UNDERSTANDING THE EVOLUTION AND GLOBAL TRENDS OF RESILIENCE AND URBAN PLANNING STUDIES: A BIBLIOMETRIC ANALYSIS

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Abstract

This paper represents a bibliometric analysis of the Scopus database publications on resilience and urban planning. The study recalled 1,923 documents from 1997 to 2021 using keywords related to the research topic and analyzed this using Microsoft Excel 2019, VOSviewer and Harzing's Publish or Perish software. The findings show that the expansion rate of works in resilience and urban planning has steadily increased every year since 1997. This study's most frequently used terms are the main keywords, which are climate change, sustainability, urban resilience and spatial planning. Landscape and Urban Planning is recommended as the main target journal for publication of the results of this research analysis. Research on COVID-19 or pandemic resilience, public space and urban mobility may eventually supersede prior dominant themes. The findings suggest that researchers from less contributed countries should explore this topic more to provide nuance to this field.

Keywords: Urban planning, Resilience, Bibliometric, VOSviewer, Harzing's Publish or Perish

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INTRODUCTION

In recent years, countless natural and non-natural calamities have struck municipalities worldwide. Natural disasters have claimed lives and ruined inhabitants' spatial environments (Elysa, Fahmi, Evalina, & Myna, 2020). Within a century, disasters have taken more than 1 million lives, impacted 4 billion people, incurred approximately US$ 3 trillion in economic loss and destroyed urban space and its inhabitants (CRED & UNDRR, 2020; Zainol, Elsawahli, & Ibrahim, 2018). In addition, the COVID-19 outbreak that emerged in late 2019 around the world highlighted the vulnerabilities of living and functioning of existing urban environments (Sharifi & Khavarian-garmsir, 2020). This loss of life and property may be mitigated if cities and their people had sufficient resilience measures in place to deal with possible disasters (Achmad, Burhan, Zuraidi, & Ramli, 2020; Mahmoud, Ahmad, & Alias, 2019).

In response to this phenomenon, scientific studies of resilience and urban planning in recent decades have also grown significantly, accumulating more and more evidence of their importance in disaster risk reduction (Sagala, Anwar, Lubis, & Yamin, 2015). Furthermore, knowledge is constantly evolving, and the uniqueness of ideas from researchers is the primary cause for progressing scientific research with significant scientific and practical contributions (Gläser & Laudel, 2015). Thus, examining the evolution and trends of the study topic based on published literature is necessary for identifying gaps in the literature that must be filled to support the researcher's proposal. This study therefore aims to understand current scientific evolution and the worldwide trend, to help researchers understand the perspective of resilience and urban planning research.

LITERATURE REVIEW

The thought of resilience has grown in popularity as a subject of research and has been used in various fields, including psychology, physics and socio-ecological systems (Brown, 2014). The notion of resilience has been applied to urban areas to improve their ability to cope with calamities (Jabareen, 2013). To comprehensively understand the evolution and trends of resilience related to urban planning, many experts recommend using bibliometric analysis as an analytical tool. The bibliometric analysis was firstly described by Pritchard (1969) as "the application of statistical and mathematical methods to books and other media of communication." Bibliometric studies are also frequently used to evaluate the number and quality of published papers to detect trends or patterns in a particular field of study (Ahmi & Mohamad, 2019).

This study found that six previous bibliometric articles on resilience-related urban planning have been published to date (Table 1). Three articles use the bibliographic analysis method as part of the analytical tool for a systematic literature review, namely (Castro & Lopez, 2021; Lopez & Castro, 2021; Meerow, Newell, & Stults, 2016). Meanwhile, the other articles, namely (L.

Wang, Xue, Zhang, & Luo, 2018; M.-H. Wang, Ho, & Fu, 2019; Zuraidi, Caisarina, & Agustina, 2021) used specific records, i.e., Scopus, Web of Science (WoS), or Google scholar as databases for analysing the publication's performance. While these articles focus on the study of resilience from precise angles such as sustainability, community and smart cities, the current study is the first to examine scientific publications of research related to the evolution of resilience and urban planning from larger data collections to comprehensively identify current trends in research interest and potential directions for future research.

Table 1: Prior Studies on Resilience Related Urban Planning and Bibliometric Indicators

Author	Keywords	Data-bases	Total Doc.	Indicator of Bibliometrics
Castro & Lopez (2021)	"Sustainability," "resilient cities," "COVID-19", "emerging cities"	Scopus, WoS, GoogleScholar	49	Co-occurrence of keywords
Lopez & Castro (2021)	"Urban* Planning*, "urban ecosystems," "sustainability," "urban resilience," "smart cities."	Scopus, WoS, Google Scholar	87	Co-occurrence analysis
Meerow et al. (2016)	"Urban resilience," "resilient cities."	Scopus, WoS	172	The most influential studies
Wang, Ho, & Fu (2019)	Phrases related to the sustainable city: resilient city, zero-carbon city, eco-city, sponge city	WoS	1457	Publication output, countries, author keywords
Wang et al. (2018)	"Resilience," and publication name.	WoS	405	Lead authors, institutions, journals, author contribution, keywords, evolutionary trends
Zuraidi et al. (2021)	Phrases related to spatial planning and community resilience	Scopus	144	Research productivity, citation analysis, publication growth

Source: Author (2021)

RESEARCH METHODOLOGY

The Scopus database was used for bibliometric analysis because it is one of the largest databases for scientific publications search and continuously expands and updates data compared to other databases (Wahid, Ahmi, & Alam, 2020). The following query was employed: TITLE-ABS-KEY (resilience AND "city planning," or "urban planning," or "town planning," or "spatial planning," or "land-use planning"). Data were retrieved on 28 September 2021 and resulted in 1,923 documents for further analysis.

This study presents a bibliometric analysis based on some parameters, including the growth of publications, most used keywords, most cited papers, highly cited writers, most cited institutions and more productive countries. This study used the Publish and Perish Harzing Tool to calculate citation metrics. To calculate the frequency and percentage of each publication and produce appropriate graphical representation, this study uses Microsoft Excel 2019. Bibliometric relations were created and represented using VOSviewer (version 1.6.17).

RESEARCH FINDINGS & DISCUSSION

Growth of publications

The study revealed that the annual growth in resilience and urban planning publications increased over the study period, reaching a peak in 2020 (Figure 1). Four publications were published in 1997, namely Berg & Nycander (1997), Dumanski (1997), Goetz & Szyliowicz (1997), and Krebs & Larsen (1997), which marked the beginning of resilience in urban planning studying sustainable land-use management, resource management, and infrastructure. In 2020, the highest number of documents were produced (295). The year with the most citations was 2013, with 4,648 citations.
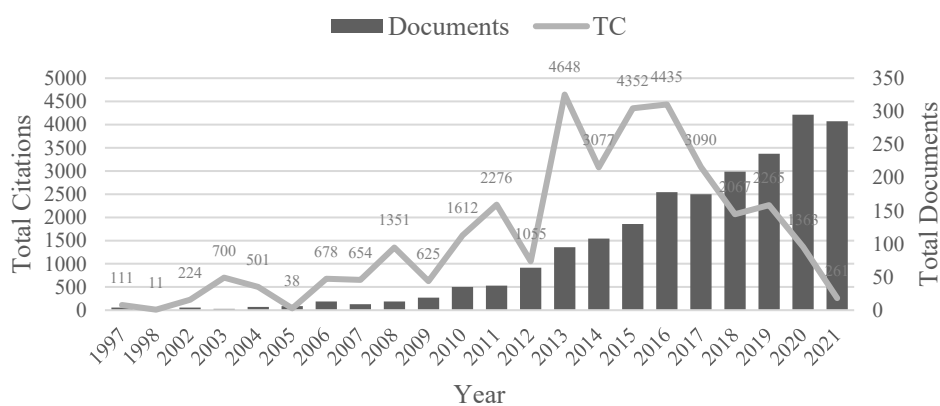

Figure 1: Publication growth and total citations
Source: Author (2021)

Our findings support a recent study performed by Sharifi et al. (2021) that employed the WoS database to gain publications data and claimed a continuing trend in the subject area, as evidenced by annual growth in the number of periodicals beginning in the 1990s and continuing to grow significantly since 2015.

Most used keywords

To address the current topic of debate, we use VOSviewer software's co-occurrence analysis. The author's keywords adequately reflect the publication's content, which is an essential assumption of keyword analysis (Wahid et al., 2020). VOSviewer depicts the strength of the relationship of keywords in colour, size of the circle or square, typeface, and width of connecting lines. Based on the analysis, 13 clusters have been established based on keywords used by the author. For instance, Figure 2(a) suggests that urban planning, COVID-19, pandemic, and urban mobility, coloured in brown, are closely connected and frequently appear together. One other group seen is resilience, cities, climate adaptation and environmental justice, highlighted in blue.
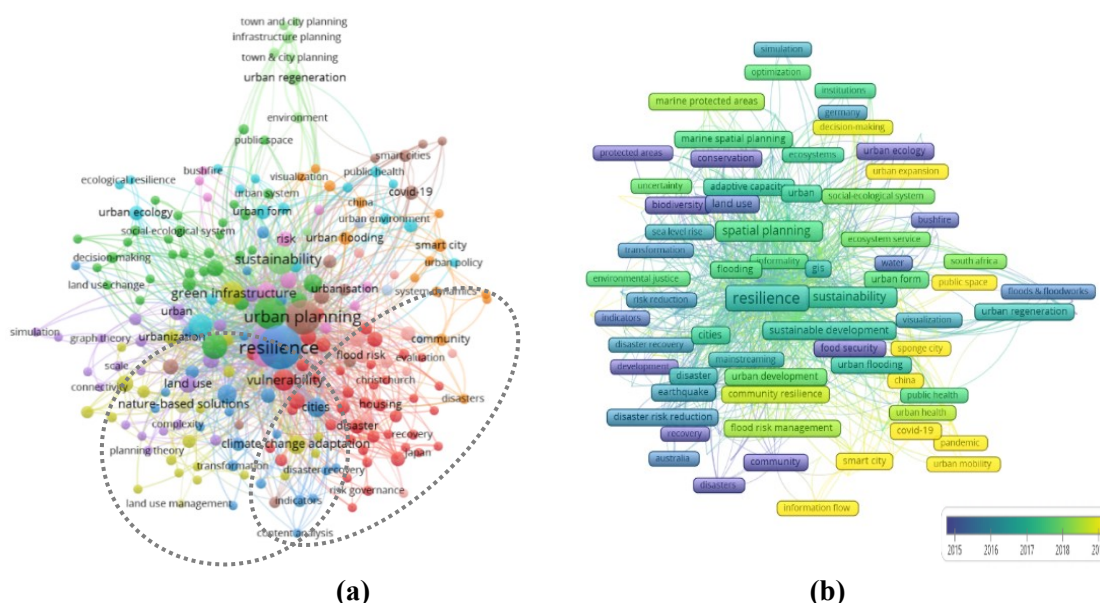

(a)   **(b)**

Figure 2: (a) Network visualisation of author keywords, (b) Overlay visualisation of author keyword
Source: Author (2021)

Figure 2(b) also explains the evolution of themes that often appear in literature within the last five years (2015-2019). In 2015, the most widely used keywords included community, disasters and urban ecology. Some of the

researchers that focused on community related keywords are (Rabe et al., 2019; Sulaiman, She, & Fernando, 2019). In the following year, many topics related to resilience, urban planning, spatial planning and public health emerged. Towards the end of 2019, themes related to smart city, urban mobility, pandemics, COVID-19, China, and public space became topics researchers widely used. It is indicated that the COVID-19 outbreak, which began at the end of 2019, attracted researchers to explore its relationship with urban planning and urban resilience.

This study confirms that resilience and urban planning have become relevant social-disaster issues, as reflected by the evolution and trends in the keywords the authors used, which were recommended in a previous study (Sharifi et al., 2021). It is speculated that resilience and urban planning research related to pandemics and COVID-19 may eventually replace other dominant clusters in the research field, as illustrated by the network visualisation map.

Most cited articles

To know the most widely read article on resilience and urban planning, we analysed a total of 1,923 articles based on their overall number of citations. We employed Harzing's Publish or Perish package to assist with citation analysis. According to Table 2, the most cited article was "Safeguarding human health in the Anthropocene epoch: report of the Rockefeller Foundation-Lancet Commission on planetary health" written by Whitmee et al. (2015) with 781 citations.

Table 2: Highly Referenced Papers (Top 5)

Authors	Title	Year	Cites
(Whitmee et al., 2015)	"Safeguarding human health in the Anthropocene epoch: report of the Rockefeller Foundation-Lancet Commission on planetary health."	2015	781
(GÃ³mez-Baggethun & Barton, 2013)	"Classifying and valuing ecosystem services for urban planning."	2013	774
(Meerow, Newell, & Stults, 2016)	"Defining urban resilience: A review."	2016	694
(Godschalk, 2003)	"Urban hazard mitigation: Creating resilient cities."	2003	688
(Sandifer, Sutton-Grier, & Ward, 2015)	"Exploring connections among nature, biodiversity, ecosystem services, and human health and well-being: Opportunities to enhance health and biodiversity conservation."	2015	456

Source: Author (2021)

Most productive authors

According to Table 3, Ayyoob Sharifi dominated the publications throughout the research period with 13 documents. The top 10 authors came from various research institutes, two in Japan, two in the US, two in France and four in the United Kingdom, Sweden, Australia and South Africa.

Table 3. Authors with the Most Output

Author's Name	TP	Affiliation	Country
Sharifi, A.	13	Hiroshima University	Japan
McPhearson, T.	11	Institute of Ecosystem Studies	US
Diab, Y.	10	Ecole des Ingenieurs de La Ville de Paris, Lab'Urba, Paris	France
Serre, D.	10	IFREMER Institut	France
Meerow, S.	9	Arizona State University	US
Wamsler, C.	9	Lund University	Sweden
Yamagata, Y.	9	National Institute for Environmental Studies of Japan	Japan
Coaffee, J.	8	University of Warwick	UK
Frantzeskaki, N.	8	Swinburne University of Technology	Australia
Andersson, E.	7	Stockholms universitet	South Africa

Notes: TP=total number of publications   *Source: Author (2021)*

Most Productive Source Titles

All publications in this study were published in 160 resource names. To assess the level of productivity of source titles several indicators can be used, including the CiteScore, SJR or SNIP of each resource. The Cite Score is a metric that calculates the average number of citations collected per article published in a journal, and the SJR (SCImago Journal Rank) is a metric for measuring citations weighted by reputation. A journal with an SJR value >1 has above-average citation potential, while a journal with an SJR value <1 has below-average citation potential. The Source Normalized Impact per Paper (SNIP) metric quantifies citations weighted by subject field. A SNIP above 1.0 means the journal obtains more citations than the field average, while a SNIP below 1.0 shows the journal receives fewer citations than the field average. A SNIP over 1.5 usually indicates a highly cited journal.

As can be seen from Table 4, the journal Sustainability Switzerland has published 122 articles about resilience and urban planning within the study period, and most of the sources are published by Elsevier. Likewise, the Landscape and Urban Planning journal has long established a leading position in this field, with the highest Cite Score, SJR 2018, and SNIP 2018 (11.6; 1.938; 2.476) among the top 5 source titles in the sample.

Most Productive Countries

This study discovered that scientists from 40 countries participated in publishing recovered documents. The leading 20 nations that contributed to the journals as the most productive countries are listed in Table 5. The United States of America (USA) ranked first with 389 documents, followed by two European countries, the United Kingdom and Italy. Four Asian nations also placed among the top twenty, including China, India, Japan, and Indonesia. The USA's leading rank as the top productive country for publications is also supported by the total record number of article citations (14,428) and the highest h-index (57) and g-index (112) among other countries.

Table 4. Highly Prolific Source Titles

Source Title	TP	TC	Publisher	Cite Score	SJR 2018	SNIP 2018
Sustainability Switzerland	122	1260	MDPI AG	3.9	0.612	1.242
Cities	64	1860	Elsevier Ltd	8	1.771	2.58
Landscape And Urban Planning	40	3243	Elsevier BV.	11.6	1.938	2.476
Iop Conference Series Earth And Environmental Science	32	32	IOP Publishing Ltd	0.5	0.179	0.436
Land Use Policy	29	637	Elsevier Ltd	7.5	1.668	1.908

Notes: TP=total number of publications; TC=total citations   *Source: Author (2021)*

Table 5. Leading twenty Countries that contributed to publications

Country	Continent	TP	NCP	TC	C/P	C/CP	h	g
United States	America	389	323	14428	37.09	44.67	57	112
United Kingdom	Europe	258	218	6703	25.98	30.75	39	74
Italy	Europe	188	141	2464	13.11	17.48	29	42
Australia	Australia	186	158	4106	22.08	25.99	31	59
China	Asia	140	104	1974	14.10	18.98	21	42
Germany	Europe	127	105	2874	22.63	27.37	25	51
Netherlands	Europe	126	109	3275	25.99	30.05	30	55
Canada	America	87	70	2337	26.86	33.39	23	47
Spain	Europe	85	68	2687	31.61	39.51	22	51
Sweden	Europe	82	72	2719	33.16	37.76	27	51
France	Europe	64	47	1029	16.08	21.89	15	31
South Africa	Africa	61	47	2222	36.43	47.28	17	47
India	Asia	48	33	571	11.90	17.30	11	23
Japan	Asia	47	38	840	17.87	22.11	16	28
Portugal	Europe	41	34	574	14.00	16.88	14	23
Brazil	America	39	27	858	22.00	31.78	9	29

Country	Continent	TP	NCP	TC	C/P	C/CP	*h*	*g*
New Zealand	Australia	37	31	662	17.89	21.35	13	25
Indonesia	Asia	34	18	644	18.94	35.78	8	25
Austria	Europe	32	28	1010	31.56	36.07	12	31
Poland	Europe	30	24	421	14.03	17.54	9	20

Source: Author (2021)

Notes: TP=total number of publications; NCP=number of cited publications; TC=total citations; C/P=average citations per publication; C/CP=average citations per cited publication; h=h-index; and g=g-index.

Certain territories or zones show no more scientific articles than others within the research period. This study exposes the European countries that dominate urban planning and resilience research, with 10 European countries placing within the top 20 contributor countries list. Meanwhile, countries from the continent of Africa contributed the least, as seen in the geographic distribution of publications in Figure 3.
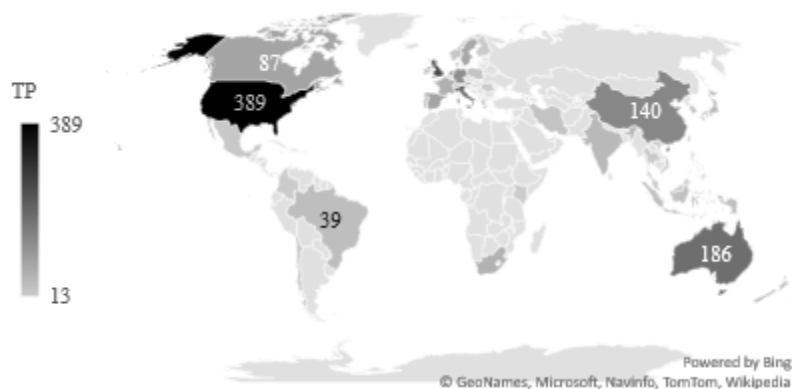

Figure 3. Geographical Distribution of Publication
Source: Author (2021)

CONCLUSION

This study aims to conduct a bibliometric analysis of the resilience and urban planning literature to detect emerging trends and possible additions. The evolution of resilience and urban planning works began in 1997, increasing gradually year by year. Besides the core keywords, the most used keywords in this study are climate change, sustainability, urban resilience, spatial planning, and land use management. Ayyoob Sharifi was identified as the most productive author and Sustainability Switzerland the most productive journal on resilience and urban planning research. The study also discovered that the US ranks as the most productive country for urban planning and resilience publications, and that four Asian countries are also in the top 20, including China, India, Japan and Indonesia.

This study recommends the Landscape and Urban Planning journal for the main targeted journal for publication. Also, it is hypothesised that resilience and urban planning research related to COVID-19 or pandemic, public space and urban mobility may later overtake other themes that earlier dominated the research topic. The final suggestion is for researchers from countries with less contribution to this research topic to explore resilience and urban planning to provide nuance to studies in this field.

Despite the informative bibliometric analysis results, the quality of the results can still be enhanced in future research. First, despite this study identifying the major research areas and their evolution, additional information about each main issue, such as techniques, theoretical underpinnings and key findings, is still required. Second, we analysed the papers within rigorous parameters to avoid receiving useless search results. This work could be updated in the future to produce more accurate outcomes while searching for scientific papers. Finally, it should be noted that the software employed in this study has limited capability, even though this technology has been used in many bibliometric research investigations. However, this paper's findings are based on objective data that are valid and reliable.

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