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A BIBLIOMETRIC ANALYSIS: RESEARCH OF URBAN FARMING IN INDONESIA PERIOD 1991-2023

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ABSTRACT

This research is related to urban farming as a major variable in this publication. The aim of this research is to investigate the profile of original scientific articles along with reviews on the topic of urban farming in Indonesia in the period 1991-2023 using bibliometric analysis. Journals related to urban farming in Indonesia published between 1991-2023 are taken from Scopus. The records analyzed and taken from the research material as characteristic of the subsequent quotation containing the distribution of the author's name, year of publication, principal author institution, publisher processed using Microsoft Excel 2016 and VOSviewer v.1.61 are used to create bibliometric diagrams. A total of 81 journals published in Scopus were written by 160 identified authors. The number of published articles continued to increase from 1991 to 2023, with the majority of articles written in English. The most cited article is Aquaculture Research with a 10-year quotation. Visualization analysis based on the accuracy of connected words in titles and abstracts has revealed several groups of research. This research contributes to providing a systematic overview of the productivity and visibility of research projects focused on urban farming in Indonesia, which is expected to be used to organize and prioritize future research.

Keywords: *bibliometrik analysis, citation analysis, Indonesia, scopus, urban farming*

BACKGROUND

Humans are living creatures that have basic needs, food needs are one of the basic needs that must be met by every human being even living creature to live (Vinayak, 2022). Since there are such needs humans will strive to be able to meet food needs, various efforts are made either directly or indirectly (Trivellone et al., 2022). Directly they will engage in planting, livestock and catching fish and other seafood, indirectly, they will seek access or a way to meet such needs as markets (Willer et al., 2022).

For rural people to grow crops can be said to be easy because there is still a lot of land, but for urban people they can meet their needs by finding a market to buy food, minimal green land due to sustainable development leads to unavailability of arable land which raises concerns for urban communities, where urban ecosystems are socially and ecologically threatened (Abdillah et al., 2023). Previous studies by Suparwoko, S., & Taufani, (2017), Grochulska-Salak et al., (2021), Langemeyer et al., (2021) and Abdillah et al., (2023) have shown that the influence of urban farming will look for alternatives to building urban food resilience, from threatening urban food availability and promoting the implementation of urban farming in the Regional Space Plan for use as urban farming land. Urban

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farming in Indonesia is designed in such a way as to urban food resilience and support urban economic growth in Indonesia facing threats related to food availability in urban areas. Urban farming is growing as people are beginning to realize increased food needs, while urban green land is decreasing as a result of urban development, pollution from urban vehicles is increasing and in early 2020 the Covid-19 pandemic at the time the government implemented lockdown policies across the region resulting in logistic supply chains being restricted, so people are starting to become aware of the ability and knowledge related to urban farming is an opportunity to cultivate agricultural crops, other disasters can also be used as life-proofing in a little green land.

Urban farming can be the backbone of suppliers of food availability in urban areas, it is revealed in the study Elfida., (2020), Darmawan et al., (2023), and Hardiana & Hutasuhut, (2021) ability in managing urban farms independently can be a solution to the distribution of food supply in urban, urban farming is believed as a new trend related to healthy lifestyle in the urban, this is because the majority of the people implemented farming and organic farming systems that avoid users of chemical fertilizers and synthetic pesticides so that these farms can create a comfortable and healthy living environment. Plants planted by urban communities using hydroponic and aquaponic planting systems that are easily implemented in limited areas (Prayoga & Raya, 2020).

So in this study the author wants to see the development of research related to urban farming in Indonesia from the period 1991-2023 in the academic world as a basis for further research and for the community can be implemented in urban areas throughout Indonesia to maintain food sustainability and can boost the growth of urban social economy.

RESEARCH METHODS

Scopus is the largest publishing company in the world of Dutch academics, and is one of the world's largest providers of contextual, technical, and multidisciplinary scientific information. In this study we identify the research article with the topic of urban farming, the research was conducted on August 20, 2023. The period of publication is limited to 1991-2023. Scientific articles and reviews were selected for further analysis. From the records analyzed for quotation, including the distribution of publications, years, languages, regions, publishers, journals, articles and authors using Microsoft Excel 2016 software (Garfield & Paris, 2006).

The distribution of the data studied is the frequency of the authors and the number of their publications adjusted to the distribution function described by Lotka's law, to obtain the value n (log-log plot slope) and the constant c (the author's fraction with the publication only one). The discrepancies observed between the theoretical distribution functions evaluated using the Kolmogorov-Smirnov test (Rousseaum, 2000).

VOSviewer v.161 for Microsoft Windows, used to build bibliometric diagrams for visualization, quotation between quotations from scientific articles and co-occurance of sets of writings taken from the title and abstract fields of scientific articles (Koo, 2017). Collaboration can be understood as two authors who have been cited together with the other author, so the more articles are cited jointly and the greater the likelihood that they have a connection with each other (Small, 1973). Group counting is a method used when building a co-citation, using fractions, if other scientific articles that cite contain n references with each cite will only be counted 1n of the total of the entire cite (Koo, 2017).

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A co-occurance analysis, text mining that looked at the functions of the first VOSviewer was to identify the phrase object word in a text collection based on the Apache Open NLP Toolkit, and then turn all the word object of the phrases into a single one (van Eck & Waltman, 2011). In this study, the word word phrase referred to as a "term" identified by the VOS Viewer was also examined manually, whereas words with similar meanings or abbreviations would be merged into an official form, for terms considered to be non-informative such as "years", "changes", and the publisher's name was removed to improve the clarity generated by the co-incurance (Koo, 2017).

RESULT AND DISCUSSION

The scientific article with the keyword “urban farming” produced 882 articles that we then focused again on research in Indonesia, so we used Indonesia AND Urban AND Farming keywords so we produced 127 articles that were published in Scopus using the period 1991-2023. Distribution of articles included in Table 1 out of 76 are original articles (59.8%) and 5 (3.9%) are review articles. So, the 81 articles in the study will be analyzed.

Figure 1 shows that the number of articles has increased over 3 decades published in 2018 to 2023 with research figures totalling 18 studies. Most of the articles (79) are in English language (97,5%) in Table 2 of a total of 81 articles there are 160 authors contributing to research projects related to urban farming in Indonesia as much as 1377 cites from the period 1991-2023.

Of the 160 authors who wrote articles related to urban farming in Indonesia, that is:

1. Three articles (3.7%) by Abdoellah from The Living Lab, Bandung, Indonesia.
2. Three articles by Arisena & Krisnandika from Udayana University, Bali, Indonesia.
3. Two articles (2,5%) by Suparman & Safitri from the University of Padjadjaran, Bandung, Indonesia.
4. Two articles by Darmawan, Djelantik, & Korri from from the Udayana University, Bali, Indonesia.
5. Two articles by Ramke from London School of Hygiene & Tropical Medicine, London, United Kingdom
6. Two articles by Bobor from Syiah Kuala University, Banda Aceh, Indonesia.
7. Two articles by Alfian from the University of Lyon, France.
8. While, 316 other authors have 1 article (1,2%) related to urban farming in Indonesia.

Table 1. Distribution of Types of Articles on Urban Farming in Indonesia Published between 1991 and 2023 (N=127)

Document Type	n	%
Article	76	59,8
Book Conference	4	3,1
Conference Paper	32	25,2
Conference Review	8	6,3
Erratum	1	0,8
Review	5	3,9
Short Survey	1	0,8

Only "Articles" and "Reviews" are included in the subsequent analysis
Source: Scopus, 2023

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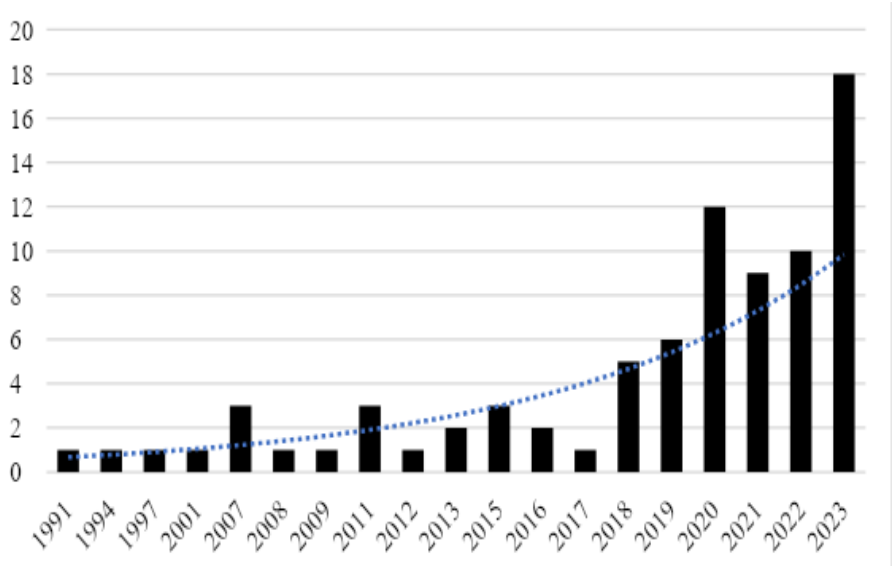

Figure 1. Time Trends from Original Article Numbers and Reviews on Urban Farming Research in Indonesia Published in the Period 1991-2023
Source: Scopus, 2023

Table 2. Languages Used in the Original Article and Review of Urban Farming in Indonesia Published in 1991-2023 (N=81)

Language	n	%	TGCS	Citation/Article
English	79	97,5	1369	17,3
French	1	1,2	6	6,0
Portuguese	1	1,2	2	2,0

TGCS total global score = number of digits of the quotation edited
Citation/article = TGCS/number of the article

Of the 81 articles published in 66 different journals. Table 4 shows the 10 journals with the highest number of original and urban farming related articles in Indonesia with a median value of 85.5 of the impact factor. Of the 10 periodicals in Table 4, there are one of them falling into the category of quarterly 1 a total of 7 journal, from quarter of 2 a number of 2 journal and quartery 3 a whole of 1 article only. According to the classification of the Journal Citation Report concerning the number of articles published in each journal Sustainability (Switzerland) published 11 articles, International Journal on Advanced Science; Engineering and Information Technology published 3 articles, Human Ecology published 2 articles, Land Use Policy published 2 Articles, Aquaculture Research, Biological Invasions published 1 article, Spatial and Spatio-temporal Epidemiology published 1 Article, Journal of Environmental Management published 1 Artikel, Landscape and Ecological Engineering published 1 Article, British Journal of Ophthalmology issued 1 Article and 51 other journals each published one article.

Table 3. Country on Original Article and Related Review Articles Urban Farming in 1991-2023 (N = 81)

Country	n	%	TGCS	Citation/Article
Indonesia	81	100,0	1377	17,0

TGCS total global score = number of digits of the quotation edited
Citation/article = TGCS/number of the article

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Next to 66 journals there are 4 Table 5 showing more than 10 cites from original articles and reviews on urban farming research in Indonesia that were published in the period 1991-2023. The highest ranked journal, with 307 cites, was published in the journal Aquaculture Research in 1997. The second rank of several articles that have been published is Human Ecology with 226 cites in 2016. In the early phase of the year of publication of the article, will have a long duration to have the chance cited, quotation scores per year will also be counted, in order to give the index difference in making comparisons. The articles found will also be ranked based on the number obtained from the number of cites on Scopus.

The visualization of the analysis of the quotation data that has been explored using VOSviewer in Figure 2 shows the results of the co-citation analysis of 66 journals received there are 4 quotations in common. The size of the circle on the analysis results indicates the number of cites in the journal that have been received, while the distance between the two journals shows the strength of the correlation between the journal. Four clusters containing 16 journals were identified. Cluster 1 (red) consists of 11 journals associated with Suistainability (Switzerland), cluster 2 (green) with a land use policy item having a connection with 2 journal items, cluster 3 (blue) with the worldwatch paper item having 2 related magazines, cluster 4 (pink) with an item Human Ecology has 2 interrelated magazines.

Figure 3, a network of co-occurrence terms that appear on the author keyword and index keywords with a minimum number of 5 articles. Overall, there are 15 of the 872 criteria that meet and the top of all the most relevant terms, namely the 15 terms shown in Figure 3, Cluster 1 (red) has 7 tribes and the common occurrence term is “Indonesia” there are 44 common occurrences, followed by “urban area” has 5 tribes with 9 common events, and the last one is Cluster 3 (blue) has 3 tribe with 9 shared occurrence.

In this bibliometric context the author presents the results of the publication on the topic of urban farming in Indonesia published in the period 1991-2023. The trend analysis carried out experienced growth in the number of original articles and reviews in the 3 decades (1991-2023), the language in the article, the countries of findings not mentioned into the findings of this research. Of the 81 articles surveyed, not all authors used English, there were 79 articles (97.6%) using English, 1 article (1.2%) using Franch, and 1 article (1,2%) speaking Portuguese. So it can be said that English is a global language and a language of scientific communication (Ferguson, 2007).

From the data the number of authors identified is 160 authors who are productive in the topic of urban farming in Indonesia revealed in this study are Abdoellah from The Living Lab, Bandung, Indonesia in the field of International Journal of Sustainable Development and Planning, Qualitative Report, Sustinability Science. Second by Arisena in the area of Global Journal of Environmental Science and Management, African Journal of Food, Agriculture, Nutrition and Development, Journal of Agricultural Sciences - Sri Lanka and third by Krisnandika in the sphere of African Journal for Food, Agriculture, nutrition and development, both authors from the University of Udayana, Bali, Indonesia, each of which have 3 articles published.

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Table 4. Top 10 Original Articles and Reviews Related to Urban Farming in Indonesia Published in 1991-2023 (N = 81)

Journal	Scopus Subject Category	No. of Cited Article	%	TGCS	Citation/Article	Impact Factor	
Sustainability (Switzerland)	Social Sciences: Geography, Planning and Development, Computer Science: Computer Science (miscellaneous), Environmental Science: Environmental Science (miscellaneous)	11	13,58	106	9,7	1,82	Q1
International Journal on Advanced Science, Engineering and Information Technology	Agricultural and Biological Sciences: General Agricultural and Biological SciencesEngineering: General EngineeringComputer Science: General Computer Science	3	3,70	7	2,3	0	Q3
Human Ecology	Anthropology, Sociology and Political Science, Arts and Humanities (miscellaneous), Ecology	2	2,47	245	122,5	5,62	Q1
Land Use Policy	Social Sciences: Geography, Planning and Development, Agricultural and Biological Sciences: Forestry, Environmental Science: Management, Monitoring, Policy and Law	2	2,47	78	39	2,41	Q1
Aquaculture Research	Agricultural and Biological Sciences: Aquatic Science	1	1,23	263	263	2,14	Q2
Biological Invasions	Agricultural and Biological Sciences: Ecology, Evolution, Behavior and Systematics,	1	1,23	108	108	0,56	Q1

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	Environmental Science						
Spatial and Spatio-temporal Epidemiology	Social Sciences: Geography, Planning and Development, Medicine: Infectious Diseases, Epidemiology, Environmental Science: Health, Toxicology and Mutagenesis	1	1,23	93	93	2,67	Q1
Journal of Environmental Management	Environmental Science: Management, Monitoring, Policy and Law, Environmental Engineering, Waste Management and Disposal	1	1,23	54	54	2,16	Q1
Landscape and Ecological Engineering	Environmental Science: Ecology, Nature and Landscape Conservation, Management, Monitoring, Policy and Law	1	1,23	54	54	0,27	Q2
British Journal of Ophthalmology	Neuroscience: Sensory Systems, Cellular and Molecular Neuroscience, Medicine: Ophthalmology	1	1,23	51	51	2,02	Q1
Median				**85,5**	**54**	**2,08**	

TGCS (Total Global Citation Score) = numbers from the received citation
Citation/article = TGCS/ number of articles received
Impact factors obtained from the Field-Weighted citation impact metrics in Scopus

The distribution of the number of articles published by the author is evaluated by the law of scientific productivity, Lotka's law. Then if you look at the statistical distribution in terms of productivity of the writer with reference to the Law of Lotka observes that "the number of writers who make n contributions is about 1/n2 of the reader who makes one, then the proportion of all contributors who give one contribution is about 60%". It can be understood that the number of authors produces n articles equal to 1/n2. The study found that only 13 authors who contributed to 2 or more articles, out of a total of 160 authors (8.1%), contributed at least two articles. However, the calculation

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of Lotka according to Rousseaum (2000) could not make adjustments to the distribution of the law of Lotka to the data studied.

The data distribution of 81 articles in 66 journals is consistent as shown in the goodness-of-fit Kolmogorov-Smirnov test. According to the Law of Lotka A is n of -3,44 and C with a value of 0.15 derived from the calculation of LOTKA, the resulting function of the power of Lotka can be expressed as Y=0.15/X-3.44, where Y is the number of the relative frequency of journal articles with X articles obtained 0.78 According to this formula can produce that can be estimated, journals that contain only one article. The n value suggested by the Lotka law would be greater than 2, but in the near future, quotation data from the Scopus database says 1.2% (Brzezinski, 2015). While previous research showed that exponents n and c can be influenced by the subject area and productivity, the development of circumstances, the country of origin, the duration of the study and the length of the period (Pulgarin, 2012).

Table 5. Five Large Cites from Original Articles and Reviews Related to Urban Farming in Indonesia Published in 1997-2023 (N = 81)

R	First Author	Title	Impact Factor		Year	GCS	GCSY	No of Scopus Citation	
1	Primavera J.H. (1)	Socio-economic impacts of shrimp culture	Aquaculture Research	2,14	1997	307	11,81	263	Q1
2	Fox J. (8)	Policies, political-economy, and Swidden in southeast asia	Human Ecology	5,62	2009	226	16,14	218	Q1
3	Thiengo S.C. (5)	Rapid spread of an invasive snail in South America: The giant African snail, Achatina fulica, in Brasil	Biological Invasions	0,56	2007	111	6,94	108	Q2
4	Gilbert M. (2)	Risk factor modelling of the spatio-temporal patterns of highly pathogenic avian influenza (HPAIV) H5N1: A review	Spatial and Spatio-temporal Epidemiology	2,67	2012	96	8,73	93	Q1
5	Pribadi D.O. (2)	Peri-urban agriculture in Jabodetabek Metropolitan Area and its	Land Use Policy	2,41	2016	59	8,43	57	Q1

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	relationship with the urban socioeconomic system	

GCS (Global Citation Score) = frequency of citation based on Scopus calculations of time and data downloaded
GCSY (General Citations Score per Year) = GCS/(2023-year-release)
Number of the Scopus citation obtained from "https://www.scopus.com"
Impact factors obtaining from the Field-Weighted citation impact metrics in Scopus

Most of the articles have concentrated from several journals, from articles that have been published in only three periodicals, namely the first journal Sustainability (Switzerland), the second International Journal on Advanced Science; Engineering and Information Technology, and the third journal Human Ecology, therefore, the journal can be regarded as a core journal for disseminating science related to urban farming in Indonesia.

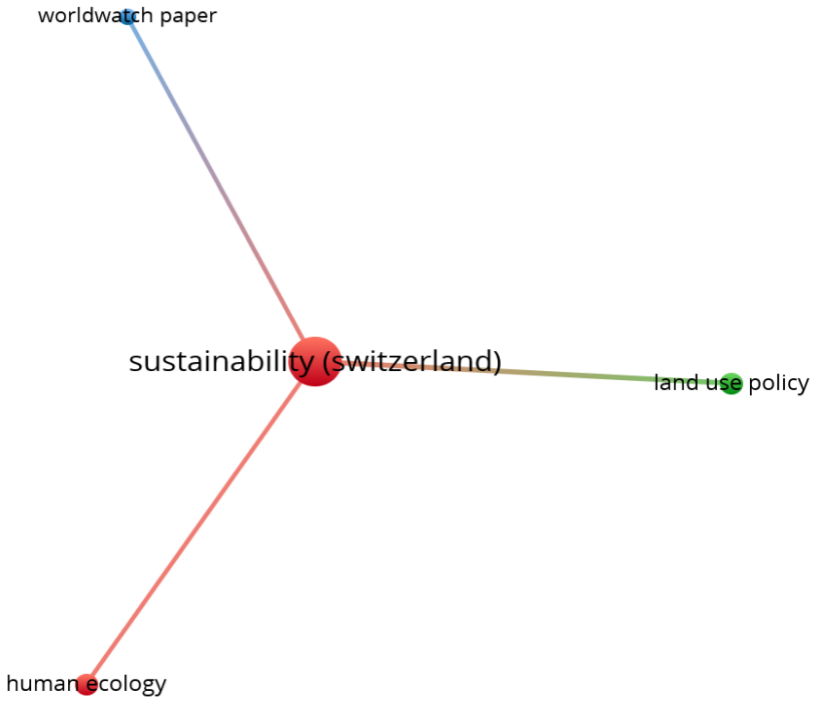

Figure 2. Co-citation on the Original Article and Review of 66 Interrelated Journals. There are 4 Joint Quotations Related to Urban Farming in Indonesia that were Published in the Period 1991-2023. There are Three Clusters that Have Been Identified, Cluster 1 (Red), Cluster 2 (Green), and Cluster 3 (Blue)

Of the five most cited original articles and reviews in the urban farming research in Indonesia published in the period 1991-2023, those analyzed to show the type of research related to urban farming in Indonesia can be seen in table 5. The review of the article with the highest quotation shows findings on urban faring that focus on the mangrove ecosystem, including assessment, cost-benefit analysis, and the relationship between offshore fishing and mangrove goods and services. The need

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to internalize the ecological and socio-economic costs of shrimp farming as well as the gaps in existing research in this field are more emphasized (Primavera, 1997).

The article with the second rank provides information identifying several countries Xishuangbanna, Laos, Thailand, Malaysia, and Indonesia used as examples of six variables that have contributed to the decline or modification of the Swedish system. Which divides into several landscapes forests and permanent farming, expansion of forest departments and increased conservation, relocation, privatization and commoditization of land and land production, and expanding market infrastructure and promotion of industrial farming (Fox et al., 2009). The article with the third rank provides information about specimens brought from Indonesia introduced to the state of Paraná in the 1980s for commercial purposes ("agricultural propagation") that failed. Among the reasons for the species' rapid invasion are its high reproductive capacity and people's tendency to release butterflies into the wild. Achatina fulica has been introduced throughout the tropics and subtropics and has been considered as an exhaustion pest occurring in dense populations in urban areas where it is a pest in ornamental gardens, vegetable gardens and small-scale farms (Thiengo et al., 2007). The fourth and fifth ranked articles are articles with cites below 100, so for the period of urban farming research in Indonesia period 1991-2023 with quotations above 100 there are 3 journals.

The visualization analysis by the VOSviewer program used in this study to create two-dimensional mapping co-citation journals from 66 journal items there are 4 shared cites received (Figure 2). There are three clusters that contain 16 journals, cluster 1 (red) formed 3 Journal Suistainable (Switzerland) which is the focus of Social Sciences: Geography, Planning and Development, Computer Science: Computer Science (miscellaneous), Environmental Science: Enviromental Science (miscellaneus), then cluster 2 (green) is formed 1 journal Land Use Policy with focus Social Science: Geography, Planning and Development (Agricultural and Biological Sciences): Forestry. Cluster 3 (blue) is composed of 1 journal namely with item Wordwatch Paper with focus Societies: geography, planning and development. This pattern of distribution indicates that there is a high correlation between articles in each cluster, a moderate corelation exists in the main cluster namely cluster 1 versus cluster 2, 3, and 4.

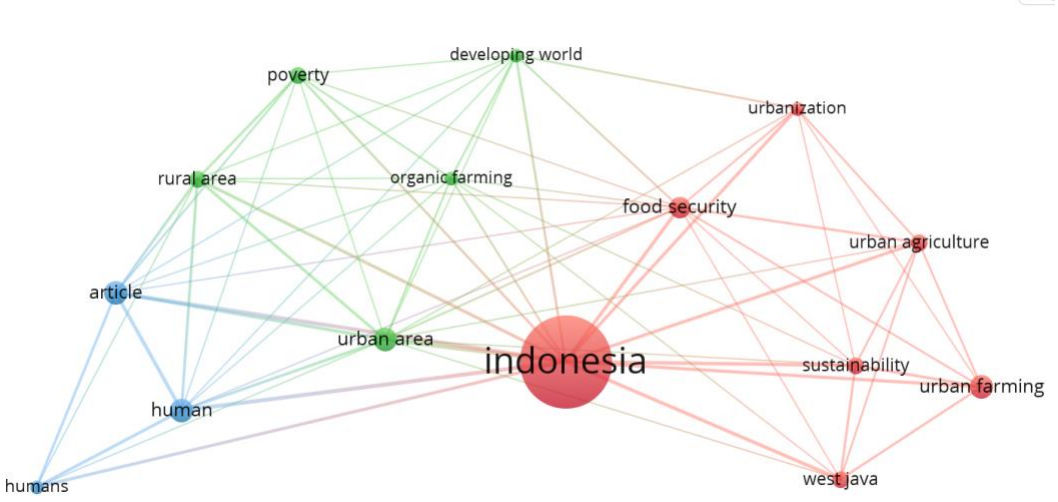

Figure 3. Co-occurrence on Author Keywords and Index Keyword on Articles Related to Urban Farming in Indonesia Published in the Period 1991-2023. There are Three Clusters that Have Been Identified, Cluster 1 (Red), Cluster 2 (Green), and Cluster 3 (Blue)

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To find popular research topics related to urban farming in Indonesia with the period 1991-2023 in the publication, the co-occurrence of each term in the author keyword and index keyword with a minimum of 5 that appear from the article in analysis, has formed three clusters with a total of items 15 items with each item connected as much as 67. Cluster 1 (red) dominates the Indonesian item that is a focus item according to the country or region studied namely “Indonesia”. Indonesia has recently faced a number of major problems: poverty, natural disasters such as tsunamis, earthquakes, floods and storms, volcanic eruptions, loss of biodiversity, decline in water quality and quantity, increased pollution, and aesthetic degradation of landscapes. These disturbances are caused by rapid changes in land use and land coverage, deforestation, application of monoculture agricultural systems in commercial agriculture, urbanization, industrialization, and other types of infrastructure development (Arifin & Nakagoshi, 2011). A total of 14 connected with a total co-occurrace of 44.

Cluster 2 (green) with the "urban area" item used as the main research subject resulting in 13 connected with the co-occurance 9. Urban areas in Indonesia are carried out because efforts to greening andining food resilience are always on the path of urban life, as in Jakarta is the in-depth characterization of one urban farming typology in Jakarta, summarized as small and medium-scale farms operated domestically and highly commercial, located mainly on private land, producing vegetables and livestock for local markets in the city. The farmers are a mixture of locals and migrants with informal ownership status, who rely heavily on their farms to generate income and household food security. We end with a proposed strategy to improve policies to accommodate a variety of urban farming types. The Jakarta case provides proof of the concept, and serves as a reference for other metropolitan areas in developing countries to develop policies to adapt urban farming practices across the spectrum of typologies, in particular as a strategy to meet city food security goals (Chandra & Diehl, 2019).

Cluster 3 (blue) gives a contribution of 9 which is connected to a total co-occurrence of 9 of the “human” item. This indicates that the emergence of every term often appears in every article. Co-occurrence visualization can help to show potential or area neglected in a study (Koo, 2017). The intrinsic limitations of this bibliometric analysis should be noted, namely, the possibility of skipping several articles because of the use of a single quotation database. Then further research could evaluate other databases such as WOS and Google Schoolar and then compare with these findings. Secondly, the quotation index data is biased towards journals with English, because journalism using non-English has a lower impact than using English (Van Leeuwen et al., 2001). So it affects the output of the country where the journal is published.

CONCLUSION AND SUGGESTION

This research is a bibliometric analysis related to urban farming in Indonesia by introducing a database of productive authors, journals, and research groups relating to urban farming in Indonesia along the 3 decades (1991-2023). This research provides systematic productivity and visibility research on urban farming in Indonesia in the agricultural world. These findings can be used to direct, regulate and prioritize in order to conduct future research related to urban farming in Indonesia.

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