Journal of Infrastructure, Policy and Development 2024, 8(9), 6310.
https://doi.org/10.24294/jipd.v8i9.6310

Article

Exploring understudied areas of urban regional planning through bibliometric analysis

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CITATION

Harahap MAK, Sugiarto A, Harmain U, Nasution AA. (2024). Exploring understudied areas of urban regional planning through bibliometric analysis. Journal of Infrastructure, Policy and Development. 8(9): 6310. https://doi.org/10.24294/jipd.v8i9.6310

ARTICLE INFO

Received: 9 May 2024
Accepted: 1 July 2024
Available online: 6 September 2024

Abstract: Combining physical, social, and economic elements, urban planning plays a critical role in creating sustainable, resilient, and livable urban environments. It encompasses the regulation of land use, infrastructure, transportation systems, and environmental resources, with a focus on sustainable urban design and green infrastructure. While progress has been made, there are still areas that have not been fully explored, including the integration of renewable energy sources and the development of urban environments that are resilient to environmental stresses. This study aims to analyze the direction and scope of urban planning research and to identify research gaps in this area. The method used is bibliometrics by analyzing data obtained from the Scopus database in January 2024. The results of this study showed that Yufeng Zhang, a professor at Wuhan University, China, was the most productive author in producing publications, namely 22 documents. In addition, the article produced by Qianqian Zhou is also influential in this research topic because it gets a number of citations, as high as 204 citations. Additionally, the results indicate the current focus of research on sustainability, adaptation to climate change, and technology in urban planning. These findings can guide future research, direct policy, and ensure an interdisciplinary approach to modern urban and regional challenges.

Keywords: bibliometric analysis; regional planning; urban planning

1. Introduction

Urban planning is a multifaceted discipline that plays an important role in shaping the physical, social, and economic characteristics of urban areas (Barke, 2018; Cilliers et al., 2014). Urban planning involves the planning and regulation of land use, infrastructure, transportation systems, and environmental resources to create sustainable, resilient, and livable cities. Regional planning, on the other hand, extends to a larger scale, covering multiple cities or regions and addressing issues such as regional transportation, housing policy, and environmental protection. It is important to note that urban planning is focused on the design and development of local cities, while regional planning takes a more comprehensive approach (Herrschel and Newman, 2003; Pantić et al., 2021). Although urban planning is a comprehensive field, there are still unexplored areas that offer potential for innovative research and application (Bibri and Krogstie, 2017).

Climate change and environmental sustainability are important considerations in urban planning (Abubakar and Dano, 2020; Wamsler et al., 2013). Although there has been considerable research on sustainable urban design and green infrastructure, there are still several areas that require further attention. These include the long-term

sustainability of urban projects, the integration of renewable energy sources into the urban landscape, and the development of resilient urban environments capable of coping with environmental pressures (Russo and Cirella, 2020; Zeng et al., 2022).

Rapid technological advances present opportunities and challenges for urban planning (Freire, 2006; Paiva et al., 2021). Smart city initiatives, the use of big data in planning, and the impact of autonomous vehicles on urban spaces are all areas worth exploring (Lau et al., 2019). Bibliometric analysis can aid in identifying the current integration of technological developments in urban planning research and areas that require further study.

Bibliometric analysis is a powerful tool for understanding the dynamics of scientific research (Li and Xu, 2023; Pessin et al., 2022). This analysis entails a statistical examination of books, articles, and other publications to track the development of a field over time, identify influential studies, and discover emerging trends (Donthu et al., 2021; José de Oliveira et al., 2019).Various metrics, including citation analysis, co-citation analysis, and content analysis, are used to map the scholarly landscape. Bibliometric analysis can reveal patterns in research topics, collaboration among experts, and the geographic distribution of research in urban planning, providing a meta-level understanding of the field's evolution.

Despite extensive research in certain areas of urban planning, bibliometric analysis has revealed that some topics remain largely unknown. These areas include the integration of public health issues into urban design, the socio-economic impacts of urban planning decisions, and the role of community participation in the planning process (Carmichael et al., 2019; Panagopoulos et al., 2016; Sharifi and Khavarian-Garmsir, 2020). Recognizing this gap is important to direct future research efforts towards a more comprehensive understanding of urban planning. Furthermore, a significant portion of the existing literature on urban planning is focused on western models and methodologies (Portugali et al., 2012). More comparative studies are needed that incorporate perspectives from regions that are rapidly urbanizing in Asia, Africa, and Latin America. Bibliometric analysis can shed light on the geographical distribution of research and encourage a more global approach to urban and regional planning.

Bibliometric analysis can guide the future direction of urban planning research by identifying well-researched and underexplored areas. This can help academics, practitioners, and policymakers focus on interdisciplinary approaches, collaborate internationally, and address the complex challenges of modern urban and regional environments.

2. Theoretical framework

Building upon the theoretical framework and methodological approach previously outlined, this study aims to extend the application of bibliometric analysis in urban planning research. By synthesizing quantitative data with qualitative insights, we seek to uncover not only the current state of the field but also to identify understudied areas that warrant further investigation. To illustrate the practical utility of bibliometric analysis in urban planning, we present three case studies that demonstrate its application across various sub-domains of the field. These empirical

examples serve to substantiate our methodological approach and provide concrete evidence of the insights that can be gleaned through systematic analysis of the literature.

The first case study examines the evolution of smart city research (Mora et al., 2017). Their bibliometric analysis of 1067 articles published between 1992 and 2012 revealed a significant surge in publications post-2010, indicating the rapid emergence of smart cities as a dominant paradigm in urban planning discourse. Through co-citation analysis, the study identified key research clusters, including smart city technologies and infrastructure, governance frameworks, and socio-environmental impacts. This temporal and thematic mapping exemplifies how bibliometric methods can elucidate the trajectory of emerging concepts within urban planning.

The second case study focuses on geographical patterns in urban resilience research (Wang et al., 2018). Their analysis of 1107 articles published from 1973 to 2017 unveiled notable disparities in research output across regions, with a predominance of contributions from North America and Europe. However, the study also highlighted an emerging body of literature from Asia, particularly centered on disaster resilience in rapidly urbanizing contexts. This geographical analysis underscores the potential of bibliometric methods to reveal spatial biases in knowledge production and identify areas for more geographically diverse research.

The third case study explores interdisciplinary connections in urban green space research (Aram et al., 2019). Their bibliometric analysis of 1737 articles employed co-citation analysis to map the interdisciplinary landscape of urban green space research. The study identified key bridging concepts such as “ecosystem services” and “nature-based solutions” that facilitate knowledge transfer between urban planning and allied fields like ecology and public health. This case demonstrates the capacity of bibliometric analysis to illuminate interdisciplinary linkages and potential areas for cross-pollination of ideas.

These case studies collectively illustrate the diverse applications of bibliometric analysis in urban planning research. They demonstrate its utility in tracking conceptual evolution, revealing geographical disparities, and mapping interdisciplinary connections. Moreover, they provide empirical support for our argument that bibliometric methods can offer valuable insights into the structure and dynamics of urban planning literature. Building on these empirical foundations, our study applies a similar methodological approach to a broader corpus of urban planning literature. By analyzing publication patterns, citation networks, and keyword co-occurrences across a comprehensive dataset of recent urban planning research, we aim to identify emergent trends, potential research gaps, and understudied areas within the field.

3. Method

This research uses a bibliometric analysis method by accessing the Scopus journal database as the main data source (Alryalat et al., 2019; Baas et al., 2020; Obidat, 2022). The Scopus database offers extensive features and coverage. This is due to its comprehensiveness, high reputation, strong citation network, consistent data standards, and ability to conduct continuous analysis (Gusenbauer, 2022; Pölönen et al., 2020). These qualities make Scopus the number two reference source after WOS that is

trusted and qualified to produce research findings.

3.1. Search strategy and data collection

The data for this bibliometric analysis were sourced from the Scopus database, which was chosen for its comprehensive coverage of peer-reviewed literature in the field of urban planning. The search was conducted on 4 January 2024, using a carefully constructed search string to capture relevant publications while minimizing noise. The exact search string used in Scopus was as follows: (TITLE ("Urban planning") OR TITLE ("urban development") OR TITLE ("urban design")) AND (LIMIT-TO (PUBYEAR, 2019) OR LIMIT-TO (PUBYEAR, 2020) OR LIMIT-TO (PUBYEAR, 2021) OR LIMIT-TO (PUBYEAR, 2022) OR LIMIT-TO (PUBYEAR, 2023)) AND (LIMIT-TO (DOCTYPE, "ar")). The TITLE function was used to search for articles with "Urban planning," "urban development," or "urban design" in their titles.

This ensures a focus on publications centrally concerned with these topics. The search was limited to publications from 2019 to 2023. This five-year window was chosen to capture recent trends while providing sufficient data for meaningful analysis. The search was restricted to articles (LIMIT-TO (DOCTYPE, "ar")) to focus on peer-reviewed research outputs. As a result, 2806 documents matching the search criteria were identified, which will be further analyzed to uncover trends, key topics, and significant contributions to this field of research related to urban planning and governance research.

3.2. Data analysis tools and procedures

This bibliometric analysis aims to explore and understand the scientific literature related to urban planning and governance. The aim is to provide an in-depth picture of the direction and scope of urban planning research and to identify research gaps in this field. The study used Biblioshiny software for data visualization, which provides functionality in both descriptive data processing and conceptual analysis of the collected data set (Muskhir et al., 2024; Watrianthos et al., 2023; Windarto et al., 2023). In addition to Biblioshiny, Microsoft Excel (version 16.0) was used for data management and creation of additional visualizations. R (version 4.1.2) was employed for supplementary statistical analyses and generation of complex visualizations not available in Biblioshiny.

Figure 1 illustrates the five-step process of our data analysis methodology. This flowchart provides a clear visual representation of the sequential stages we followed in our bibliometric analysis of urban planning research. The process begins with the import of our cleaned dataset into Biblioshiny, a powerful tool for bibliometric analysis. This is followed by the generation of descriptive statistics using Biblioshiny's built-in functions, providing us with a broad overview of our data. In the third step, we export the raw results from Biblioshiny for further processing. This allows us to conduct additional statistical analyses in R, including trend analysis and significance testing, which forms our fourth step.

Finally, we create our visualizations using a combination of Biblioshiny, R, and Excel. This multi-tool approach allows us to leverage the strengths of each software package, resulting in comprehensive and insightful visual representations of our

findings. This structured, five-step approach ensures a thorough and systematic analysis of our data, enabling us to confidently identify trends, patterns, and potential gaps in urban planning research. By following this methodology, we can provide valuable insights that can guide future research directions in the field.

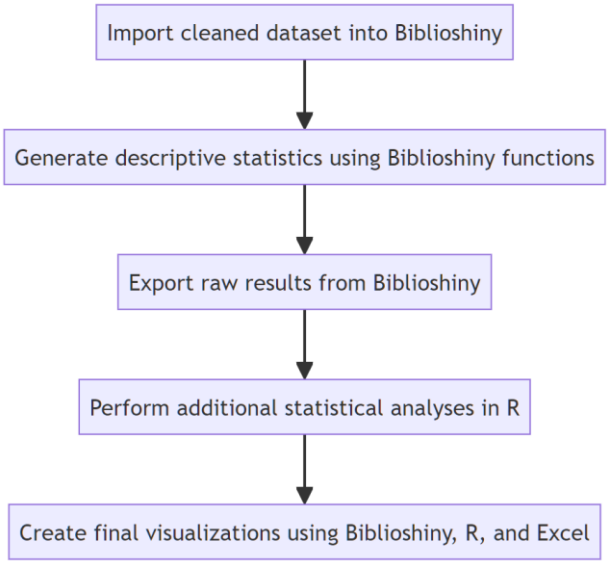

Figure 1. Five-step process data analysis method.

4. Result and discussion

From the data screening stage on the Scopus database related to urban planning research topics, 2806 publications were obtained in the range 2019–2023. Of this total, it is divided into 1023 sources of journals, books, etc. In the growth rate in publications related to this topic, there is a percentage of 8.33. Additionally, there are 8066 authors who have contributed to research related to urban planning. This shows that the interest of researchers and academics who discuss topics in this field is quite high. The results and discussion of this research are divided into subdiscussions consisting of publication trends and trend analysis. Publication trends are also divided into the top ten most productive authors, the top ten most productive affiliations, the top ten most productive sources, and the top ten most cited articles. These results and discussions can help map the bibliometric landscape of the publication to inform future research directions.

4.1. Publication trends

Exploring lesser-known areas in urban planning through bibliometric analysis is an important approach to identify gaps and emerging trends in the field. This process typically involves a comprehensive examination of the existing literature to map the frequency, relationships, and development of various research topics. In urban planning, under-researched areas may include topics such as the integration of sustainable development practices, the impact of digital technologies on urban landscapes, and the dynamics of small and medium urban areas.

Bibliometric analysis in this context will use the Scopus database to collect publication data related to urban planning. This analysis can focus on several key

aspects including the number of publications over time to identify trends, citation analysis to measure the influence of specific works, author networks, and collaborations to understand the academic landscape in the field, and keyword frequency analysis to detect emerging themes and under researched areas. The results of this analysis will benefit researchers, policy makers and practitioners in the field of urban planning. The results of this analysis can guide the direction of future research, inform policy development, and ensure that emerging and critical issues are fully addressed. The results of this publication trend analysis are divided into several analyses that include the top ten most productive authors, the top ten most productive affiliations, the top ten most productive sources and the top ten most cited articles.

The relationship between publication trends, the most prolific authors, affiliations, associated sources, and the most cited articles is complex and reflects the dynamics within a research field. Publication trends are influenced by collective research efforts of prolific authors, the institutions with which they are affiliated, and the sources through which they choose to disseminate their research work (Santra and Majhi, 2023). Prolific authors and affiliates who consistently contribute large amounts to research shape the direction of such trends. In addition, influential sources play an important role in publication trends, as researchers often target these sources for publication, influencing the areas that take center stage. Consequently, highly cited articles, often written by prolific individuals or published in influential sources, significantly influence the direction of research. These articles introduce a revolutionary concept, methodology, or finding, then attract attention and encourage further exploration of related themes.

The first analysis of publication trends discusses the authors who are most productive in discussing research topics related to urban planning. **Table 1** presents 10 authors who produce many publications related to research topics in urban planning. This analysis can help researchers to identify the author who contributes the most in conducting this research as a reference. The total authors obtained from the analysis are 8066 authors and in **Table 1** there are 10 authors who have been filtered as productive authors in conducting and publishing research related to urban planning.

Table 1. Top 10 most productive authors.

Authors	Record count	Affiliation
Yufeng Zhang	22	Wuhan University
Yangcheng Liu	21	Nanjing University
Yueyao Wang	18	Peking University
Xiang Zhang	18	Wuhan University
Xia Li	15	East China Normal University
Jingzhi Li	13	University of Science & Technology, Changsha
Jianming Wang	13	Zhejiang University
Mingshu Wang	13	University of Twente
Hao Zhang	12	Kong Polytechnic University
Le Zhang	12	University of Illinois at Urbana-Champaign

Table 1 shows that there is no dominant author in urban planning-related research.

In analyzing the data, the author Yufeng Zhang from Wuhan University leads the table with 22 records, closely followed by Yangcheng Liu from Nanjing University with 21. This suggests that these authors are either leading figures in their field or also work in urban planning or related disciplines, given the context of the previous discussion. This high output may also indicate an active research program or leadership in collaborative projects.

From these data, it can be discussed that the research landscape in the fields represented by these authors is dynamic, with significant contributions from institutions in China. The authors listed are influential in their domains, which can be further explored by examining the topics of their publications and the citations they receive. The data also triggers discussions about the focus of research in different regions, with Chinese universities showing a strong emphasis on producing high research output.

The presence of authors affiliated with non-Chinese institutions, such as the University of Twente and the University of Illinois at Urbana-Champaign, demonstrates international collaboration. Such collaborations are often key to advancing research through the exchange of ideas and methodologies across borders. In this respect, it can also be seen that global research networks are crucial in the dissemination and development of knowledge. Collaboration between Chinese and international institutions is a strategic approach to increase the global reach and applicability of research findings. In addition to the results of the top ten most productive authors, this study also identifies the affiliations of authors who conduct research related to urban planning. **Figure 1** presents data from affiliates spread throughout the world who contributed to this research. The total number of affiliations obtained from the analysis was 2255, and in **Figure 2** we filtered into 10 affiliations that were the most productive in producing research related to urban planning.

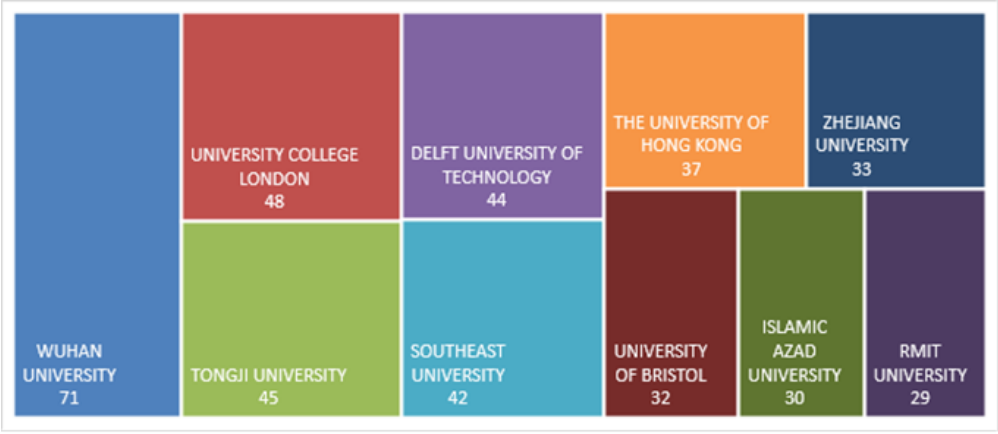

Figure 2. Top ten most productive affiliations.

Figure 2 shows a TreeMap visualization that appears to represent the number of publications, contributions, or related metrics of the various affiliations. The size of each block correlates with the number associated with each university, indicating a quantifiable measure of output or impact in a particular field related to urban planning given the context of the previous discussion. With the largest block of 71 articles, Wuhan University appears to be leading the way in this metric. This lead may indicate

a significant contribution to the field, whether in the number of publications, research impact, or other measures of academic productivity. Second is University College London (UCL) with 48 articles, which makes it a significant contributor as well. The strong reputation of UCL in urban planning and the Bartlett Faculty of Built Environment may explain its substantial contribution.

This map shows the diversity of contributions from institutions on different continents, including Asia, Europe, and Australia. The dominance of Chinese universities may reflect the rapid urbanization of the country and the need for extensive urban planning research and education. These data can paint a picture of the global academic landscape in urban planning, the regional focus on urban issues, and the influence of these institutions' research on urban policy and practice. In addition, it can also touch on the methodologies of knowledge production, interdisciplinary approaches, and the dissemination of this knowledge in addressing urban challenges.

In addition to analyzing the affiliation origin of the researchers, information on the number of publications in certain journals is also analyzed in the results of this study, as it can help to determine the direction of further research. For example, if a journal has a high number of publications on a particular topic, it can be a signal that the topic is important and worthy of further investigation. In **Figure 3,** 10 journals are presented that produce many publications related to urban planning research topics. This analysis can help select journals for later publication of research results. If the research corresponds to a topic that is widely discussed in a particular journal, it can be a good choice to submit a paper to that journal. The total number of journals obtained from the analysis is 1023 and in **Figure 3** we filter into 10 journals that are the most productive in producing research related to urban planning.

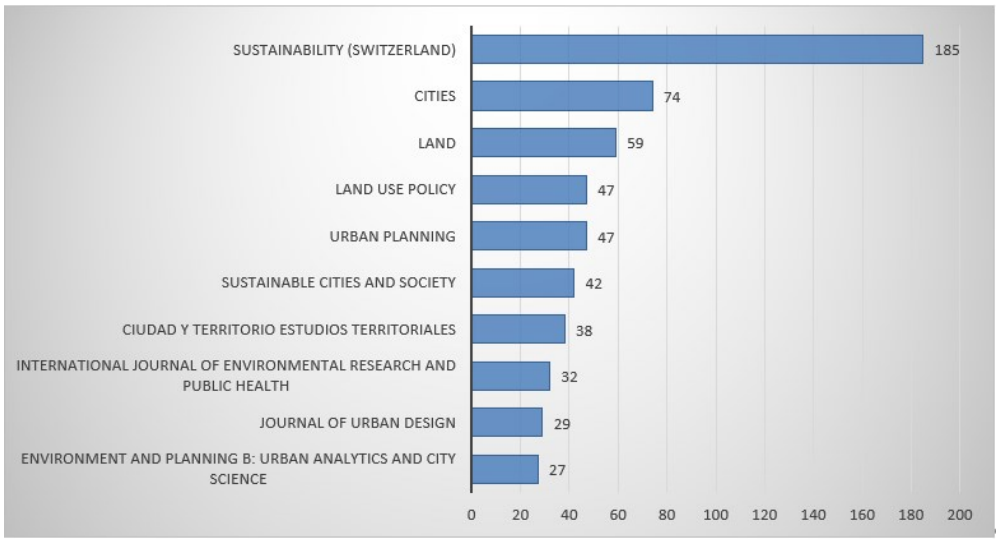

Figure 3. Top ten most productive sources.

Figure 3 shows the 10 most productive journal sources for publishing articles related to urban planning. This graph presents an overview of current priorities and interests within the urban planning research community, with sustainability and the integration of health and environmental considerations prominent as key trends. The journal "Sustainability (Switzerland)" leads significantly with 185 records, indicating that sustainability is a major focus in the urban planning research domain. This

indicates a high level of research activity and academic interest in the sustainability aspects of the urban environment. Other journals such as "Cities", "Land," "Land Use Policy" and "Urban Planning" have a substantial number of records, with numbers ranging from 27 to 74. These topics cover a broad spectrum of urban planning, including urban space planning, land management, policy making, and sustainable urban area development.

The data show that the academic community places significant emphasis on sustainability in urban planning. The prominence of "Sustainability (Switzerland)" in the graph reflects global concerns about environmental issues and the need for sustainable development practices. The distribution of journals demonstrates a comprehensive approach to urban planning research, covering a range of disciplines from policy and land use to design and environmental health. The interdisciplinary nature of the field is important to address the complex challenges facing modern cities. The focus on specific areas such as "Land Use Policy" and "Urban Planning" shows that the development of practical planning policies and strategies is a key research area, driven by the need for evidence-based approaches to managing urban growth and ensuring sustainable urban development.

Table 2. Top ten most cited article.

No.	Title	DOI	Citations	TC
1	Comparison of Urbanization and climate change impacts on urban flood volumes: Importance of urban planning and drainage adaptation (Zhou et al., 2019)	10.1016/j.scitotenv.2018.12.184	204	34.00
2	Changing the urban design of cities for health: The superblock model (Mueller et al., 2020)	10.1016/j.envint.2019.105132	187	37.40
3	The effect of urban planning on urban formations determining the effect of bioclimatic comfort area using satellitia imagines on air quality: a case study of Bursa city (Cetin, 2019)	10.1007/s11869-019-00742-4	178	29.67
4	Urban flood resilience—A multi-criteria index to integrate flood resilience into urban planning (Bertilsson et al., 2019)	10.1016/j.jhydrol.2018.06.052	172	28.67
5	Building urban resilience with nature-based solutions: How can urban planning contribute? (Bush and Doyon, 2019)	10.1016/j.cities.2019.102483	169	28.17
6	Measuring daily accessed street greenery: A human-scale approach for informing better urban planning practices (Ye et al., 2019)	10.1016/j.landurbplan.2018.08.028	164	27.33
7	The Digital Twin of the City of Zurich for Urban Planning (Schrotter and Hürzeler, 2020)	10.1007/s41064-020-00092-2	147	29.40
8	15-Minute City: Decomposing the New Urban Planning Eutopia (Pozoukidou and Chatziyiannaki, 2021)	10.3390/su13020928	132	33.00
9	Urban planning and quality of life: A review of pathways linking the built environment to subjective well-being (Mouratidis, 2021)	10.1016/j.cities.2021.103229	121	30.25
10	Numerical evaluations of urban design technique to reduce vehicular personal intake fraction in deep street canyons (Zhang et al., 2019)	10.1016/j.scitotenv.2018.10.333	121	20.17

The results obtained from the analysis of the trends of the last publication were related to the articles that achieved the highest citation rate on the topic of urban planning. The methodology used is citation analysis, which measures the frequency of a scientific work cited in other publications and reflects the influence and importance of the work. **Table 2** shows the 10 most cited articles on the topic of urban planning. This citation analysis can help identify trends in urban planning and climate impact

research. Frequently-cited articles illustrate trends or topics that are important in this field. In addition, information about frequently cited articles can be a valuable reference source for researchers who want to carry out further research in the field of urban planning. The total number of articles obtained from the analysis is 2806 documents and in **Table 2** we filtered into 10 articles that received the most citations related to urban planning.

Based on the data in **Table 2**, we can see the top ten most influential articles over the past five years. The first place is Qianqian Zhou from Guangdong University of Technology, China, as a highly influential author with one of his works being the most frequently cited on Scopus. The article received 204 citations in the last 5 years. Research shows a comparative study between urbanization and impacts of climate change, which is highly relevant in contemporary urban planning research (Zhou et al., 2019). This study underscores the need to understand how urban expansion and land use change contribute to climate change. It highlights the importance of urban planning and adaptation to the impacts of climate change on flooding in cities. This indicates that the study is highly relevant to the current global issue of climate change and urban resilience.

The second study focused on how urban design affects health outcomes. Research conducted (Mueller et al., 2020) suggests that there is a strong correlation between urban planning and public health, and that research in this area has a strong influence on society. This topic is especially important given the push to create more pedestrian-friendly, bicycle-friendly, and green cities that can increase physical activity and overall, well-being. In the research conducted by Cetin (2019) also obtained the third highest number of citations on this topic of urban planning research (Cetin, 2019). His research discusses how urban planning can affect the bioclimate and comfort of urban areas, highlighting the importance of urban design that takes into account environmental factors. The influence of urban planning on urban development patterns. This suggests a focus on the formative effects of planning policy and the resulting urban landscape.

In addition, the multicriteria index for flood resilience shows that measurement tools that can assess urban resilience are an important research area. Referring to this research (Bertilsson et al., 2019), discussing urban flood resilience, he suggests that it is an area of growing concern due to the increasing frequency and severity of flood events (Bertilsson et al., 2019). The research explores strategies for cities to survive and recover quickly from floods. From this analysis, we can conclude that there is a strong trend in the literature indicating the importance of innovative and sustainable urban planning to address environmental and social challenges. The articles most cited in this area tend to focus on adaptation to climate change, improving quality of life, and implementing technology-based solutions. The table shows that these topics are not only academically relevant, but also very important for policymakers and practitioners in the field of urban planning and environmental management.

4.2. Trend analysis

Trend investigation provides very important information and insights into dynamic changes within a particular research area. By observing and analyzing

patterns in the publication pool over time, this type of analysis reveals the development of academic interest, research methods, and topic focus within the area. This analysis is a very important tool for various parties involved in the world of research. Co-occurrence analysis is a bibliometric technique used to identify trends and patterns in specific literature. This method comes from the assumption that keywords or terms that often appear together in one document have a stronger relationship than can be explained by chance. In the context of trend analysis, co-occurrence analysis can be used to recognize emerging topics, track the development of research themes over time, and even project future research directions. Furthermore, trend analysis can be used as a reference for research gaps to be investigated.

Figure 4 is a visualization of the network analysis depicting various concepts related to urban planning. This network graph is a shared word analysis which is a method used to visualize the structure and connectedness of terms in a body of text, such as a research article, policy document, or educational material. The visualization shows 5 clusters, with the main cluster being "urban planning". In addition, there are also the words "urban development" and "urban design" which are part of the keywords associated with the core keywords in this study.

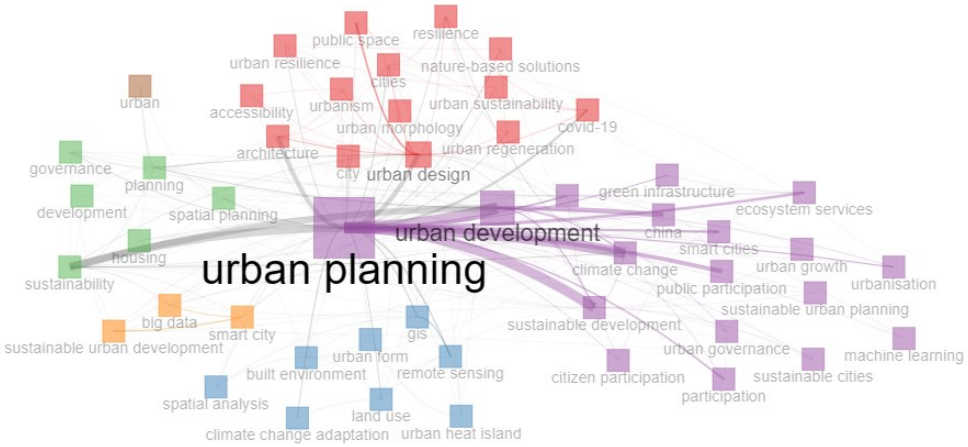

Figure 4. Co-occurrence analysis.

The size of these nodes indicates the frequency or importance of the terms in the context under study (Lozano et al., 2019). This is because many research topics discuss these keywords. Nodes such as "urban development" and "sustainable development" have a strong relationship with "urban planning," suggesting that sustainable development is an important principle in urban planning discussions. This is supported by Dimitrios Kalfas et al. (2023) who said that quality indicators of urbanization are critical to achieving various sustainable development goals (Kalfas et al., 2023).

It also indicates that sustainable urbanization is not just about converting farmlands and forests into cities, but is also one of the answers to the world's population growth problem if done with vision and dedication. This study clearly shows that an integrated land use strategy is essential for achieving the SDGs. There is a strong trend toward more environmentally responsible development. Although it appears to be a concept that is frequently discussed, there is still a lack of research that effectively integrates these two aspects, especially in the context of developing

countries facing rapid growth of urbanization (Ameen and Mourshed, 2017).

In addition, the terms "smart city" and "big data" indicate the adoption of technology in urban planning. The presence of these buzzwords emphasizes the role of big data and information technology in developing cities that are more efficient and responsive to the needs of their residents. The integration of technologies, such as big data, GIS, and smart city, is becoming more dominant and indicates a trend toward more data-driven and automated urban planning (Bibri, 2023).

The keywords "land use" and "climate change adaptation" are smaller but important nodes, indicating specific issues faced in urban planning. This reflects attention to how land is used and how cities adapt to climate change (Zhou et al., 2019). Adaptation to climate change is becoming a major focus in urban planning, with terms such as "urban heat island" and "climate change adaptation" becoming more important. This indicates an increased awareness of the importance of preparing cities for existing and future climate challenges and integrating mitigation solutions into the fabric of cities (Carter et al., 2015; Godschalk, 2003). The terms "public participation," "citizen participation," and "participation" are also seen in relation to "urban planning". This places an emphasis on the social aspects of urban planning. This reflects a trend toward a more inclusive and participatory approach, where community input is crucial in shaping an urban environment that meets the needs of its residents (Abbott, 2013; Mcfarlane, 2000).

There is an increasing interest in green infrastructure, which is reflected in terms such as "green infrastructure" and "nature-based solutions." This trend underscores the effort to incorporate natural elements into urban design, which not only improves the aesthetics of cities, but also improves air quality, reduces pollution, and supports biodiversity (Miller and De Roo, 2017) While the importance of green infrastructure has been recognized, there is still room for further research on how this infrastructure quantitatively affects ecosystem services in urban environments (Fang et al., 2023). From some analysis of the results of the presentation, it can be derived that these trends show the evolution of urban planning that not only faces contemporary challenges, but also pursues innovations that can lead to more sustainable, resilient, and inclusive development. This analysis can be deepened by studying related literature and comparing it with historical data to understand how trends change over time.

5. Conclusion

Urban planning, multidisciplinary in its form, is key to shaping the physical, social, and economic aspects of cities. Managing land use, infrastructure, transportation, and environmental resources, the goal is to create sustainable, resilient, and livable cities. While it encompasses urban design and regional development, there are still areas of planning that have not been fully explored, opening up space for innovation. This study aims to analyze the direction and scope of urban planning research and to identify research gaps in this field. The method used is bibliometric by analyzing data obtained from the Scopus database. As a result of the analysis, a total of 2806 documents that met the specified search criteria were retrieved in January 2024. Of this total, 1023 sources were divided into journals and books, etc. The growth rate in pub-

lications related to this topic has a percentage of 8.33. In addition, there are 8066 authors who have contributed to research related to urban planning. This shows that the interest of researchers and academics who discuss topics in this field is quite high. Yufeng Zhang, a professor at Wuhan University, China, became the most productive author in producing publications, namely 22 documents. In addition, the article produced by Qianqian Zhou was also influential on this research topic because it obtained a total of 204 citations. Furthermore, the results indicate the current focus of research on sustainability, adaptation to climate change, and technology in urban planning. These findings can guide future research, direct policy, and ensure an interdisciplinary approach to modern urban and regional challenges.

Author contributions: Conceptualization, MAKH; methodology, MAKH; software, MAKH and AS; validation, AS; formal analysis, AS; investigation, UH; resources, AAN; data curation, MAKH; writing—original draft preparation, MAKH; writing—review and editing, MAKH and AS; visualization, MAKH and AS; supervision, AAN; project administration, UH; funding acquisition, UH. All authors have read and agreed to the published version of the manuscript.

Conflict of interest: The authors declare no conflict of interest.

References

Abbott, J. (2013). Sharing the city: Community participation in urban management. In: Sharing the City: Community Participation in Urban Management. Routledge. https://doi.org/10.4324/9781315070759

Abubakar, I. R., & Dano, U. L. (2020). Sustainable urban planning strategies for mitigating climate change in Saudi Arabia. Environment, Development and Sustainability, 22(6). https://doi.org/10.1007/s10668-019-00417-1

Alryalat, S. A. S., Malkawi, L. W., & Momani, S. M. (2019). Comparing bibliometric analysis using pubmed, scopus, and web of science databases. Journal of Visualized Experiments, 2019(152). https://doi.org/10.3791/58494

Ameen, R. F. M., & Mourshed, M. (2017). Urban environmental challenges in developing countries—A stakeholder perspective. Habitat International, 64. https://doi.org/10.1016/j.habitatint.2017.04.002

Aram, F., Higueras García, E., Solgi, E., & Mansournia, S. (2019). Urban green space cooling effect in cities. Heliyon, 5(4), e01339. https://doi.org/10.1016/j.heliyon.2019.e01339

Baas, J., Schotten, M., Plume, A., et al. (2020). Scopus as a curated, high-quality bibliometric data source for academic research in quantitative science studies. Quantitative Science Studies, 1(1), 377–386.

Barke, M. (2018). The importance of urban form as an object of study. In: Urban Book Series. Springer, Cham. https://doi.org/10.1007/978-3-319-76126-8_2

Bertilsson, L., Wiklund, K., de Moura Tebaldi, I., et al. (2019). Urban flood resilience—A multi-criteria index to integrate flood resilience into urban planning. Journal of Hydrology, 573. https://doi.org/10.1016/j.jhydrol.2018.06.052

Bibri, S. E. (2023). Data-Driven Smart Eco-Cities of the Future: An Empirically Informed Integrated Model for Strategic Sustainable Urban Development. World Futures, 79(7–8). https://doi.org/10.1080/02604027.2021.1969877

Bibri, S. E., & Krogstie, J. (2017). Smart sustainable cities of the future: An extensive interdisciplinary literature review. Sustainable Cities and Society, 31, 183–212. https://doi.org/10.1016/j.scs.2017.02.016

Bush, J., & Doyon, A. (2019). Building urban resilience with nature-based solutions: How can urban planning contribute? Cities, 95. https://doi.org/10.1016/j.cities.2019.102483

Carmichael, L., Townshend, T. G., Fischer, T. B., et al. (2019). Urban planning as an enabler of urban health: Challenges and good practice in England following the 2012 planning and public health reforms. Land Use Policy, 84. https://doi.org/10.1016/j.landusepol.2019.02.043

Carter, J. G., Cavan, G., Connelly, A., et al. (2015). Climate change and the city: Building capacity for urban adaptation. Progress in Planning, 95. https://doi.org/10.1016/j.progress.2013.08.001

Cetin, M. (2019). The effect of urban planning on urban formations determining bioclimatic comfort area's effect using satellitia

imagines on air quality: a case study of Bursa city. Air Quality, Atmosphere and Health, 12(10). https://doi.org/10.1007/s11869-019-00742-4

Cilliers, S., du Toit, M., Cilliers, J., et al. (2014). Sustainable urban landscapes: South African perspectives on transdisciplinary possibilities. Landscape and Urban Planning, 125. https://doi.org/10.1016/j.landurbplan.2014.02.009

Donthu, N., Kumar, S., Mukherjee, D., et al. (2021). How to conduct a bibliometric analysis: An overview and guidelines. Journal of Business Research, 133. https://doi.org/10.1016/j.jbusres.2021.04.070

Fang, X., Li, J., & Ma, Q. (2023). Integrating green infrastructure, ecosystem services and nature-based solutions for urban sustainability: A comprehensive literature review. Sustainable Cities and Society, 98, 104843. https://doi.org/10.1016/j.scs.2023.104843

Freire, M. (2006). Urban Planning: Challenges in developing countries. International Congress on Human Development.

Godschalk, D. R. (2003). Urban Hazard Mitigation: Creating Resilient Cities. Natural Hazards Review, 4(3). https://doi.org/10.1061/(asce)1527-6988(2003)4:3(136)

Gusenbauer, M. (2022). Search where you will find most: Comparing the disciplinary coverage of 56 bibliographic databases. Scientometrics, 127(5). https://doi.org/10.1007/s11192-022-04289-7

Herrschel, T., & Newman, P. (2003). Governance of Europe's city regions: Planning, policy & politics. In: Governance of Europe's City Regions: Planning, Policy & Politics. Routledge. https://doi.org/10.4324/9780203446683

José de Oliveira, O., Francisco da Silva, F., Juliani, F., et al. (2019). Bibliometric Method for Mapping the State-of-the-Art and Identifying Research Gaps and Trends in Literature: An Essential Instrument to Support the Development of Scientific Projects. In: Scientometrics Recent Advances. IntechOpen. https://doi.org/10.5772/intechopen.85856

Kalfas, D., Kalogiannidis, S., Chatzitheodoridis, F., & Toska, E. (2023). Urbanization and Land Use Planning for Achieving the Sustainable Development Goals (SDGs): A Case Study of Greece. Urban Science, 7(2). https://doi.org/10.3390/urbansci7020043

Lau, B. P. L., Marakkalage, S. H., Zhou, Y., et al. (2019). A survey of data fusion in smart city applications. Information Fusion, 52. https://doi.org/10.1016/j.inffus.2019.05.004

Li, Y., & Xu, Z. (2023). A bibliometric analysis and basic model introduction of opinion dynamics. Applied Intelligence, 53(13). https://doi.org/10.1007/s10489-022-04368-5

Lozano, S., Calzada-Infante, L., Adenso-Díaz, B., & García, S. (2019). Complex network analysis of keywords co-occurrence in the recent efficiency analysis literature. Scientometrics, 120(2). https://doi.org/10.1007/s11192-019-03132-w

Mcfarlane, A. (2000). When Inclusion Leads to Exclusion: The Uncharted Terrain of Community Participation in Economic Development. Brooklyn Law Review, 66(3).

Miller, D., & De Roo, G. (2017). Integrating city planning and environmental improvement: Practicable strategies for sustainable urban development. In: Integrating City Planning and Environmental Improvement: Practicable Strategies for Sustainable Urban Development. Routledge. https://doi.org/10.4324/9781315252162

Mora, L., Bolici, R., & Deakin, M. (2017). The First Two Decades of Smart-City Research: A Bibliometric Analysis. Journal of Urban Technology, 24(1). https://doi.org/10.1080/10630732.2017.1285123

Mouratidis, K. (2021). Urban planning and quality of life: A review of pathways linking the built environment to subjective well-being. Cities, 115. https://doi.org/10.1016/j.cities.2021.103229

Mueller, N., Rojas-Rueda, D., Khreis, H., et al. (2020). Changing the urban design of cities for health: The superblock model. Environment International, 134. https://doi.org/10.1016/j.envint.2019.105132

Muskhir, M., Luthfi, A., Watrianthos, R., et al. (2024). Emerging Research on Virtual Reality Applications in Vocational Education: A Bibliometric Analysis. Journal of Information Technology Education: Innovations in Practice, 23, 005. https://doi.org/10.28945/5284

Obidat, A. H. (2022). Bibliometric Analysis of Global Scientific Literature on the Accessibility of an Integrated E-Learning Model for Students with Disabilities. Contemporary Educational Technology, 14(3), ep374. https://doi.org/10.30935/cedtech/12064

Paiva, S., Ahad, M. A., Tripathi, G., et al. (2021). Enabling technologies for urban smart mobility: Recent trends, opportunities and challenges. Sensors, 21(6). https://doi.org/10.3390/s21062143

Panagopoulos, T., González Duque, J. A., & Bostenaru Dan, M. (2016). Urban planning with respect to environmental quality and human well-being. Environmental Pollution, 208. https://doi.org/10.1016/j.envpol.2015.07.038

Pantić, M., Cilliers, J., Cimadomo, G., et al. (2021). Challenges and Opportunities for Public Participation in Urban and Regional

Planning during the COVID-19 Pandemic—Lessons Learned for the Future. Land, 10(12), 1379. https://doi.org/10.3390/land10121379

Pessin, V. Z., Yamane, L. H., & Siman, R. R. (2022). Smart bibliometrics: an integrated method of science mapping and bibliometric analysis. Scientometrics, 127(6). https://doi.org/10.1007/s11192-022-04406-6

Pölönen, J., Laakso, M., Guns, R., et al. (2020). Open access at the national level: A comprehensive analysis of publications by finnish researchers. Quantitative Science Studies, 1(4). https://doi.org/10.1162/qss_a_00084

Portugali, J., Meyer, H., Stolk, E., & Tan, E. (2012). Complexity Theories of Cities Have Come of Age—An overview with Implications to Urban Planning and Design. Springer, 53(9).

Pozoukidou, G., & Chatziyiannaki, Z. (2021). 15-minute city: Decomposing the new urban planning Eutopia. Sustainability (Switzerland), 13(2). https://doi.org/10.3390/su13020928

Russo, A., & Cirella, G. T. (2020). Urban Sustainability: Integrating Ecology in City Design and Planning. In: Advances in 21st Century Human Settlements. Springer, Singapore. https://doi.org/10.1007/978-981-15-3049-4_10

Santra, P. P., & Majhi, D. (2023). Scholarly Communication and Machine-Generated Text: Is it Finally AI vs AI in Plagiarism Detection? Journal of Information and Knowledge, 175–183. https://doi.org/10.17821/srels/2023/v60i3/171028

Schrotter, G., & Hürzeler, C. (2020). The Digital Twin of the City of Zurich for Urban Planning. PFG - Journal of Photogrammetry, Remote Sensing and Geoinformation Science, 88(1). https://doi.org/10.1007/s41064-020-00092-2

Sharifi, A., & Khavarian-Garmsir, A. R. (2020). The COVID-19 pandemic: Impacts on cities and major lessons for urban planning, design, and management. Science of the Total Environment, 749, 142391. https://doi.org/10.1016/j.scitotenv.2020.142391

Wamsler, C., Brink, E., & Rivera, C. (2013). Planning for climate change in urban areas: From theory to practice. Journal of Cleaner Production, 50. https://doi.org/10.1016/j.jclepro.2012.12.008

Wang, L., Xue, X., Zhang, Y., & Luo, X. (2018). Exploring the Emerging Evolution Trends of Urban Resilience Research by Scientometric Analysis. International Journal of Environmental Research and Public Health, 15(10), 2181. https://doi.org/10.3390/ijerph15102181

Watrianthos, R., Triono Ahmad, S., & Muskhir, M. (2023). Charting the Growth and Structure of Early ChatGPT-Education Research: A Bibliometric Study. Journal of Information Technology Education: Innovations in Practice, 22, 235–253. https://doi.org/10.28945/5221

Windarto, A. P., Wanto, A., Solikhun, S., & Watrianthos, R. (2023). A Comprehensive Bibliometric Analysis of Deep Learning Techniques for Breast Cancer Segmentation: Trends and Topic Exploration (2019-2023). Jurnal RESTI (Rekayasa Sistem Dan Teknologi Informasi), 7(5), 1155–1164. https://doi.org/10.29207/resti.v7i5.5274

Ye, Y., Richards, D., Lu, Y., et al. (2019). Measuring daily accessed street greenery: A human-scale approach for informing better urban planning practices. Landscape and Urban Planning, 191. https://doi.org/10.1016/j.landurbplan.2018.08.028

Zeng, X., Yu, Y., Yang, S., et al. (2022). Urban Resilience for Urban Sustainability: Concepts, Dimensions, and Perspectives. Sustainability (Switzerland), 14(5). https://doi.org/10.3390/su14052481

Zhang, K., Chen, G., Wang, X., et al. (2019). Numerical evaluations of urban design technique to reduce vehicular personal intake fraction in deep street canyons. Science of the Total Environment, 653. https://doi.org/10.1016/j.scitotenv.2018.10.333

Zhou, Q., Leng, G., Su, J., & Ren, Y. (2019). Comparison of urbanization and climate change impacts on urban flood volumes: Importance of urban planning and drainage adaptation. Science of the Total Environment, 658. https://doi.org/10.1016/j.scitotenv.2018.12.184