical implementation of research within said field up to the present moment. The comprehension of this matter is of utmost importance in acquiring profound discernment regarding the research emphasis of the extant body of literature and discerning potential domains to investigate in facilitating researchers in attaining requisite objectives.

The principal objective of this investigation is to elucidate the fundamental purpose.

I. To engage in a scholarly discourse regarding the contemporary trends observed in palimpsest in architectural literature through bibliometric analysis.

ii. The present study aims to furnish a comprehensive and systematic review encompassing the diverse applications and methodologies employed in examining the palimpsest in architectural studies.

This study represents the first comprehensive bibliometric review of the architectural palimpsest, offering the most up-to-date insights derived from a range of research on this topic. The subsequent section of this study is structured in the following manner. Section 2 outlines the methodology used to extract and analyse pertinent literature. Section 3 presents the results of the bibliometric analysis and provides an overview of the methodologies utilised in architectural palimpsest-based research. Section 4 highlights the conclusion and limitations of this work.

II. Material And Methods

Research questions development

The primary objective of this research endeavour is to undertake a meticulous bibliometric analysis and comprehensive systematic literature review about the domain of architectural palimpsest. The research inquiries are duly enumerated in Table 1, accompanied by the corresponding rationales and methodologies employed for analysis. The descriptive analysis offers comprehensive insights into the annual productions, annual citations, and performance of countries, journals, articles, and keywords to give researchers a comprehensive understanding of the advancements in pertinent domains. Phoong et al., (2022) and Trinidad et al. (2021) posit that this step assumes paramount importance, as it affords the researcher a comprehensive comprehension of the dependability of a particular journal and effectively safeguards them against disseminating their scholarly endeavours in predatory journals.

Gaining cognisance of the journal's performance vis-à-vis its annual production and citations can facilitate the researcher's comprehension of the journal. Furthermore, the findings can give the researcher a rudimentary notion regarding prospective journals wherein they may disseminate their scholarly contributions. The present study's social network analysis has the potential to shed light on the collaborative exchange of pertinent information, specifically about countries, through the utilisation of the visualisation mapping method as proposed by Mao et al. (2021). The primary objective of conceptual structure analysis is to unveil the prevailing areas of research interest within the field, whereas intellectual structure analysis serves to elucidate the impact of a publication on interconnected research domains ((38,39).

A comprehensive elucidation of every subsection within the bibliometric analysis is expounded upon herein:

I. Publication Analysis: Assessing Authors' Contributions in Related Fields (40) utilising the comprehensive counting method, which accords full recognition to pertinent contributions, Citation analysis, as expounded upon, entails meticulously examining an article's prominence through the quantitative assessment of its citation frequency(41).

ii. Co-authorship analysis: This study section examines the phenomenon of national collaborative endeavours by quantifying the frequency of joint publications, as discussed (42,43)

iii. Co-word analysis: Unveiling research hotspots by examining the degrees of co-occurrence among keywords (42,44).

Table 1. Overview of the Research Development in This Study.

Bibliometric analysis			
No.	Research question(s)	Research objective(s) and aims	Research Methodology
1.	What is the publication trend of architectural palimpsest literature?	To understand how the palimpsest concept in architectural study has evolved. This objective is essential to assist the researchers in visualising the potential of applying the palimpsest concept in the research.	Descriptive analysis (publication analysis; citation analysis)
2	Which countries contributed to architectural palimpsest research?	To determine which countries contributed the most and gained the highest citations in the research. This objective is crucial to encourage the researchers in international collaboration.	Descriptive analysis (publication analysis; citation analysis)
3	Which journals led in the field of architectural palimpsest?	To determine the most prolific journals published regarding the palimpsest concept in architectural studies. This objective is vital to help researchers to decide where to publish and publicise research findings.	Descriptive analysis (citation analysis)
4	How is the countries' collaboration structure in	To assess the countries' collaboration trend in the architectural research regarding the palimpsest concept. This objective aims to help	Conceptual structure analysis (co-word analysis)

	the architectural palimpsest?	researchers decide which country is suitable for collaborating in publishing the palimpsest concept in architectural research.	
5	What is the conceptual structure of keywords in architectural palimpsest?	To identify the research hotspots that evolved in the field. This objective helps researchers to understand the new research topics.	Conceptual structure analysis (co-word analysis)
6	What are the countries' coupling structures in the architectural palimpsest area?	To provide information regarding the similarity between the two countries. This objective assists the researcher in exploring how often these countries share similar literature and viewpoints in the related field.	Intellectual structure analysis (bibliographic coupling)
7	Which are the research fronts of the architectural palimpsest study?	To determine the thematically similar articles in the field. This objective provides researchers with an idea regarding what has been discussed in the articles and hence assists researchers in developing new research work.	Intellectual structure analysis (Bibliographic coupling)
8.	What are the areas in which the architectural palimpsest has been implemented?	To identify the areas in which the architectural palimpsest is applied. This goal aids researchers in understanding the value of the architectural palimpsest. This can help academics spot emerging patterns in the industry.	Review technique (Systematic literature reviews)

Locating the study

An appropriate and trustworthy scientific database is required to ensure the validity and quality of the articles obtained. Web of Science (WoS), Scopus, and Google Scholar Web are examples. Among these examples, Scopus has been selected as the core database in this study. However, WoS is widely regarded as the world's most extensive scientific citation search and analytical information database (Li et al., 2018), covering more than 21,419 prestigious research journals, books, and conference proceedings that underwent stringent selection process (Dabbagh et al., 2019; Elango, 2019). Due to the unavailability of access to the Web of Science database within the researchers' domain, a limitation, Scopus has been selected as the preferred database for conducting a systematic review. This decision is based on Scopus's equally wide-ranging coverage and thorough indexing of academic literature. Scopus provides a comprehensive selection of academic disciplines and a global scope encompassing various foreign publications, making it a viable option for capturing a wide range of research(45–47). The user-friendly interface, citation analysis capabilities, and incorporation of diverse publication genres, such as conference proceedings, facilitate the comprehensive and well-rounded literature evaluation(45). Although Scopus may not fully mimic the precise extent of the Web of Science, its extensive capabilities and interdisciplinary orientation render it a good alternative for upholding the rigour and comprehensiveness necessary for conducting a systematic review. However, this study focused on peer-reviewed articles written in English, as peer-reviewed papers are legitimate scholarly communication (38,48).

The primary topic of this study centres around the concept of architectural palimpsest. Consequently, the search query is limited to the keyword "Architectural palimpsest" exclusively. By employing this search approach, publications containing the "architectural palimpsest" are chosen for further analysis. The query equation: TITLE-ABS

KEY (architectural AND palimpsest) AND (EXCLUDE (DOCTYPE , "cp") OR EXCLUDE (DOCTYPE , "ch") OR EXCLUDE (DOCTYPE , "bk") OR EXCLUDE (DOCTYPE , "re") OR EXCLUDE (DOCTYPE , "cr")) AND (EXCLUDE (LANGUAGE , "Italian") OR EXCLUDE (LANGUAGE , "Russian") OR EXCLUDE (LANGUAGE , "Turkish") OR EXCLUDE (LANGUAGE , "Spanish") OR EXCLUDE (LANGUAGE , "Slovak") OR EXCLUDE (LANGUAGE , "Lithuanian"))

Selection of Relevant Research

The palimpsest, in its multifaceted nature, has been widely utilised as a metaphor across various disciplines, encompassing the realms of building preservation and heritage studies, memory studies, archaeology, architecture, literature studies, and theoretical discourse(11,15,49–53). Its purpose lies in meticulously examining temporal progression and historical evolution, serving as a unifying force that intertwines the past, present, and future realms(6,7,9,54).

The significance of the selection process in this analysis cannot be overstated, as it guarantees that all retrieved papers are intricately linked to the domain of architectural palimpsest. The selection process was commenced by utilising the esteemed Scopus database. Nevertheless, it is imperative to note that the scope of application within architecture has been significantly limited. No specific temporal parameters were provided for extensively exploring pertinent scholarly works. This endeavour was undertaken to facilitate the scholarly inquiry into the evolutionary advancements of the palimpsest metaphor within architectural studies, encompassing its diverse proponents and its multifaceted application across various architectural disciplines.

The initial selection process commenced by searching "Architectural palimpsest." Following that, the criteria for inclusion and exclusion were presented as a set of guidelines to aid in selecting pertinent publications. Initially, a rigorous selection process was employed to identify publications published in peer-reviewed journals throughout the specified time frame. Subsequently, exclusively peer-reviewed publications composed in English were obtained to mitigate the risk of misinterpretation arising from other languages, ensuring the validity of the obtained findings. The workflow depicted in Figure 1 illustrates the process of extracting pertinent literature to enhance researchers' comprehension. The dataset utilised in this study was obtained from Scopus on August 9, 2023, and comprised 80 documents. Out of the articles considered, a total of 28 documents were omitted from the analysis due to their lack of relevance to the specific category of the article. These removed files encompassed conference papers, books, book reviews, book chapters, and conference reviews. Because of this exclusion, 52 articles were generated, focusing on architecture and palimpsest. Forty-one (41) articles were chosen after applying language filtering techniques on 13 distinct languages, excluding English.

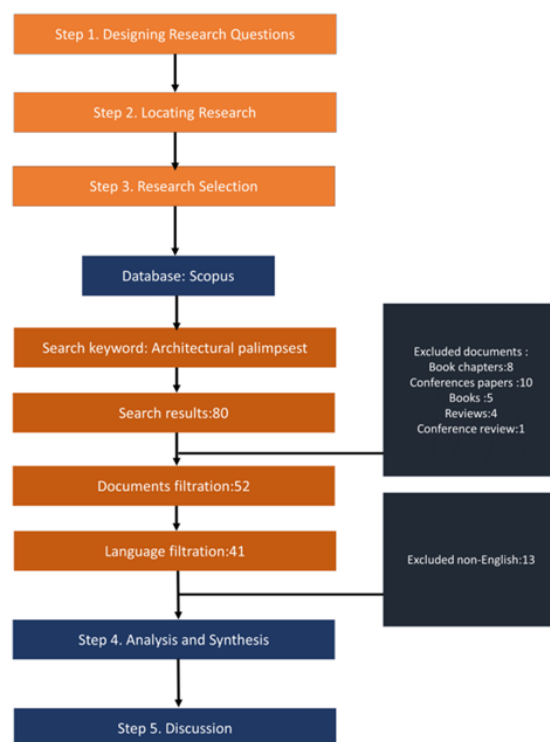


Figure 1. Research workflow for a systematic review with bibliometric analysis

III. Result

Analysis and synthesis of results.

Following the retrieval and extraction of articles from Scopus, bibliographic approaches were employed to ascertain the information required to meet the research inquiries. Subsequently, Biblioshiny was employed with the R package to analyse the salient facets delineated in the research inquiries. The R package Biblioshiny, developed by Aria and Cuccurullo (2017), is a widely utilised quantitative analytical tool in Scientometrics and bibliometric analysis(55). It is a valuable resource for anyone without coding expertise, enabling them to extract comprehensive statistical information from bibliographic data. While both Biblioshiny serve the purpose of bibliometric analysis, they provide distinct advantages. Biblioshiny is particularly useful for fundamental counting tasks.

IV. Bibliometric Analysis

The bibliometric analysis employs substantial quantities of scholarly research in discerning prevalent patterns in the field of architecture and the realm of palimpsest literature. Henceforth, this section accentuates the outcomes of utilising a bibliometric analytic instrument.

Main information

Description	Results
MAIN INFORMATION ABOUT DATA	
Timespan	1998:2023

Sources (Journals, Books, Etc)	39
Documents	41
Annual Growth Rate %	6.65
Document Average Age	4.54
Average Citations Per Doc	2.317
References	1319
DOCUMENT CONTENTS	
Keywords Plus (ID)	89
Author's Keywords (DE)	187
AUTHORS	
Authors	68
Authors Of Single-Authored Docs	29
AUTHORS COLLABORATION	
Single-Authored Docs	29
Co-Authors Per Doc	1.68
International Co-Authorships %	7.317
DOCUMENT TYPES	
Article	41

Annual Scientific Production

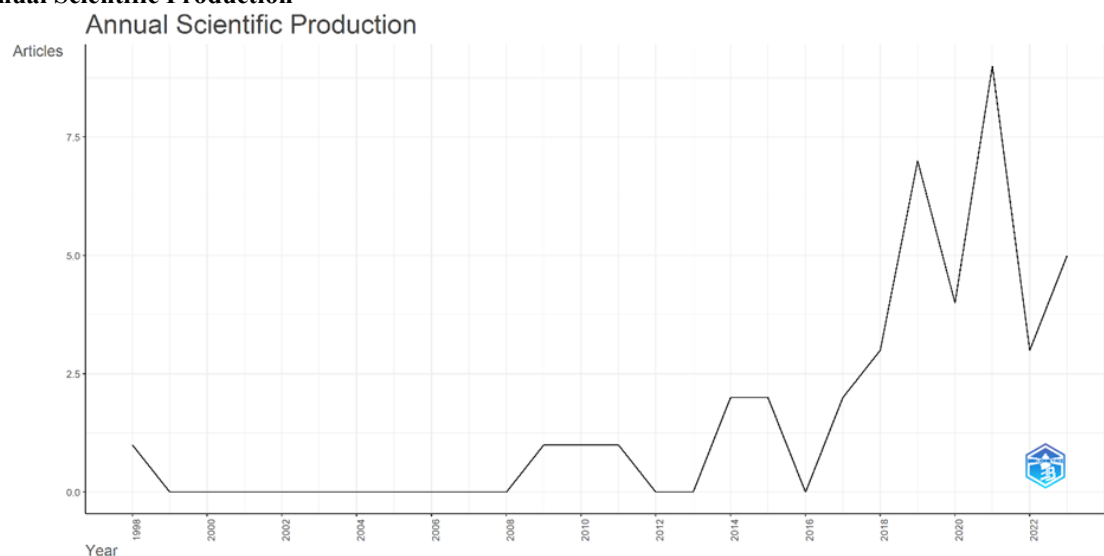


Figure 2.0 Annual Scientific Production

The annual scientific production of architectural palimpsest or usage articles from 1998 to 2022 reveals a consistent upward trajectory with an annual growth rate of 6.65 per cent. Notably, this trend experienced a significant surge between 2008 and 2016. Figure 2 and Table 1 illustrates the progressive increase in the number of documents utilised in the bibliometric analysis of the architectural palimpsest over time. The present analysis reveals that 68 esteemed scholars have made significant contributions to the domain of inquiry under consideration, as evidenced by their collective involvement in 41 distinct scholarly works. Furthermore, an extensive body of literature has meticulously supported these works, comprising 1319 references. Furthermore, it is worth noting that the corpus consists of 29 documents authored by a single individual, with a notable 7.317 per cent of these documents showcasing international co-authorship. Moreover, it is noteworthy that the average citation rate per document stands at 2.317 per cent and the average citation per year at 1.9 per cent, an undeniably commendable figure. The average age per document is also 4.54, a reasonably satisfactory value.

Most Productive and Top Journals

Bibliometric analysis places significant importance on journals' productivity and citation impact, as they are crucial indicators of a field's research output and influence(56). Productive journals are characterised by their ability to consistently publish numerous research articles, indicating the extent of scholarly engagement within a specific field of study(17,56). Conversely, it is essential to note that top-cited journals are esteemed for their research quality and impact, as indicated by the frequency with which their articles are referenced in other scholarly publications(57,58). Academic journals frequently function as authoritative information repositories, significantly influencing research agendas and trends. Researchers and institutions commonly employ metrics to assess the importance and pertinence of journals within their specific area of study.

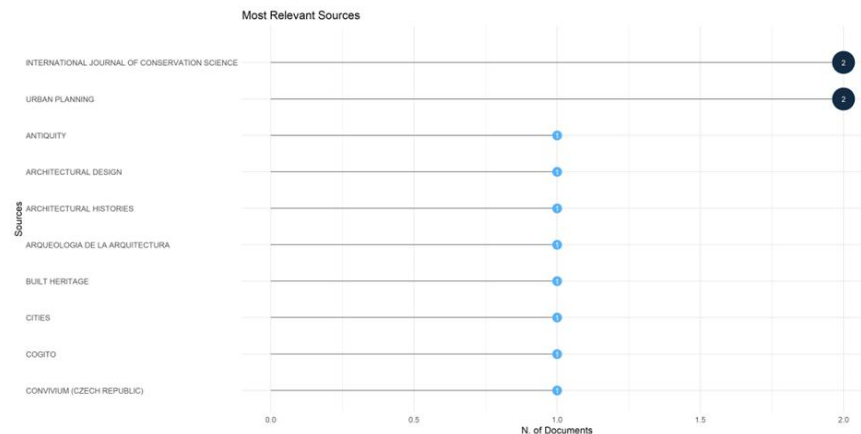


Figure 3. Top Ten Most Productive Journals

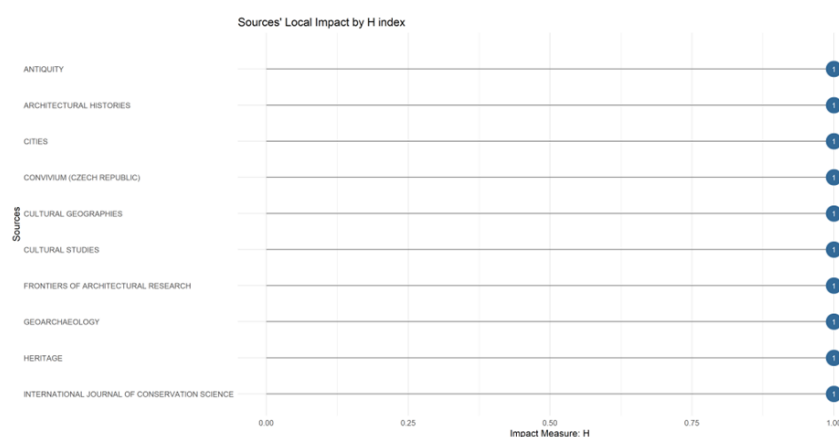


Figure 4. Top Ten Most Influential Journals.

Figure 3 displays the top ten journals that exhibit high productivity in publishing research on the architectural palimpsest. The bibliometric research conducted from 1998 to 2022 revealed that the International Journal of Conservation Science and Urban Planning had the most significant number of publications, with two published during this period. The other journals included in the analysis had one publication each. This indicates a decreased frequency of publication concerning the utilisation of the architectural palimpsest concept. However, the top locally cited journals with the highest impact factor, ten architectural palimpsest research journals, are displayed in Figure 4. The most influential journal in the world, according to the bibliometric analysis, is Antiquity, which also has the greatest h-index (1), g-index (1), and m-index (0.250). The second-most often cited journal was The Architectural Histories and Cities. The current state of scholarly publications on architectural palimpsest reveals a notable dearth of research and warrants increased attention within the academic community.

Most Relevant Authors and Productive Over Time.

The analysis of bibliometrics plays a crucial role in comprehending the scholarly landscape by examining the most significant authors and their productivity over time(56). Identifying the most relevant authors involves acknowledging individuals whose work has made a substantial and lasting impact in their respective academic disciplines. These authors possess a significant collection of influential publications and are frequently cited by their peers, demonstrating their authority and expertise(17,59). Furthermore, monitoring authors' productivity over time allows for identifying patterns in their research output. This includes recognising periods of high productivity and changes in their research interests. Insights of this nature are crucial to acknowledge the changing contributions made by authors in a specific field, facilitate research collaborations, and evaluate the dynamics of scholarly expertise and productivity(58,60). Bibliometric analysis offers a holistic perspective on influential individuals and their contributions to a particular field, facilitating the assessment and recognition of scholarly excellence.

A comprehensive analysis reveals that a collective of 68 authors have contributed to the publication of 41 research papers, each focusing on the architectural palimpsest, across various academic journals and other publication platforms. In 2015, Turgut, H emerged as the most prolific author, having published two articles

(equivalent to a fractionalised value of 1.5). Additionally, Turgut, H achieved the highest peak frequency for average citations per item during that year. Following closely behind was Abdelhady K, with a fractionalised value of 1.0 in Figure 5. Table 2 shows that Andreou Ac, Artopoulos G, and Averkiou M achieved the highest total citation (TC) score of 7, indicating their significant impact on the field. Furthermore, their total citation per year (TCY) stands at an impressive 2.333, highlighting the consistent recognition their work has received. Following closely behind, Avramidis K and Bailey G obtained a total citation score of 3, further underscoring their noteworthy contributions to the field. Upon further analysis, it becomes evident that Turgut, H, who has accumulated a total citation count of 1, continues to exert a modest influence compared to Avramidis K (0.75) about the Total Citation Score per year, which stands at 0.111.

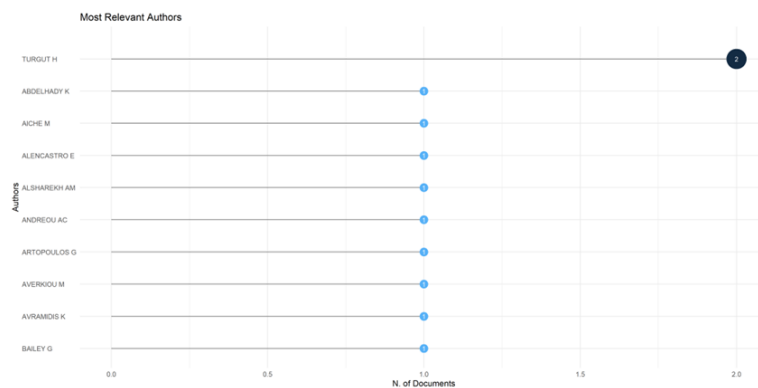


Figure 5. Most Relevant Authors in Architectural Palimpsest Research

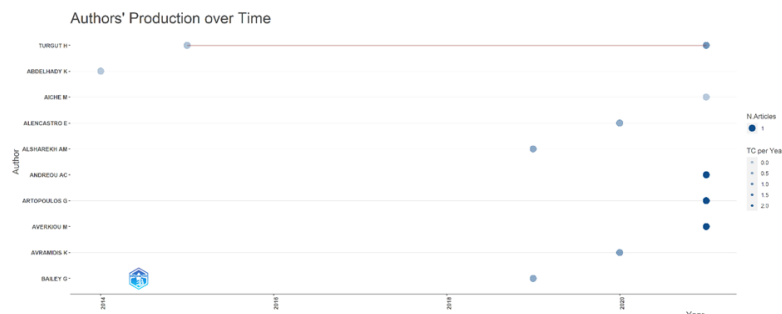


Figure 6. Authors Production Over Time in Architectural Palimpsest Research

Table 2. Top Ten Most Productive Authors

Author	year	freq	TC	TCpY
Abdelhady K	2014	1	0	0
Aiche M	2021	1	0	0
Alencastro E	2020	1	2	0.5
Alsharekh Am	2019	1	3	0.6
Andreou Ac	2021	1	7	2.333
Artopoulos G	2021	1	7	2.333
Averkiou M	2021	1	7	2.333
Avramidis K	2020	1	3	0.75
Bailey G	2019	1	3	0.6
Turgut H	2015	1	1	0.111

Corresponding Author's Countries and The Most Cited Countries

In bibliometrics analysis, it is crucial to consider the countries of the corresponding authors and the most frequently cited countries. This information is essential for evaluating the worldwide impact and influence of research. The countries of the corresponding author in a publication are determined by the authors' affiliations who assume the corresponding author's role (17,20,61). This data provides valuable insights into the geographical distribution of research contributions, emphasising a study's wide range of perspectives and institutional affiliations. On the other hand, the countries with the highest number of citations indicate nations where researchers and institutions have been extensively referenced in academic publications(17,56). This highlights the influence and importance of research originating from these nations, demonstrating their substantial contributions to the worldwide academic community(60). Both datasets are crucial for identifying patterns of international collaboration, recognising research hubs, and assessing the overall influence of nations in academia.

According to the data presented in Figure 5, it is evident that the United Kingdom displayed the highest of 5 publications, with four single-country publications (SCP), and one multiple-country publication. Moreover, it attained the utmost frequency, exhibiting a numerical value of 0.341. Again, Italy and the USA came next with the highest number of single-country (SCP) publications. It is evident that the United Kingdom, Italy, and the USA are widely recognised as the nations that demonstrate the most notable levels of scientific productivity on a global scale. Table 3 presents architectural palimpsest research findings, highlighting various countries' citation counts. The United Kingdom and the USA exhibit the highest citation counts, with 30 and 10 citations, respectively. These figures correspond to average article citation rates of 6 and 3 citations per entry, respectively. Nevertheless, it is noteworthy that Ukraine and Cyprus exhibit a more robust performance regarding average article citation, with values of 9 and 7, respectively, even though they have a lower citation count than the United Kingdom and the USA. It is worth mentioning that both countries have achieved an equal total citation count.

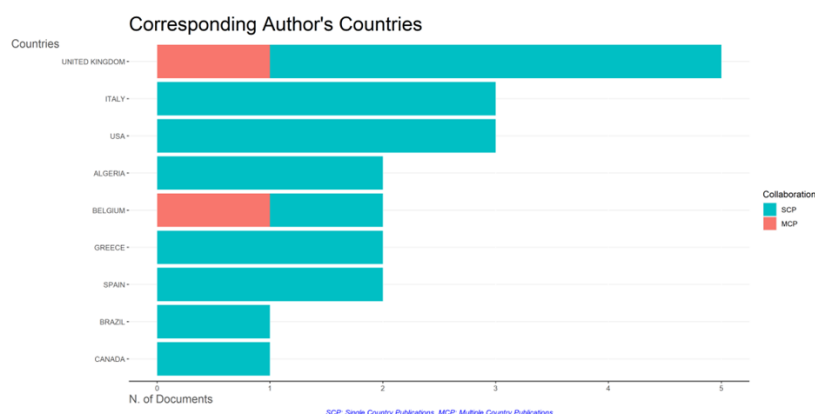


Figure 5. Corresponding Authors Countries

Table 3. Top Ten Most Cited Countries

Country	TC	Average Article Citations
UNITED KINGDOM	30	6.00
USA	10	3.30
UKRAINE	9	9.00
CYPRUS	7	7.00
ALGERIA	6	3.00
ITALY	6	2.00
BELGIUM	3	1.50
CANADA	3	3.00
NETHERLANDS	3	3.00
SPAIN	3	1.50

Thematic Focus in The Field of Architectural Palimpsest Research

Keyword analysis, co-occurrence network analysis, and trend themes analysis are integral elements of bibliometric analysis. The keyword analysis process thoroughly investigates the terminology and expressions utilised in academic papers to identify prevailing themes and areas of research emphasis within a specific discipline(56,62,63). The technique of co-occurrence network analysis extends the scope of keyword research by employing visual representations to depict the associations among keywords, which are determined by their co-occurrence frequencies inside documents(17,58,64). This methodology facilitates the identification of interconnected study subjects' interrelationships and groupings, exposing a particular discipline's fundamental framework. Moreover, analysing trend themes involves thoroughly examining the evolving patterns of keywords over a specific period, thereby shedding information on growing areas of interest and changes in research objectives within a particular field of study(24,58,60). Collectively, these methodologies offer significant perspectives on the cognitive terrain of a particular discipline, facilitating knowledge acquisition for scholars, decision-makers, and organisations, enabling them to remain updated on emerging patterns and focus their endeavours on areas that are gaining prominence.

Keyword Analysis

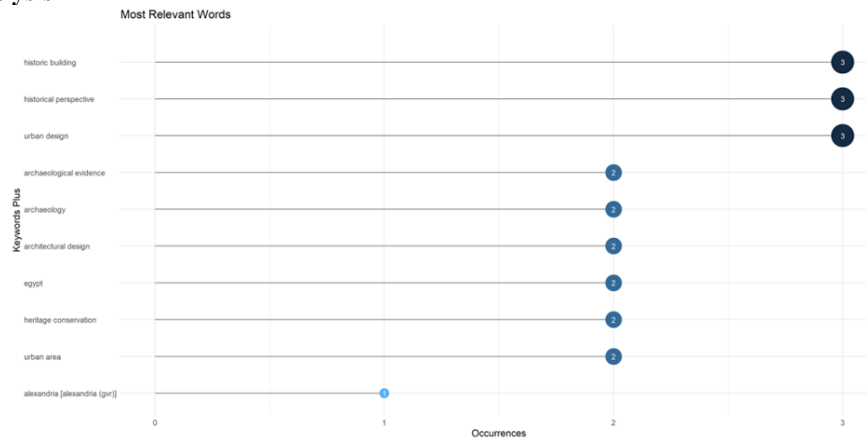


Figure 6. Most Relevant Keywords in Architectural Palimpsest Research

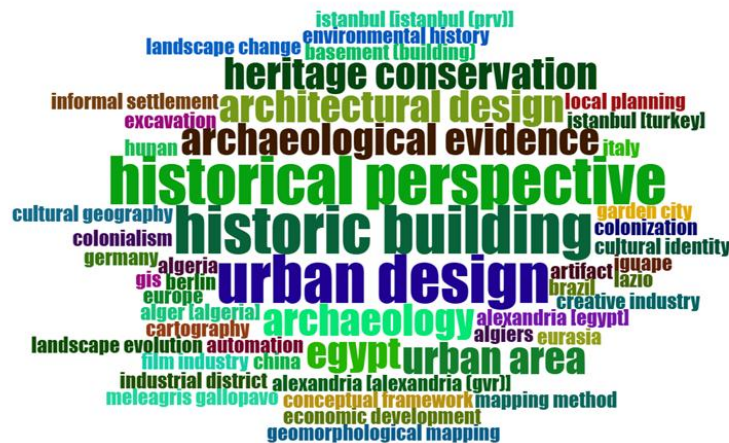


Figure 7. Most frequently, keywords by authors

The publications subjected to analysis have been delineated through the utilisation of an all-encompassing collection of 187 author keywords, supplemented by the inclusion of (DE), within the realm of architectural palimpsest research. Based on the analysis conducted, it is evident that the terms "Historic buildings," "historical perspectives," and "Urban design" were frequently employed by the authors, each appearing three times. Following closely behind are the terms "archaeological evidence," "archaeology," "architectural design," "Egypt," "heritage conservation," and "urban area," each occurring twice in both the word cloud and the compilation of most relevant keywords. The annual frequency of the primary terms exhibited a progressive upward trend, albeit with varying growth rates. The terms "historic buildings," "historical perspectives," and "urban design" exhibited a notable surge in frequency, as evidenced by the visual representation in Figure 6 and Figure 7, depicting a word cloud.

Keywords Co-Occurrence Network Analysis

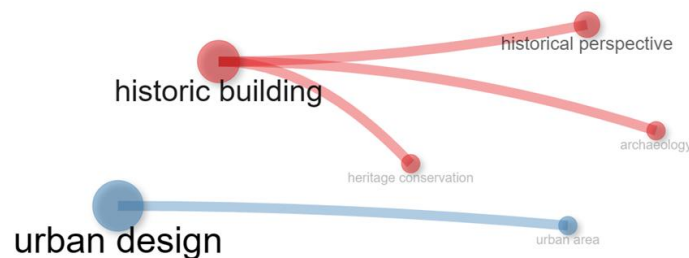


Figure 8. Keyword co-occurrence network.

Figure 8 illustrates the co-occurrence network of "Keywords Plus" terms. The primary objective of co-occurrence analysis is to evaluate the degree of association between items by considering the frequency with which they appear together in each set of documents. The articles yielded a cumulative count of 187 distinct terms. The co-occurrence network was generated to ensure optimal readability by including the most prominent six terms. The circular representation is magnitude indicates the frequency of term occurrence across a corpus of articles. The degree of relatedness between two terms can be inferred from their proximity, which is determined by the frequency of their co-occurrences. The observation revealed the presence of two interconnected clusters. The first cluster, denoted by red, encompasses a central group of "historic buildings". This cluster primarily focuses on "historical perspectives", "archaeology", and heritage conservation. The second cluster, represented by green, is centred around "urban design". Within this cluster, the sole minor cluster pertains to "urban areas". The present analysis aims to elucidate the salient themes that emerge from the works of the 67 authors in architectural palimpsest studies.

Trend Topics

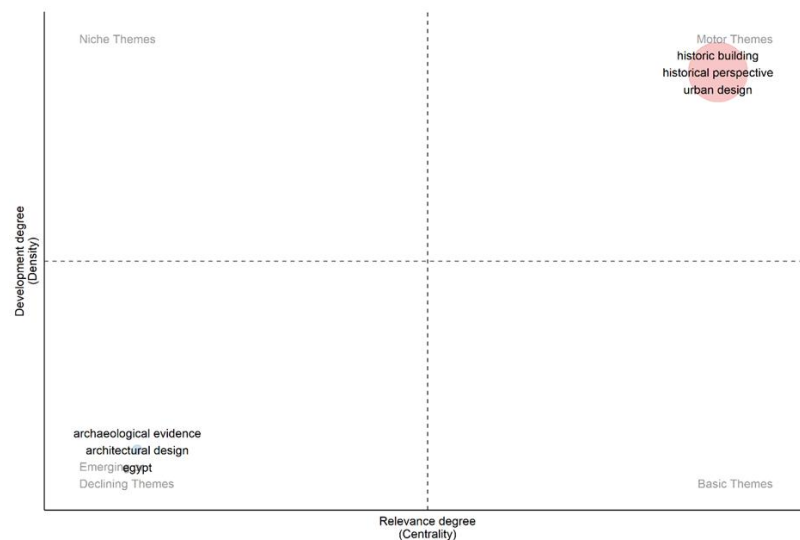


Figure 9. Thematic evolution map of the period 1998-2023

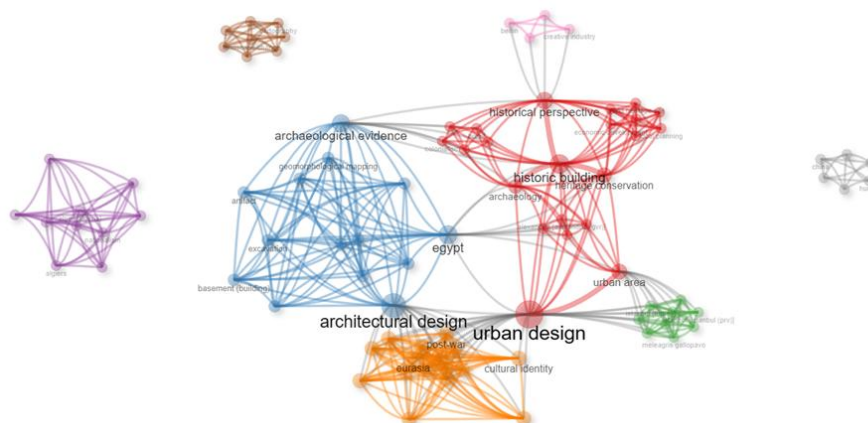


Figure 10. Thematic Network of Keywords Plus in Architectural Palimpsest Research.

Themes refer to groupings of keywords that can be effectively organised into a cohesive circle and visually represented as a two-dimensional image based on their density and centrality. The thematic map depicted in Figure 9 showcases a classification of themes based on their respective quadrants. Notably, the upper-right quadrant is characterised by motor themes, while the lower-right quadrant is associated with fundamental themes. The lower-left quadrant of our analysis pertains to examining themes that are either emerging or disappearing. On the other hand, the upper-left quadrant is dedicated to the exploration of highly specialised or niche topics. The concepts of Callon's centrality, Callon's density, rank centrality, and rank density were employed to analyse the thematic cluster depicted in Figures 9 and 10. These measures allowed for the identification of various evolutionary associations, which in turn shed light on the development of the field, as well as the pivotal moments, pathways, and shifts in the thematic content. The primary aim of this study was to discern and ascertain pertinent

subject matters spanning the years 1998 to 2023, specifically focusing on the evolution and advancement of research about architectural palimpsests.

The thematic evolution of the keyword "plus" among the different authors is depicted in Figure 9. The analysis reveals several prominent themes, namely "historical perspectives," "historical building," and "urban design." Once more, the analysis reveals a thematic network of keywords, which includes a notable cluster consisting of "historical building," "urban design," "architectural design," and "archaeological evidence." This cluster demonstrates a similar degree of significance. As mentioned earlier, the statement elucidates the various applications of the architectural palimpsest within the realm of the built environment, with particular emphasis on its utilisation in archaeological studies, conservation and preservation studies, urban planning, and design, as well as architectural history and theory.

Systematic Literature Review

After completing the bibliometric analysis, a comprehensive and meticulous systematic literature review was undertaken to ascertain the methodologies and applications of the architectural palimpsest within the selected documents. The thematic discussion of the review was derived from the process of screening and selecting the documents, which encompassed a comprehensive analysis of their respective focal points. The ensuing discourse will delve into the themes that emerged during this evaluation.

Methodologies Used in Architectural Palimpsest-Based Research.

The research conducted in the built environment, specifically focusing on architectural palimpsests, employs a wide range of qualitative and quantitative methodologies. These approaches aim to thoroughly examine and analyse spaces' intricate historical and architectural layers. Qualitative methodologies often encompass architectural surveys and visual assessments, which entail on-site visits and meticulously documenting architectural elements, materials, and historical context, which has been widely explored in most of these studies(65–70). These methodologies aim to elucidate architectural edifices' cultural and historical import within a specific milieu. Furthermore, most scholars extensively explore historical archives, cartographic materials, visual representations, and oral testimonies to meticulously reconstruct the constructed landscape's intricate development(71–75). Ethnographic methodologies can effectively establish meaningful connections with indigenous communities and relevant stakeholders, thereby facilitating a comprehensive understanding of architectural palimpsests' intricate social and cultural aspects(76–79). The utilisation of qualitative techniques collectively contributes a wealth of narratives that aid in interpreting the stories and meanings intricately woven within the various strata of the built environment. This, in turn, facilitates making well-informed decisions about preservation, restoration, and urban planning.

Quantitative methodologies serve as a valuable complement to qualitative analysis as they provide empirical data and metrics that enable the assessment of physical attributes and changes within the built environment. Technological advancements such as LiDAR scanning and Geographic Information Systems (GIS) are also employed in spatial modelling and cartography to generate highly accurate representations of physical spaces(80–82). The tools facilitate assessing and quantifying architectural attributes, spatial interconnections, and urban configurations. Statistical methodologies can also be utilised to discern patterns, such as variations in the concentration of structures or architectural design principles throughout distinct epochs in history which has also been explored(75,82–84). By combining qualitative and quantitative research methodologies, scholars can acquire a holistic comprehension of architectural palimpsests, thereby facilitating evidence-driven decision-making in heritage preservation, adaptive reuse, and sustainable urban development. This approach ensures due regard for urban spaces' historical and cultural strata.

However, it is apparent from these studies that the integration of qualitative and quantitative methods has been infrequently utilised to address the limitations inherent in the respective research approaches. Thus far, the studies have neglected to incorporate theoretical approaches and conceptual frameworks to theorise novel concepts and themes arising from their findings. The architectural palimpsest has been widely employed as a conceptual framework in numerous studies, serving to comprehend a research problem or to facilitate the discussion of research findings derived from the said investigation.

Architectural History and Theory

Architectural palimpsest holds significant importance within architectural history and theory, providing a comprehensive and multifaceted framework for analysing and interpreting the constructed environment(78,85). Architectural historians and theorists apply this concept to elucidate the intricate layers of meaning, evolutionary processes, and cultural significance deeply ingrained within architectural structures(72,86–88). With Walther Ruttmann's *Berlin: Symphony of a Great City* serving as the urtext for all future Berlin films, Evans (2022) examines how Berlin films include many historical and textual palimpsests. Consequently, this approach fosters a heightened comprehension of architectural history and theory, enabling a more profound exploration of the

subject matter. Deciphering the intricate narratives in structures and urban environments uses architectural palimpsest(72,76). For instance, Van Ooijen (2019) examines the application in palaeography by exploring the diachronic essence of the architectural palimpsest. It establishes a set of characteristics for examining structures that fit the palimpsest category. Experts can reconstruct the historical development of structures by closely examining architectural components, materials, and spatial arrangements(66,69,89). Architectural historians can illuminate the larger historical context in which these structures were designed by comprehending these historical layers, which let them trace the impacts of various architectural movements, architects, and civilisations. By laying a foundation for the growth of architectural theory, this contextualisation is crucial for enhancing the history of architecture.

Analysing the interplay between historical and contemporary architectural elements enables theorists to examine how these elements collectively shape the significance and character of a building or urban environment(77,78,88,90). This concept promotes a scholarly examination of architecture's intricate symbolism and cultural significance. It facilitates thoughtful discussions on various topics, including preserving heritage, constructing identity, and the socio-cultural implications of architectural design(72,79,83,91,92). In addition, the concept of architectural palimpsest presents a compelling challenge to the conventional understanding of architectural styles as fixed and unchanging constructs(69,72). Instead, it highlights the inherent dynamism and evolutionary character of architecture. The viewpoint expressed holds significant importance within contemporary architectural theory, as architects and scholars are inclined to adaptive reuse of preexisting structures and the multifaceted narratives they embody.

Urban planning and design

As a concept, the architectural palimpsest has garnered significant traction within urban planning and design. It serves as a valuable framework through which one can gain insight into and cultivate an appreciation for the intricate strata of history, culture, and development that converge to mold urban landscapes(65,75–77,88). This analytical framework provides planners and designers with the means to develop urban environments that effectively acknowledge and respect historical legacies while also accommodating the present-day requirements and aspirations of the community. For instance, Turgut (2021) attempts to gain insight and comprehension into the intricate and layered structure of Istanbul, as perceived by the authors of various papers, and to emphasise their interpretations using the concept of the palimpsest. Again, Grabar (2014) posits that the significance of urban symbolism and architectural inheritance within post-colonial discourse is pivotal and underappreciated and so explored the palimpsest as an approach to understanding this research challenge.

Moreover, Cities serve as a complex amalgamation of diverse architectural styles and periods intricately woven together to portray the gradual transformation of societies throughout history(65,76,88). Urban planners can create spaces that honour and appreciate the various layers of a city's history. By recognising and preserving these layers, they can contribute to celebrating the diversity and richness inherent in a city's past. One illustrative instance of architectural adaptive reuse involves the transformation of historical edifices into contemporary functionalities, thereby upholding the integrity of the original structure while revitalising urban spaces(77,79,88). Integrating historical elements in urban planning preserves and promotes a community's stories, traditions, and identities, ensuring their continued visibility and relevance(76,88). Integrating traditional and contemporary architectural features enables urban planners to establish environments that function as a conduit between historical and modern contexts, thereby strengthening the cultural essence of a given location(65,75,93). This approach fosters a sense of belonging and ensures a seamless experience for residents and visitors. The concept of an architectural palimpsest has the potential to address sustainability and environmental concerns effectively(73,92). Instead of demolishing existing structures, urban planners can employ repurposing and retrofitting strategies, effectively minimising waste generation and promoting resource conservation. Adopting a sustainable approach in urban design is by current principles in the field, which emphasise the optimisation of space, materials, and energy resources. One example of enhancing urban environment sustainability is the implementation of energy-efficient technologies in historic buildings(75,80,94). It is possible to achieve a more sustainable urban environment by upgrading these structures with such technologies. Using architectural palimpsest in urban planning and design presents a comprehensive and environmentally conscious method for shaping the constructed surroundings. Creating urban spaces with depth regarding historical, cultural, and developmental aspects is crucial for urban planners. By acknowledging these layers, planners can design spaces that are imbued with significance, foster cultural vibrancy, prioritise environmental sustainability, promote social inclusivity, and possess adaptability to future requirements.

Architectural Conservation and Heritage Studies

The concept acknowledges the common occurrence of buildings exhibiting multiple historical periods, modifications, and interventions. Consequently, it becomes imperative for conservationists and scholars specialising in heritage to meticulously examine these layers to guarantee the authentic preservation of

architectural heritage(65,71,92,95). Using architectural palimpsest in conservation is a significant approach for documenting and assessing historical structures. The approach employed by conservationists involves systematically uncovering the various layers of a building's history, thereby illuminating its gradual development and transformation throughout the years(78,96,97).

For instance, a comprehensive survey of the various factors that impact the conservation and regeneration of the urban fabric within the ancient cities of Alexandria through the palimpsest the objective is to shed light on the challenges contributing to the erosion of the cultural essence inherent in the urban fabric of Alexandria, a city of great historical significance(92). This endeavour aims to facilitate the establishment of a comprehensive framework that promotes sustainable development in the urban regions surrounding archaeological sites. Scholars and experts can compile comprehensive documentation of a structure's past by meticulously analysing architectural elements, materials, and construction techniques employed during various historical periods (66,92). In urban landscape design, Pezzetti (2017) examines the prefigured by analysing the structural characteristics of locations and their connections to cultural assets and history. This process facilitates making well-informed choices about the structure's restoration, rehabilitation, or adaptive reuse. A comprehensive documentation process ensures that interventions undertaken on a building are conducted with sensitivity towards its historical significance, thereby preventing the unintentional erasure of essential layers of its past(78,88). Furthermore, the concept of architectural palimpsest plays a crucial role in formulating conservation strategies that emphasise safeguarding the various historical strata in a structure(69,71,72). Instead of pursuing the restoration of a building to a singular and idealised state, this approach recognises the significance of preserving the evidence of its evolutionary process. Conservationists endeavour to achieve a delicate equilibrium by safeguarding the original architectural elements, addressing structural concerns, and upholding the historical essence of a building(66,69,86,95). Adopting a holistic approach enables the preservation of architectural heritage while simultaneously accommodating contemporary uses and requirements.

In heritage studies, architectural palimpsest enhances our comprehension of a particular site's cultural and historical circumstances. Studying buildings and structures provides scholars with a valuable tool for deciphering the complex narratives embedded within them, shedding light on the societies that conceived and occupied these architectural marvels(89,96,98). Deligiorgi et al. (2021) introduce a comprehensive workflow for digitising three-dimensional (3D) objects, explicitly focusing on applying reality capture technologies in the annotation and structural analysis of architectural heritage. The proposed methodology incorporates the utilisation of 3D Convolutional Neural Networks (3D CNNs) for classification. Through a comprehensive examination of the various strata of architectural history, scholars can acquire valuable insights into the evolution of architectural styles, the progression of technological innovations, and the profound cultural influences that have contributed to the development of the built environment across different epochs(73,91). Adopting an interdisciplinary approach establishes a connection between architecture and broader historical narratives, enriching our comprehension of cultural heritage.

Archaeology

Architectural palimpsest holds significant value within archaeology, as it offers a framework to delve into the intricate strata of construction and alteration that amass over time within architectural edifices(82,83). This concept empowers archaeologists to decipher the intricate tapestry of historical narratives, temporal sequencing, and socio-cultural import embedded within architectural structures and locations(74,81–83,90). Ultimately, this analytical framework affords invaluable perspectives into bygone civilisations and the transformative nature of their constructed habitats. Using architectural palimpsest in archaeology plays a pivotal role in dating and sequencing historical structures(80,83,90). Archaeological sites frequently encompass multiple strata of construction, which serve as tangible evidence of diverse stages of human habitation and alteration. By meticulously examining the architectural layers, researchers can establish a chronological framework that enables them to determine the specific periods during which various stages of construction took place(83). Moreover, it empowers archaeologists to comprehensively analyse the cultural and historical contexts that influenced architectural transformations(82,99). Consequently, this approach illuminates past societies' social dynamics. Another noteworthy application pertains to deciphering cultural interactions and influences(71,86). Examining architectural elements and modifications within a site can provide valuable insights into the dynamic interaction of different cultures throughout history(68,81,95,100). Including architectural styles, materials, or decorative motifs from diverse regions can serve as evidence of historical periods characterised by cultural exchange, conquest, or trade. Examining architectural palimpsest is a valuable tool for archaeologists in comprehending the intricate sociopolitical and economic dynamics within ancient societies. This analysis shows that architectural styles and practices were not stagnant but transformed due to cross-cultural exchanges and interactions(90).

V. Conclusion

The present study employed a bibliometric analysis and systematic literature review to investigate the progression and research trajectory of the architectural palimpsest literature from 1998 to 2023. The analysis of architectural palimpsest or usage articles demonstrates a persistent and steady upward trend, characterised by an annual growth rate of 6.65 per cent. It is worth noting that there was a substantial increase in this trend during the period spanning from 2008 to 2016. The bibliometric investigation between 1998 and 2022 unveiled that the *International Journal of Conservation of Science and Urban Planning* emerged as the most prolific publication, producing two scholarly articles within this timeframe. According to the bibliometric analysis, *Antiquity* is the preeminent journal of global influence. Notably, it boasts the highest h-index (1), g-index (1), and m-index (0.250) among its scholarly counterparts. The *Architectural Histories and Cities* journal emerged as the second most frequently referenced publication in the field. In 2015, a group of authors consisting of Turgut, H, Andreou Ac, Artopoulos G, and Averkiou M demonstrated exceptional productivity and scholarly impact. Their collective efforts reached the highest peak frequency for average citations per item. The data indicates that the United Kingdom, Italy, and the United States of America exhibited the highest number of publications, consisting of four single-country journals (SCP) and one publication involving multiple countries. The present analysis reveals a conspicuous prevalence of the terms "Historic buildings," "historical perspectives," and "Urban design" in the scholarly discourse on architectural palimpsest research. These terms have emerged as dominant themes, reflecting the ongoing research trend in this field. The prevailing usage of "architectural palimpsest" is primarily observed within archaeological and preservation studies, as indicated by the analysis's findings. The findings derived from the bibliometric study suggest that a restricted pool of authors is responsible for generating the most impactful scholarly contributions. Most publications adhere to an open-access model, facilitating the swift and extensive distribution of scholarly contributions and fostering the rise of multiple writers as the area progresses. These studies show that qualitative and quantitative methods are rarely used together to address research methodologies' limitations. While these studies have advanced our understanding of the research topics, the synergistic use of qualitative and quantitative methods has unexplored potential. A mixed-methods strategy allows researchers to triangulate findings, deepen analysis, and gain a broader perspective on complicated research problems. This integrative approach improves research integrity and recognises the complexity of topics. Significantly, the research has not used theoretical methodologies or conceptual frameworks to theorise unique concepts and themes from their data. The lack of a theoretical framework hinders scholarly discourse and the formation of a cohesive and holistic understanding of the phenomena researched. Researchers should actively use relevant theoretical frameworks and notions to overcome this constraint. They can give a conceptual scaffold to evaluate research findings and progress their field theoretically. This theoretical engagement helps us understand complex scientific topics better. Furthermore, it is imperative to acknowledge a noticeable increase in the number of citations, underscoring the present-day importance of the subject matter. The present study encountered certain limitations, foremost among them being the potential limitations inherent in the accuracy of the datasets extracted from Scopus. The datasets obtained may exhibit slight variations when the search query is performed on different dates despite employing identical search keywords and methodology. This can be attributed to the daily updates made by Scopus in its compilation of published articles. The search query for this study was obtained on August 9, 2023. It is important to note that the search results may vary, as there have been subsequent publications on Architectural palimpsests since that time. Furthermore, the precision of outcomes is contingent upon the selection of sources employed to extract datasets. Nevertheless, it is essential to note that utilising a solitary scientific database may have excluded superior architectural palimpsest studies that Scopus has not indexed. Hence, utilising and integrating additional renowned databases such as WoS in conjunction with Scopus is advisable to access a comprehensive range of architectural palimpsest literature. This approach is anticipated to enhance the dependability of the research outcomes.

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