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Article

Form and Typology: Systematic Review in Architectural Publications

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Abstract: This paper presents a comprehensive bibliometric analysis of research on form and typology in architectural publications, spanning from 1999 to 2024. Utilizing the Web of Science database and the bibliometrix package in R, the study examines trends, influential works, and thematic evolution in the field. The findings reveal a progression from foundational themes such as "architecture," "culture," and "planning" to more specialized and diverse topics, including "sustainability," "parametric design," and "digital fabrication." Key influential works by authors like Jane Jacobs, Kevin Lynch, and Bill Hillier are highlighted. The study also underscores the collaborative nature of contemporary architectural research, with significant international co-authorship. While providing valuable insights into the research landscape, the study acknowledges limitations, such as database reliance and the need for qualitative analysis. The paper concludes with recommendations for future research, emphasizing the exploration of emerging technologies, interdisciplinary collaborations, and regional research dynamics.

Keywords: Architectural Form; Urban Morphology; Bibliometric Analysis; Research Trends; Interdisciplinary Collaboration

Introduction

Architecture, as both an academic discipline and a professional practice, is deeply rooted in the exploration of form and typology. These concepts are fundamental to the creation and critique of architectural space, offering a lens through which the physical and theoretical aspects of architecture can be understood and advanced. This research delves into the scholarly discourse surrounding architectural forms and typologies, employing a comprehensive bibliometric analysis to map the intellectual landscape of this field (Vergara-Perucich, 2021, 2023, 2024). Through meticulous examination of the existing literature, this study aims to uncover key trends, influential works, and emergent themes that define the discourse on architectural forms and typologies.

Bibliometric analyses play a crucial role in advancing knowledge across various fields. These research approaches provide insights into the evolution of scientific production, identifying trends and setting work priorities (Selva-Pareja 2022, Pinto 2019). These analyses also help in understanding the place of specific journals and their contribution to scientific literature (Adanir 2020, Erciyas 2022). Furthermore, bibliometric studies can be used to measure the depth of public awareness and the impact of social impact of scientific findings (Winardi 2022). The use of bibliometric methods is expected to grow, with the introduction of advanced technologies and new tools (Basile 2022).

The focus of this research is on the intricate dynamics of architectural knowledge as it pertains to form and typology. Researching architectural processes to generate form is crucial for several reasons. Firstly, it allows for the development of sustainable and technically sound solutions in vulnerable environments (Bernal, 2019). Secondly, it enhances the management of the design process, which is essential for the success of construction projects (Alkassabany, 2020). Thirdly, it can lead to the creation of innovative tools, such as a board game to support the design process (Deliberador, 2019). Fourthly, it can contribute to the understanding of the relationship between space, form, and process in architectural science (Hyde, 2017). Fifthly, it can drive practice and learning in architecture,

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leading to more diverse and iterative design research processes (Aydemir, 2022). Lastly, it can inform a research agenda that nurtures a more vibrant and sustainable built environment (Brause, 2020). In relation to typology, the literature also provides insights to value its importance in advancing knowledge. In this case, it allows for the identification and analysis of building types, which can inform architectural projects and stimulate design proposals (Pisani, 2011). Also, it can be used as a learning framework in design studios, guiding project decisions and encouraging ideation (Grover, 2018). By analyzing a vast corpus of scholarly works, this study seeks to identify the significant contributions, thematic focuses, and methodological approaches that have shaped the architectural discourse. The ultimate objective is to construct a detailed map of the intellectual terrain, highlighting both the historical evolution and contemporary developments in this area of study.

At the heart of this investigation lies the research question: How have form and typology been explored and researched within the architectural literature, and what are the prevailing trends and emergent themes that define this discourse? This question is pivotal as it seeks to bridge the gap between the theoretical foundations and practical implications of architectural research. By addressing this question, the study aims to provide a holistic overview of the field, facilitating a deeper understanding of the critical issues and methodological approaches that underpin architectural scholarship.

The relevance of this research is to contribute to the ongoing dialogue within architectural studies by providing a systematic and data-driven analysis of the literature. This is particularly significant in an era where the volume of scholarly output is continually increasing, necessitating sophisticated tools and methods to distill meaningful insights. Likewise, the focus on form and typology addresses fundamental aspects of architectural practice and theory, thereby resonating with both academic and professional audiences. Understanding how these elements are conceptualized and critiqued within the literature can inform future research, pedagogy, and practice in architecture.

By employing a bibliometric approach, the research transcends traditional narrative reviews, offering a more objective and quantifiable examination of the literature. The use of the bibliometrix package in R facilitated a sophisticated analysis (Aria 2017), encompassing citation patterns, co-authorship networks, and thematic mapping, thereby providing a multifaceted understanding of the architectural discourse. The rationale for choosing the Web of Science (WOS) as the primary database for this research was its distinct categorization for "architecture," which significantly streamlined the search process. This categorization allowed for a more targeted retrieval of documents, ensuring that the corpus was predominantly centered around architectural studies and discourse.

Thus, this article offers a comprehensive overview of the architectural literature on form and typology, providing valuable insights into the intellectual landscape of the field. The findings derived from this study not only enhance our understanding of the current state of architectural research but also identify emerging trends and future directions. This makes the study a valuable resource for scholars, educators, and practitioners, informing future research, teaching, and practice in architecture.

Methodology

The methodological approach employed in this research was meticulous and comprehensive, designed to yield a robust dataset for a nuanced bibliometric analysis within the field of architecture. The initial phase involved the formulation of precise search criteria to navigate the expansive and multifaceted database of the Web of Science (WOS). The chosen search parameters were as follows:

wc=("architecture") and ts=(typology or form) NOT ts=(computer or programming) and Engineering Electrical Electronic or Computer Science Hardware Architecture or Computer Science Theory Methods or Telecommunications

The later code effectively excluded categories not pertinent to the architectural discourse. This exclusion was pivotal to ensure the relevance and specificity of the results, eliminating fields such as Geology, Computer Science Artificial Intelligence, Computer Science Information Systems, and Materials Science Paper Wood.

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The rationale behind selecting WOS for this investigation was its distinct categorization for "architecture," which significantly streamlined the search process. This categorization allowed for a more targeted retrieval of documents, ensuring that the corpus was predominantly centered around architectural studies and discourse. Many papers are wrongly indexed as architecture but in reality they refer to computers and hardware. The initial search query yielded a substantial corpus of 4726 documents. However, this dataset required rigorous refinement to ensure the integrity and utility of the data for subsequent bibliometric analysis.

The cleaning process was an essential step, addressing the issues of incomplete metadata, such as missing authors, keywords, or references. These deficiencies rendered a significant portion of the initial results unsuitable for a comprehensive bibliometric analysis, which relies heavily on the availability and accuracy of metadata to trace citation patterns, keyword co-occurrences, and authorial networks. Through this meticulous cleaning process, the dataset was refined to a more manageable and reliable sample of 3178 documents.

The cleaned dataset was then subjected to an in-depth bibliometric analysis using the bibliometrix package in R. This package was chosen for its robust capabilities in handling and analyzing large bibliometric datasets, providing a suite of tools for performing various types of analyses, including co-citation, co-authorship, and thematic mapping. The bibliometrix package facilitated a systematic examination of the architectural literature, enabling the identification of key trends, influential authors, and pivotal publications within the domain.

The analysis began with a descriptive examination of the dataset, capturing the temporal distribution of publications, the geographical dispersion of research output, and the core journals contributing to the field. This preliminary analysis provided a foundational understanding of the landscape of architectural research, highlighting the prolific periods of publication and the prominent regions and institutions driving the discourse.

Subsequently, the analysis delved into more complex bibliometric indicators, such as citation analysis and co-citation networks. Citation analysis enabled the identification of highly cited works, shedding light on seminal papers and influential authors that have shaped the architectural field. Co-citation analysis further elucidated the intellectual structure of the field by mapping the relationships between frequently co-cited papers, revealing clusters of related research and thematic concentrations.

Additionally, a keyword analysis was conducted to uncover prevalent themes and emerging topics within the architectural literature. This involved examining the frequency and co-occurrence of keywords, which provided insights into the evolving focus areas and research trends in architecture. The thematic mapping generated through this analysis highlighted the interplay between various subfields and the shifting priorities within architectural research.

The methodological rigor of this study was underscored by the comprehensive data cleaning and the sophisticated analytical techniques employed. The use of the bibliometrix package in R allowed for a detailed and multifaceted examination of the architectural literature, yielding insights that are both deep and broad. This methodological framework not only ensured the reliability and validity of the findings but also set a precedent for future bibliometric studies in architecture.

Results

The bibliometric analysis conducted on the dataset spanning from 1999 to 2024 provides a comprehensive overview of the scholarly output and trends within the architectural domain on form and typology. The dataset comprises a total of 3178 documents sourced from 105 different journals, books, and other types of publications. This substantial body of work reflects a robust annual growth rate of 22.32%, indicating a rapidly expanding field. The documents have an average age of 5.49 years, suggesting that the research is relatively recent and thus likely to be relevant to current academic and professional discourse. On average, each document in the dataset has been cited 3.683 times, with the cumulative references totaling 92,179. The content of these documents is richly populated with keywords, which serve as crucial indicators of the research themes and topics. The analysis reveals that there are 12,790 Keywords.

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The authorship data underscores the collaborative nature of contemporary architectural research. The 3178 documents were authored by 5572 unique authors, with a significant portion, 1309, being single-authored works. This points to a strong tradition of individual scholarship within the field. However, collaboration is also a prominent feature, as evidenced by the 1427 single-authored documents and the average of 2 co-authors per document. Furthermore, 13.03% of the documents are products of international co-authorship, reflecting the global interconnectedness and collaborative efforts among researchers in architecture.

Examining the types of documents within the dataset, the overwhelming majority are articles, comprising 3005 entries. This is followed by 57 documents categorized as both articles and book chapters, 91 as articles with early access status, 23 as articles and proceedings papers, and 2 retracted publications. The prevalence of articles indicates that journal publications remain the primary medium for disseminating research findings in architecture.

The bibliometric analysis of the architectural research dataset from 1999 to 2024 highlights a dynamic and growing field characterized by diverse research interests, substantial collaboration, and a strong emphasis on journal articles as the main avenue for scholarly communication (Figure 1). The dataset's expansive timespan, coupled with the high annual growth rate and the significant number of citations, underscores the evolving and impactful nature of architectural research. The detailed examination of keywords, authorship patterns, and document types provides valuable insights into the trends and directions shaping the discourse within the architectural domain.

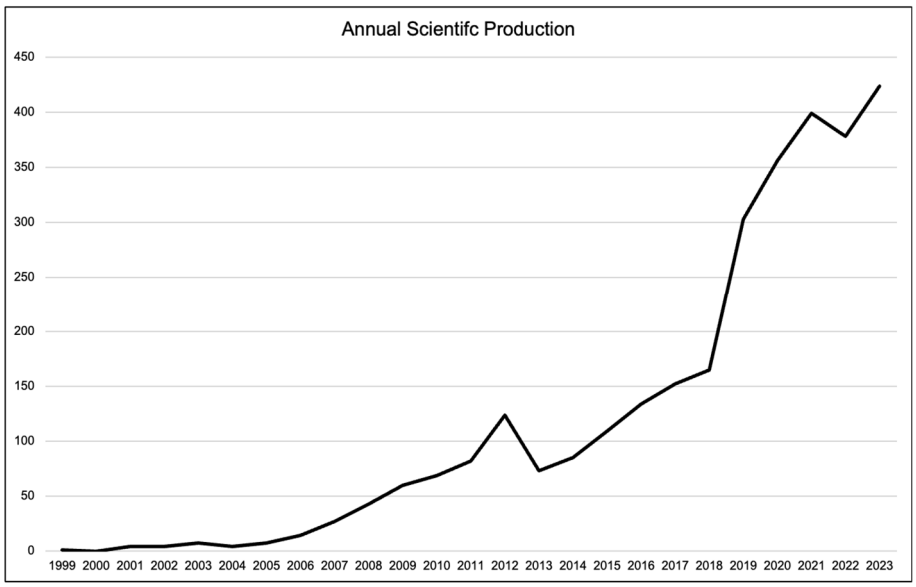

Figure 1. Annual Scientific Production in the sample of articles analysed.

Figure 2 provides an insightful overview of the countries that have most significantly contributed to the scholarly literature on architectural form and typology. Leading the contributions is China with 291 articles, showcasing its substantial investment and focus on architectural research. Closely following are Spain and the United States, with 288 and 270 articles respectively, indicating robust academic output and interest in the architectural discourse within these nations. Italy and Turkey also emerge as key contributors, with 246 and 228 articles respectively, highlighting their strong research communities in the field of architecture. The United Kingdom, with 221 articles, further underscores its long-standing tradition of architectural scholarship. Australia, with 106 articles, and Korea, with 99 articles, represent significant contributions from the Asia-Pacific region, reflecting the global nature of research on architectural form and typology. Chile, contributing 97 articles, demonstrates the active engagement of South American countries in this area of study. Japan, with 86 articles, rounds out the top ten contributing countries, illustrating its influential role in the architectural research landscape. These countries represent a diverse and comprehensive global

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perspective on architectural form and typology, underscoring the widespread academic interest and collaborative efforts within this field.

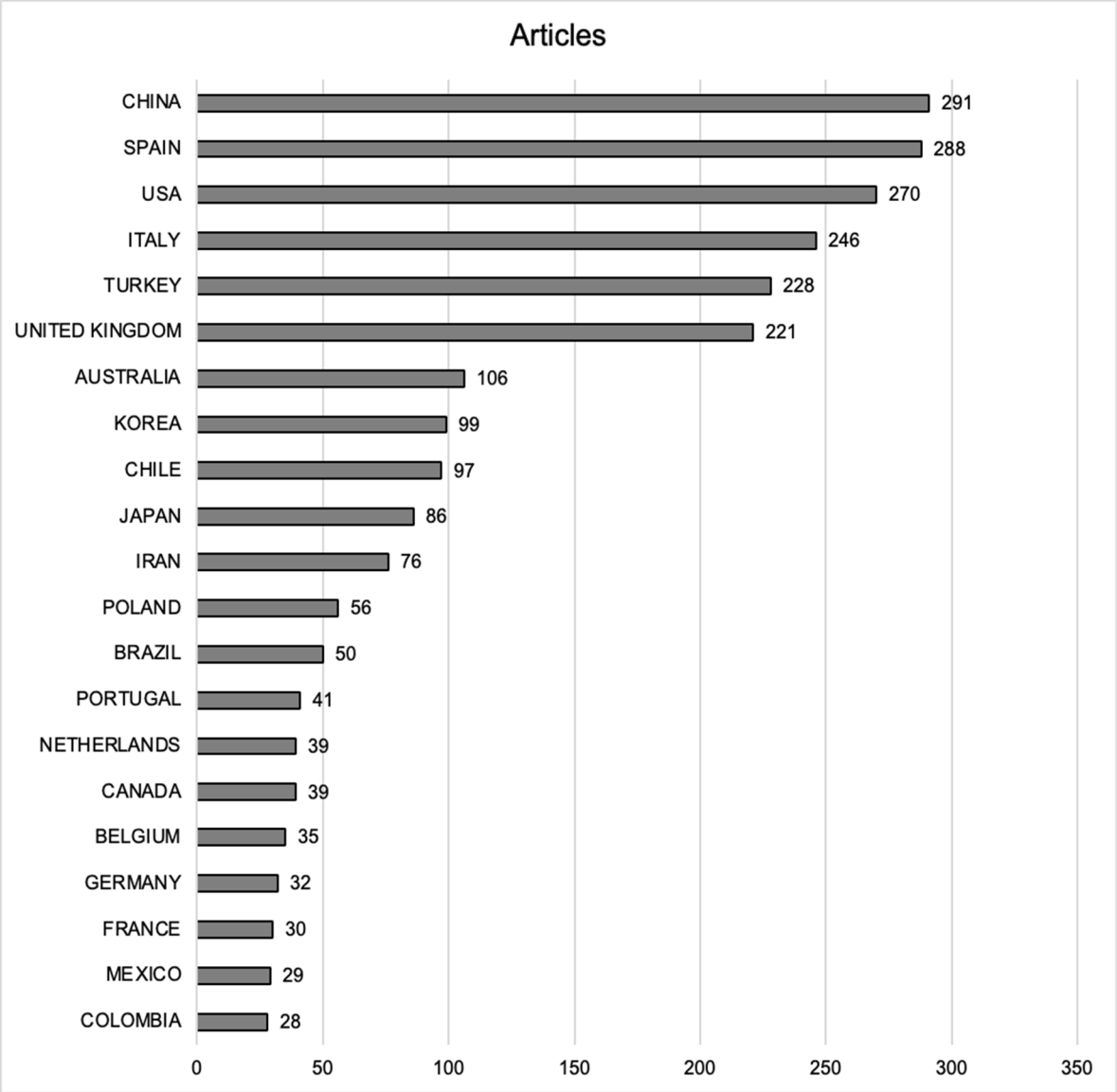

Figure 2. Countries with the highest number of contributions.

Figure 3 offers a detailed view of the most prolific sources contributing to the literature on architectural form and typology. It highlights a range of journals and publications, each with a significant number of articles dedicated to this field of study. Leading the contributions is the Journal of Asian Architecture and Building Engineering, which stands out with an impressive 259 articles. This reflects the journal's extensive focus on architectural topics and its influence in the academic community. Open House International follows with 171 articles, indicating its substantial role in disseminating research related to architectural form and typology. The Nexus Network Journal, with 162 articles, also makes a notable contribution, emphasizing the importance of interdisciplinary approaches in architectural research. The International Journal of Architectural Heritage, with 135 articles, underscores the significance of preserving architectural heritage and its impact on contemporary architectural discourse. Urban Design International and EGA-Revista de Expresion Grafica Arquitectonica, contributing 117 and 116 articles respectively, reflect the diversity of topics within the field, from urban design to graphical representation in architecture.

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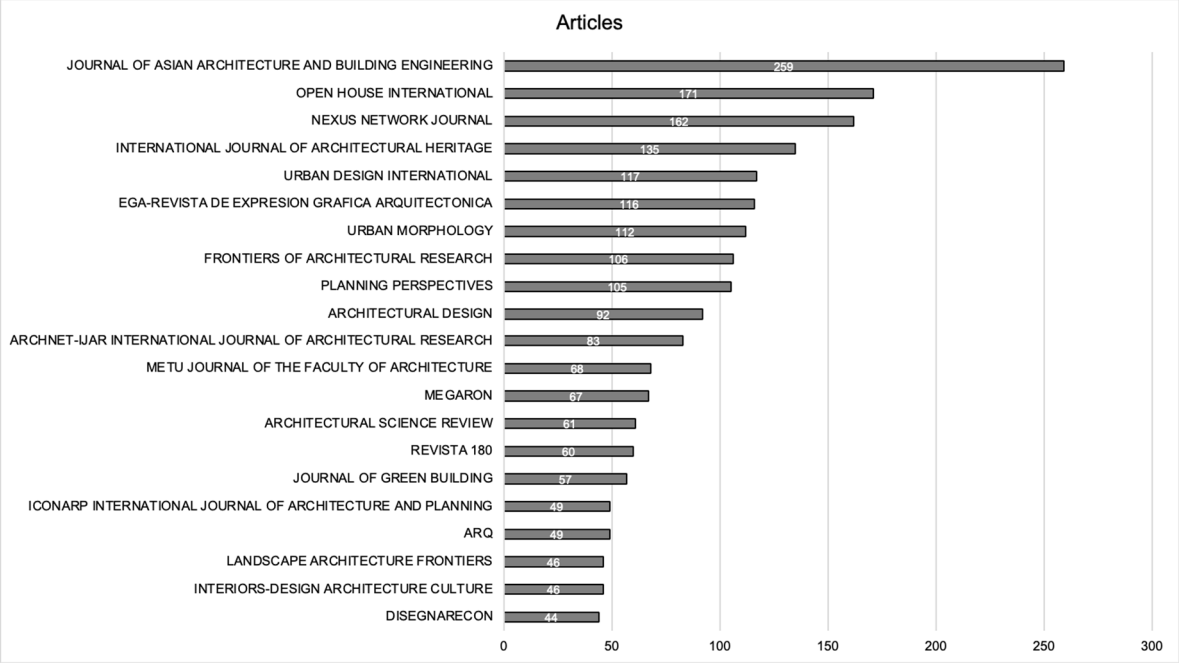

Figure 3. Most relevant sources.

Table 2. Most relevant affiliations in the sample.

Affiliation	Articles
UNIVERSIDAD POLITECNICA DE MADRID	59
UNIVERSITY COLLEGE LONDON	44
POLYTECHNIC UNIVERSITY OF MILAN	41
UNIVERSITAT POLITECNICA DE VALENCIA	39
SOUTHEAST UNIVERSITY - CHINA	35
UNIVERSITY OF LONDON	35
ISTANBUL TECHNICAL UNIVERSITY	30
UNIVERSITY OF SEVILLA	29
DELFT UNIVERSITY OF TECHNOLOGY	25
UNIVERSITAT POLITECNICA DE CATALUNYA	25
PONTIFICIA UNIVERSIDAD CATOLICA DE CHILE	23
EGYPTIAN KNOWLEDGE BANK (EKB)	21
ETH ZURICH	20
HARVARD UNIVERSITY	20
SAPIENZA UNIVERSITY ROME	20

The list of affiliations showcases leading academic institutions that have significantly contributed to the research on architectural form and typology. At the forefront is the Universidad Politécnica de Madrid with 59 articles, indicating its strong research output in architecture. University College London and the Polytechnic University of Milan follow with 44 and 41 articles, respectively, reflecting their prominent roles in advancing architectural scholarship. Other notable contributors include the Universitat Politècnica de València, Southeast University in China, and the University of London, each with substantial contributions. Institutions like Istanbul Technical University, University of Sevilla, and Delft University of Technology also demonstrate their active engagement in architectural research. Additionally, the Pontificia Universidad Católica de Chile, Egyptian Knowledge Bank (EKB), ETH Zurich, Harvard University, and Sapienza University Rome further highlight the global nature and collaborative efforts within the architectural academic community.

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Figure 4 illustrates the publication trends of various authors within the field of architectural form and typology. The chart spans from 2006 to 2023, highlighting key authors such as Vitor Oliveira, Ashraf M. Salama, Kai Gu, and Jin-Ho Park. Each dot represents a publication, with the size of the dot corresponding to the number of articles produced and the shading indicating the total citations per year. For instance, Vitor Oliveira shows consistent productivity with notable peaks in 2013 and 2020, while Ashraf M. Salama's work from 2017 to 2021 demonstrates significant citations, reflecting his influence in the field. The visualization effectively captures the academic contributions and impact of these authors over time.

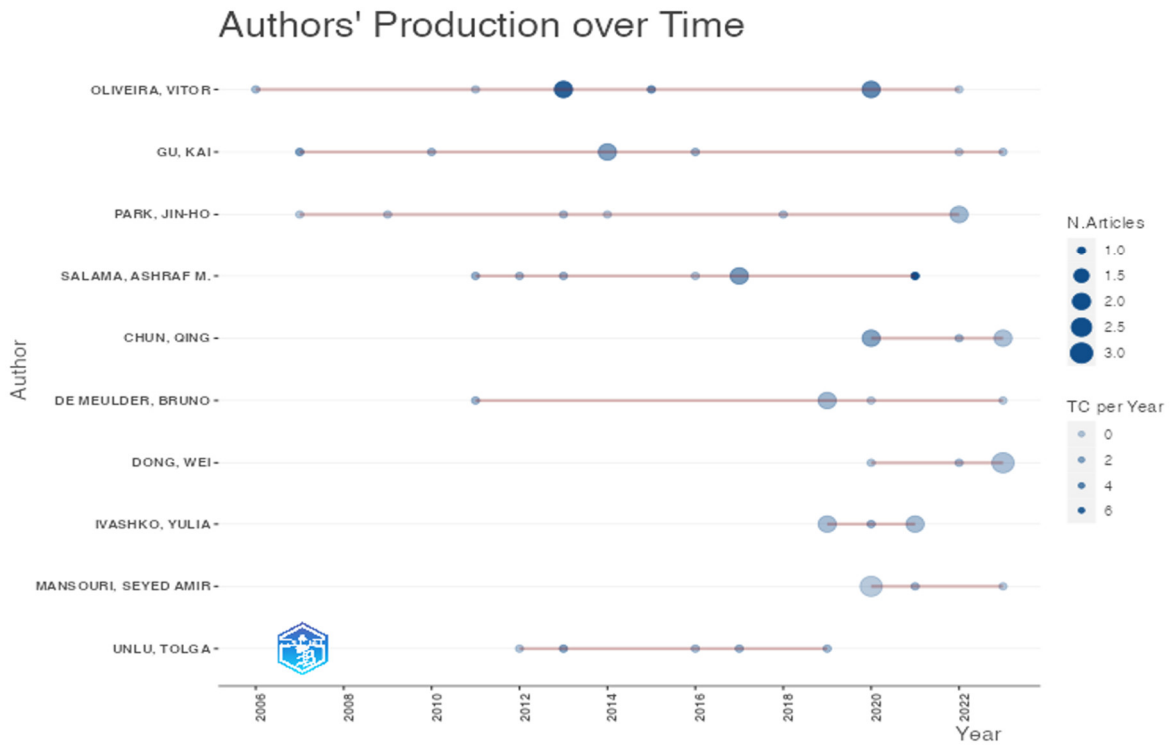

Figure 4. Most relevant authors per year.

The scholarly contributions of these authors span a variety of themes within the field of architectural form and typology. Vitor Oliveira's works, such as "The Urban Form of Ancient Chinese Capital Cities" and "A Comparative Study of Urban Form," demonstrate a deep engagement with urban morphology across different cultural contexts and time periods. His methodology often involves comparative analyses, contributing significantly to the understanding of urban forms. Kai Gu's research focuses on the interplay between traditional practices and contemporary urban challenges. Titles like "Topographical Understanding of Artificial Mountain Making in Traditional Chinese Gardens" and "Plan Analysis of Historical Cities: A Sino-European Comparison" reflect his interest in blending historical and modern perspectives to manage urban transformations. Jin-Ho Park examines vernacular and colonial influences in architectural practices, as seen in "The Spatial and Environmental Characteristics of Vietnamese Vernacular Houses in Vietnam's French Colonial Public Buildings." His work often integrates cultural heritage with contemporary design considerations, highlighting sustainable practices. Ashraf M. Salama's research, including "Architecture, Urbanism, and Health in a Post-Pandemic Virtual World" and "Deciphering Urban Life: A Multi-Layered Investigation of St. Enoch Square, Glasgow City Centre," explores the intersections of architecture, urbanism, and public health, emphasizing the role of mega projects and urban reconfiguration in shaping urban environments.

Figure 5 illustrates the international collaboration network within the architectural form and typology research domain, highlighting extensive academic partnerships across the globe. The map indicates significant collaborative ties, particularly between China and the United Kingdom (18

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collaborations), China and the USA (16 collaborations), and the USA and the United Kingdom (18 collaborations), underscoring the strong transnational academic relationships among these countries. Australia also shows a robust network, collaborating extensively with New Zealand (4 collaborations) and Iran (4 collaborations), reflecting regional as well as intercontinental research synergy. Italy and Spain demonstrate numerous partnerships, with Italy collaborating notably with Germany (4 collaborations) and Portugal (4 collaborations), while Spain has strong ties with Chile (7 collaborations) and Italy (15 collaborations). Moreover, countries such as Japan, Korea, and Iran are also central to multiple international collaborations, enhancing the global interconnectedness of architectural research. The visualization highlights the pivotal role of developed countries in fostering research partnerships and the contribution of emerging economies to the global research landscape.

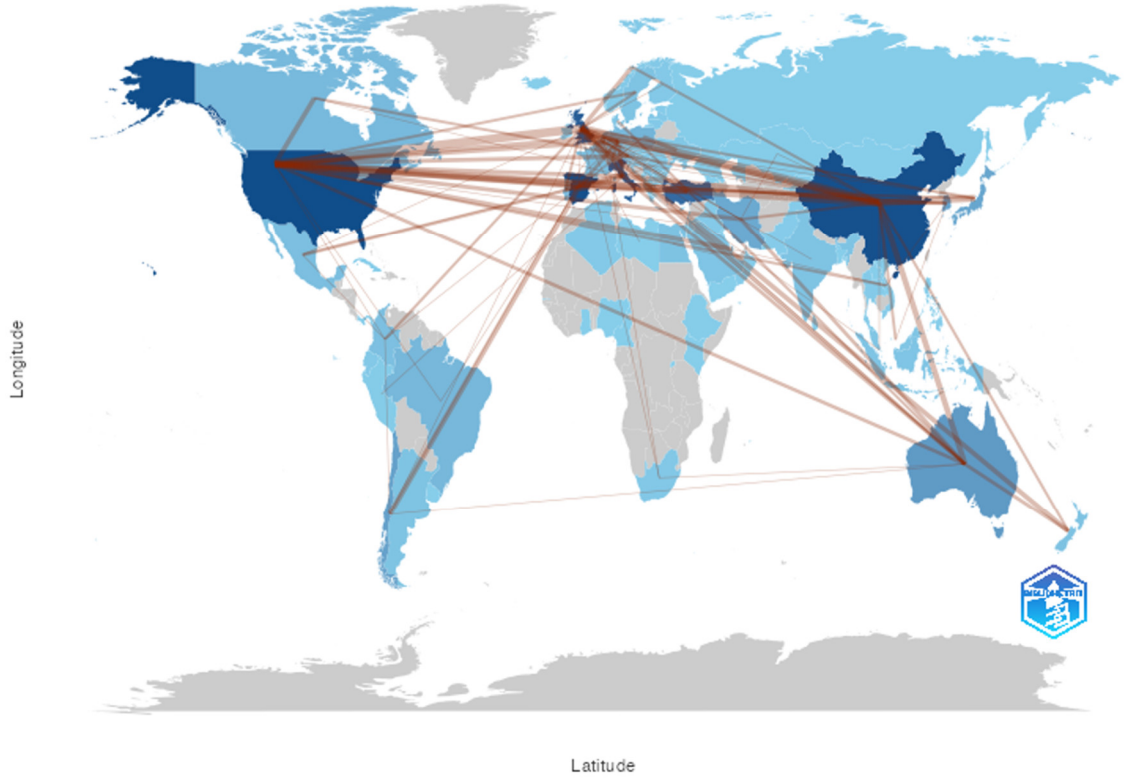

Figure 5. International collaboration networks between authors.

The most globally cited references of the sample (Table 3) showcase a diverse range of influential studies that have significantly contributed to urban design and morphology. Leading the citations is Forsyth's 2015 article, "What is a walkable place? The walkability debate in urban design," published in Urban Design International. This paper, cited 247 times with an impressive annual citation rate of 24.7, delves into the concept of walkability and its implications for urban design, emphasizing the importance of creating pedestrian-friendly environments. Whitehand's seminal 2001 paper, "British urban morphology: The Conzenian tradition," with 179 citations and 7.5 citations per year, is a foundational text in urban morphology. It explores the Conzenian tradition in British urban studies, providing a deep historical context for contemporary morphological research. Kropf's 2009 article, "Aspects of urban form," published in Urban Morphology, has garnered 139 citations with an annual rate of 8.7. This work examines various dimensions of urban form, offering a comprehensive framework for understanding the complexities of urban structures. Brignola et al.'s 2008 study on "Identification of Shear Parameters of Masonry Panels Through the In-Situ Diagonal Compression Test," appearing in the International Journal of Architectural Heritage, has achieved 124 citations. This research is pivotal for its methodological advancements in assessing the structural integrity of masonry, crucial for heritage conservation. Ozbil, Peponis, and Stone's 2011 research,

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"Understanding the link between street connectivity, land use and pedestrian flows," cited 109 times, investigates the interrelations between street network design, land use patterns, and pedestrian movement, contributing valuable insights into urban planning. Carmona's 2019 article, "Principles for public space design, planning to do better," also cited 109 times but with a higher annual citation rate of 18.2, addresses the core principles of public space design, advocating for better planning practices to enhance urban livability. Ye and Nes's 2014 paper, "Quantitative tools in urban morphology," combines various analytical tools within a GIS framework, cited 88 times, and offers a quantitative approach to studying urban form, highlighting the integration of space syntax, spacematrix, and mixed-use indices. Gil et al.'s 2011 study on "On the discovery of urban typologies," has 79 citations and explores data mining techniques to uncover urban form typologies, contributing to a more nuanced understanding of urban morphology. Kropf's 2013 article on "Ambiguity in the definition of built form," cited 75 times, delves into the complexities and ambiguities inherent in defining built forms, stressing the need for clear terminologies in urban morphology. Peters and Halleran's 2020 study, "How our homes impact our health," using a COVID-19 informed approach, cited 73 times, investigates the health impacts of urban apartment housing, emphasizing the relevance of housing design in public health contexts. These highly cited works collectively highlight critical themes in urban design and morphology, emphasizing methodological innovation, interdisciplinary approaches, and practical applications in urban planning and heritage conservation. Their extensive citations reflect their impact and ongoing relevance in shaping contemporary architectural and urban studies.

Table 3. Most global cited documents.

Reference	Total Citations	Total citations per year
Forsyth, A. (2015). What is a walkable place? The walkability debate in urban design. URBAN DESIGN International, 20(4), 274–292. https://doi.org/10.1057/udi.2015.22	247	24,7
Whitehand, J. W. R. (2001). British urban morphology: The Conzenian tradition. Urban Morphology, 5(2), 103–109. https://doi.org/10.51347/jum.v5i2.3896	179	7,5
Kropf, K. (2009). Aspects of urban form. Urban Morphology, 13(2), 105–120. https://doi.org/10.51347/jum.v13i2.3949	139	8,7
Brignola, A., Frumento, S., Lagomarsino, S., & Podestà, S. (2008). Identification of Shear Parameters of Masonry Panels Through the In-Situ Diagonal Compression Test. International Journal of Architectural Heritage, 3(1), 52–73. https://doi.org/10.1080/15583050802138634	124	7,8
Ozbil, A., Peponis, J., & Stone, B. (2011). Understanding the link between street connectivity, land use and pedestrian flows. URBAN DESIGN International, 16(2), 125–141. https://doi.org/10.1057/udi.2011.2	109	7,8
Carmona, M. (2019). Principles for public space design, planning to do better. URBAN DESIGN International, 24(1), 47–59. https://doi.org/10.1057/s41289-018-0070-3	109	18,2
Ye, Y., & Nes, A. V. N. (2014). Quantitative tools in urban morphology: Combining space syntax, spacematrix and mixed-use index in a GIS framework. Urban Morphology, 18(2), 97–118. https://doi.org/10.51347/jum.v18i2.3997	88	8,0
Gil, J., Beirão, J. N., Montenegro, N., & Duarte, J. P. (2011). On the discovery of urban typologies: Data mining the many dimensions of urban form. Urban Morphology, 16(1), 27–40. https://doi.org/10.51347/jum.v16i1.3966	79	6,1
Kropf, K. (2013). Ambiguity in the definition of built form. Urban Morphology, 18(1), 41–57. https://doi.org/10.51347/jum.v18i1.3995	75	6,8
Peters, T., & Halleran, A. (2020). How our homes impact our health: Using a COVID-19 informed approach to examine urban apartment housing. Archnet-IJAR: International Journal of Architectural Research, 15(1), 10–27. https://doi.org/10.1108/ARCH-08-2020-0159	73	18,3

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Mehaffy, M., Porta, S., Rofè, Y., & Salingaros, N. (2010). Urban nuclei and the geometry of streets: The 'emergent neighborhoods' model. URBAN DESIGN International, 15(1), 22–46. https://doi.org/10.1057/udi.2009.26	70	4,7
Conzen, M. P. (2009). How cities internalize their former urban fringes: A cross-cultural comparison. Urban Morphology, 13(1), 29–54. https://doi.org/10.51347/jum.v13i1.3946	70	4,4
Potbhare, V., Syal, M., & Korkmaz, S. (2009). Adoption of Green Building Guidelines in Developing Countries Based on U.S. and India Experiences. Journal of Green Building, 4(2), 158–174. https://doi.org/10.3992/jgb.4.2.158	68	4,3
Dovey, K., & Pafka, E. (2014). The urban density assemblage: Modelling multiple measures. URBAN DESIGN International, 19(1), 66–76. https://doi.org/10.1057/udi.2013.13	68	6,2
Boeing, G. (2018). Measuring the complexity of urban form and design. URBAN DESIGN International, 23(4), 281–292. https://doi.org/10.1057/s41289-018-0072-1	65	9,3

The most influential titles in the sample (Table 4) reflect seminal works in the field of urban studies and architectural theory, shaping contemporary understanding and practices. Jane Jacobs' "The Death and Life of Great American Cities," stands as a monumental critique of urban planning policies, with 102 citations in this sample. Jacobs' work emphasizes the vitality of city life and the importance of community-centric urban design, arguing against the prevailing trends of urban renewal that she saw as destructive to the fabric of urban neighborhoods. Kevin Lynch's classic, "The Image of the City," cited 92 times, introduces the concept of city imageability and legibility, exploring how people perceive and navigate urban environments. This work has profoundly influenced urban design and planning by highlighting the importance of spatial orientation and mental maps.

Table 4. Most influential references.

Cited References	Citations
Jacobs, J. (1992). The death and life of great American cities (Vintage books ed). Vintage Books.	102
Lynch, K. (1996). The image of the city. The MIT Press, Massachusetts Institute of Technology.	92
Hillier, B., & Hanson, J. (1984). The Social Logic of Space (1st ed.). Cambridge University Press. https://doi.org/10.1017/CBO9780511597237	71
Alexander, C., Ishikawa, S., & Silverstein, M. (1977). A pattern language: Towns, buildings, construction. Oxford University Press.	41
Whitehand, J. W. R. (2001). British urban morphology: The Conzenian tradition. Urban Morphology, 5(2), 103–109. https://doi.org/10.51347/jum.v5i2.3896	37
Moudon, A. V. (1997). Urban Morphology as an emerging interdisciplinary field. Urban Morphology, 1(1), 3–10. https://doi.org/10.51347/jum.v1i1.4047	35
Rapoport, A. (2002). House form and culture. Prentice Hall.	34
Caniggia, G., & Maffei, G. L. (2001). Architectural composition and building typology: Interpreting basic building. Alinea.	33
Gehl, J. (2010). Cities for people. Island Press.	30
Rossi, A. (2007). The architecture of the city (16. print). MIT Press.	27

"The Social Logic of Space" by Bill Hillier and Julienne Hanson, cited 71 times, presents the groundbreaking theory of space syntax. This theory provides a framework for analyzing spatial configurations and their social implications, revolutionizing the way urban spaces are studied and designed. Christopher Alexander, Sara Ishikawa, and Murray Silverstein's "A Pattern Language: Towns, Buildings, Construction" with 41 citations, offers a comprehensive compendium of design principles that advocate for user-centered and context-sensitive architectural and urban design. John Whitehand's 2001 article "British Urban Morphology: The Conzenian Tradition" is cited 37 times,

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underlining its importance in understanding the historical and geographical dimensions of urban form. Anne Vernez Moudon's 1997 paper, "Urban Morphology as an Emerging Interdisciplinary Field," cited 35 times, marks the formalization of urban morphology as a distinct area of study, bridging various disciplines to better understand urban form. Amos Rapoport's book, "House Form and Culture," with 34 citations, examines the relationship between cultural practices and residential architecture, emphasizing the role of social and cultural factors in shaping the built environment. Gianfranco Caniggia and Gian Luigi Maffei's "Architectural Composition and Building Typology," cited 33 times, offers insights into the typological process in architecture, providing a method for understanding the evolution and classification of building forms. Jan Gehl's "Cities for People," cited 30 times, advocates for human-centered urban design, focusing on how urban spaces can promote social interaction, health, and well-being. Aldo Rossi's "The Architecture of the City," is cited 27 times. Rossi's work is foundational in the field of urban morphology, emphasizing the historical continuity and typological structure of the city. These works represent the core intellectual foundations of urban morphology and design, continuing to influence research, teaching, and practice in the field.

Figure 6 illustrates the trending topics in the field of architectural form and typology over a period from 2007 to 2023. The y-axis lists various terms, while the x-axis represents the years. The size of the circles corresponds to the term frequency, indicating the popularity and prevalence of each term in the scholarly discourse. The figure shows a clear evolution of research interests over time. Early in the period, terms such as "gated communities," "segregation," and "acoustics" were prominent around 2008 to 2010. These topics reflect initial concerns with social and environmental issues in urban design and the technical aspects of architectural acoustics. From 2010 onwards, there is a noticeable shift towards more diverse themes. Terms like "baroque architecture," "new towns," and "vaults" gain traction, suggesting a growing interest in historical architectural forms and new urban developments. During this period, "topology" and "proportion" also emerge, indicating a focus on the mathematical and geometric aspects of design. In the mid-2010s, the figure shows an increasing interest in sustainability-related topics, with "energy efficiency," "sustainable," and "morphology" becoming more frequent. This shift highlights the field's growing emphasis on sustainable design practices and the morphological study of urban forms. "Design analysis" and "urban design" also become prominent, reflecting a deeper analytical approach to architectural and urban studies. Recent years, particularly from 2016 to 2023, show a significant rise in topics related to "urban form," "typology," "urban morphology," and "architecture," indicating a mature phase of research focusing on comprehensive urban and architectural studies. The terms "cultural heritage," "landscape architecture," and "built environment" also gain importance, reflecting a broader interdisciplinary approach and concern for cultural and environmental contexts. In the most recent years, from 2021 onwards, emerging topics like "machine learning," "postmodernism," "Beijing," and "nature" indicate new directions and innovations in architectural research. The appearance of "machine learning" highlights the integration of advanced technologies in architectural analysis, while "postmodernism" suggests a revisiting of architectural theories. The specific mention of "Beijing" points to a regional focus, likely reflecting China's growing influence in the field.

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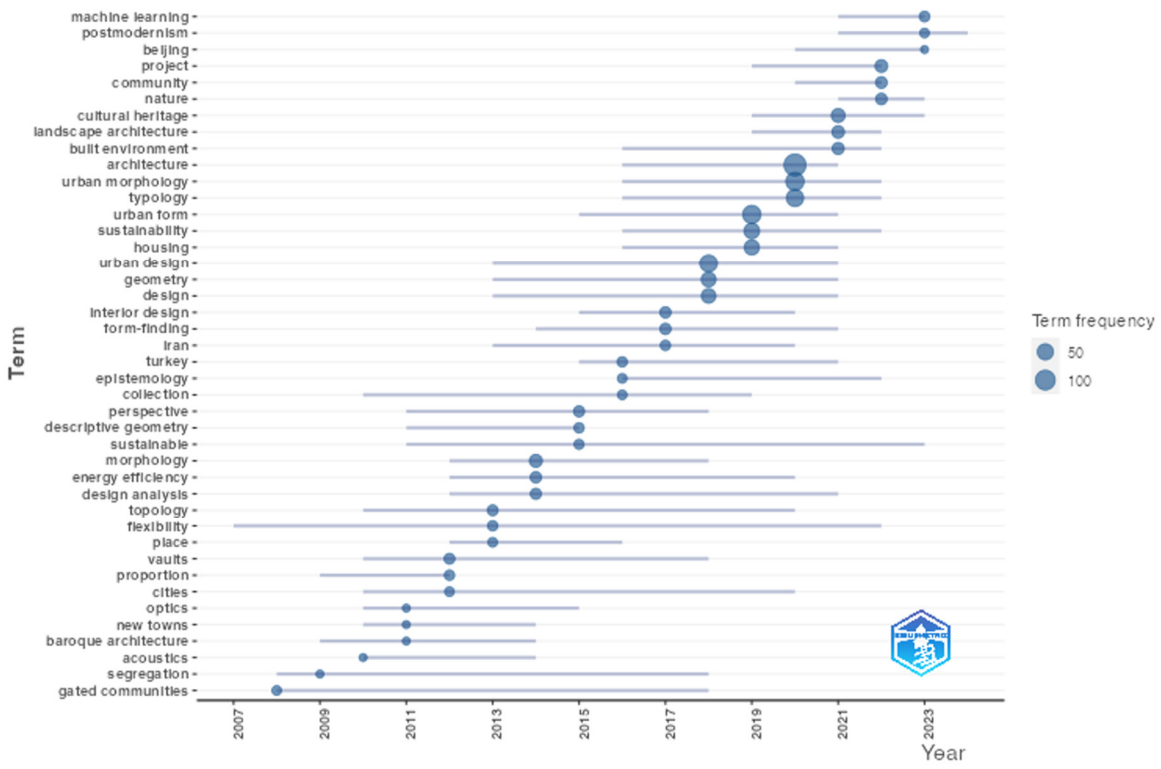

Figure 6. Trend topics by keywords in sample.

Figure 7 illustrates a network map of the most influential topics within the architectural form and typology domain. The map visualizes the interconnectedness of various terms based on their co-occurrence in scholarly literature, with clusters indicating thematic groupings. The size of each node reflects its prominence or centrality within the network, while the colors represent different clusters or thematic groups. At the core of the map, the term "architecture" stands out as the most central and influential node, highlighting its fundamental role in the network. Surrounding "architecture" are key related terms such as "design," "urban form," "typology," and "urban morphology," which form the central cluster of topics directly tied to architectural studies. Cluster 1, depicted in red, includes terms such as "parametric design," "architectural design," and "digital fabrication." These terms represent the intersection of architecture with advanced design technologies and methods, emphasizing the role of digital tools in modern architectural practice. Cluster 2, shown in light blue, focuses on regional and cultural aspects of architecture, with terms like "urban planning," "vernacular architecture," and "China." This cluster reflects the diverse cultural influences and planning practices that shape architectural discourse. Cluster 3, represented in green, includes terms such as "typology," "housing," and "morphology." This grouping underscores the importance of typological studies and housing in understanding urban form and design. Cluster 4, in purple, features "cultural heritage" and "conservation," highlighting the significance of heritage preservation and its integration into contemporary architectural practice. Cluster 5, in orange, includes terms like "London" and "New York," pointing to specific geographic locations that are significant in the study of urban form and architecture. Cluster 6, shown in brown, is composed of terms like "urban morphology," "urban design," "sustainability," and "space syntax." This cluster emphasizes the analytical and sustainable approaches in studying urban forms and designs, with a focus on spatial configurations and sustainable urban practices. Cluster 7, in pink, includes terms such as "aesthetics," "topography," and "history," which are crucial for understanding the visual and historical dimensions of architecture. Cluster 8, depicted in gray, includes a wide range of terms such as "drawing," "representation," "art," "modernity," and "public space." This diverse cluster reflects the interdisciplinary nature of architectural studies, encompassing artistic, modern, and public aspects of urban design. Finally, Cluster 9, in light green, includes "public space" and

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"landscape architecture," emphasizing the role of open spaces and landscape in urban design. The network map provides a comprehensive visualization of the thematic interconnections and prominent topics within the field of architectural form and typology, highlighting the diverse and interdisciplinary nature of contemporary architectural research.

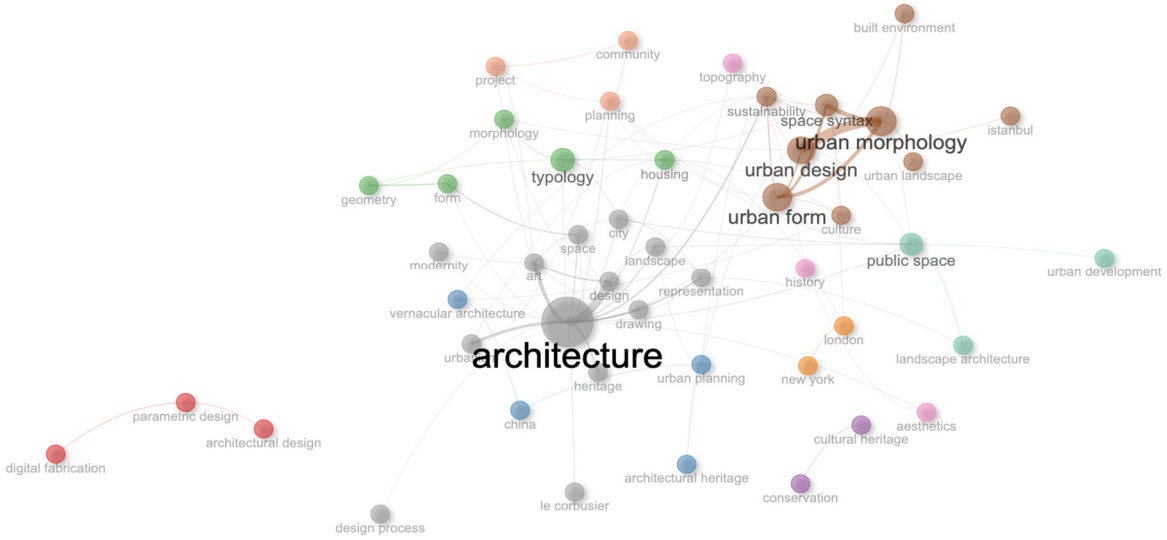

Figure 7. Network and nodes based on keywords per article.

Figure 8 is a thematic map created using the bibliometrix package, categorizing topics based on their influence and role in driving research within the field of architectural form and typology. The map is divided into four quadrants: Niche Themes, Motor Themes, Basic Themes, and Emerging or Declining Themes. Each quadrant provides insights into the relevance, development, and centrality of various research topics.

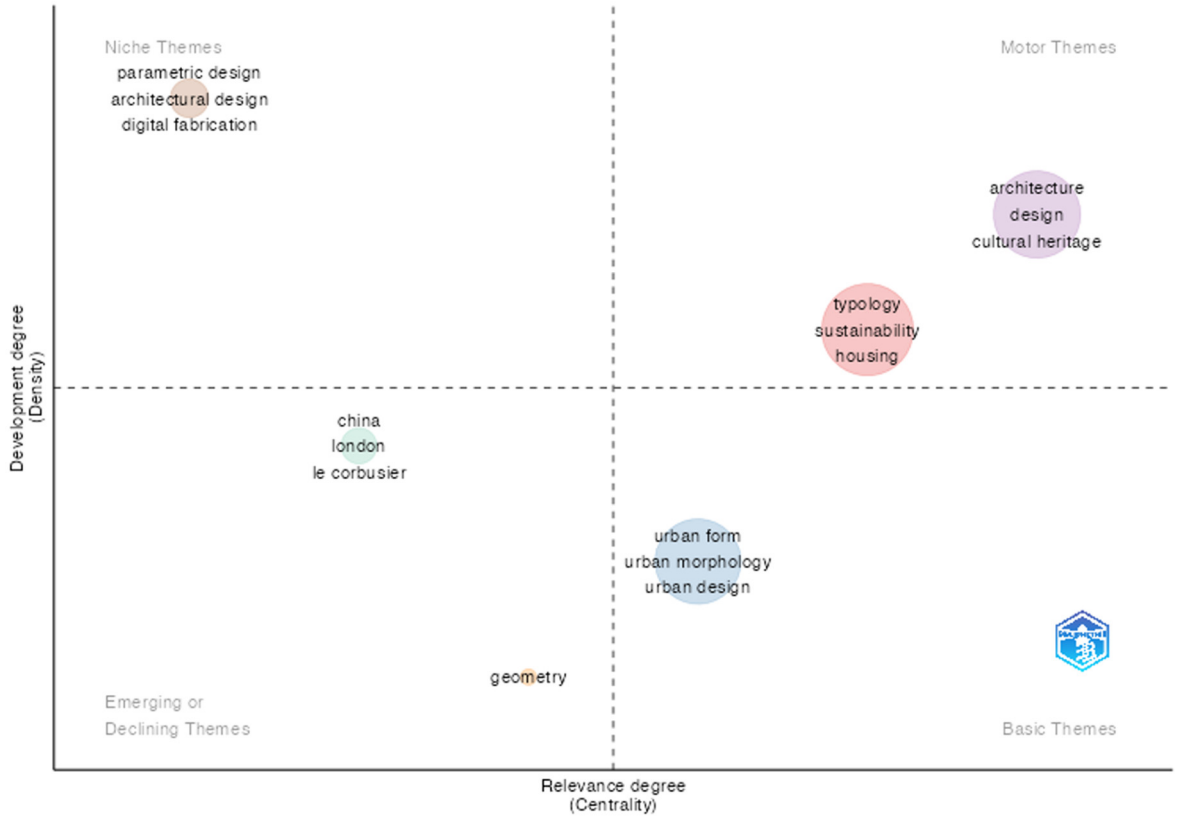

Figure 8. Thematic map of keywords.

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Niche Themes: The upper left quadrant, labeled as Niche Themes, includes topics that are highly specialized but not central to the broader research field. Here, we find terms such as "parametric design," "architectural design," and "digital fabrication." These themes, while not central, are critical for their specific areas, particularly in the context of advanced design technologies and methods. Their development degree is high, indicating robust internal coherence and specialized research communities.

Motor Themes: The upper right quadrant, labeled Motor Themes, encompasses topics that are both well-developed and central to the field, playing a pivotal role in driving research forward. Key terms in this quadrant include "architecture," "design," "cultural heritage," "typology," "sustainability," and "housing." These themes are essential for advancing theoretical and practical knowledge in architecture and urban design. Their high density and centrality underscore their importance in shaping contemporary research and discourse.

Basic Themes: The lower right quadrant, labeled Basic Themes, consists of foundational topics that are fundamental to the field but not necessarily specialized. Terms such as "urban form," "urban morphology," "urban design," and "public space" are prominent here. These topics are central to understanding and analyzing urban environments, serving as the backbone for much of the research in architecture and urban studies. Their high centrality indicates broad relevance across various studies, although their developmental density is lower, suggesting a wide but not necessarily deep engagement.

Emerging or Declining Themes: The lower left quadrant, labeled Emerging or Declining Themes, includes topics that are either gaining traction or losing relevance. Here, terms like "china," "London," "Le Corbusier," and "geometry" are found. These topics show varying degrees of centrality and density, indicating their fluctuating significance in the research landscape. For instance, "geometry" may represent foundational knowledge, while terms like "china" and "London" might reflect specific regional or historical studies that are currently in flux.

The Motor Themes cluster, particularly with "architecture," "design," and "cultural heritage," represents the driving force of the field, focusing on the integration of historical perspectives, design principles, and sustainable practices. The presence of "typology," "sustainability," and "housing" in the same quadrant indicates a strong emphasis on the practical and theoretical implications of urban planning and architectural design, with sustainability being a crucial aspect of current research trends. The Niche Themes, such as "parametric design" and "digital fabrication," highlight the technological advancements and their applications in architecture, reflecting the ongoing evolution of design processes and methodologies. These themes, while not broadly central, contribute significantly to innovation within their specific areas. Basic Themes like "urban form" and "urban morphology" provide the essential frameworks for analyzing urban structures and their development. Their foundational nature means they are indispensable for a wide range of studies, supporting various aspects of architectural research. The Emerging or Declining Themes suggest dynamic changes in the field, with some areas possibly rising in prominence while others may be waning. For example, the focus on specific geographic locations like "china" and historical figures like "Le Corbusier" indicates areas of shifting academic interest.

Figure 9 depicts the evolution of research themes in the field of architectural form and typology from 1999 to 2024. The visualization is divided into four time periods: 1999-2007, 2008-2015, 2016-2022, and 2023-2024, illustrating the shifting focus of scholarly attention over time. In the earliest period (1999-2007), the dominant themes are "architecture," "culture," and "planning," with "urban design" also making a notable appearance. This era marks the foundational stage of integrating cultural and planning perspectives into architectural research, setting the stage for more detailed thematic explorations. From 2008 to 2015, the themes become more diversified. "Architecture" remains a core focus, but new themes like "urban form," "urban development," and "sustainability" emerge, reflecting a growing interest in sustainable practices and urban morphology. "Urban planning" and "urbanism" also gain prominence, indicating an increasing integration of broader urban studies into architectural discourse. The period from 2016 to 2022 shows a significant shift towards specialized themes. "Urban form" and "architecture" continue to be central, but themes like

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"parametric design," "project," and "cultural heritage" highlight the expanding scope of research. "Typology," "landscape design," and "gender" emerge, showing a more nuanced approach to architectural studies that includes technology, cultural contexts, and social dimensions. In the most recent period (2023 to 2024), "architecture" again takes center stage, but there is a marked increase in thematic diversity with "public space," "modern architecture," "architectural history," and "democracy" coming to the fore. Emerging technologies and methodologies are evident with the inclusion of "digital fabrication" and "machine learning." Regional focus is indicated by "china" and "london," while thematic depth is shown by "architectural theory," "materiality," and "architectural form." Overall, Figure 9 illustrates a clear trajectory from broad foundational themes to more specialized and diverse topics, reflecting the evolving complexity and interdisciplinary nature of research in architectural form and typology. This evolution underscores the field's responsiveness to technological advancements, cultural shifts, and emerging global challenges.

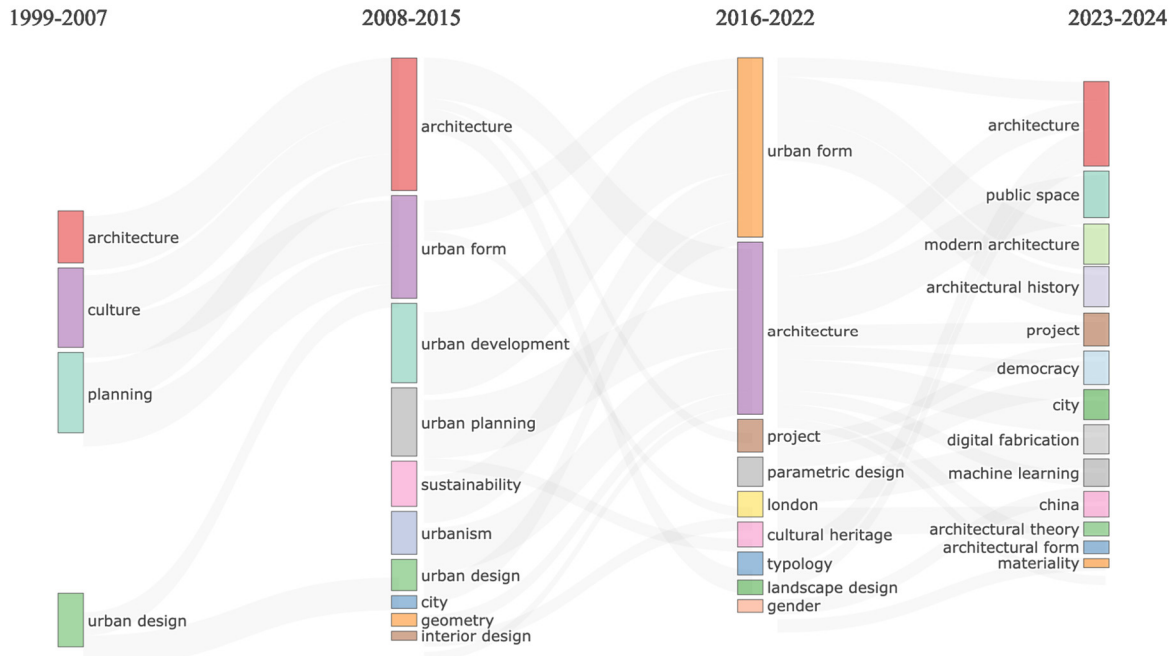

Figure 9. Thematic evolution of keywords in the sample.

Discussion

The bibliometric analysis of form and typology in architectural publications provides a comprehensive understanding of the evolving research landscape within this domain. The results highlight the increasing volume and diversity of scholarly output, revealing significant trends, influential works, and emergent themes. This discussion aims to assess these findings, weighing their implications for the understanding of architectural studies on form and typology.

The analysis delineates a clear trajectory from foundational themes to more specialized and diverse topics over time. Initially, from 1999 to 2007, the dominant themes were "architecture," "culture," and "planning," reflecting the foundational stage of integrating cultural and planning perspectives into architectural research. This period set the stage for more detailed thematic explorations in subsequent years. From 2008 to 2015, the themes diversified, with "urban form," "urban development," and "sustainability" gaining prominence alongside "architecture." This shift indicates a growing interest in sustainable practices and urban morphology, highlighting the integration of broader urban studies into architectural discourse. The period from 2016 to 2022 shows a significant shift towards specialized themes such as "parametric design," "project," and "cultural heritage," underscoring the expanding scope of research. This era also sees the emergence of themes like "typology," "landscape design," and "gender," indicating a more nuanced approach to

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architectural studies that includes technological advancements, cultural contexts, and social dimensions.

In the most recent period (2023 to 2024), "architecture" again takes center stage, but with a marked increase in thematic diversity. Emerging technologies and methodologies are evident with the inclusion of "digital fabrication" and "machine learning," while regional focus is indicated by "China" and "London." Thematic depth is further shown by "architectural theory," "materiality," and "architectural form," reflecting the field's responsiveness to technological advancements, cultural shifts, and emerging global challenges.

The most influential titles in the sample reflect seminal works that have significantly shaped contemporary understanding and practices in urban studies and architectural theory. For instance, Jane Jacobs' "The Death and Life of Great American Cities" stands out for its monumental critique of urban planning policies and its emphasis on community-centric urban design. Kevin Lynch's "The Image of the City" introduces the concept of city imageability and legibility, profoundly influencing urban design and planning by highlighting the importance of spatial orientation and mental maps. Bill Hillier and Julienne Hanson's "The Social Logic of Space" presents the groundbreaking theory of space syntax, revolutionizing the way urban spaces are studied and designed. Christopher Alexander, Sara Ishikawa, and Murray Silverstein's "A Pattern Language" offers a comprehensive compendium of design principles advocating for user-centered and context-sensitive architectural and urban design. These works, among others, represent the core intellectual foundations of urban morphology and design, continuing to influence research, teaching, and practice in the field.

The authorship data highlights the collaborative nature of contemporary architectural research, with significant portions of the documents being products of international co-authorship. This underscores the global interconnectedness and collaborative efforts among researchers in architecture. The international collaboration network map further illustrates extensive academic partnerships across the globe, with significant collaborative ties particularly between China, the United Kingdom, and the USA, reflecting strong transnational academic relationships.

The thematic map categorizes topics based on their influence and role in driving research within the field of architectural form and typology. Motor themes such as "architecture," "design," and "cultural heritage" play a pivotal role in advancing theoretical and practical knowledge in architecture and urban design. The presence of themes like "typology," "sustainability," and "housing" in the same quadrant underscores a strong emphasis on the practical and theoretical implications of urban planning and architectural design, with sustainability being a crucial aspect of current research trends. Niche themes like "parametric design" and "digital fabrication" highlight technological advancements and their applications in architecture, contributing significantly to innovation within their specific areas. Basic themes such as "urban form" and "urban morphology" provide essential frameworks for analyzing urban structures and their development, serving as the backbone for much of the research in architecture and urban studies.

The bibliometric analysis of form and typology in architectural publications offers a comprehensive overview of the intellectual landscape of the field. The findings enhance our understanding of the current state of architectural research, identify emerging trends, and highlight future directions. The evolving complexity and interdisciplinary nature of research in architectural form and typology underscore the field's responsiveness to technological advancements, cultural shifts, and emerging global challenges, paving the way for continued innovation and development in architectural studies.

Conclusions

The bibliometric analysis of architectural form and typology has yielded several significant findings that contribute to our understanding of the evolving landscape in this field. Firstly, the study reveals a clear evolution of research themes from broad foundational topics in the early years to more specialized and diverse themes in recent times. This shift reflects the growing complexity and interdisciplinary nature of architectural studies. Key themes such as "architecture," "urban form," "sustainability," and "urban morphology" have been consistently central, underscoring their

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ongoing importance in the discourse. The analysis also highlights the most influential works and seminal authors that have shaped contemporary understanding and practices. Notably, works by Jane Jacobs, Kevin Lynch, Bill Hillier, and Christopher Alexander have been pivotal in advancing theoretical and practical knowledge in urban design and morphology. These foundational texts continue to influence research, teaching, and practice, providing a robust intellectual framework for future studies.

Furthermore, the study underscores the collaborative nature of contemporary architectural research, with significant portions of publications resulting from international co-authorship. This global interconnectedness is vividly illustrated in the international collaboration network map, which highlights strong academic ties, particularly between China, the United Kingdom, and the USA. Despite its comprehensive approach, this study has several limitations that should be acknowledged. The reliance on the Web of Science (WOS) database, while robust, may have led to the exclusion of relevant publications not indexed within this platform. This limitation could potentially bias the analysis towards certain regions or types of publications that are more frequently indexed by WOS. Additionally, the bibliometric analysis primarily focuses on quantitative measures such as citation counts and co-authorship networks. While these metrics provide valuable insights into research trends and collaborations, they do not capture the qualitative aspects of the research, such as the depth and impact of the theoretical contributions or the practical applications of the findings.

The findings of this research open several new questions that warrant further investigation. One intriguing question is how emerging technologies, such as machine learning and digital fabrication, will continue to influence architectural research and practice. The study highlights these as growing areas of interest, but their full impact on the field remains to be seen. Another open question pertains to the regional disparities in research output and collaboration. The study identifies strong collaborations between certain countries, but it would be valuable to explore the underlying factors driving these partnerships and the barriers that might exist for other regions. Understanding these dynamics could help promote more inclusive and diverse collaborations in architectural research.

Building on the findings of this study, several possibilities for further research can be pursued. Future studies could incorporate a broader range of databases to capture a more comprehensive view of the global research landscape. Including databases like Scopus, Google Scholar, and regional databases could help mitigate the limitations associated with reliance on a single source. Moreover, future research could delve deeper into the qualitative aspects of architectural studies, examining the specific contributions and impacts of influential works and authors. This approach would provide a richer understanding of how theoretical advancements and practical applications have shaped the field. Investigating the role of interdisciplinary collaborations in architectural research is another promising area. Understanding how different disciplines intersect and contribute to advancements in architectural form and typology could foster more innovative and holistic approaches to research and practice.

Finally, exploring the implications of emerging technologies on architectural education and practice would be valuable. As digital tools and methods become increasingly integrated into the field, examining how these changes affect the training of future architects and the evolution of professional practice could provide critical insights for educators and practitioners alike.

References

1. Adanır, S. S., Bahşi, Ilhan, Kervancıoğlu, P., Orhan, M., & Cihan, Omer Faruk. (2020). Bibliometric analysis of articles published in Anatomy, the official publication of the Turkish Society of Anatomy and Clinical Anatomy between 2007–2018. *Anatomy*, *14*(1), 39–43.
2. Alexander, C., Ishikawa, S., & Silverstein, M. (1977). *A pattern language: Towns, buildings, construction*. Oxford University Press.
3. Alkassabany, N., & Mousa, M. (2020). ARCHITECTURAL DESIGN PROCESS MANAGEMENT. *Architecture and Planning Journal (APJ)*, *23*(2).
4. Amir, Z., & De Meulder, B. (2023). Contested forests: The Van Gujjars' struggle to settle. *Journal of Landscape Architecture*, *18*(1), 30–39. https://doi.org/10.1080/18626033.2023.2258722
5. Aria, M. (2017). Bibliometrix. In *R-Package Manual* (Vol. 11, Issue 4). https://doi.org/10.1016/j.joi.2017.08.007

Preprints.org (www.preprints.org) | NOT PEER-REVIEWED | Posted: 14 June 2024 doi:10.20944/preprints202406.0928.v1

6. Aydemir, A. Z., & Jacoby, S. (2022). Architectural design research: Drivers of practice. *The Design Journal*, *25*(4), 657–674.
7. Ayşe Zeynep Aydemir & Sam Jacoby. (2022). Architectural design research: Drivers of practice. *The Design Journal*.
8. Boeing, G. (2018). Measuring the complexity of urban form and design. *URBAN DESIGN International*, *23*(4), 281–292. https://doi.org/10.1057/s41289-018-0072-1
9. Brause, C. (2020a). Creative Framing, Systematic Exploration. *Technology \textbarArchitecture + Design*, *4*(1), 2–3.
10. Brause, C. (2020b). Creative Framing, Systematic Exploration. *Technology \textbarArchitecture + Design*, *4*(1), 2–3.
11. Brignola, A., Frumento, S., Lagomarsino, S., & Podestà, S. (2008). Identification of Shear Parameters of Masonry Panels Through the In-Situ Diagonal Compression Test. *International Journal of Architectural Heritage*, *3*(1), 52–73. https://doi.org/10.1080/15583050802138634
12. Caniggia, G., & Maffei, G. L. (2001). *Architectural composition and building typology: Interpreting basic building*. Alinea.
13. Carmona, M. (2019). Principles for public space design, planning to do better. *URBAN DESIGN International*, *24*(1), 47–59. https://doi.org/10.1057/s41289-018-0070-3
14. Chen, Q., Chun, Q., & Zhang, C. (2023). Quantitative Evaluation Method of Structural Safety Status of Timber Lounge Bridge with Cantilever Beams—A Case Study of the Yongqing Bridge. *International Journal of Architectural Heritage*, 1–19. https://doi.org/10.1080/15583058.2023.2217130
15. Chernyshev, D., Ivashko, Y., Kuśnierz-Krupa, D., & Dmytrenko, A. (2021). Role of natural landscape in perception of Ukrainian sacral architecture monuments. *Landscape Architecture and Art*, *17*, 13–21. https://doi.org/10.22616/j.landarchart.2020.17.02
16. Chun, Q., Jin, H., Dong, Y., Hua, Y., & Han, Y. (2020). Research on Mechanical Properties of Dingtougong Mortise-Tenon Joints of Chinese Traditional Hall-Style Timber Buildings Built in the Song and Yuan Dynasties. *International Journal of Architectural Heritage*, *14*(5), 729–750. https://doi.org/10.1080/15583058.2019.1568613
17. Conzen, M. P. (2009). How cities internalize their former urban fringes: A cross-cultural comparison. *Urban Morphology*, *13*(1), 29–54. https://doi.org/10.51347/jum.v13i1.3946
18. D. Indrosaptono, T. S. Andadari, & Alfanadi Agung Setiyawan. (2021). *The Studies of Architectural Design Method*.
19. de Salles Tiburcio, T. M., & Nobrega, C. L., Junior (Eds.). (n.d.). *CRIATIVIDADE E PROCESSO DE PROJETO – JOGO DE TABULEIRO COMO FERRAMENTA DE APOIO*. PPGAU/FAUeD/UFU.
20. Dovey, K., & Pafka, E. (2014). The urban density assemblage: Modelling multiple measures. *URBAN DESIGN International*, *19*(1), 66–76. https://doi.org/10.1057/udi.2013.13
21. Forsyth, A. (2015). What is a walkable place? The walkability debate in urban design. *URBAN DESIGN International*, *20*(4), 274–292. https://doi.org/10.1057/udi.2015.22
22. Gehl, J. (2010). *Cities for people*. Island Press.
23. Gil, J., Beirão, J. N., Montenegro, N., & Duarte, J. P. (2011). On the discovery of urban typologies: Data mining the many dimensions of urban form. *Urban Morphology*, *16*(1), 27–40. https://doi.org/10.51347/jum.v16i1.3966
24. Grover, R., Emmitt, S., & Copping, A. (2017). The typological learning framework: The application of structured precedent design knowledge in the architectural design studio. *International Journal of Technology and Design Education*, *28*(4), 1019–1038.
25. Gu, K. (2010). Urban morphological regions and urban landscape management: The case of central Auckland, New Zealand. *URBAN DESIGN International*, *15*(3), 148–164. https://doi.org/10.1057/udi.2010.4
26. Gu, K. (2014). From urban landscape units to morphological coding: Exploring an alternative approach to zoning in Auckland, New Zealand. *URBAN DESIGN International*, *19*(2), 159–174. https://doi.org/10.1057/udi.2013.21
27. Gu, K. (2023). Topographical Understanding of Artificial Mountain Making in Traditional Chinese Gardens. *Landscape Architecture Frontiers*, *11*(4), 28. https://doi.org/10.15302/J-LAF-1-020081
28. Gu, K., Wang, S., Zhang, J., & Chen, S. (2021). Exploring the substantive nature of urban morphology: Managing the changing character of cities in China. *Urban Morphology*, *26*(1). https://doi.org/10.51347/UM26.0001
29. Hillier, B., & Hanson, J. (1984). *The Social Logic of Space* (1st ed.). Cambridge University Press. https://doi.org/10.1017/CBO9780511597237
30. Im, J., & Han, J. (2015). Typological Design Strategy of FOAs Architecture. *Journal of Asian Architecture and Building Engineering*, *14*(2), 443–449.
31. Ivashko, Y., Kusnierz-Krupa, D., & Peng, C. (2020). History of origin and development, compositional and morphological features of park pavilions in Ancient China. *Landscape Architecture and Art*, *15*, 75–82. https://doi.org/10.22616/j.landarchart.2019.15.08

Preprints.org (www.preprints.org) | NOT PEER-REVIEWED | Posted: 14 June 2024 doi:10.20944/preprints202406.0928.v1

32. Ivashko, Y., Kuzmenko, T., Shuan, L., & Peng, C. (2020). The influence of the natural environment on the transformation of architectural style. *Landscape Architecture and Art*, *15*, 98–105. https://doi.org/10.22616/j.landarchart.2019.15.11
33. Jacobs, J. (1992). *The death and life of great American cities* (Vintage books ed). Vintage Books.
34. Kattia Villadiego Bernal, Carmen Elena Meza Estrada, Otón Alberto Navas De La Cruz, & Manuel García. (2019). EL PROCESO DE INVESTIGACI\' ON CREACI\' ON EN ARQUITECTURA PARA LA GENERACI\' ON DE SOLUCIONES T\' ECNICAS Y SOSTENIBLES EN ENTORNOS VULNERABLES. *Arquitetura Revista*.
35. Kropf, K. (2009). Aspects of urban form. *Urban Morphology*, *13*(2), 105–120. https://doi.org/10.51347/jum.v13i2.3949
36. Kropf, K. (2013). Ambiguity in the definition of built form. *Urban Morphology*, *18*(1), 41–57. https://doi.org/10.51347/jum.v18i1.3995
37. Laia Selva-Pareja, A. Ramos-Pla, Peré Mercadé-Melé, & Anna Espart. (2022). Evolution of Scientific Production on Health Literacy and Health Education—A Bibliometric Analysis. *International Journal of Environmental Research and Public Health*.
38. Liu, C., Jin, L., Yao, J., Zhang, Y., Guo, Y., & Oliveira, V. (2022). The urban form of ancient Chinese capital cities. *Urban Morphology*, *26*(2), 154–172. https://doi.org/10.51347/um26.0012
39. Liu, P., Neppl, M., & Dong, W. (2020). Smart plot division: Generating a plot-based strategy for the restoration of the old south historic urban area in Nanjing. *URBAN DESIGN International*, *25*(4), 357–376. https://doi.org/10.1057/s41289-020-00133-7
40. Lynch, K. (1996). *The image of the city*. The MIT Press, Massachusetts Institute of Technology.
41. M. S. Deliberador, C. H. Taralli, & Giovanna Ferraro Peres. (2019). CRIATIVIDADE E PROCESSO DE PROJETO – JOGO DE TABULEIRO COMO FERRAMENTA DE APOIO. *ANAIS DO VI SIMPOSIO BRASILEIRO DE QUALIDADE DO PROJETO NO AMBIENTE CONSTRUIDO*.
42. Macera, M., Meulder, B. D., & Shannon, K. (2020). NEW PARADIGMS OF TERRITORIAL PLANNING AND (POST-)MINING ECOLOGICAL RESTORATION IN THE ANDES. *Landscape Architecture Frontiers*, *8*(1), 26. https://doi.org/10.15302/J-LAF-1-020021
43. Maria Pinto, Rosaura Fernández-Pascual, David Caballero-Mariscal, Dora Sales, David Guerrero Quesada, & Alejandro Uribe Tirado. (2019). Scientific production on mobile information literacy in higher education: A bibliometric analysis (2006–2017). *Scientometrics*.
44. Maturana, B., Salama, A. M., & McInneny, A. (2021). Architecture, urbanism and health in a post-pandemic virtual world. *Archnet-IJAR: International Journal of Architectural Research*, *15*(1), 1–9. https://doi.org/10.1108/ARCH-02-2021-0024
45. Mehaffy, M., Porta, S., Rofè, Y., & Salingaros, N. (2010). Urban nuclei and the geometry of streets: The 'emergent neighborhoods' model. *URBAN DESIGN International*, *15*(1), 22–46. https://doi.org/10.1057/udi.2009.26
46. Meulder, B. D., & Shannon, K. (2019). SETTLING ALONG, WITH, AND ON WATER IN THUA THIEN HUE, VIETNAM: PAST, PRESENT, AND FUTURE. *Landscape Architecture Frontiers*, *7*(4), 10. https://doi.org/10.15302/J-LAF-1-020006
47. Meulder, B. D., Shannon, K., & Nguyen, M. Q. (2019). FOREST URBANISMS: URBAN AND ECOLOGICAL STRATEGIES AND TOOLS FOR THE SONIAN FOREST IN BELGIUM. *Landscape Architecture Frontiers*, *7*(1), 18. https://doi.org/10.15302/J-LAF-20190103
48. Moudon, A. V. (1997a). Urban Morphology as an emerging interdisciplinary field. *Urban Morphology*, *1*(1), 3–10. https://doi.org/10.51347/jum.v1i1.4047
49. Moudon, A. V. (1997b). Urban Morphology as an emerging interdisciplinary field. *Urban Morphology*, *1*(1), 3–10. https://doi.org/10.51347/jum.v1i1.4047
50. Na, L. T. H., & Park, J.-H. (2022). Cultural heritage values and underlying spatial characteristics of the Temple of Literature in Vinh Long, Southern Vietnam. *Open House International*, *47*(2), 282–295. https://doi.org/10.1108/OHI-06-2021-0128
51. Nesreen Alkassabany & Magdy Mousa. (2020). ARCHITECTURAL DESIGN PROCESS MANAGEMENT. *Architecture and Planning Journal (APJ)*.
52. Neves, I. C., Rocha, J. ao, & Duarte, J. e P. (2014). Computational Design Research in Architecture: The Legacy of the Hochschule f\" ur Gestaltung, Ulm. *International Journal of Architectural Computing*, *12*(1), 1–25.
53. Nguyen, V. T. A., Park, J.-H., & Jeon, Y. (2022). The spatial and environmental characteristics of Vietnamese vernacular houses in Vietnam's French colonial public buildings. *Open House International*, *47*(1), 122–134. https://doi.org/10.1108/OHI-04-2021-0078
54. Ozbil, A., Peponis, J., & Stone, B. (2011). Understanding the link between street connectivity, land use and pedestrian flows. *URBAN DESIGN International*, *16*(2), 125–141. https://doi.org/10.1057/udi.2011.2

Preprints.org (www.preprints.org) | NOT PEER-REVIEWED | Posted: 14 June 2024 doi:10.20944/preprints202406.0928.v1

55. Pang, Y., Dong, W., & Wang, X. (2023a). Research on the early Buddhist architecture in the Ayeyarwady Basin. *Journal of Asian Architecture and Building Engineering*, *22*(3), 1763–1790. https://doi.org/10.1080/13467581.2023.2165403
56. Pang, Y., Dong, W., & Wang, X. (2023b). Research on the early Buddhist architecture in the Ayeyarwady Basin. *Journal of Asian Architecture and Building Engineering*, *22*(3), 1763–1790. https://doi.org/10.1080/13467581.2023.2165403
57. Park, J.-H., & Baldanchoijil, G. (2014). The Superimposition of Circles Cut into Louis I. Kahn's Building Façades. *Journal of Asian Architecture and Building Engineering*, *13*(2), 389–396. https://doi.org/10.3130/jaabe.13.389
58. Park, J.-H., & Lee, H.-K. (2009). The Proportional Design in Rudolph M. Schindler's Braxton-Shore House of 1930. *Journal of Asian Architecture and Building Engineering*, *8*(1), 33–39. https://doi.org/10.3130/jaabe.8.33
59. Peters, T., & Halleran, A. (2020). How our homes impact our health: Using a COVID-19 informed approach to examine urban apartment housing. *Archnet-IJAR: International Journal of Architectural Research*, *15*(1), 10–27. https://doi.org/10.1108/ARCH-08-2020-0159
60. Pisani, M., & De Figueiredo, E. (2011). Edificios de escritorios em Sao Paulo: Tipologias de 1979 a 2010. *11a Conferencia Internacional Da LARES*.
61. Potbhare, V., Syal, M., & Korkmaz, S. (2009). Adoption of Green Building Guidelines in Developing Countries Based on U.S. and India Experiences. *Journal of Green Building*, *4*(2), 158–174. https://doi.org/10.3992/jgb.4.2.158
62. R. Hyde. (2017). *Space, form and process in architectural science*.
63. Rapoport, A. (2002). *House form and culture*. Prentice Hall.
64. Ricardo Arencibia-Jorge, Rosa Lidia Vega-Almeida, & Humberto Carrillo-Calvet. (2020). *Evolucion y alcance multidisciplinar de tres tecnicas de analisis bibliometrico*.
65. Rossi, A. (2007). *The architecture of the city* (16. print). MIT Press.
66. Salama, A. M., & Maclean, L. (2017). Integrating Appreciative Inquiry (AI) into architectural pedagogy: An assessment experiment of three retrofitted buildings in the city of Glasgow. *Frontiers of Architectural Research*, *6*(2), 169–182. https://doi.org/10.1016/j.foar.2017.02.001
67. Sevgi KEÇELİ ERCİYAS. (2022). THE BIBLIOMETRIC ANALYSIS OF JOURNAL OF KAFKAS UNIVERSITY ECONOMICS AND ADMINISTRATIVE SCIENCES FACULTY. *Kafkas \" Universitesi \. Iktisadi ve \. Idari Bilimler Fak\" Ultesi Dergisi*.
68. Sleptsov, O., Ivashko, Y., Dmytrenko, A., & Krupa, M. (2021). The contemporary churches in the natural environment: Modernization of landscape traditions. *Landscape Architecture and Art*, *19*(19), 121–130. https://doi.org/10.22616/j.landarchart.2021.19.12
69. Syaputra Winardi, Muhammad Chabibur Rohman, Yusach Ryadh, Rasyid, Andre Astana Putra, & Ferry Adhi Dharma. (2022). Bibliometric Analysis The Effect of Health Protocol Social Marketing Communications on New Adaptations Covid-19 Pandemic. *Kanal: Jurnal Ilmu Komunikasi*.
70. Tatum, C. T. S., & Russo, S. L. ao. (2020). Bibliometric analysis for frugal innovation. *International Journal for Innovation Education and Research*, *8*(3), 01–14.
71. Ünlü, T. (2019). Managing the urban change: A morphological perspective for planning. *Iconarp International J. of Architecture and Planning*, *7*(Special Issue 'Urban Morphology'), 55–72. https://doi.org/10.15320/ICONARP.2019.82
72. Vergara-Perucich, F. (2021). Productividad multidisciplinar sobre COVID-19 en Chile: Estudio bibliométrico de fuentes en Web of Science. *Revista Médica de Chile*, *149*(7), 1099–1100. https://doi.org/10.4067/s0034-98872021000701099
73. Vergara-Perucich, J. F. (2024). *Measuring the Impact of New Publications on Housing in Urban Studies*. https://doi.org/10.20944/preprints202401.0022.v1
74. Vergara-Perucich, J.-F. (2023). A Systematic Bibliometric Analysis of the Real Estate Bubble Phenomenon: A Comprehensive Review of the Literature from 2007 to 2022. *International Journal of Financial Studies*, *11*(3), 106. https://doi.org/10.3390/ijfs11030106
75. Villadiego Bernal, K. D. C., Meza Estrada, C. E., Navas De La Cruz, O. A., & Munar Garcia, M. C. (2019). EL PROCESO DE INVESTIGACION CREACION EN ARQUITECTURA PARA LA GENERACION DE SOLUCIONES TECNICAS Y SOSTENIBLES EN ENTORNOS VULNERABLES. *Arquitetura Revista*, *15*(2).
76. Vincenzo Basile, Massimiliano Giacalone, & P. Cozzucoli. (2022). The Impacts of Bibliometrics Measurement in the Scientific Community A Statistical Analysis of Multiple Case Studies. *Review of European Studies*.
77. Wang, H., Chun, Q., Zhang, C., Li, P., Li, D., & Zhai, F. (2023). Quantitative Evaluation Method of Structural Safety for the Great Wall Hollow Defensive Forts under Gravity Loads. *International Journal of Architectural Heritage*, *17*(10), 1736–1756. https://doi.org/10.1080/15583058.2022.2070048
78. Wang, Y., Chun, Q., Xiong, X., & Zhu, T. (2022). Conservation and adaptive reuse of modern military industrial heritage: A case study on the former site of Jinling Arsenal in Nanjing, China. *Journal of Asian Architecture and Building Engineering*, *21*(4), 1193–1210. https://doi.org/10.1080/13467581.2021.1941977

Preprints.org (www.preprints.org) | NOT PEER-REVIEWED | Posted: 14 June 2024 doi:10.20944/preprints202406.0928.v1

79. Whitehand, J. W. R. (2001). British urban morphology: The Conzenian tradition. *Urban Morphology*, *5*(2), 103–109. https://doi.org/10.51347/jum.v5i2.3896
80. Ye, Y., & Nes, A. V. N. (2014). Quantitative tools in urban morphology: Combining space syntax, spacematrix and mixed-use index in a GIS framework. *Urban Morphology*, *18*(2), 97–118. https://doi.org/10.51347/jum.v18i2.3997
81. Zhang, P., & Dong, W. (2023). A preliminary study on the spatial combing method of red-landscape based on historical narration. *Journal of Asian Architecture and Building Engineering*, *22*(4), 2405–2419. https://doi.org/10.1080/13467581.2022.2129262
82. Zhang, Y., & Dong, W. (2022). The interaction of city and basin: Research on the transformation of historical cities in JinZhong Basin, ShanXi province, China. *Journal of Asian Architecture and Building Engineering*, *21*(6), 2621–2635. https://doi.org/10.1080/13467581.2021.1972807
83. Żychowska, M., Ivashko, Y., Chang, P., Dmytrenko, A., Kulichenko, N., & Zhang, X. M. (2021). The influence of traditional Chinese landscape architecture on the image of small architectural forms in Europe. *Landscape Architecture and Art*, *18*, 59–68. https://doi.org/10.22616/j.landarchart.2021.18.06

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