The Relation Between Resilient Cities and City Growth: A Bibliometric Analysis

The Relation Between Resilient Cities and City Growth: A Bibliometric Analysis

Ahmed K. Abdulla[1]*, Tarek Z. Soud[1], Marwa S. Hamid[2], Seham Mostafa[1]

[1] Department of Environmental Planning and Infrastructure, Faculty of Urban and Regional Planning, Cairo University campus, Egypt

[2] Department of Urban Planning, Faculty of Urban and Regional Planning, Cairo University campus, Egypt

*Corresponding author: ahmed_khames@cu.edu.eg

In light of global rapid urbanization and the need to implement cities that attract investments, more effective approaches to environmental considerations are increasingly important. These approaches will ensure the resilience of the stages of urban growth through different development phases of cities. The resilient cities approach aims to preserve the continuity of diverse systems and enhance the capacity of cities to withstand all challenges. To ensure the successful application of resilient city strategies, it must be integrated into the urban growth stages from planning and design to implementation and various operational phases. As there is a lot of research published on urban studies and planning since the middle of the 20th century, a number of environmental approaches appear to fill the gap of the association between urban planning studies and environmental approaches. This research aims to study the relationship between the "resilient city" approach and the "city growth" stages by applying a bibliometric analysis of selected 816 studies from SCOPUS database listed journals published in the past 20 years from 2004 to 2024 to capture long-term trends and shifts in the research focus. A statistical analysis of the data was conducted using VOS viewer software. The results revealed that more than 65% of studies on resilience and city growth focus primarily on risks and disasters, and only 35% of studies address the applications of different fields in relation to the resilience among city growth studies. This highlights the limited application of resilience strategies during the stages of city growth, especially during the COVID-19 pandemic, when there was a notable increase in research on resilience, particularly on crisis and risk management. However, the resilience approach should not be confined to crisis and disasters alone. Instead, it is a continuous process that must be integrated into long term planning and development strategies such as the city growth phases. The study recommends conducting extensive future research on various frameworks and mechanisms for applying resilience strategies throughout the city growth process, in addition to exploring the potential integration between resilience approaches and other environmental methodologies that emerged during the study, for example, urban metabolism.

Keywords: resilient cities, resilience, city growth, relational bibliometric analysis, VOS viewer.

Introduction

City growth stages

The development of a city follows a planned procedure that ensures sustainable growth. According to contemporary urban planning theories (Alexander, 1992; Batty, 2008), the first stage is planning, where it starts with analyses of spatial, economic, environmental, and social factors to develop a strategic framework for future growth. This stage involves land use planning, infrastructure, and services to ensure sustainable development growth (Batty, 2008; Gehl, 2013). Following planning, the implementation stage focuses on executing the proposed urban strategies such as the establishment of transportation, utilities, and public services (Gehl, 2013; Newman and Kenworthy, 2015). After construction, the operation stage begins, where the city functions are ready to service (Batty, 2008). Finally, the monitoring and maintenance phase ensures sustainability and resilience of the city growth. This phase requires continuous monitoring of urban performance indicators and expected, or sudden, changes related to the growth of the city over years (Hall, 2014, 2020).

City growth changes

Throughout the stages of urban growth, various transformations occur. Some of these changes are planned and anticipated, with different scenarios outlined during the planning phase to ensure preparedness. However, during the implementation phase, additional changes emerge, some of which are unforeseen, arising from natural conditions or economic factors, such as funding constraints, or social dynamics.

The operation phase, which is the longest and most complex stage, encompasses both expected and unexpected transformations. These include urban changes, such as shifts in land use patterns that deviate from initial plans, as well as variations in population size, service provision, and the ability to meet evolving socio-economic demands. Additionally, environmental changes linked to climate change may be partially predictable, yet some occur suddenly and without warning, leading to significant disruptions and destruction.

The final stage, monitoring and maintenance, plays a crucial role in assessing system performance and enhancing its capacity for recovery and adaptability. This phase focuses on ensuring urban resilience by addressing emerging challenges, optimizing infrastructure efficiency, and strengthening the city's ability to withstand and respond to future uncertainties.

Resilience approach

To ensure the success of the city's growth stages and the achievement of its developmental goals, one of the most important approaches to be applied is the city resilience approach (Kolte et al., 2023). The approach of resilience first emerged in 1973 and has since evolved through the work of many authors and institutions, as an approach aimed at preserving urban ecosystems and enhancing their ecological capacity to face environmental and non-natural risks and challenges (Holling, 1973). Additionally, the approach involves developing various strategies and plans to address these interconnected challenges (Holling, 1973; Walker and Salt, 2012). The stages of the resilience approach begin with the pre-occurrence phase. This phase assesses the system's ability to anticipate challenges by utilizing various technologies and studies. It necessitates the development of preventive strategies by decision-makers. The second phase is an immediate response, during which the system's speed in addressing challenges is measured. This involves crisis management and directing available resources to contain the problem and initiate recovery. The third phase is recovery, where the system's ability to develop plans to compensate for all losses is evaluated. The fourth phase is adaptation and resumption, which involves resuming system development and continuing the city's growth trajectory (Yang et al., 2021).

Resilient cities and changes

Based on the concept of resilience and advancements in environmental approaches and trends, there has been a gradual shift from the concept of sustainability characterized by stability and equilibrium indicators to the concept of resilience, which is defined by a dynamic approach dealing with the changes through different scenarios (Gehl, 2013; Walker and Salt, 2012). This is achieved by enhancing the system's ability to absorb disturbances and unexpected change while preserving its function and structure (Sharifi and Yamagata, 2018).

Resilient cities include a broad range of environmental, social and economic approaches, which enable them to

withstand disturbances and adapt to change. Studies on urban resilience tend to be divided into two main categories: radical/sudden changes, which focus on sudden shocks such as earthquakes, hurricanes, viral pandemic, or terrorist attacks (Kolte et al., 2023; Sharifi and Yamagata, 2018), and gradual transformations, which explore slow transformation processes associated with city growth in economic, social, and environmental sectors, occurring through changes in population, consumption increase, and material flows over the different stages of city growth across time (de Ruiter and Van Loon, 2022).

Regardless of the type of changes occurring, their impacts are felt across spatial scales and sectors. While the effects of these changes may initially be concentrated within a specific geographical scope or a specific temporal, they often extend across multiple levels due to the existence of complex interconnections (Sharifi and Yamagata, 2018).

Relation between resilience and city growth

However, to ensure that approaches achieve their goals, they must be applied throughout all stages of the city's growth starting from planning, through implementation, operation, and development over the years, due to changes and challenges that occur over time in different sectors such as economic, environmental, social, and urban (Labaka et al., n.d.). This study analyzes the relations between resilient cities and the stages of city growth over the past twenty years to clarify the strength or weakness of the relationship through conducted studies. The research highlights the importance of applying the resilience approach in all stages of city growth to ensure the city's ability to achieve its objectives, in order to understand how study of resilience approaches can be integrated into city growth development to enhance sustainability and adaptability in the face of future challenges.

A bibliometric analysis was used in this research as a quantitative tool for analyzing literature and descriptive data (Aria and Cuccurullo, 2017; Maulani and Widuri, 2024) to identify research gaps and future studies within the context of previously mentioned relationships. The research questions are as follows: 1) What is the distribution of relations between the resilient cities and city growth publications by years for the last 20 years? 2) Which are the most productive countries in resilient cities and city growth research areas? 3)Who are the most relevant authors and journals in resilient cities and city growth research? 4) What are the additional relevant research keywords within the last 20 years of resilient cities and city growth?

Methods

Methodology

The stages of city growth endure continuous changes and face numerous challenges, both natural or human-made, expected or unexpected, the same as living organisms having life phases (Athanassiadis, 2020; Palme and Salvati, 2020). These stages can be summarized into four main phases (*Fig. 1*) beginning with the planning phase, which includes the city's vision, developmental goals, policies, and strategies over the years, followed by the implementation phase, which involves the provision of infrastructure, roads, housing, etc. Afterward, the city enters the operation phase, during which it is inhabited and provided with services, while maintenance and monitoring processes for all sectors of the city start (Glaeser et al., 1992; Goalstone, 2007; Wang and Wu, 2009). The cycle then is repeated to develop the policies and strategies further. This is referred to as circular development (Williams, 2023). Various social, economic, urban, and environmental changes occur throughout these phases, influencing the city's ability to achieve its developmental goals. Hence, the importance of applying different environmental and planning approaches becomes evident, as these approaches set frameworks and standards to monitor and manage these changes effectively.

The bibliometric analysis aims to analyze the frame of relations between studies (Merigó and Yang, 2017; Mongeon and Paul-Hus, 2016) depending on the analysis of the most published journals, books, and scientific articles, in addition to the most cited authors and the most used keywords (Van Eck and Waltman, 2007). Through this analysis, it is possible to integrate between different studies and develop new scientific topics from the identified research gaps.

The research methodology, as demonstrated in *Fig. 2*, is divided into four main steps. The first step is the research problem and determines the research objectives and the research questions; the second step is focused on selecting adequate statistical analysis tools, collecting the relevant descriptive data according to the requirements of each analysis tool (Judijanto and Auliani, 2024; Tomaszewski, 2023), then filtering and screening the data to the final data that is consistent with the research objectives. The third step is the analysis of the results within the framework of answering the research questions and making a relational map including the

Fig. 1. *City growth phases. Source: authors. Based on Glaeser et al. (1992), Goalstone (2007), Wang and Wu (2009)*

Fig. 2. *Research methodology. Source: authors*
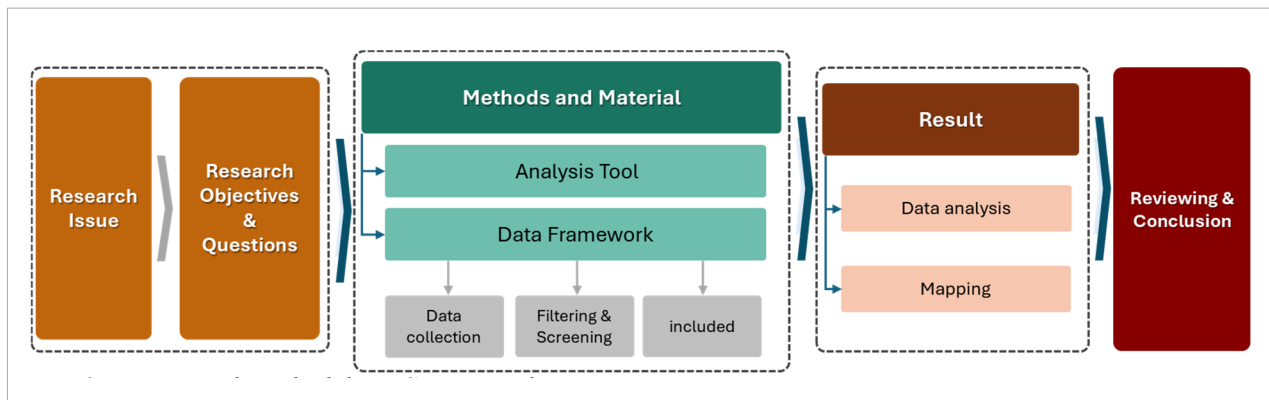
connections and relationships of the various descriptive data (Lihitkar, 2019; Suradkar and Khaparde, 2012). The fourth step is to review the recommendations and identify the research gaps and future trends emerging from the relationship between resilient cities and city growth.

Bibliometric analysis tool

Several quantitative analysis tools are used for scientific literature across various disciplines (Cobo et al., 2012; Zhang et al., 2024). Among these tools is the bibliometric analysis tool, which aims to apply statistical methods to analyze patterns of connections among publications, books, scientific articles, databases, and authors (Paglia, 2022; Salinas-Ríos and García López, 2022). By utilizing descriptive data, it seeks to achieve integration across diverse research relationships and foster the development of new scientific topics (İri and Ünal, 2024; Tamtam et al., 2023). The term "bibliometrics" was first introduced and defined, as far as it can be determined, in 1934 as a measuring tool for research, books and documents, and in the issue of 1969 of the *Journal of Documentation* as the search for systematic patterns in comprehensive bodies of literature (Broadus, 1987; Greener, 2022; Montazeri et al., 2023).

Bibliometric analysis is divided into two types: valuative bibliometrics, employed to track a specific topic and analyze the features of published information through various measurement techniques (Ninkov et al., 2021) and relational bibliometrics, used to analyze the metadata from various scientific fields (authors, books, papers, journals) to identify scientific gaps and uncover hidden connections, which can lead to the emergence of new topics on a broader scale (Ninkov et al., 2021; Passas, 2024). However, most bibliometric studies in the field of environmental and urban planning have adopted a single study of one approach or trend without using the relationship analysis between different approaches (Indriati et al., 2024). Therefore, the research aims to adopt a study of the relationship between resilient cities and urban growth using the relational bibliometric tool.

### Bibliometric analysis software

Different software can be used for relational bibliometric analysis such as Vos Viewer, Bib Excel, Cite Space, and Sci-MAT (Kemeç and Altınay, 2023; Zhang et al., 2024). In this study, Vos Viewer, a software tool launched in 2019, was used to create and visualize bibliometric networks with output maps that reflect the strength of the association between the elements, as well as an analysis of the density of the different elements according to the input of metadata (Van Eck and Waltman, 2010).

Data framework

The research adopted the PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analyses) framework within the methodology for collecting, filtering, and screening data to reach the final included data (Moher et al., 2009). The PRISMA framework works systematically to include and exclude metadata according to the criteria that are determined to reach accurate descriptive data that can be relied upon in the analysis and achieve the same accurate results (Stovold et al., 2014).

Fig. 3. *PRISMA framework of the analysis study. Source: authors*
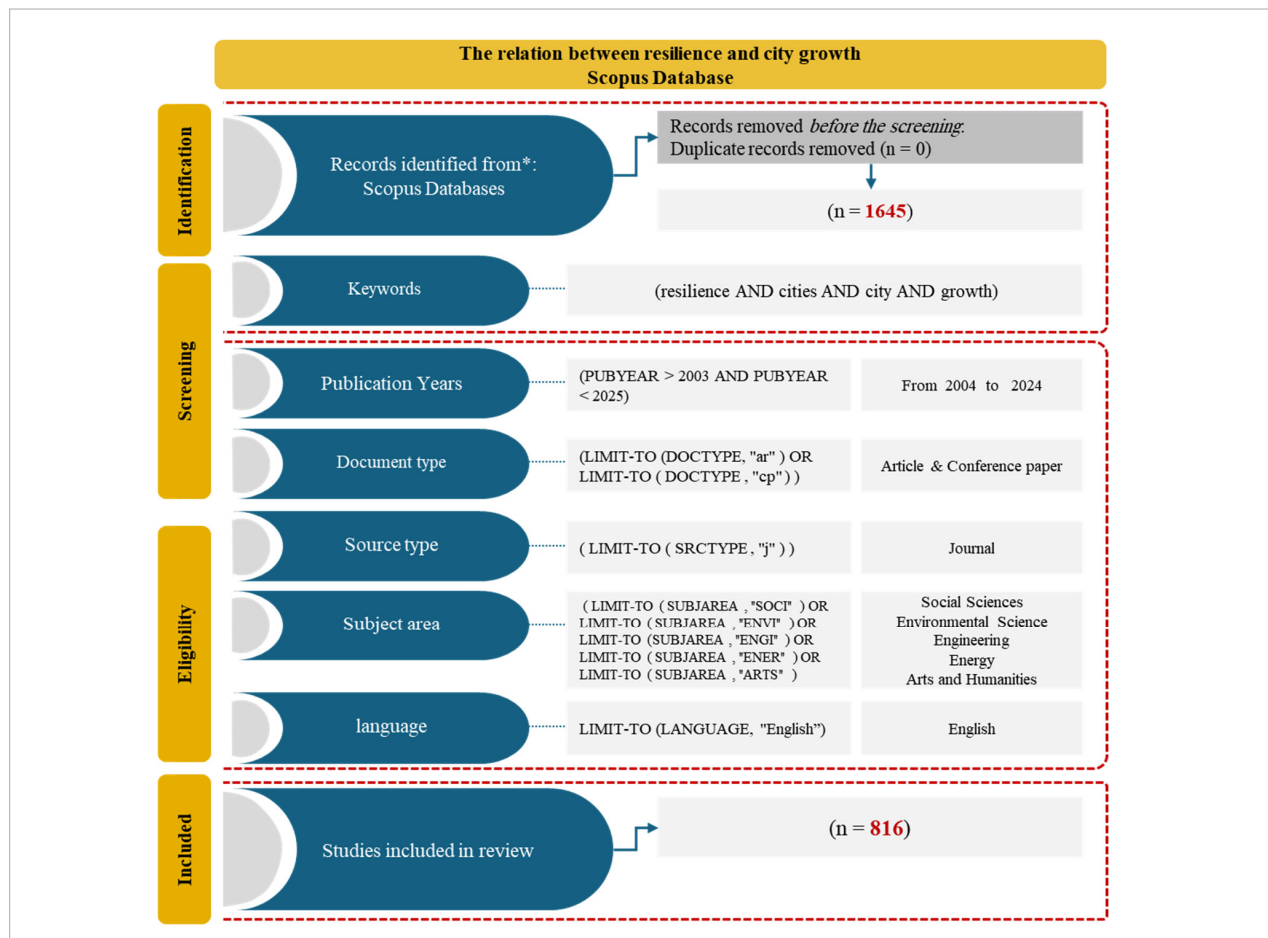
Data collection has been based on the Scopus scientific database. Scopus database was selected among other databases since it is one of the largest citation and abstract databases, covering a wide range of disciplines, including social science, technology, arts, and humanities. It indexes over 83 million records from more than 25 000 journals, providing a comprehensive overview of global research (Peters et al., 2020). The data collection was conducted on 1st October 2024. The initial search results using the keywords (resilience AND cities AND city AND growth) (TITLE-ABS-KEY (resilience AND cities AND city AND growth) was 1645 articles, after filtering and screening, covering the past 20 years from 2004 to 2024 (PUBYEAR >2003 AND PUBYEAR <2025). In addition, subject areas included Social Sciences, Environmental Science, Engineering, Energy, Arts and Humanities (LIMIT-TO (SUBJAREA, "SOCI") OR LIMIT-TO (SUBJAREA, "ENVI") OR LIMIT-TO (SUBJAREA , "ENGI") OR LIMIT-TO (SUBJAREA, "ENER") OR LIMIT-TO (SUBJAREA, "ARTS")). Moreover, articles were selected only in English as a research language and excluded any other language (LIMIT-TO (LANGUAGE, "English"). Furthermore, the documentation type selected was articles and conference journals (LIMIT-TO (DOCTYPE, "ar") OR LIMIT-TO (DOCTYPE, "cp")), and the source type selected was journals (LIMIT-TO (SRCTYPE, "j")). The final selection resulted in 816 articles on resilience and city growth (*Fig. 3*).

Results

The research aims to analyze the relations between resilient cities and the stages of city growth over the past 20 years. Based on the research questions, the findings are discussed.

Research question "What is the distribution of relations between the resilient cities and city growth publications by years for the last 20 years?"

The distribution of the research conducted by the year of publication of articles on resilience and city growth for the last 20 years can be seen in *Fig. 4*. The papers

Fig. 4. *Distribution of publications by years (2005–2024). Source: authors*
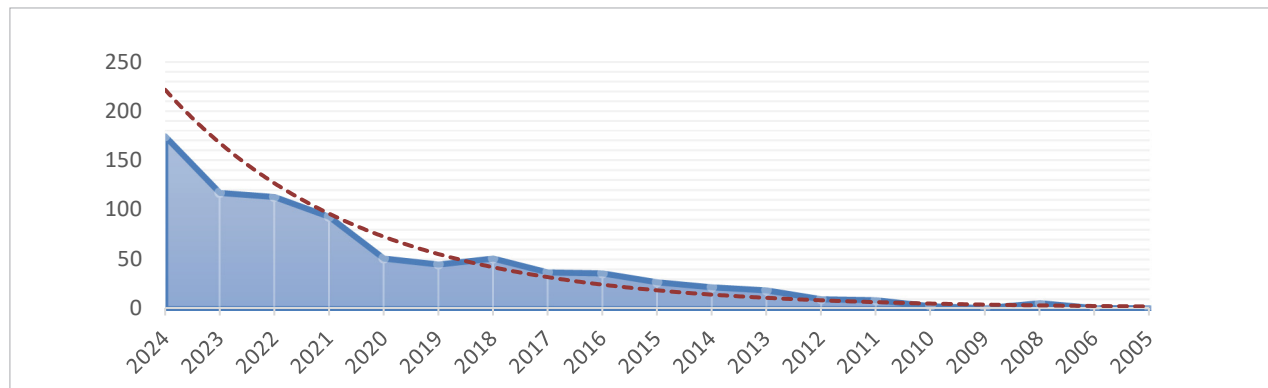
Table 1. *List of top 20 countries in resilience and city growth*

Rank	Countries	TP	Rank	Countries	TP	Rank	Countries	TP	Rank	Countries	TP
1	China	202	11	Japan	26	7	Netherlands	42	17	Belgium – Egypt – South Korea – Switzerland	10
2	United States	148	12	France – Iran	19	8	India	40	18	Ghana	9
3	United Kingdom	89	13	Indonesia	16	9	Canada	39	19	Bangladesh – Pakistan – Poland – Portugal – Turkey – Vietnam	8
4	Australia	54	14	New Zealand – South Africa – Sweden	15						
5	Italy	47	15	Brazil – Hong Kong – Saudi Arabia	14	10	Spain	27	20	Ireland – Romania – Russian Federation	7
6	Germany	46	16	Malaysia – Singapore	11						

TP = total publications. Source: authors.

were mainly published in an increasing trend in the last 10 years, starting from 2014 to 2024, with a total number of 766 publications, considering that 174 publications were recorded in 2024, until 1st October 2024. Before 2014, the distribution of publications on the relationship between resilience and city growth did not receive significant attention; meanwhile, from 2005 to 2013, the total number of publications was only 50.

Research question "Which are the most productive countries in resilient cities and city growth research areas?"

The results shown in *Table 1* list 20 most productive countries in resilience and city growth. The table shows that China ranked the first by a total number of 202 publications, followed by the USA as the second country with publications by a total number of 148.

In addition, according to the relational analysis of the most productive countries in the research subject (*Fig. 5*),

two Arab countries were in the top 20 places. Saudi Arabia occupied the 15th place with a total of 14 publications, followed by Egypt which occupied the 17th place with a total of 10 publications.

Research question "Who are the most relevant authors and journals in resilient cities and city growth research?"

To identify the most relevant authors and journals on resilience and city growth, the question was divided into two parts, first by author and then by journal. *Table 2* shows the top 10 authors in the field of study clarifying the "author's country", "affiliated institution", "h-index", "the most cited article (according to the research subject)", and "times cited". It appears that A. Sharifi from Japan is the most productive author, with the most cited article relevant to the research subject titled (*Urban form resilience: A meso-scale analysis*), which was cited 137 times.

Fig. 5. *Results of relational analysis of the most productive countries in the research subject. Source: authors*
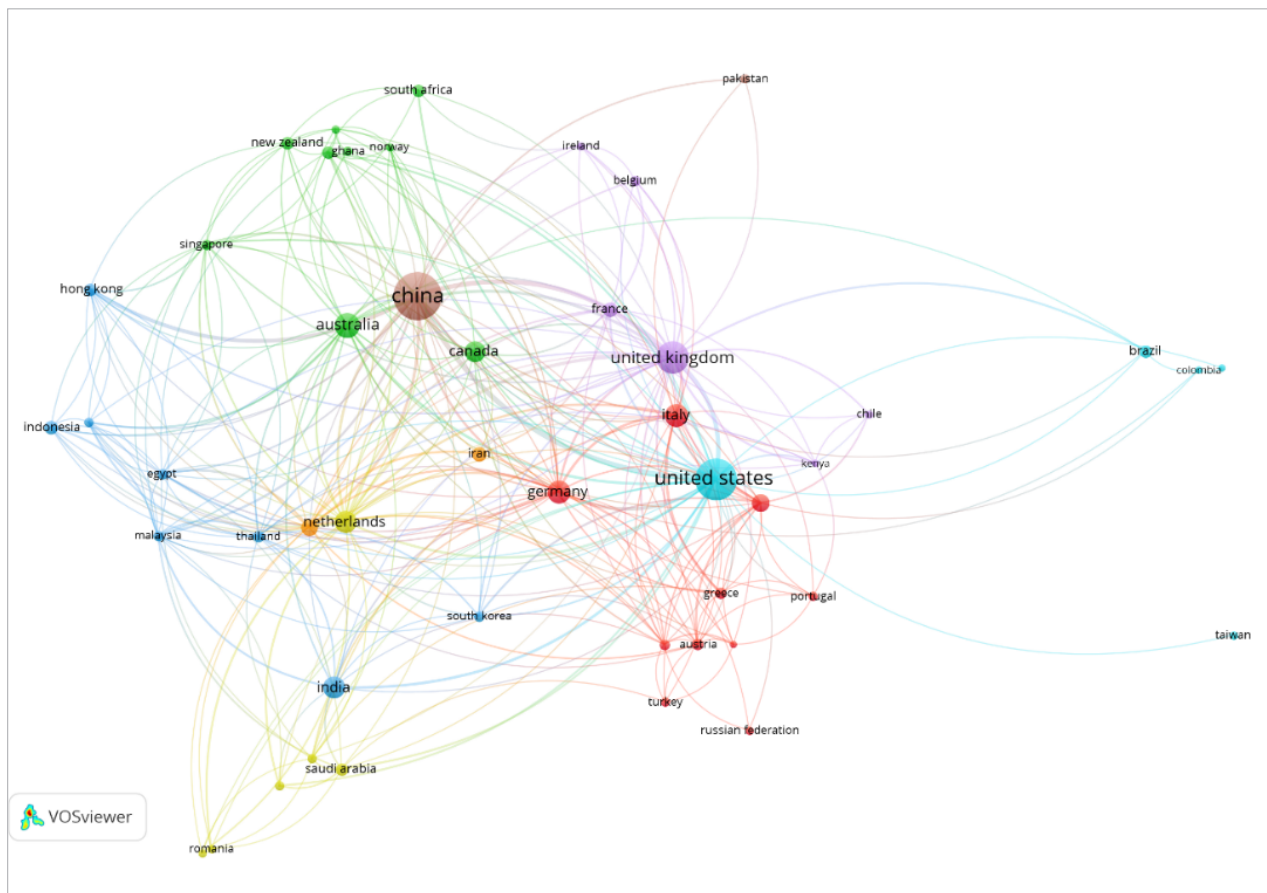
Table 2. *List of 10 most prolific authors in resilience and city growth*

Rank	Author	Country	Affiliated institution	h-index	The most cited article (according to the research)	Times cited
1	Sharifi, A.	Japan	Hiroshima University	50	Urban form resilience: A meso-scale analysis	137
2	Miguez, M. G.	Brazil	Universidade Federal do Rio de Janeiro	19	Urban flood resilience – A multi-criteria index to integrate flood resilience into urban planning	262
3	Salvati, L.	Italy	Sapienza Università di Roma	83	Beyond a 'side street story'? Naples from spontaneous centrality to entropic polycentricism, towards a 'crisis city'	131
4	Veról, A.P.	Brazil	Universidade Federal do Rio de Janeiro	11	A scatchment scale Integrated Flood Resilience Index to support decision making in urban flood control design	86
5	Battemarco, B.P	Brazil	Universidade Federal do Rio de Janeiro	8	A framework to support the urbanization process on lowland coastal areas: Exploring the case of Vargem Grande – Rio de Janeiro, Brazil	20
6	Butler, D.	United Kingdom	University of Exeter	58	Modelling the future impacts of urban spatial planning on the viability of alternative water supply	22
7	Chelleri, L.	Spain	Universitat Internacional de Catalunya- Barcelona	16	Analytical framework to evaluate the level of integration of climate adaptation and mitigation in cities	88
8	Chen, W.Y.	China	The University of Hong Kong	34	Strategic interaction in municipal governments' provision of public green spaces: A dynamic spatial panel data analysis in transitional China	80
9	Cheng, X.	China	Southwest University- Chongqing	14	Coupling coordination analysis and spatiotemporal heterogeneity between urbanization and ecosystem health in Chongqing Municipality, China	211
10	Cobbinah, P.B.	Australia	University of Melbourne- Melbourne	33	On the absurdity of rapid urbanization: Spatio-temporal analysis of land-use changes in Morogoro, Tanzania	59

Source: Authors.

The second part of the question regarding the most productive journals, shown in *Table 3*, presents the top 10 most productive journals on resilience and city growth. In the content analysis made for the most cited journals, the criteria of selection were total publications, total citations, cite score 2023, the most cited journals, times cited, and publisher. In addition, *Fig. 6* shows the comparison between the top 5 journals' publications per year. It is evident that *Sustainability* has the most publications per year, especially in 2021.

Fig. 6. *Results of relational analysis of the most productive countries in the research subject*
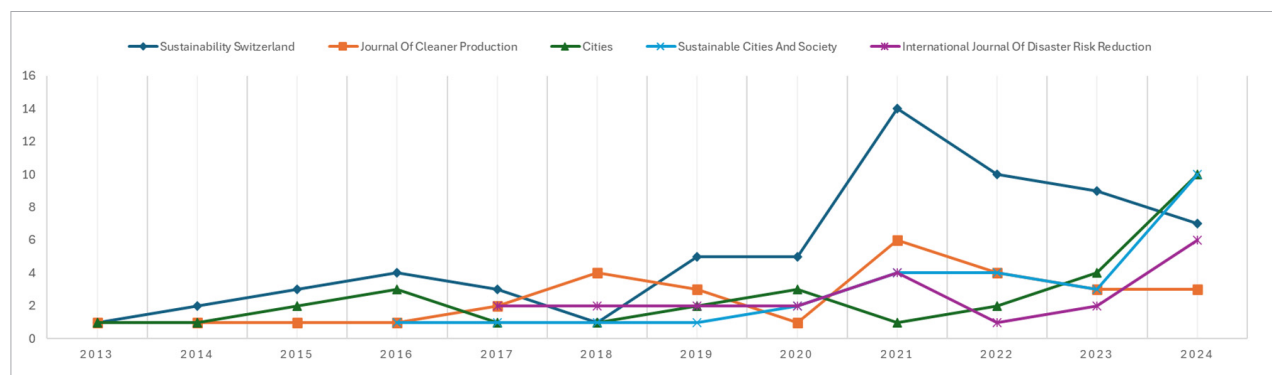
Table 3. *List of 10 most productive journals on resilience and city growth*

Journal	TP	TC	CS	The most cited article	Times cited	Publisher
Sustainability (Switzerland)	55 991	381 357	6.8	Recent advances in the remediation of textile-dye-containing wastewater: Prioritizing human health and sustainable wastewater treatment	38	Multidisciplinary Digital Publishing Institute (MDPI)
Journal of Cleaner Production	19 382	394 597	20.4	Does artificial intelligence promote energy transition and curb carbon emissions? The role of trade openness	64	Elsevier
Cities	1783	19 923	11.2	Smart cities and sustainable development goals (SDGs): A systematic literature review of co-benefits and trade-offs	38	Elsevier
Sustainable Cities and Society	3072	67 666	22.0	Simulation for impact of nanofluid spectral splitter on efficiency of concentrated solar photovoltaic thermal system	55	Elsevier
International Journal of Disaster Risk Reduction	2551	22 197	8.7	Drought risk assessment: The importance of vulnerability factors interdependencies in regional drought risk management	9	Elsevier
Land	6363	31 157	4.9	Evaluating the sustainable development goals within spatial planning for decision-making: A major function-oriented zone planning strategy in China	12	Multidisciplinary Digital Publishing Institute (MDPI)
Environmental Science and Pollution Research	22 908	199 035	8.7	Have carbon emission trading pilot policy improved urban innovation capacity? Evidence from a quasi-natural experiment in China	53	Springer Nature
Science of the Total Environment	30 644	540 202	17.6	Emergence of nanoplastics in the aquatic environment and possible impacts on aquatic organisms	63	Elsevier
Ecological Indicators	5345	63 108	11.8	Digital economy empowers sustainable agriculture: Implications for farmers' adoption of ecological agricultural technologies	17	Elsevier
International Journal of Environmental Research and Public Health	46 693	339 831	7.3	Advantages and limitations of the body mass index (BMI) to assess adult obesity	6	Multidisciplinary Digital Publishing Institute (MDPI)

TP = total publications, TC= total citations, CS = cite score 2023

Source: authors.

Research question "What are the additional relevant research keywords within the last 20 years of resilient cities and city growth?"

To identify relevant research keywords, relational mapping was used through the VOS viewer (*Fig. 7*), determining 122 most relevant keywords related to resilience and urban growth. The map shows groups of relevant research areas, such as environmental phenomena and disaster, infrastructure, and sustainable development. In addition, there are different sectors of resilience, such as economic and social resilience. Furthermore, it points to additional environmental approaches dealing with urban growth such as urban metabolism.

The results of additional relevant research keywords are presented in *Table 4*, with the most occurrences of keywords related to different sectors, fields, and tools. The research found keywords relevant to urban

Fig. 7. *Results of relational analysis publications keywords. Source: authors using VOS viewer*
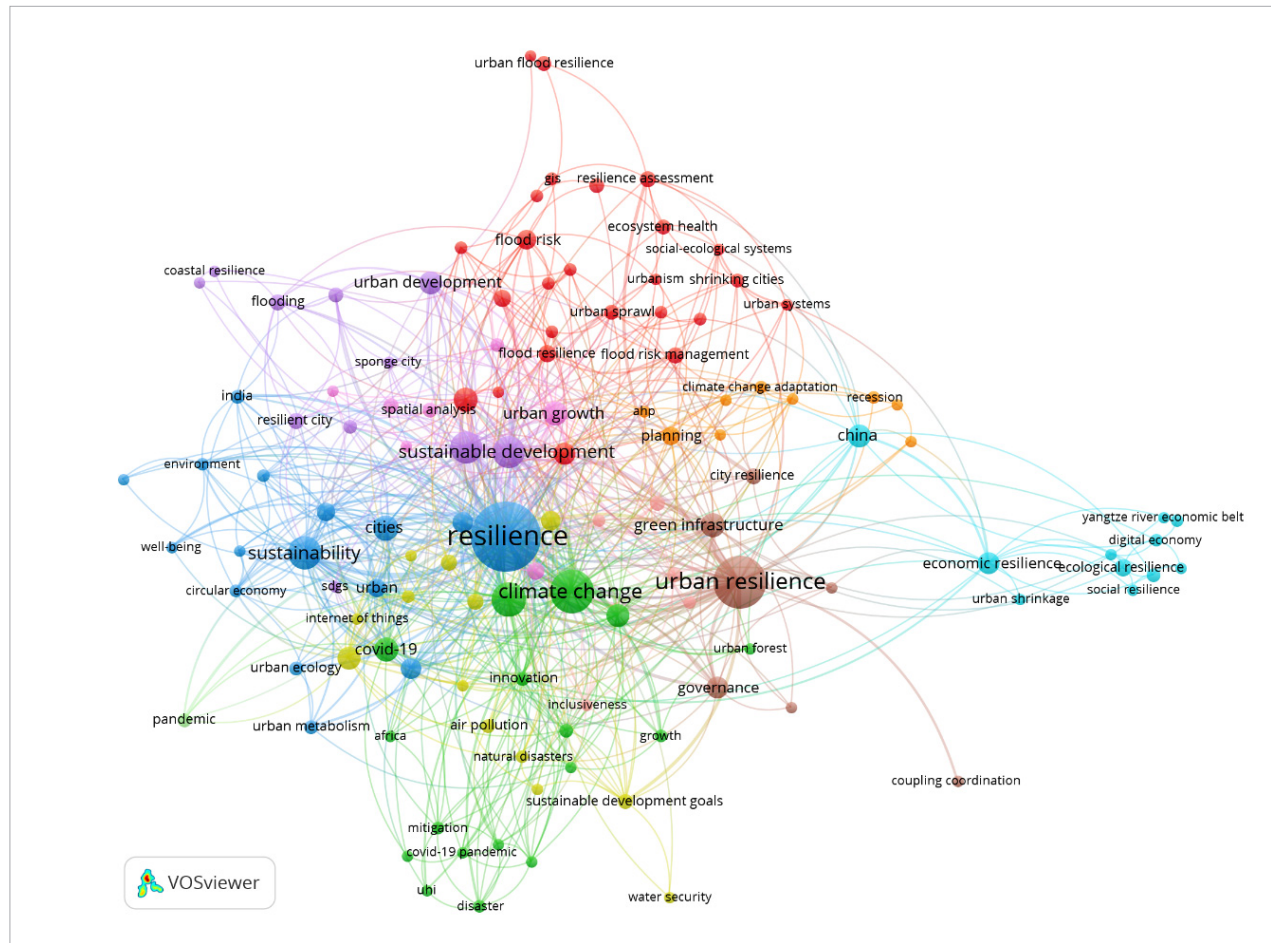
Table 4. *List of 20 additional relevant keywords on resilience and city growth*

Rank	Keywords	OC	Total link strength	Rank	Keywords	OC	Total link strength
1	resilience	146	201	11	adaptation	17	40
2	urban resilience	84	106	12	smart cities	16	36
3	climate change	59	109	13	governance	15	25
4	urbanization	37	65	14	urban sustainability	14	27
5	sustainability	33	62	15	smart city	13	24
6	sustainable development	32	53	16	flood risk	12	19
7	urban planning	32	72	17	urban heat island	12	21
8	covid-19	18	27	18	flood resilience	9	12
9	green infrastructure	18	33	19	flood risk management	8	11
10	urban growth	18	37	20	flooding	8	15

OC = occurrences

Source: Authors.

growth such as urban growth (OC=18), housing (OC=5), land use (OC=8), transportation (OC=4), and urban sprawl (OC=4). However, the highest occurrence keywords are relevant to environmental phenomena and risk assessment, such as flood risk (OC=12), COVID-19 (OC=18), disaster / natural disasters / risk assessment, etc.

Discussion

Based on the analysis results of the relationship between relevant keywords and previous studies from the most productive authors and journals, in addition to examining the spatial analysis (*Fig. 8*) of the most productive countries in resilience and urban growth studies, it is evident that northern countries show the greatest interest in the research field. China holds the largest number of all published research, while Saudi Arabia appears as one of the leading Arab countries in publication within Asia. In contrast, research in Africa is limited, and only Egypt, South Africa, and Ghana stand out in this field.

It appears from the bibliometric analysis that most studies in the field of resilience tend to study natural disasters such as flood risks, drowning, COVID-19,

pollution, etc., or studies of risks and their effects in a specific area, whether expected or unexpected. On the other hand, the relationship between resilience and city growth or other related fields such as land use, etc., is less studied. There is a research gap in the relationship between the application of the resilience approach and the stages of city growth and related research.

The resilience approach is one of the most impactful and powerful frameworks for addressing changes and challenges, which was clear during the time of COVID-19 pandemic. This period saw a significant rise in published research related to resilience in the field of crisis management. However, the application of this approach should not be limited to times of crisis and disasters. The temporal dimension for applying resilience standards is ongoing and continuous. The research proposes a framework (*Fig. 9*) to apply the resilience approach continuously to all the stages of city growth over the years. The framework will cover resilient planning methods, resilient implementation strategies, and resilient operation tools for infrastructure, transportation, housing, and resilient maintenance for the various sectors of the whole city. The context of the continuous changes that cities face throughout their growth stages, in social, economic, environmental, and urban sectors needs to be taken into consideration.

Fig. 8. *Spatial distribution of the most productive countries in resilience and city growth. Source: authors using Microsoft office (Excel)*
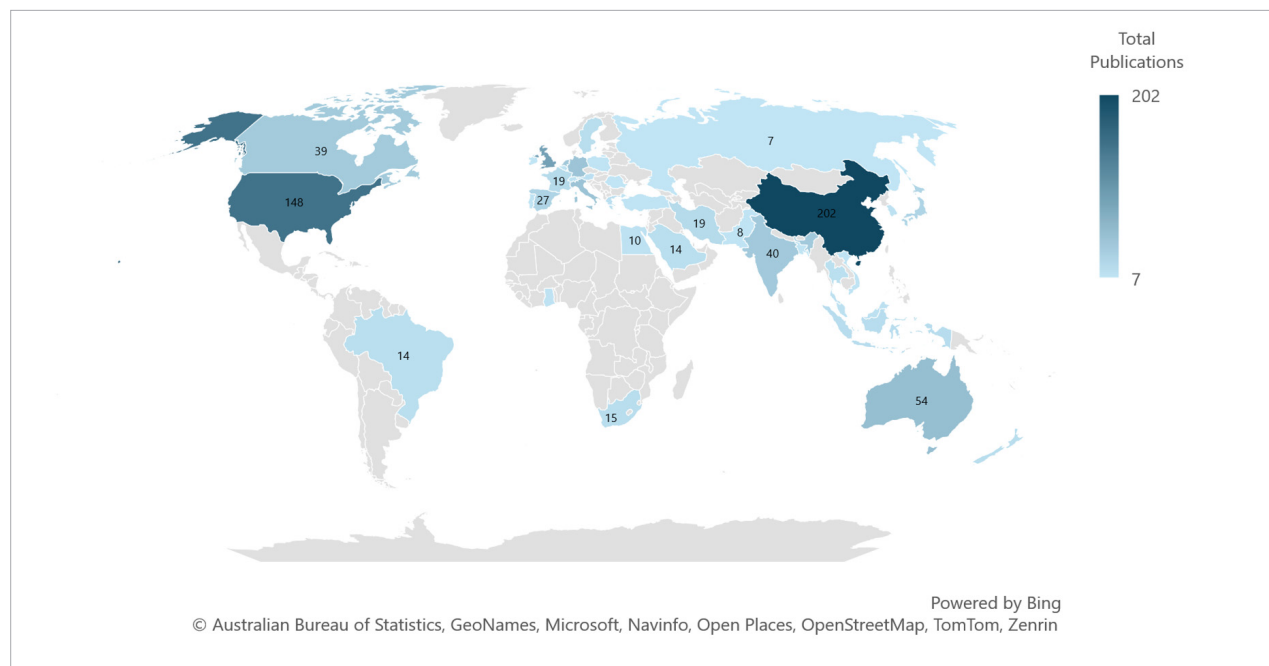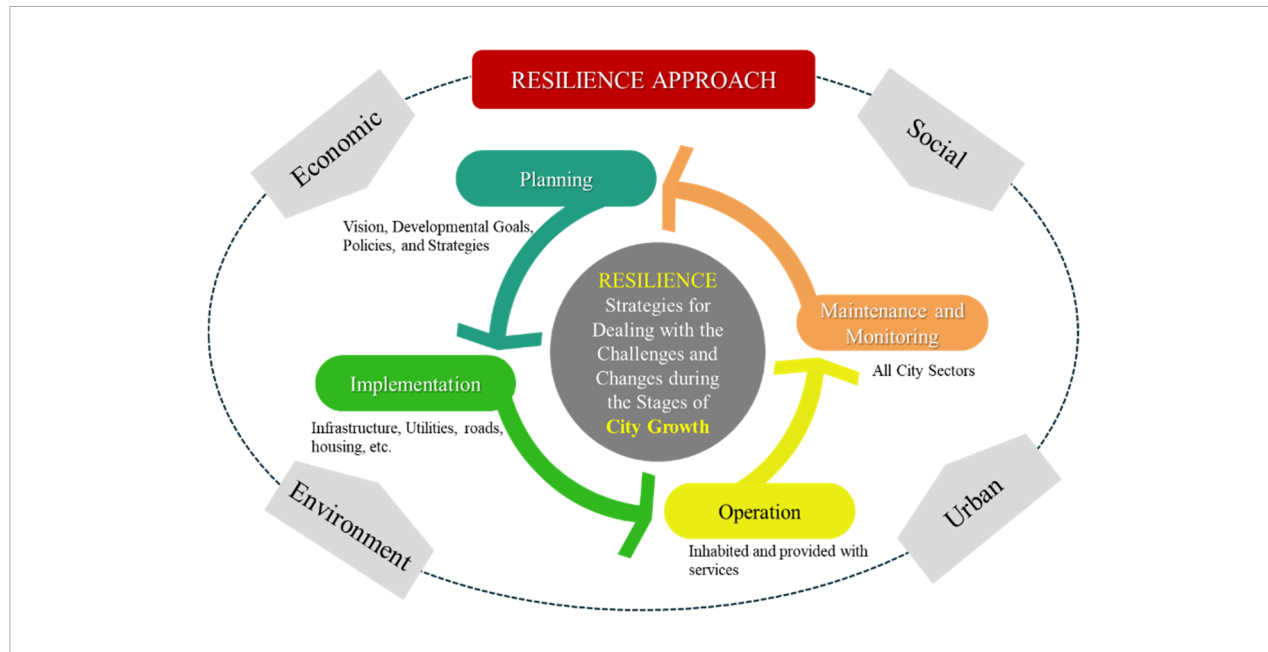
Fig. 9. *Suggested framework of the resilience approach applying for the stages of city growth. Source: authors*

The research recommends intensifying future studies on the impact of applying resilience standards during the various stages of urban growth, including the social, economic, urban, and environmental changes that occur over the years. It also suggests examining the standards that should be applied in each phase, whether during planning, implementation, or operation. Additionally, it advocates exploring the feasibility of integrating resilience with other environmental approaches, such as the urban metabolism approach to urban development studies, which focuses on the flow of materials processes throughout the city's growth stages. This integration aims to achieve resilience in all flows associated with the various changes during urban growth. Resilience is more than a risk assessment tool; it is an approach to deal with different expected and unexpected variables and continuous adaptation with no limited time to achieve the city's development goals.

Conclusions

Expected and unexpected natural disasters pose a significant threat to human survival. However, human behavior also represents a continuous and evolving threat to the sustainability of urban development. Both threats are of critical importance. The main research aim is to analyze the relationship between the resilience approach and urban growth. Most authors and researchers emphasize that focusing on risk assessment and applying resilience standards to cities enhances their ability to adapt, recover swiftly, and withstand. However, the core of the resilience approach is not limited to dealing with natural disasters alone. It is a continuous process that should be present throughout all stages of a city's development. Even if we assume there are no major hazards, the changes accompanying urban growth, whether social, economic, environmental, or urban, profoundly impact a city's ability to achieve its sustainability goals.

Furthermore, most studies in urban resilience often seek to identify the characteristics of urban systems that exhibit the least vulnerability (de Ruiter and Van Loon, 2022; Sharifi and Yamagata, 2018), aiming to highlight lessons on how cities can withstand future shocks and how planning can operate within contexts of uncertainty and unpredictability (Walker and Salt, 2012; Yang et al., 2021). Many theoretical perspectives have examined gradual transformation characteristics that enable cities to maintain or (re)achieve long-term stability, ultimately aiming to manage city growth through a dynamic relationship between stability and change (Holling, 1973; Kolte et al., 2023; Labaka et al., n.d.).

Throughout the city growth, various transformations occur, which are classified into radical/sudden changes and gradual transformations, both of which impact environmental, social, urban, and economic sectors at different stages of urban development over time. This highlights the need for further research into the integration of resilience approaches at each stage of urban growth and across the different types of changes that occur. Such an approach is crucial for ensuring the cities to remain resilient, adaptable, and capable of recovery in the face of future challenges, ultimately enabling them to achieve their long-term development goals.

Research note

Research results depended on collecting data from the Scopus database only. The results might be different using other academic journal databases. In addition, the main keywords (resilience, cities, urban, and growth) were used as search terms in retrieving data with a specific fitting and screening according to the research objectives.

References

Alexander E. R. (1992) Approaches to planning: Introducing current planning theories, concepts, and issues. Taylor and Francis.

Aria M. and Cuccurullo C. (2017) bibliometrix: An R-tool for comprehensive science mapping analysis. Journal of Informetrics 11(4): 959–975. Available at: https://doi.org/10.1016/j.joi.2017.08.007

Athanassiadis A. (2020) Urban Metabolism and Open Data: Opportunities and Challenges for Urban Resource Efficiency. In Open Cities | Open Data (pp. 177–196). Springer Nature Singapore. Available at: https://doi.org/10.1007/978-981-13-6605-5_8

Batty M. (2008) The size, scale, and shape of cities. Science 319(5864): 769–771. Available at: https://doi.org/10.1126/science.1151419

Broadus R. N. (1987) Toward a definition of "bibliometrics." Scientometrics 12(5–6): 373–379. Available at: https://doi.org/10.1007/BF02016680

Cobo M. J., López-Herrera A. G., Herrera-Viedma E. and Herrera F. (2012) SciMAT: A new science mapping analysis software tool. Journal of the American Society for Information Science and Technology 63(8): 1609–1630. Available at: https://doi.org/10.1002/asi.22688

de Ruiter M. C. and Van Loon A. F. (2022) The challenges of dynamic vulnerability and how to assess it. IScience 25(8). Available at: https://doi.org/10.1016/j.isci.2022.104720

Gehl J. (2013) Cities for people. Island Press.

Glaeser E. L., Kallal H. D., Scheinkman J. A. and Shleifer A. (1992) Growth in Cities. Journal of Political Economy 100(6): 1126–1152. Available at: https://doi.org/10.1086/261856

Goalstone D. (2007) Stages of Growth. In Macrofoundations of Political Economy and Development (pp. 215–222). Palgrave Macmillan US. Available at: https://doi.org/10.1057/9780230604315_23

Greener S. (2022) Evaluating literature with bibliometrics. Interactive Learning Environments 30(7): 1168–1169. Available at: https://doi.org/10.1080/10494820.2022.2118463

Hall P. (2014) Cities of tomorrow: An intellectual history of urban planning and design since 1880. John Wiley and Sons.

Hall P. (2020) "The City of Theory": from Cities of Tomorrow: An Intellectual History of Urban Planning and Design in the Twentieth Century, 4th edn (2014). In The City Reader (pp. 440–453). Routledge.

Holling C. S. (1973) Resilience and stability of ecological systems.

Indriati S. P., Saputro D. R. and Widyaningsih P. (2024) The bibliometric network to identify research trends in multi-input transfer function. BAREKENG: Jurnal Ilmu Matematika Dan Terapan 18(3): 1931–1938. Available at: https://doi.org/10.30598/barekengvol18iss3pp1931-1938

İri R. and Ünal E. (2024) Bibliometric analysis of research (1980–2023). Ahi Evran Üniversitesi Sosyal Bilimler Enstitüsü Dergisi 10(2): 386–403. Available at: https://doi.org/10.31592/aeusbed.1446738

Judijanto L. and Auliani R. (2024) Bibliometric analysis of biotechnology development. West Science Nature and Technology 2(02): 108–117. Available at: https://doi.org/10.58812/wsnt.v2i02.992

Kemeç A. and Altınay A. T. (2023) Sustainable energy research trend: A bibliometric analysis using VOSviewer, RStudio Bibliometrix, and CiteSpace software tools. Sustainability 15(4): 3618. Available at: https://doi.org/10.3390/su15043618

Kolte R., Goswami S., Kumar A. and Pipralia S. (2023) Challenges in practical implementation of the concept of urban resilience in cities. International Journal of Disaster Risk Reduction 99: 104142. Available at: https://doi.org/10.1016/j.ijdrr.2023.104142

Labaka L., Puime M., Bañuls V. A., Villar-Rosety F., López-Catalán B. and Hernantes J. (n.d.) Towards resilient cities: Development of a city resilience assessment tool. Available at SSRN 4797785. Available at: http://dx.doi.org/10.2139/ssrn.4797785

Lihitkar S. (2019) Science mapping and visualization tools used for bibliometric and scientometric studies: A comparative study. Journal of Advancements in Library Sciences 6(1): 382–394.

Maulani A. and Widuri R. (2024) Bibliometric analysis: Adoption of big data analytics in financial auditing. Business Informatics 18(2): 78–89. Available at: https://doi.org/10.17323/2587-814X.2024.2.78.89

Merigó J. M. and Yang J.-B. (2017) A bibliometric analysis of operations research and management science. Omega 73: 37–48. Available at: https://doi.org/10.1016/j.omega.2016.12.004

Mongeon P. and Paul-Hus A. (2016) The journal coverage of Web of Science and Scopus: A comparative analysis. Scientometrics 106(1): 213–228. Available at: https://doi.org/10.1007/s11192-015-1765-5

Montazeri A., Mohammadi S., M. Hesari P., Ghaemi M., Riazi H. and Sheikhi-Mobarakeh Z. (2023) Preliminary guideline for reporting bibliometric reviews of the biomedical literature (BIBLIO): A minimum requirements. Systematic Reviews 12(1). Available at: https://doi.org/10.1186/s13643-023-02410-2

Newman P. and Kenworthy J. (2015) The end of automobile dependence. Springer. Available at: https://doi.org/10.5822/978-1-61091-613-4

Ninkov A., Frank J. R. and Maggio L. A. (2021) Bibliometrics: Methods for studying academic publishing. Perspectives on Medical Education 11(3): 173–176. Available at: https://doi.org/10.1007/S40037-021-00695-4

Paglia L. (2022) Bibliometrics to improve our patients' care! European Journal of Paediatric Dentistry 23(3): 173.

Palme M. and Salvati A. (2020) Sustainability and urban metabolism. Sustainability 12(1): 353. Available at: https://doi.org/10.3390/su12010353

Passas I. (2024) Bibliometric analysis: The main steps. Encyclopedia 4(2): 1014–1025. Available at: https://doi.org/10.3390/encyclopedia4020065

Peters M. D. J., Godfrey C., McInerney P., Munn Z., Tricco A. C. and Khalil H. (2020) Scoping reviews. JBI Manual for Evidence Synthesis 10.

Salinas-Ríos K. and García López A. J. (2022) Bibliometrics, a useful tool within the field of research. Journal of Basic and Applied Psychology Research 3(6): 9–16. Available at: https://doi.org/10.29057/jbapr.v3i6.6829

Sharifi A. and Yamagata Y. (2018) Resilient urban form: A conceptual framework. In Resilience-Oriented Urban Planning: Theoretical and Empirical Insights (pp. 167–179). Available at: https://doi.org/10.1007/978-3-319-75798-8_9

Stovold E., Beecher D., Foxlee R. and Noel-Storr A. (2014) Study flow diagrams in Cochrane systematic review updates: An adapted PRISMA flow diagram. Systematic Reviews 3(1): 54. Available at: https://doi.org/10.1186/2046-4053-3-54

Suradkar P. and Khaparde V. (2012) Bibliometric analysis: The Electronic Library. LAP LAMBERT Academic Publishing.

Tamtam S., Laguidi A. and Elkalay A. (2023) Data integration systems and bibliometrics. ITM Web of Conferences 52: 01008. Available at: https://doi.org/10.1051/itmconf/20235201008

Tomaszewski R. (2023) Visibility, impact, and applications of bibliometric software tools through citation analysis. Scientometrics 128(7): 4007–4028. Available at: https://doi.org/10.1007/s11192-023-04725-2

van Eck N. J. and Waltman L. (2007) Bibliometric mapping of the computational intelligence field. International Journal of Uncertainty, Fuzziness and Knowledge-Based Systems 15(05): 625–645. Available at: https://doi.org/10.1142/S0218488507004911

van Eck N. J. and Waltman L. (2010) Software survey: VOSviewer, a computer program for bibliometric mapping. Scientometrics 84(2): 523–538. Available at: https://doi.org/10.1007/s11192-009-0146-3

Walker B. and Salt D. (2012) Resilience thinking: Sustaining ecosystems and people in a changing world. Island Press.

Wang J. J. and Wu Z. Q. (2009) Delimiting the stages of urbanization growth process: A method based on Northam's theory and logistic growth model. Acta Geographica Sinica 64(2): 177–188.

Williams J. (2023) Circular cities: Planning for circular development in European cities. European Planning Studies 31(1): 14–35. Available at: https://doi.org/10.1080/09654313.2022.2060707

Yang Q., Yang D., Li P., Liang S. and Zhang Z. (2021) Resilient city: A bibliometric analysis and visualization. Discrete Dynamics in Nature and Society 2021: 1–17. Available at: https://doi.org/10.1155/2021/5558497

Zhang L., Cui S., Xi X., Bi H. and Huang B. (2024) Research hotspots and frontiers of essential tremor from 2013 to 2023: A visualization analysis based on CiteSpace. Frontiers in Aging Neuroscience 16. Available at: https://doi.org/10.3389/fnagi.2024.1380851