

PAPER • OPEN ACCESS

Society 5.0 publication mapping using a scientometric perspective

To cite this article: A Purnomo *et al* 2021 *IOP Conf. Ser.: Earth Environ. Sci.* **729** 012141

View the [article online](#) for updates and enhancements.

You may also like

- [A Framework of Science Based Entrepreneurship Through Innovative Learning Model Toward Indonesia in Society 5.0](#)

Sajidan, Idam Ragil Widiyanto Atmojo, Devie Febriansari et al.

- [Online training: The application of the Society 5.0 concept](#)

Michael

- [Preface](#)

R A Firdaus, M Satriawan, Fitriana et al.



ECS
The
Electrochemical
Society
Advancing solid state &
electrochemical science & technology

DISCOVER
how sustainability
intersects with
electrochemistry & solid
state science research

Society 5.0 publication mapping using a scientometric perspective

A Purnomo^{1*}, N Asitah², T H Latukismo³, E Rosyidah⁴ and B K Kurniawan⁵

^{1,5} Entrepreneurship Department, BINUS Business School Undergraduate Program, Bina Nusantara University, Jakarta, Indonesia 11480

^{2,4} Universitas Nahdlatul Ulama Sidoarjo, Indonesia

³ Krisnadwipayana University of Jakarta, Indonesia

Email: agung.purnomo@binus.ac.id

Abstract. Society 5.0 initiated by the Japanese nation seeks to enhance the standard of living of the society with an IoT-based smart society and an entrepreneurial spirit. This research aims to study the map of international publications in the field of Society 5.0 using a scientometrics perspective. The research conducts a scientometrics method and analyzed research data using the analyze search results service from Scopus and the VOSviewer application. Research data on 57 academic documents published from 2017 to 2019 obtained from the Scopus database. The results show an increase in the number of international publications in Society 5.0 each year. However, there were no research institutions and individual researchers with the most publications in the field of Society 5.0. The most countries, subject areas, and type documents in Society 5.0 publications were Japan, computer science, and article. There was one collaborative pattern of researchers in the field of Society 5.0. This study proposes a convergence axis classification consisting of society 5.0 publications to characterize the body of knowledge generated from three years of publications: computer science, society, economics, industry, technology, and IoT.

Keywords: Society 5.0, publication mapping, International publication, scientometrics

1. Introduction

The society and manufacturing industry are experiencing a sustainable digital transformation due to the influence of the development and use of Information and Communication Technologies (ICT) based on entrepreneurial spirit [1]. Information technology has become an important enough tool to encourage and support the development of innovation and is used to improve competitiveness [2], [3], [4], [5]. The Japanese government used the 5th Science and Technology Basic Plan which is focused on community development towards the Super Smart Society [6]. Being in the era of digital technology evolution, especially the Internet of Things (IoT), the Japanese introduced the concept of the Society 5.0 era. The concept of Society 5.0 is claimed to solve numerous cultural issues by applying it to every social living and industry [7].

Society 5.0 or Super Smart Society initiated by the Japanese nation is included as the fifth development in human society [8]. Smart Society is focused on establishing the standard of living



Content from this work may be used under the terms of the [Creative Commons Attribution 3.0 licence](https://creativecommons.org/licenses/by/3.0/). Any further distribution of this work must maintain attribution to the author(s) and the title of the work, journal citation and DOI.

between persons and the social use of the technology itself [9]. The idea underlying Japan to make the concept of Society 5.0 is the rapid development of technology now that allows the mixture of cyberspace - the information - with the physical space - the real world [6]. Society 5.0 is described by the Japanese Cabinet Office as a brand new financial society centered on humans themselves. People who can provide services and can meet the needs of users. A society that can help individual actions to obtain a better standard of living by reducing discrimination and inequity in language, age, sexuality, and religion. Communities with initiatives to combine physical space and cyberspace through utilizing internet communication technology to the maximum [10].

Society 5.0 shows the role of humans as the center and circle of feedback, not just machines. Humans become social networks and systems through their smartphones [11]. Progressive progress made through innovation in the fields of science and technology plays a role in the improvement of society and business [12]. In a study conducted by Hamdani, Herlianti, and Amin on the feasibility and small and medium industries of financial technology (fintech) as part of the concept of Society 5.0 [13], [14], states that many small and medium industries are not ready for it because of the limitations of technological infrastructure, human resources, and policies. Therefore, it is necessary to improve factors to create a human-centered and technology-based society [14]. Technology-based entrepreneurship or technopreneur can help achieve the dreams of Society 5.0.

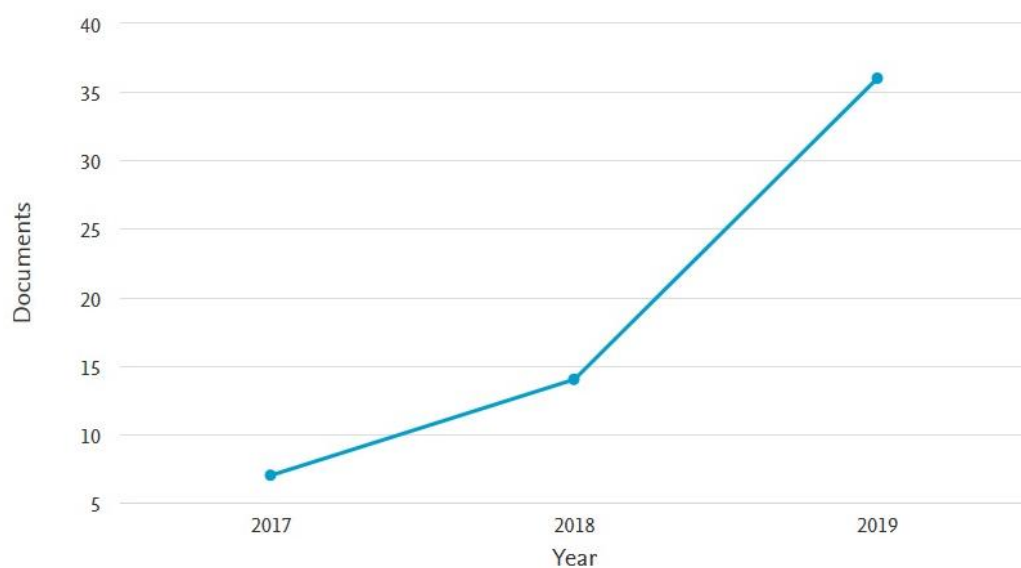


Figure 1. Number of Year Documents from Society 5.0

The growth in the number of academic documents related to the topic of Society 5.0 that has been published internationally and indexed by Scopus from 2017 to 2019 is shown in Figure 1. There has not been much research on Society 5.0 by providing a big picture visualized from year to year with data from all publications on the global level. Also, there are no studies that specifically address the relationship between authors, affiliations, and the impact of their research. This study aims to study the map of international publications in the field of Society 5.0 using a scientometrics perspective. We monitor the growth in the number of academic documents related to the topic of Society 5.0 that have been published and indexed by Scopus from 2017 to December 2019.

2. Research method

This research measures the publication map visually in the field of Society 5.0 which was published internationally and has been Scopus indexed. Research data were obtained from the Scopus database using the document search service in March 2020 [15]. Analysis and visualization of data using the analyze search results feature on the Scopus service and VOSViewer application [16], [17]. The VOSViewer tool was used to build and visualize scientometrics networks, namely the number of studies, researchers, academic affiliations, countries, fields, keywords, and author collaboration [18]. This survey was conducted by identifying keywords related to Society 5.0 to find and identify related articles from research in the Scopus database for 57 academic documents published from 2017 to December 2019.

The query command applied when mining data in Scopus was TITLE-ABS-KEY ("society 5.0") AND PUBYEAR <2020. This means that research has explored publication data that contains society 5.0 text in the title, abstract, and keyword sections before 2020. Research limit data retrieval until 2019. Exclude 2020 was carried out so that annual data obtained illustrates the condition of the study in one whole year from January to December. The study conducted a type of analysis of co-authorship with the unit of analysis of authors and full counting methods using the VOSViewer tool to obtain the author's collaboration network. The study carried out a type of analysis of co-occurrence using units of analysis of keywords and a full calculation method using VOSViewer to obtain a network of keywords.

3. Results and discussion

International publications on Society 5.0 continue to increase every year. Society 5.0 publications have been carried out since 2017, with the most research spike in 2019 with 36 documents.

3.1. The most common country affiliations of society 5.0 publications

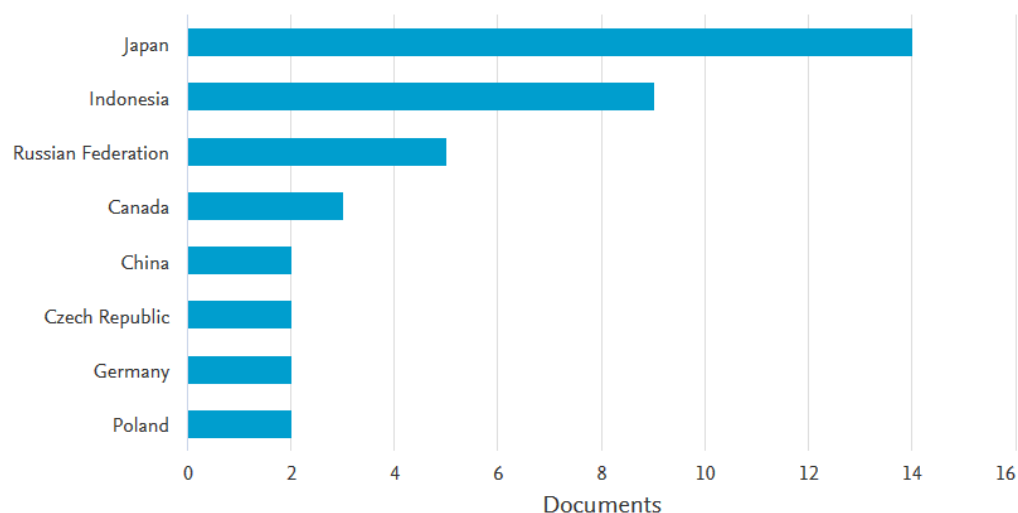


Figure 2. Country Number of Society 5.0 Publication Per Year

The country that has the largest contribution and conducts research in the field of Society 5.0 as shown in Figure 2 was Japan with a total of 14 documents. Followed by Indonesia with 9 documents, Russian Federation with 5 documents, Canada with 3 documents, China with 2 documents, the Czech Republic with 2 documents, Germany with 2 documents, and Poland with 2 documents. Japan as the highest country in the publication of Society 5.0 because Japan was the initiator of the concept of Society 5.0.

3.2. Most common institutional affiliations of society 5.0 publications

There are no research institutions with the most publications in the field of Society 5.0 as shown in Figure 3. There were 8 research institutions that publish research society 5.0 with a total of 2 documents, namely: the Hitachi, Ltd. Kobe University, University of Waterloo, Mitsubishi Electric Corporation, National Institute of Advanced Industrial Science and Technology, Universitas Garut, and Institute of Automation Chinese Academy of Sciences, Yamaguchi University. In general, research institutions come from Japan as the originator of the concept of Society 5.0. However, no research institution has dominated the publication of Society 5.0.

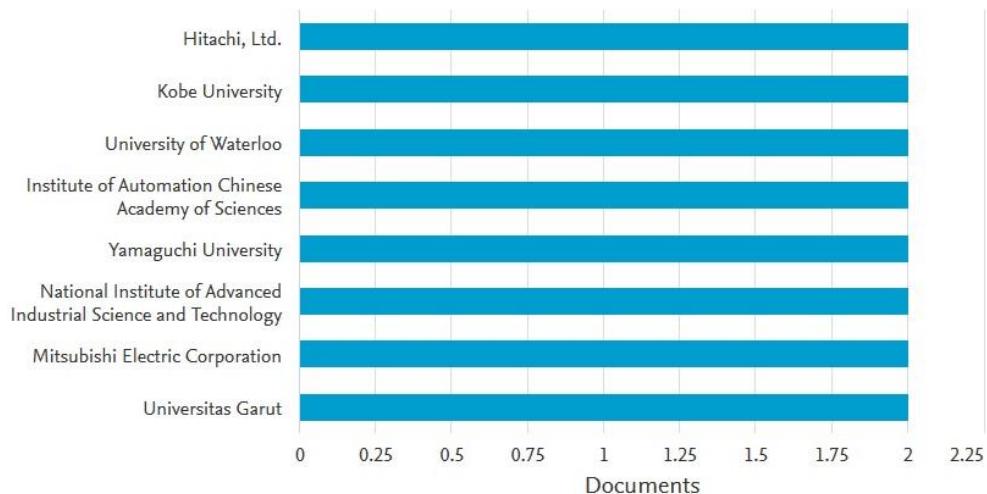


Figure 3. Affiliation Number of Society 5.0 in Year

3.3. Most individual researcher of society 5.0

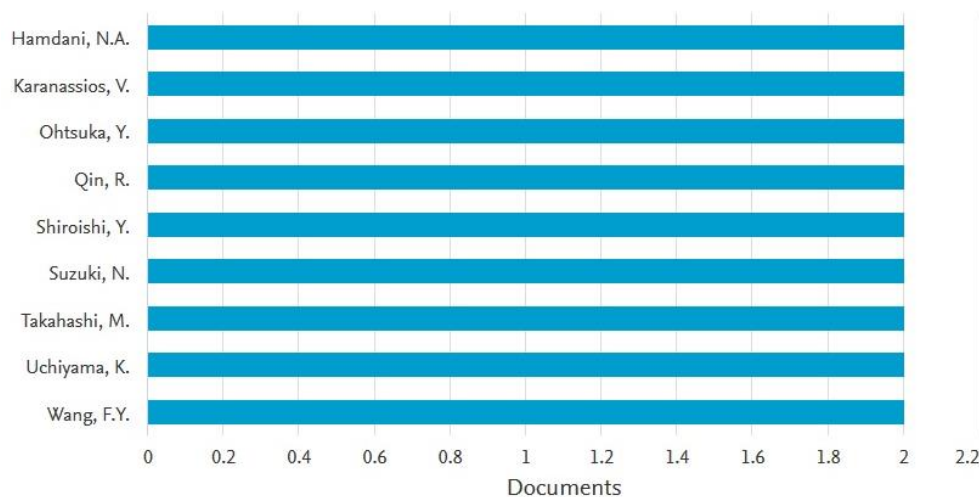


Figure 4. Most Individual Authors of Society 5.0

There were no individual researchers with the most publications in the field of Society 5.0 publications as shown in Figure 4. There were 9 individual researchers who publish research society 5.0 with some

2 documents and were sorted alphabetically, namely: Hamdani, N.A., Karanassios, V., Ohtsuka, Y., Qin, R., Shiroshi, Y., Suzuki, N., Takahashi, M., Uchiyama, K., and Wang, F.Y. In general, individual researchers from Japan as the originator of the concept of Society 5.0. However, there has not been a researcher who dominated the publication of Society 5.0.

3.4. Most frequency of society 5.0 publication by subject area

The most subject area in Society 5.0 publications was computer science with 24 documents (20.2%) as shown in Figure 5. Followed by engineering with 23 documents (19.3%), social sciences with 16 documents (13.4%), mathematics with 15 documents (12.6%), business, management and accounting with 8 documents (6.7%), materials science with 7 documents (5.9%), decision sciences with 5 documents (5.0%), physics and astronomy with 4 documents (4.2%), arts and humanities with 3 documents (2.5%), and agricultural and forestry with 2 documents (1.7%). The most intensive field of study in the publication of Society 5.0 is computer science because the study of Society 5.0 deals with smart societies based on technological progress.

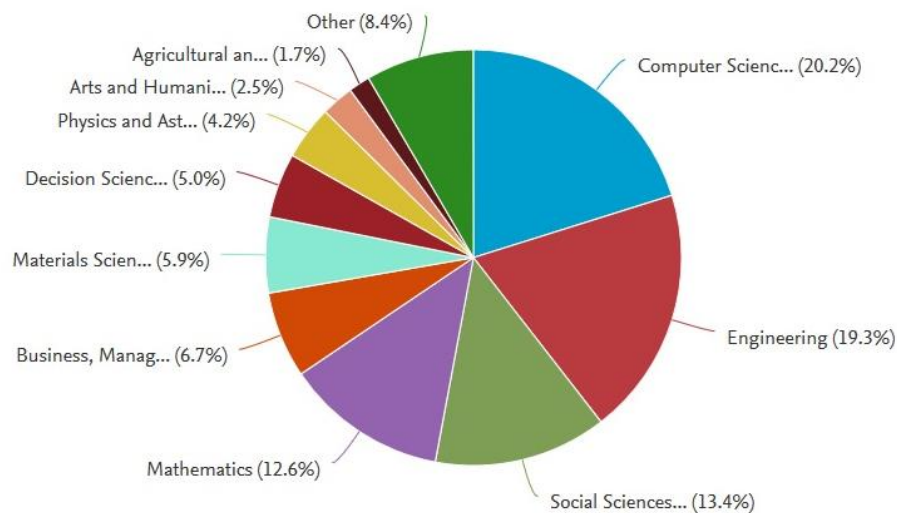


Figure 5. Most Frequency of Society 5.0 Publication by Subject Area

3.5. Most frequent type document of society 5.0 publication

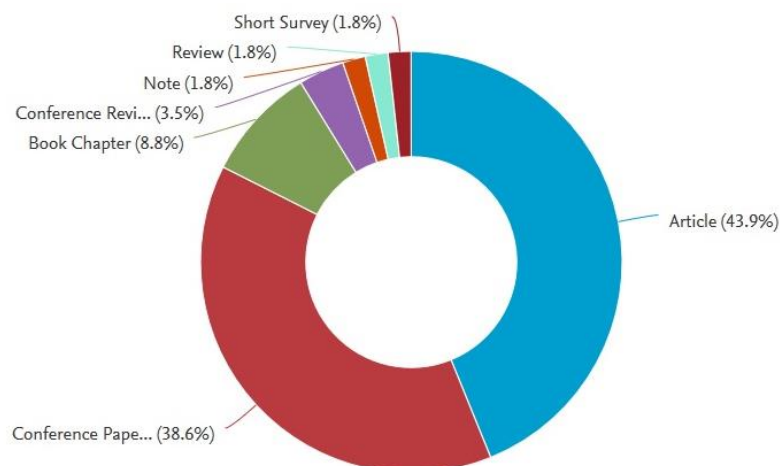


Figure 6. Most Frequent Type Document of Society 5.0 Publication

The most frequent type document in Society 5.0 publication is an article (43.9%) with 25 documents as shown in Figure 6. Then, conference paper (38.6%) with 22 documents, book chapter (8.8%) with 5 documents, conference review (3.5%) with 2 documents, note (1.8%) with 1 documents, review (1.8%) with 1 documents, and short survey (1.8%) with 1 documents.

3.6. Document cited from the society 5.0 studies

Table 1. Number of Citations from Publications in The Society 5.0 Studies

No	Document Title	Authors	Year	Source	Cited by
1	The Cyber-Physical Systems Revolution	Serpanos, D.	2018	Computer 51(3), pp. 70-73	18
2	Society 5.0: A New Paradigm for Computational Social Systems Research	Wang, F.-Y., Yuan, Y., Wang, X., Qin, R.	2018	IEEE Transactions on Computational Social Systems 5(1), pp. 2-8	16
3	Society 5.0: for Human Security and Well-Being	Shiroishi, Y., Uchiyama, K., Suzuki, N.	2018	Computer 51(7), 8423130, pp. 91-95	10

The topmost cited publications were shown in Table 1. The most cited international publications in the Computer journal were the work of Dimitrios Serpanos in 2018 entitled "The Cyber-Physical Systems Revolution", which has been cited in 18 documents.

3.7. Map of article theme

The construction of keyword networks for the article themes map was compiled with the VOSviewer tool. The criterion for a minimum number of documents related to keywords was two repetitions. Therefore, from 436 keywords, 35 keywords are found to meet the threshold.

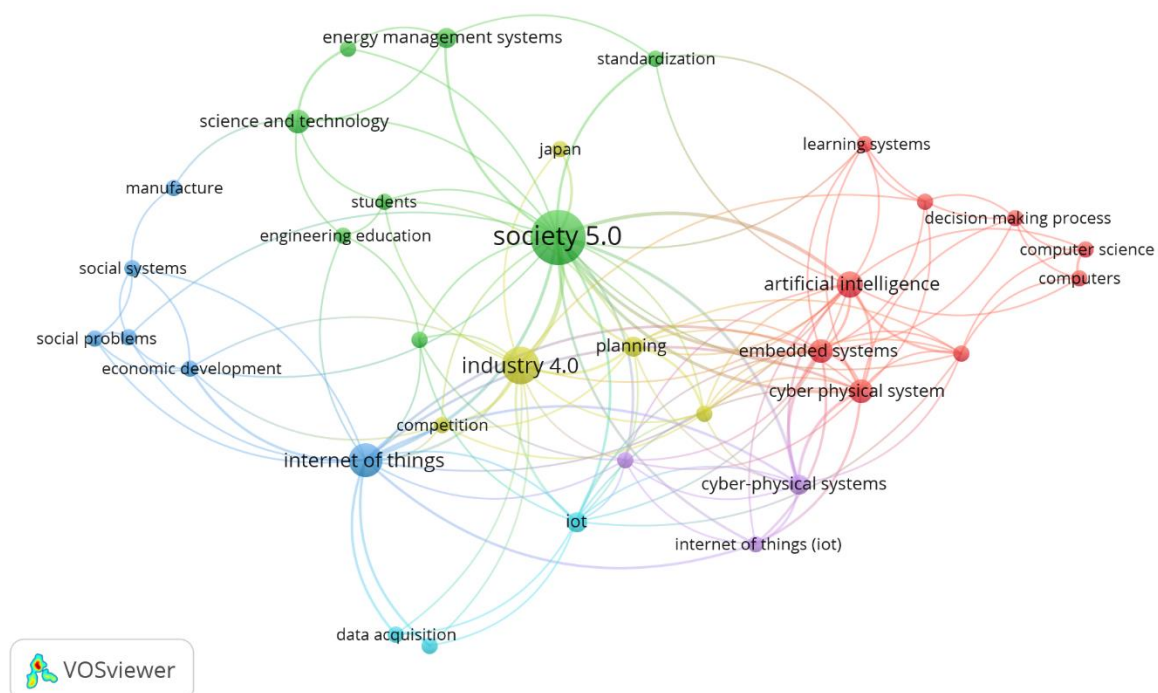
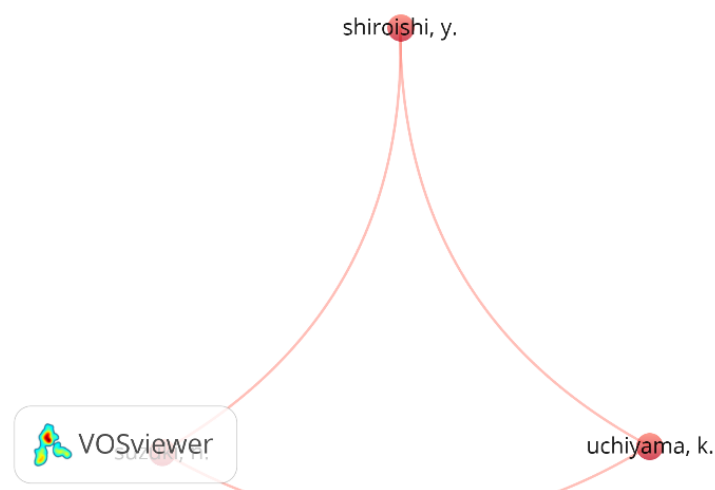


Figure 7. Map of Article Theme

There were 6 clusters of article themes based on research keywords related to Society 5.0 studies as shown in Figure 7.

1. Computer Science Cluster (Red). This cluster dominated by the keywords artificial intelligence, embedded system, computers, computer science, decision making process, human machine interface, and learning systems. All these concepts are related to computer science.
2. Society Cluster (Green). In this cluster, we can find about society topics. So that why not surprise if in this cluster dominated by the keywords society 5.0, engineering education, science and technology, students, standardization, and energy management systems.
3. Economic Cluster (Dark Blue). This cluster dominated by the keywords social systems, social problems, and manufacture. All these concepts are related to economic.
4. Industry Cluster (Yellow). This cluster dominated by the keywords industry 4.0, planning, competition, sustainable development, and japan.
5. Technology Clusters (Purple). This cluster dominated by the keywords cyber-physical systems, and information management. All these concepts are related to technology.
6. IoT (Light Blue). This cluster dominated by the keywords data acquisition, IoT, and signal processing. All these concepts are related to IoT.

3.8. Authorship network

**Figure 8.** Authorship Network

The collaboration of authors in the field of society 5.0 was compiled using the VOSViewer tool. The criteria for the minimum number of documents per author was two documents. Thus, from 131 authors, 9 authors were found who met the threshold. There was a one-group collaboration network between authors in the Society 5.0 studies as seen in Figure 8. The red cluster which contains Shiroishi, Y., Uchiyama, K., and Suzuki, N. The three researchers came from Japan as the initiators of the concept of Society 5.0.

4. Conclusion

This research allows find out maps of increasing numbers of publications in the field of Society 5.0 each year on a global level. The peak number of publications was reached in 2019 with 36 documents. However, there was only one pattern of collaborative groups conducted by researchers on an ongoing basis namely Shiroishi, Y., Uchiyama, K., and Suzuki, N. Considering this concept was still quite new so publication in the field of Society 5.0 is still dominated by the Japanese because of the initiator and pioneer of the concept. There were no research institutions and individual researchers with the most publications in the field of Society 5.0. The most subject area in Society 5.0 publications was computer science. The most cited type of document was an article. The paper with the highest number of document citations was "The Cyber-Physical Systems Revolution" from the journal computer by Serpanos, D. with the number of citations reaching 18 documents. There was one pattern of collaborative researchers in the field of society 5.0.

In terms of contributing implications to knowledge, this study proposes a convergence axis classification consisting of society 5.0 publications to characterize the body of knowledge generated from three years of publications: computer science, society, economics, industry, technology, and IoT. As implications for practical, identifying key themes in the Society 5.0 sector leads to understanding the development of publications to understand common topics and contexts, as well as the research gaps. With all of this, new studies can be led to address a lack of study and advance knowledge in the areas. The themes most researched also demonstrate Society 5.0 contribution to society and technology practice.

Limitations of this research related to scientometrics analysis tend to simplify the complexity of the Society 5.0 research to provide a clear and simple picture. Besides, researchers chose to limit the collection of data in the Scopus database since it provides a collection of papers with peer review, which can be extracted for scientometrics studies. Society 5.0 keyword data mining is limited based on what appears in the title, abstract, and keywords in a manuscript.

Future research is to analyze contributions and explain the impact of Society 5.0 publications based on a combination of data obtained from Scopus, Web of Science, EBSCO, and SciELO.

Acknowledgments

We would like to thank our friends, teachers, parents, family, Universitas Airlangga, and Indonesia.

References

- [1] Iarovyi S, Lastra J L M, Haber R and del Toro R 2015 From artificial cognitive systems and open architectures to cognitive manufacturing systems in *Proceeding - 2015 IEEE International Conference on Industrial Informatics* p 1225–1232.
- [2] Alderete M V 2017 Examining the ICT access effect on socioeconomic development: The moderating role of ICT use and skills *Inf. Technol. Dev.* **23**(1) p 42–58.
- [3] Jiménez A and Zheng Y 2018 Tech hubs, innovation and development *Inf. Technol. Dev.* **24**(1) p 95–118,.
- [4] Kamel S 2005 The use of Information Technology to transform the banking sector in developing nations *Inf. Technol. to Dev.* **11**(4) p 305–312.
- [5] Wamuyu P K 2015 The impact of Information and Communication Technology adoption and diffusion on technology entrepreneurship in developing countries: The case of Kenya *Inf. Technol. Dev.* **21**(2) p 253–280.
- [6] Nagy K and Hajrizi E 2019 Building pillars for adapting society 5.0 in post-conflict countries *IFAC Pap.* **52**(25) p 40–45.

- [7] Fukuyama B M 2018 Society 5.0: Aiming for a new human-centered society *Japan Spotlight* **5** p 47–50.
- [8] Harayama Y 2017 Society 5.0: Aiming for a new human-centered society *Hitachi Rev.* **66**(6) p 556–557.
- [9] Adam P Y and Akhmad A A 2017 Group management system design for supporting Society 5.0 in Smart Society Platform 2017 *International Conference on Information Technology Systems and Innovation, ICITSI 2017 - Proceedings* p 398–404.
- [10] Fujii T, Guo T and Kamoshida A 2018 A consideration of service strategy of Japanese electric manufacturers to realize Super Smart Society (SOCIETY 5.0),” *Commun. Comput. Inf. Sci.* **877** p 634–645.
- [11] Nagahara M 2019 A research project of Society 5.0 in Kitakyushu, Japan 2019 *IEEE Conference on Control Technology and Applications (CCTA)* p 803–804.
- [12] Shiroishi Y, Uchiyama K and Suzuki N 2018 Society 5.0: For human security and well-being *Cyber-Physical Systems* p 91–95.
- [13] Buchak G, Matvos G, Piskorski T and Seru A 2018 Fintech, regulatory arbitrage, and the rise of shadow banks *Journal Financial Economic* **130**(3) p 453–483.
- [14] Hamdani N A, Herlianti A O and Amin A S 2019 Society 5.0: Feasibilities and challenges of the implementation of Fintech in Small and Medium Industries *J. Phys. Conf. Ser.* **1402**(7) p 1–6.
- [15] Purnomo A and Asitah N 2020 Society 5.0 research dataset (2017-2019) *Mendeley Data*.
- [16] van Eck N J and Waltman L 2010 Software survey: VOSviewer, a computer program for bibliometric mapping *Scientometrics* **84**(2) p 523–538.
- [17] Setyawati I, Purnomo A, Irawan D E, Tamyiz M and Sutiksno D U 2018 A visual trend of literature on ecopreneurship research overviewed within the last two decades *J. Entrep. Educ.* **21**(4) p 1–7,
- [18] Ranjbar-Sahraei B and Negenborn R R 2017 Research positioning & trend tdenification *AIDA Booklet* (Walanda: TU Delft).