

Scientometrics Analysis Method for Society 5.0

Sergen Gürsoy (✉ sergengursoy07@gmail.com)

Akdeniz University: Akdeniz Universitesi <https://orcid.org/0000-0002-9032-2999>

Ayten Yağmur

Akdeniz University: Akdeniz Universitesi

Research Article

Keywords: Society 5.0, Super-Smart Society, Scientometrics Analysis, CiteSpace

Posted Date: July 19th, 2021

DOI: <https://doi.org/10.21203/rs.3.rs-693665/v1>

License:  This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Abstract

It includes the systematic examination and mapping of the literature studies written for Society 5.0 using the CiteSpace application, with the scientometrics analysis method, the identification of the network of relations, and the discovery and intellectual analysis of their bibliographic contents.

151 bibliographic records from the Scopus database were analyzed between January 2017 and May 2021. Qualitative analysis of the obtained quantitative data based on the interpretative paradigm was made. Analysis of countries, intellectual analysis, keywords; burst point and cluster analyzes were performed.

The case is gaining increasing importance in the multi-disciplinary field. Since the phenomenon of Society 5.0 is still current and concerns the future period, it is seen that it is a developing field in the literature. In the literature about this case; The fact that scientometrics studies and CiteSpace analysis have never been done has increased the originality of the study. It will be important for super-smart society goals to specialize in the fields studied and to increase the working tendencies in the fields that are lacking (sociology, psychology, gerontology, etc. social sciences).

1. Introduction

When the history of the world is examined, it has been seen that societies follow a cumulative course in conjuncture with social and economic processes. Although the world wars experienced from time to time have reduced the speed of these situations, the stages of social and industrial revolution have developed continuously. There has been a transition from hunting-gathering to an agricultural society and from there to an industrial society. Digitalization, which is the necessity of the new world order, and the infusion of the internet into the way of life of societies have been indicators of a new phase. Data will be recorded and processed electronically through digitalization (Reker and Böhm, 2013). In this way, instant use of the information obtained in the new world order will be realized.

The rapid development of information and communication technology (ICT) will bring major changes to society and industry. Digital transformation will create new material and moral values and will become the pillar of industrial policy in many countries (Fukuyama, 2018: 47). For this reason, to read the concept well in terms of the development of the systematic sustainability of the future world societies, to identify the priority countries, to examine and adapt their policies; It will be important to identify many references, networks and keywords used with Society 5.0, to make inferences about the future, to examine the categories that deal with the concept, to identify interdisciplinary situations and to propose applications for all these.

In the study, scientometrics analysis method was used. Keywords, abstracts and titles were searched from the Scopus database with the titles "Society 5.0" and "Super-smart Society". In the light of the data obtained, systematically; Inferences were made from the literature trends, countries and keywords. Work is a very current phenomenon that concerns future societies. The qualitative definition of the quantitative

data included in the study is made. The fact that no scientometrics study or CiteSpace analysis application was used for the Society 5.0 phenomenon increases the originality of the study.

2. Super-smart Society 5.0

Industry 4.0 has emerged in Germany and The Country has taken its place at the beginning of the most important countries that have adapted to this phenomenon, along with the USA, China, Korea and Japan. The mentioned countries have been the countries with the most industrial robot production as of the period when robotic technologies were prioritized in the industry (Gemma et al., 2017). It has been seen that Japan is at the center of the Society 5.0 phenomenon, which ultimately concerns the present and the future period. Japan firstly implemented Industry 4.0 in its own country and laid the groundwork for Society 5.0.

What is Society 5.0? The concept of Society 5.0, the new world order, is the implementation of Japanese government policy that emerged in 2017. Under the name of "Future Investment Strategy", it is thought that the policy will be a solution to economic growth with the gains to be achieved in the medium-long term (Waldenberger, 2018). Society 5.0 is a phenomenon that has provided its development with the foundations of this phenomenon and gained new gains before the exit from the Industry 4.0 phenomenon has been made in the world history. The concept of Society 5.0 is the national policy initiative that Japan aims to implement in 2015 (Keidanren, 2016). Then, Japan's Prime Minister Shinzo Abe, who participated in the IT fair CeBIT 2017 summit, introduced it under the name Society 5.0. He stated that technology-friendly social life should be adopted and aimed that technology would help individuals in social life.

Japan faces a declining workforce and rising social security costs. The current workforce of more than 77 million people is expected to decrease to approximately 70%, 53 million people, by 2050. On the other hand, the cost of social security will rise from 120 trillion yen in fiscal 2015 to 150 trillion yen in fiscal year 2025 due to the aging of the population (Fukuyama, 2018: 47). The difficulties faced by Japan, such as declining birth rates, declining population, increasing elderly population and inability to respond to the problems of infrastructure, are the problems that many other countries in the world will eventually face. Keidanren, Japan Business Federation is well aligned to proactively fulfill the United Nations Sustainable Development Goals to end poverty, protect the planet and ensure prosperity for all through the creation of Society 5.0 (Shiroishi et al., 2018: 91). The aim of the case is to unite the physical life and the virtual world and to help individuals improve their quality of life by eliminating economic development and social problems.

As seen in the concept of Society 5.0, the main actor is not technology (tool), but human. It has been stated that digital technologies and data should be used to create a society where people lead different lifestyles and follow happiness in their own way (Keidanren, 2018:1). Although Industry 4.0 affects all segments of society, its main purpose is; digitization in industrial life and working life, and the effects have spread to all segments. Society 5.0, on the other hand, started out with the aim of developments

that concern both working life and all segments of the society. Society 5.0 undertakes to meet the needs of individuals instantly, to have a high quality of life, and to live a happy and prosperous social life regardless of age, gender, ethnicity (Harayama, 2017).

The most talked about topics about the phenomenon of Society 5.0; cyber-physical systems, cloud technology, internet of things (very important in terms of combining the real world and the virtual world), artificial intelligence concepts have been adapted with new systems that will meet human needs. It has been observed that individual-centered production structures have emerged due to the adaptation and flexible structuring of humans and machines in the operation process, effective use of communication and transportation (Foresti et al., 2019).

It has been seen that human and machine are integrated in working life, communicating and using artificial intelligence in a synchronized way, production mechanisms and efficiency are improved through the Internet (Capgemini-Prognos, 2018). According to this strategy, the key to achieving medium and long-term growth is to integrate the rapidly occurring innovations of the 4th Industrial Revolution (eg IoT, big data, artificial intelligence, robotics, sharing economy, etc.) into every industry and social life to meet various societal challenges. The solution is to realize Society 5.0 (Fukuyama, 2018: 48).

As can be seen, the concept has assumed a multidimensional form in every sense. Since the phenomenon is still new, it is seen that the outputs and effects will be obtained as of the next period. Together with the systematic handling of the case using the scientometric analysis method, the maps of the concept of Society 5.0 in the process will be revealed and will inform us about the future study topics.

3. Scientometrics

Scientometric, V. V. Nalimov was literated in 1960 by the term "scientometrics" and used to identify science studies that revealed growth, structure, relations network and productivity (Hood and Wilson, 2001:291). It has intersecting networks of scientometrics, bibliometrics, informatics and information technologies. Refers to relationship networks related to the discovery of dynamic structures of data in the literature. Science and technology are used to examine the intersecting aspects of literature.

Scientometrics and bibliometry are difficult concepts to distinguish. But the focus of bibliometry, despite many broad-scale recognition, has always been the scientific literature itself, whereas science and technology are more than just a literary output for scientists to measure and analyze; for example, the applications of researchers, socio-organizational structures, research and development management, the role of science and technology in the national economy, government policies for science and technology, etc. Statuses (Wilson, 2001). Nagpaul, et al (1999) categorized trends in scientific studies; made implications for science and technology policies, including the structure and dynamics of science, including internationally collaborative cooperation between regional aspects of science to the individual level, within the scope of methodology used in science and science.

Evaluation of the phenomenon of Society 5.0 within the scope of scientometrics in the research, the fact that both itself and the method of obtaining literature data have technological and scientific

commonalities; It will assist in obtaining inferences and policy recommendations for the scientific literature and society.

4. Research Philosophy And Method

The study is evaluated in the philosophy of Qualitative Research Methods based on Post-Modern/Anti-Positivist science (Ritchie et al., 2013: 15). Exceptions break the rule, the issue of data reality is at the forefront rather than the term mean true. The universal is not correct, the right place, time, depends on context (Holloway and Wheeler: 2010). Our work is suitable for this structure. Because the average specific to Society 5.0 is not accurate and over time the scope of the scientometrics analysis is expanding. Therefore, because it is constantly updating and expanding the concept, changes will exist in the context of time, context, or even in the context of where it is being worked. In this philosophy, the facts of society and the individual are being explored. The main philosophy of our work is idealism. The sub-paradigm on which Idealism is based is interpretive (Guba and Lincoln, 2001; Collins, 2010). There is a deductive, interpretive (hermeneutics) paradigm in which qualitative research methods are used in the study. Interpretive paradigm, the social world; It is an approach that tries to understand and explain the minds of individuals in society. Real knowledge is based on individuals' perspectives and thoughts. (Günbayı, 2019; Deetz, 1996; Reeves and Hedberg, 2003: 32). The themes that are revealed algorithmically in the program will be analyzed with the theme analysis method in accordance with the interpretive paradigm. According to TerreBlanche and Durrheim (1999), the research process has three main dimensions: ontology, epistemology, and methodology, and for them, a research paradigm is an all-encompassing system of interrelated practice and thought that defines the nature of research across these three dimensions. These Information Theory Criteria will play an important role in forming the framework of the study.

Firstly, when looking at the *Ontological Criterion*; What is the source of the information? Where is it? Idealism, which deals with the subjectivist approach, and its interpretative paradigm and nominalist perspective (Günbayı and Sorm, 2018; Collins, 2010) will lead us to the discovery of the data obtained. The examined reality is in the minds of individuals (subjectivist approach). In the subjectivist approach, the source of knowledge in social life; it is the person himself, his mind, view and point of view (Burrell and Morgan, 1979). The data obtained from the Scopus search channel constitutes the reality of the people doing the study. The starting point in social sciences is human and in our study, scientometric analysis of research based on the authenticity of the authors is carried out. Based on the *Human Nature Problem*, the subjectivist approach, it seems possible that human beings are naturally intelligent beings, that they act with their own mind and will, and that it is necessary to reveal the correct information with their own will. When analyzed according to the *Epistemological Criterion*, the ways in which information is collected will lead us to true and true information. It takes us to the subjectivist approach when we take the person as the basis and deal with the truth of the people. For this reason, the facts in the works of the authors contain their perspectives and minds and help us to interpret them as scientometric analysis. Finally, when the *Methodology* of the study is examined, the question of how the method will be is in the foreground. In the approach, information is accessed ideographically (Günbayı and Sorm, 2018). Is the

source the human mind? In our study, the source is the human mind within the framework of the subjectivist approach, the facts of the authors who conduct research on the subject.

Axiology of research; it presents us what is important, valuable and the limits of the study. The study has the distinction of being the first research article in the international literature on the phenomenon of Society 5.0, made with the scientometric method. In addition, for the first time, the CiteSpace application was used to analyze the Society 5.0 phenomenon. Therefore, it is a work with high originality. However, there are certain limits. Scopus, one of the most important and effective search channels, is used in the study. But search channels like WOS and Google Scholar will also affect coverage size. Expansion can be achieved by using these scopes in future studies.

4.1. The Problem of Research

The scientometrics method was used to explore the outputs of publications, research trends, publication patterns, and data for the Society 5.0 phenomenon, and to make policies. The interpretative paradigm was used on the data obtained to analyze, explore, interpret and make recommendations on the publication trends of scientific literature using scientometrics. countries, keywords and collaborations contributing to the international literature were quantitatively revealed and interpreted qualitatively. Research problems have been created for this purpose;

- How do literary trends for the case of Society 5.0 follow the course?
- How are the productivity and relationship networks (such as cooperation networks, centrality and frequency) of countries regarding the phenomenon of Society 5.0?
- How do the references dealing with the phenomenon of Society 5.0 contribute to the field?
- For the keywords studied within the scope of Society 5.0; What are the implications of collaborations, burst points and cluster analysis? How do representative documents contribute to the field? What are the implications for future directions?

4.2. Database Selection

Research evaluation applications are becoming increasingly important today as the main providers of universally used bibliometric data. Since the reliability of these channels depends on the data source, the most appropriate database should be selected. Scopus is one of the two most important main bibliographic databases (Pranckuté, 2021: 1).

The database of the research was chosen as Scopus. This database was chosen because Scopus is quite comprehensive in the field of social sciences (Jabali et al., 2020: 4–5). For citation analysis, Scopus offers about 20% more coverage than Web of Science, while Google Scholar provides inconsistent accuracy results (Falagas et al., 2008: 338). Scopus is currently the world's largest research abstract and citation database, containing 24,600 journals from 5000 publishers (Elsevier, 2020). Scopus is the world's largest peer-reviewed scientific literature data source, with 75 million indexed items. In addition, Scopus

updates the data daily and 32% of the total content indexed in Scopus belongs to the social sciences literature (Rashid, 2021: 3). Identify emerging trends What are the latest research areas? Who are the leading experts? Do you uncover the full scope of cutting-edge research? It fosters innovation through multidisciplinary research and reviewing, analyzing and sharing insights while seeking answers to their questions. The use of the Scopus database in our study is an important factor in terms of scope and compatibility with technology.

4.3. Search Query

In order to obtain bibliographic data about the phenomenon of Society 5.0 and to make scienometric inferences, a search interface was run in the type of search query and search field. In the Search tab: "Article Title, Abstract and Keyword" query was made. search terms; TITLE-ABS-KEY ("Society 5.0") OR ("Super-Smart Society"). The two phrases have been chosen because they are compatible and related to each other and because they are the most effective terms within the scope of the subject. There is no time limit on the search tab. The date of data collection from the system is 30.05.2021.

4.4. Research Data

165 studies for the term "Society 5.0" and 10 studies for the term "Super-Smart Society" were obtained in the search on the database. In total, 175 studies were examined in detail and 2 studies were determined not to be subject-specific and excluded. No temporal restrictions were made (from 2017–2021 End of May), no language or geo-filtering was applied. Data; conference paper (N = 71), article (N = 67), book chapter (N = 17), conference review (N = 5), review/review (N = 5), book (N = 3), editorial (N = 3), grade (N = 1) and short questionnaire (N = 1).

4.5. Data Analysis Method

The bibliographic data of 173 studies were obtained and the 5.7.R5 version of the CiteSpace application was used to perform the sciometry analysis method. The application was chosen because of its high quality in simplifying, transforming and analyzing our analysis process, innovative mapping of network of relationships, and being the first research application to be written in this field. This app combines many types of data as well as countries, keywords, references etc. In this context, it will help in mapping studies (Chen, 2006). In addition, clustering analyzes through the application help us to make inferences for the future and develop suggestions by obtaining cooperation networks.

Before starting to analyze the data, the quotation marks were deleted with the Notepad ++ program to make the data suitable for analysis. Then in the application "ris." format has been converted. The analysis was continued with 172 studies that could not be converted to 1 study and 6456/6088 (94.0%) valid references. 95.0% is a very good success rate, considering all the irregularities of the cited references (Chen, 2014: 66). In our study, it has been seen that it provides a good conversion rate as it is very close to 95%. The last operation, which is the deletion of duplicate documents, was carried out before being put into the analysis. On the application, 21 duplicate documents were excluded from the scope of analysis, and finally, 151 documents were included in the scope of analysis.

CiteSpace general application parameters for the analysis of 151 studies; time spans covering all studies (2017–2021), year per slice (1), term source (all fields), node type (select one by field at a time), selection criteria g-index scale factor ($k = 25$), Top N10.0% was chosen as pruning (pathfinder).

4.6. Definitions of Statistical Methods

In the application software, node link graphs, co-citation network analysis, detection of collaboration, centrality, citation burst points, cluster analysis, modularity, silhouette value etc. There are stages of analysis such as (Chen, 2004). CiteSpace, nodes reflect items such as keywords, countries, authors, etc. Node sizes indicate the number and density of studies. The colors on the nodes represent different time periods. The lines between nodes; It reflects cooperation and relationship, and the colors represent time.

Centrality is an important species in the field. Centrality represents the degree of importance. The center spacing of a node is similar to the constantly used toll booth, the center spacing of the most used toll booth will be high, and the center spacing of the less used toll booth will be low (Chen, 2016: 30). The fact that the center edge of the node is purple shows the importance, power and effectiveness of the centrality between them. The key node is the part with intermediate centrality ≥ 0.1 . The bursting point is an important indicator for determining the trend of the research focus. Redness of circles and lines in the graph; it shows the time period of quote bursts and trend, trend is detected.

Cluster analysis reveals themes determined through the application's algorithm. The modularity of the clustered partner networks and their average silhouette scores represent the algorithm features of the cluster analysis. Modularity is applied in order not to focus on individual nodes and local details (so that the overall schema is not overlooked) and to divide the panoramic network into separate node groups within the visual analytic process for this. This kind of splitting can be done with quite a variety of clustering algorithms. The modularity of the network measures the extent to which it can be decomposed into multiple components or modules within the network. Modularity value (Q); It is convincing that it is between $0,30 < Q < 1.00$ (Chen, 2016: 32). A value close to 1 indicates that it is fairly well partitioned. The silhouette value (S) of the cluster measures the quality of the clustering. It ranges from $-1 < S < 1$, value of 1 represents perfect resolution.

5. Results

5.1 Literature Trend

The year 2017 represents the starting point for studies on the Society 5.0 phenomenon. Between 2017–2021, it has been observed that the studies on this subject in the literature have grown significantly. From 2017 ($n = 8$) to the end of 2020 ($n = 63$), it was observed that the number of studies on the subject increased approximately eight times./p>

As can be seen in the figure, there is an acceleration in an increasing structure. As of May 2021 ($n = 33$), it was seen that more than half of the studies published in 2020 were published. If the momentum continues in this way, the end of 2021 will be the year in which the largest number of works will emerge.

In addition, when the number of citations is examined, it is seen that it follows a similar course. The number of citations in 2020 (155) is approximately six times more than the number of citations in 2017 (26). As of the end of May 2021, it was determined that the acceleration of the number of citations (100) increased rapidly compared to the previous year. As can be seen, it has been observed that the number of citations in the literature has increased rapidly over the past years. As a result, these two situations show us that the trends in the literature on this subject have increased rapidly and the subject has attracted attention over the years.

5.2. Productivity and Collaboration Analysis of Countries

The CiteSpace application revealed 61 nodes and 43 links to analyze and map the countries. There are publications on the subject of Society 5.0 in 61 different countries. However, with the emergence of 43 connections, it has been observed that there is limited cooperation between countries on this issue, that countries either establish connections with studies within themselves or cooperation is made between studies among major countries (Fig. 2). At this point, the increase in the cooperation of countries; It will help each country's conditions, contexts, and countries to produce unique outputs. With the increase in collaborations, the authors can make the phenomenon adaptable to their own country within the framework of certain references.

The top ten countries in terms of number of publications and degree of centrality are listed in Table 1. The country with the most publications was Japan (42), which revealed the phenomenon of Society 5.0. Indonesia (29) and the United States (12) came first among the countries that broadcast the most. The degree of centralization on the basis of countries has remained low due to the limited number of studies and the fact that it only covers a period of four years. The most important country in terms of centrality is the United States of America (0.06), followed by Poland (0.03), Japan (0.02) and Russia (0.02). It was seen that Japan came to the fore on the basis of publication and the USA and Japan on the basis of centrality.

Table 1 Top Ten Countries by Number of Publications and Centrality Value

Ranking	Number of Publications	Countries	Years	Raking	Centrality	Countries	Years
1	42	Japan	2017	1	0.06	United States	2019
2	29	Indonesia	2017	2	0.03	Poland	2019
3	12	United States	2019	3	0.02	Japan	2017
4	7	Russian Federation	2019	4	0.02	Russian Federation	2019
5	7	Italy	2020	5	0.00	Indonesia	2017
6	5	Canada	2019	6	0.00	Italy	2020
7	5	Poland	2019	7	0.00	Canada	2019
8	4	South Africa	2020	8	0.00	South Africa	2020
9	4	Portugal	2020	9	0.00	Portugal	2020
10	3	Turkey	2020	10	0.00	Turkey	2020

It is normal for Japan to have such a high number of publications, since it is the country that reveals the source of the phenomenon (Keidanren, 2016). However, it may seem surprising that the number of publications in the country of Indonesia is so high, but it is not. Because Indonesia is one of the countries that applies the phenomenon of Industry 4.0 to all areas of social life (Natalia & Ellitan, 2019; Hamdanunsera, 2018). The penetration of Industry 4.0 into every aspect of society has led to the phenomenon of Society 5.0. The five industries (textile, automotive, electronics, chemicals, food and beverages), which are considered as focal points against Industry 4.0 and Society 5.0, are very important in terms of competitiveness and are expected to enter the top ten countries in the world economy in 2030 (Ellitan, 2020; 7–8).). In addition, according to the Google Trends data of 2021, the countries with the most searches for the word Society 5.0 are respectively (if we consider that the least popularity value is 0, the most popular value is 100); Japan (100), Indonesia (41), Malaysia (18), USA (2), Germany (1). Thus, the relationship between Indonesia and Society 5.0 can be understood. On the other hand, it is seen that the USA started the studies as late as two years but formed the intersection point as the country with the highest level of importance.

It is seen through the nodes on the map that Japan has the oldest and newest works. Although it is natural that the studies in the USA are not as old as Japan, it is seen that the number of years is not to be underestimated. At this point, the USA is one of the countries with a high potential to continue its work in the future, as it carries out many and centralized studies in a short time.

In Fig. 2, it is seen that the cooperation between the USA and Indonesia countries has followed a comprehensive course. It has been seen that the cooperation between the USA-Slovakia, Japan-Indonesia,

Russia-Poland is extensive. It has been observed that Portugal's cooperation network with other countries is effective. The other strongest cooperations were seen to be Russia-Poland, USA-Indonesia, Japan-Indonesia, USA-Slovakia. (All of them have 1.0 value) Since the number of countries is higher than the number of connections, it is normal for the value of inter-country connection to be so high. In the future, it will inevitably be seen that there will be decreases in the value of the connection with the increase in the number of cooperation.

5.3 Reference Analysis

Analysis of references is used to identify the intellectual structure and collaborations of the literature. Rather than the cited authors, reference analysis was used because of the innovative nature of the case and the comprehension of the content of the studies. While determining the final decision regarding this situation, necessary information was obtained by the founder of the CiteSpace application and an expert academician.

Considering the reference analysis of the studies studied for the case, Top N was included in the analysis as 100% (all references), unlike other parameters. Unlike other analysis titles, when Top N% was included in the analysis at a normal rate, it could not reveal the desired effect, even if it was similar to the analysis obtained in total. Including all studies in the system will be more important and effective in making discoveries and comments on references. It is seen that 5651 nodes and 17088 connections have emerged. The result was quite comprehensive as all of the studies were included in the analysis. Figure 3 shows the relationship networks map. Table 3 shows the number of nodes and connections that change from year to year, Table 4 shows the references with a centrality level of 0.01 and above that are jointly cited in order of Centrality.

Table 3 Number of Nodes and Connections from Year to Year

Years	Nodes	Links
2017	116	348
2018	547	1641
2019	964	2892
2020	2382	7146
2021	1687	5061

When the table is examined, it is seen that the nodes increase rapidly from year to year. Parallel to this situation, it was observed that the connections increased rapidly. In May 2021, it was seen that there were much higher nodes and connections than the result of the previous year when we divide it by average months. Therefore, when we come to 2021, it has been seen that there are quite good node and connection numbers according to the current studies, and if the increase rate continues in this way, it is

predicted that the phenomenon will reach the highest number of references and connections by the end of 2021. This means a rapid expansion of the subject's scope. When the network map is examined, it is seen that the number of references made to authors such as Y. Shiroishi, M. Fukuyama, B. Salgues, K. Fukuda is ahead of the others. These authors are the main reference sources for the Society 5.0 phenomenon. The level of centralization was considered to be important in the reference analysis in Table 4. Since it determines the studies with the highest level of importance, the importance of the studies that are taken as a common reference will be determined. However, the level of centralization remains low, as the case is still new and there is not much literature accumulation.

Table 4 Commonly Cited References by Centrality Ranking

Freq	Centrality	Author	Year	Source
9	0.02	Y. Shiroishi vd.	2018	Society 5.0: For Human Security and Well-Being
6	0.02	M. Fukuyama	2018	Society 5.0: Aiming For A New Human-Centered Society
2	0.02	R. Miśkiewicz	2020	Practical Application Of The Industry 40 Concept In A Steel Company @ Sustainability
7	0.01	B. Salgues	2018	Society 5.0: Industry Of The Future, Technologies, Methods And Tools
2	0.01	S. Alter	2019	Making Sense Of Smartness In The Context Of Smart Devices And Smart Systems Making Sense Of Smartness In The Context Of Smart Devices And Smart Systems
2	0.01	A. Rojko	2017	Industry 40 Concept
2	0.01	AY. Akinwale	2017	The Impact Of Technological Innovation On Smes Profitably In Nigeria Int J Research Innovation And Commercialization

The cited article with the highest centrality and frequency is that of Y. Shiroishi et al. In the study, there are objectives and targets for the phenomenon of Society 5.0 that emerged in Japan (Shiroishi et al. 2018). M. Fukuyama, on the other hand, in his study (2018; 47); He stated that information and communication technology will bring the global digital transformation and new values for the society and the sector will emerge. R. Miśkiewicz and Wolniak (2020) made inferences about the digitalization process in Industry 4.0-based company organizations. Salgues in his study (2018); He stated that the phenomenon of Society 5.0 emerged with the rapid development of technologies spreading globally, and he criticized the dramatic social changes that came with it. As can be seen, the cited references are important basic reference sources for the Society 5.0 studies. Because it provides general and basic information about

the phenomenon and forms the basis for the studies to be included in the literature. It has been observed that the studies generally make general statements, policies and promotions in the technological and economic field for the phenomenon of Society 5.0. Currently, it is usual for general statements to be quoted in new works. As the subject becomes more specific and the fields become more specific, general information can evolve with different concepts.

5.4. Analysis of Keywords and Future Research Guidelines

When the common keyword analyzes in the studies are examined; It was seen that 195 nodes and 633 connections emerged. Of the 195 clusters, 70 (highest) were in 2020 and 52 in May 2021. It has been seen that there is an increasing scope as the years go by, the subject is quite up-to-date and 2021 has the potential to host the most studies on this subject. In Fig. 5., the year-based relationship network map of the keywords is revealed. In Table 5, the 10 common keywords with the highest number and the highest level of centralization are shared.

The years are given at the top of the figure. Before the Society 5.0 keyword; The keyword Society 5.0, which references keywords such as energy systems, energy management and conceptual design progression systems, constitutes the starting point of the case. Society 5.0 naturally has the most citations and the most centrality. The other most centralized keyword is Industry 4.0. As time progressed, the network of relations with this keyword increased and new keywords were added to the literature.

Industry 4.0; computerization and employability, economic developments, cyber-physical systems, artificial intelligence were among the keywords with a high network in 2017–2018. Keywords for 2018–2019; Keywords such as complex problem solving, studentship, informatics education, assistive technology contain keywords for individuals to gain qualifications. 2019–2020 keywords; sustainability, learning systems, human happiness, technological innovation, sales technology. In the years 2020–2021, keywords such as digital transformation, sustainability, critical thinking, innovative learning, artificial intelligence technology, and blockchain were predominantly used. As you can see, keywords are terms that differ from year to year and are intertwined and related to each other. It has been observed that the keywords are mostly shaped in the fields of economy, business and engineering.

Table 5. Keywords with the Most Number and the Highest Level of Centralization

Raking	Freq	Keywords	Raking	Centrality	Keywords
1	57	Society 5.0	1	0.74	Society 5.0
2	29	Industry 4.0	2	0.40	Industry 4.0
3	12	Student	3	0.38	Student
4	12	Sustainable Development	4	0.30	Internet Of Thing
5	12	Internet Of Thing	5	0.15	Artificial Intelligence
6	12	Artificial Intelligence	6	0.10	Embedded System
7	8	Embedded System	7	0.09	Industrial Revolution
8	7	Industrial Revolution	8	0.09	Industrial Enterprise
9	7	Education Computing	9	0.08	Sustainability
10	6	Learning System	10	0.07	Engineering Education

The top 3 keywords in terms of frequency and centrality have not changed. It is usual for the words Society 5.0 and Industry 4.0 to be in the first place. Those who work on the phenomenon of Society 5.0 mostly mentioned the phenomenon of Industry 4.0. Because the facts integrate each other. In addition, the word student, the internet of things, artificial intelligence, industrial revolution, industrial entrepreneurship, sustainability, learning systems, and the fact that it contains common keywords with subjects related to many departments such as engineering education shows that the phenomenon of Society 5.0 is a mutli-disciplinary field. However, the scope of the multi-disciplinary field is still controversial due to the fact that the case is new.

Table 6 presents a list of the 20 most powerful citation bursts. Power gives the level of centrality and connectivity in the relationship between keywords. It is an indicator of the active use of keywords. While the blue area indicates a moderate citation status, the red area indicates how long the trend of relevant keywords, the boom state, lasted. The list is based on historical order.

Table. 6. Top 20 Keywords with the Strongest Citation Burst

Keywords	Year	Strength	Begin	End	2017 - 2021
Energy Management System	2017	1.24	2017	2017	
Economic Development	2017	1.2	2018	2018	
Internet Of Thing	2017	1.02	2018	2019	
Cyber Physical System	2017	0.92	2018	2018	
Competition	2017	0.86	2018	2019	
Computation Theory	2017	1.59	2019	2019	
Decision Making Proce	2017	1.06	2019	2019	
Data Acquisition	2017	1.06	2019	2019	
Signal Processing	2017	1.06	2019	2019	
Industrial Enterprise	2017	1.06	2019	2019	
Computer	2017	1.06	2019	2019	
Higher Education	2017	1.06	2019	2019	
Computer Science	2017	1.06	2019	2019	
Planning	2017	1.06	2019	2019	
Iot	2017	0.73	2019	2019	
Sustainable Development	2017	1.89	2020	2021	
Japan	2017	1.64	2020	2021	
Innovation	2017	1.09	2020	2021	
Technology	2017	0.81	2020	2021	
Embedded System	2017	0.77	2020	2021	

The words with the strongest citation bursts; They are listed as "sustainable development", "japan", "computation theory", "energy management system", "economic development". These words are mostly related to economic developments and show a tendency towards sustainable business and economy.

Together with the citation bursts, it is seen whether there is a change between the topics that were spoken in trend between 2017–2018 and the topics that were mostly spoken in recent years. On the basis of the common keyword of the case, it was observed that the only trend word was "energy management system" in 2017. In the following process, it was determined that the keywords "economic development", "internet of thing", "cyber physical system", "competition" became a trend in 2018. When the common key developments were examined in 2019, it was seen that the tendencies of data collection, internet of things, signal processing, industrial organizations, computer and information technologies were higher. Sustainable development in 2020-21 Terms such as innovation, technology, etc. The reason why terms such as Society 5.0, Industry 4.0 and Industrial Revolution are not included in the citation bursts is because they are not an instantaneous phenomenon, but are always trend terms that concern the general lines of the subject. These words are the keywords that have been studied more than in the previous

periods. Especially the last two words are important keywords that have increased rapidly in frequency and centrality, although they have entered the trend list in 2020 and are still new terms. Keywords refer to previous terms. Industry 4.0 based cyber physical system uses embedded system to communicate and connect via IOT (trend keyword of 2018). Thus, the connection between physical and digital systems is established and personalized (Peraković et al., 2020; 205). Therefore, it is usual for cyber-physical systems to be the trend in 2018 and then to develop embedded systems. With the implementation of these systems in the future, new terms can be created in the same field and these new terms can cooperate with different fields.

When the common keyword trends are examined in general in the case of Society 5.0; economy (sustainability), engineering and technology fields were seen to be the focus of attention. The phenomenon of Society 5.0 is an issue that concerns all areas of society. Ultimately, not only the economic aspect of the Society 5.0 phenomenon, but also the social aspect dominate with the smart society understanding.

Cluster analysis has been carried out in order to examine and interpret the keywords in detail today and to predict the future keywords in the light of the suggestions of the obtained documents. For this purpose, a common keyword cluster map is drawn in Fig. 5.

Modularity (Q) value: 0.6606 and Silhouette (S) value: 0.9019 are quite good figures. According to the modularity value, it has been seen that each cluster is properly separated. According to the silhouette value, it is obvious that the clusters are resolved quite well. LLR (Local Linear Regression) algorithm was used to label the clusters. 9 sets of keywords emerged. The largest of the clusters is #0; It contains 40 keywords and an average S value of 0.842, #1; It has 31 keywords and pretty good S values of 0.978. Table 7. shows the first 5 of the clusters in order of size. However, 9 clusters were also included in the analysis.

Table. 7.Major Keyword Clusters

ID	Size	Mean Silhouette	Mean Year	Terms (Local Linear Regression)
0	40	0.842	2019	open data performance expectancy (25.02); sustainable infrastructure evolution (23.49); sustainable development report (21.98); sustainable development goal (20.47)
1	31	0.978	2020	learning model (19.72); google classroom (19.72); competency assessment (19.72); 21st century student (19.72)
2	25	0.935	2018	technical introduction (20.56); care training robot (20.56); joint load material (20.56); basic consideration (20.56); east asia (16,37)
3	24	0.853	2019	human security (26.82); information society (22.23); super smart society (22.23); cyber physical system (22.23); self checkout operation (17.69)
4	15	0.822	2019	0-a discussion (21.92); japans society (21.92); smart societies (16.32); future security challenge (16.32); societal perspective (16.32)

The first four terms of the values obtained with the LLR are at close levels. The labels in each cluster were selected from the keywords in the articles with the log-likelihood ratio (LLR) weighting algorithm, which is a measure that calculates the weighting coefficient of the keywords in the cluster. Silhouette values given in the table are quite good and it is seen that the keyword sets are resolved appropriately. Keywords in the clusters, if they are in the document titles, have automatically changed to yellow background.

In the #0 cluster with 40 keywords; The year 2019 is considered as the average year. The terms aim to establish infrastructure systems for data performance, as well as to realize sustainable infrastructure evolution and sustainable development. In the #1 cluster with an average year of 2020, it was seen that the most studied subjects were learning techniques, learning stages, the concept of studentship and competency assessment. In cluster #2, whose average year is 2018; It is seen that the tendency to robotic technologies is high. #3 and #4 indicate similar average years and include süper-smart societies, security structures of societies and future work, social perspectives, cyber-physical systems and self-control systems. In other clusters, it was observed that technology, economy, engineering, health care and medical fields were emphasized.

Table 8. Representative Documentation of Major Keyword Sets

Cluster #	Citing Papers	Coverage %
#0 open data performance expectancy; sustainable infrastructure evolution; sustainable development report	Matsuda, K (2019) Technologies of production with society 5.0. 6th International Conference on Behavioral, Economic and Socio-Cultural Computing, BESC 2019.	7
	Da, Costa (2021) Society 5.0 as a contribution to the sustainable development report. International Conference on Tourism, Technology and Systems, ICOTTS.	5
	Świątek, L (2019) From industry 4.0 to nature 4.0 – sustainable infrastructure evolution by design. AHFE International Conference on Human Factors, Sustainable Urban Planning and Infrastructure.	5
	Sołtysik-Piorunkiewicz, A (2021) How society 5.0 and industry 4.0 ideas shape the open data performance expectancy. Sustainability (Switzerland).	5
#1 Learning model; google classroom; competency assessment	Ilma, AZ (2021) Assessment for learning model in competency assessment of 21st century student assisted by google classroom. 2020 National Physics Seminar, SNF.	9
	Zahara, M (2021) Teachers' perceptions of 3d technology-integrated student worksheet on magnetic field material: a preliminary research on augmented reality in stem learning. Young Scholar Symposium on Science Education and Environment 2020, YSSSEE.	6
	Liliasari, S (2021) Innovative chemistry education: an alternative course models in the disruption era. 1st Mathematics and Science Education International Seminar, MASEIS 2019.	5
	Umamah, N (2020) Teacher perspective: innovative, adaptive, and responsive instructional design aimed at life skills. 2nd International Conference on Environmental Geography and Geography Education, ICEGE 2019.	5
	Sajidan, – (2021) A framework of science based entrepreneurship through innovative learning model toward indonesia in society 5.0. 2nd International Conference on Science Education and Technology, ICOSETH 2020	

Cluster #	Citing Papers	Coverage %
#2 technical introduction; care training robot; joint load material	Takase, J (2018) Care training robot joint load material of basic consideration technical introduction. Transactions of Japanese Society for Medical and Biological Engineering.	9
	Takakuwa, S (2018) "industry 4.0" in europe and east asia. 29th International DAAAM Symposium on Intelligent Manufacturing and Automation, DAAAM 2018.	7
	Takakuwa, S (2018) "industry 4.0" in europe and east asia. 29th International DAAAM Symposium on Intelligent Manufacturing and Automation, DAAAM 2018.	6
	Fathi, S (2020) The role of urban morphology design on enhancing physical activity and public health. International Journal of Environmental Research and Public Health.	5
	Hall, A (2019) Detectors and light-sources for optical spectrometry: from a 3d-printed light-source to a self-powered sensor fabricated on a flexible polymeric substrate, and from there on to an iot-enabled smart system. 1st IEEE International Conference on Flexible and Printable Sensors and Systems, FLEPS 2019.	5
#3 human security; information society; super smart society; cyber physical system	Nieuważny, J (2020) How religion and morality correlate in age of society 5.0: statistical analysis of emotional and moral associations with buddhist religious terms appearing on japanese blogs. Cognitive Systems Research.	6
	Shiroishi, Y (2018) Society 5.0: for human security and well-being. Computer.	5
	Yıldırım, T (2020) Cyber physical systems: from information society to super smart society. 12th International Conference on Electrical and Electronics Engineering.	5
#4 5.0-a discussion;japans society;smart societies;future security challenge	Mykoniatis, K (2020) Society 5.0: a simulation study of self checkout operations in a grocery store. 32nd European Modeling and Simulation Symposium, EMSS 2020.	5
	Mavrodieva, AV (2020) Disaster and climate change issues in japan's society 5.0-a discussion. Sustainability (Switzerland).	6

In the table above, documents with a coverage ratio of less than 5% were not included in the chart, but were included in the analysis. It has been tried to gain a broad perspective by examining the representative documents. K. Matsuda's article in cluster #0 corresponds to 7% of the keywords belonging to the cluster and the study carries the most relevant keyword document associated with the cluster. According to this study of Matsuda et al. (2019); With Society 5.0, a new idea of production technologies emerged. The advertising and proliferation of the 5G network will bring a revolutionary technological advance in production management by accommodating new technical networks. Other studies within the

same cluster are focused on sustainable development. In this cluster, it has been observed that economic factors and studies on the creation of infrastructure in working life are predominant.

The work of A. Z. Ilma et al. in cluster #1 covers 9% of the keywords belonging to the cluster. In this study (2020), interview was conducted which showed that assessment for learning is useful in redesigning more online learning strategies to improve students' abilities in the 21st century. Other studies in the same cluster were also studied in the fields of qualification training for competency assessment.

In cluster #2, J. Takase et al. corresponds to 9% of the keyword coverage in the cluster. In this study (2018), special attention was paid to concepts such as sharing information, new values, low birth rate, aging and local population decline; It has been stated that reductions against poverty and wealth gap will be realized with robotic technology. In other documents of the same cluster, intelligence generation and automation systems, public health, IOT smart technologies, certain statistical analyzes were made.

In the #3 cluster, the study of Y. Shiroishi et al., (2018) corresponds to 6%. In the study, based on Keidanren's United Nations Sustainable Development Goals, the policies to reduce the poverty of the Society 5.0 phenomenon, increase the welfare of the society and protect the world are mentioned. Other documents of the same cluster are also aimed at services for the society. Finally, it has been seen that one of the main purposes of the Society 5.0 phenomenon is the service to the smart society and individuals. However, it is debatable whether this cluster is at a sufficient level for the subjects studied in social sciences.

The only work covered in cluster #4 is A.V. Mavrodieva and R. Shaw (6%). The study (2020) aims to ensure sustainable development by focusing on disaster risk and climate change policies in the case of Society 5.0. Study subjects of other articles in the same cluster; focused on security challenges in smart societies, the use of medical artificial intelligence, and the importance of innovation and values in the transition with the phenomenon of Society 5.0.

The subjects studied in the representative documents in the #5 cluster with a silhouette value of 0.971, whose average year is 2017; medical artificial intelligence, smart pandemic management and 4d mathematical modeling systems. The average year of the #6 cluster was 2020, and the Silhouette value was 0.862; It has been observed that researches are carried out in more ecosystem and working conditions-oriented areas such as flexible decision-making systems, smart pandemic management, innovative ecosystem transformation, and sustainable working conditions. In the #7 cluster, whose average year was 2018, the Silhouette value was 0.961; It has been seen that there are many studies on education policies, open data performance expectations, and best practices for the Internet of Things. In the #8 cluster, the average year was 2019 and the Silhouette value was determined as 0.980; It has been seen that computer-based studies such as visual analytical framework, cyber-physical systems, conditional monitoring, open data performance expectations are at the forefront.

As a result of the general analysis of all these clusters and considering the number of keyword nodes and links; In addition to this, it is foreseen that the subject will gain importance day by day, as well as the

expansion of the dimensions of the multi-disciplinary structure by increasing the connections in the coming years. At this point, the important thing will be to specialize in the subjects studied and to start and continue studies on subjects that are considered incomplete and that deal with society.

6. Conclusion

The literature trends of 151 articles in accordance with the CiteSpace application scienometric analysis from the Scopus database, analysis of countries and references, and detailed analyzes of keywords (collaboration, burst points, centrality levels, cluster analysis, document analysis) were made within the framework of the interpretive paradigm. The content of the aforementioned analyzes has been discovered and interpreted. In particular, this paradigm has been important in the interpretation of the relations established after the discoveries and cluster analyzes in the analysis.

The study aimed to gain a holistic and systematic perspective on the phenomenon of Society 5.0. In addition, there are various restrictions. In the future, in addition to Scopus scope, a wide range of research can be carried out in the Web of Science and Google Scholar databases with different search options. While this phenomenon cumulatively increases its scope in the literature over time, the inclusion of other databases in the analysis will also help in the emergence of more comprehensive findings.

When the trends in the literature are examined, the Society 5.0 field is currently developing and is expected to continue its development in the future. The fact that the phenomenon of Society 5.0 is included in the fields of multi-disciplinary expands its scope. In the analysis of the countries' cooperation, it has been seen that Japan, Indonesia and the USA on the basis of quantity and countries such as the USA, Japan, Poland and Russia on the basis of centrality constitute an important scope in the literature. When cooperation is examined, it is seen that the country that cooperates the most is the USA. In the reference analysis, it was seen that the works of authors such as Y. Shiroishi et al., M. Fukuyama, R. Miśkiewicz, B. Salgues were at the forefront. It has been observed that the documents, which are high in number and centrality level of the cited studies, were taken as reference for the purpose of promoting the Society 5.0 phenomenon in general terms, and to indicate its technological and economic structures. As the phenomenon becomes specialized in different fields, it is predicted that these general expressions will evolve in those fields.

Keyword cluster analysis provides guidelines for the future. It is foreseen that the studies will be in the trends of innovation education, data literacy, complex problem solving, critical thinking, taking artificial intelligence technology to advanced levels and pandemic management (especially coping with the coronavirus epidemics) in 2021 and beyond. Because when the keywords are considered over the years, it has been seen that the previous period forms the basis for the next period because it has a complementary structure. According to the report shared by the World Economic Forum in 2020, it has been seen that there are findings similar to the prediction. Technologies that are likely to be adopted in companies include concepts such as data analysis, internet of things, cyber security, artificial intelligence, cloud computing, robotic studies, virtual reality. To this end, it is envisaged that companies' demands for

workers should be based on qualifications such as critical thinking and complex problem solving, self-management and technology use.

It has been observed that the keywords included in the phenomenon of Society 5.0 have changed dimensions over time and shifted to multi-disciplinary fields. Keywords in cluster analysis; It was observed that studies on health, engineering, mathematics, technology and economy were predominant. When all these clusters are evaluated in general, it is seen that the other 7 clusters have a similar structure despite 2 clusters (#3 and partially #4). In the studies in which the keywords common to the Society 5.0 keywords are included, it has been observed that social perspectives are lacking and instead sustainable development, infrastructure stages and technological developments (internet of things, computer information systems etc.) come to the fore. Since studies on areas such as sociology, psychology, social policy, and gerontology are limited and the phenomenon of Society 5.0 has a structure that directly concerns the society (Keidanren, 2018; 17), it is recommended that studies be developed in a multi-disciplinary framework based on social sciences.

Declarations

The authors declare no competing interests.

References

Burrell, G. & Morgan, G. (1979). *Sociological Paradigms And Organizational Analysis: Elements Of The Sociology Of Corporate Life*. Heinemann Educational Books Inc.

Capgemini-Prognos (2018). *Gesellschaft 5.0*. <https://www.capgemini.com/de-de/resources/studie-gesellschaft-5-0/>

Chen, C. (2006). "Citespace II: Detecting And Visualizing Emerging Trends And Transient Patterns In Scientific Literature". *Journal Of The American Society For Information Science And Technology* 57 (3): 359-377.

Chen, C. (2014). *The citespace manual*. College of Computing and Informatics, 1, 1-84.

Chen, C. (2016). *CiteSpace: A Practical Guide for Mapping Scientific Literature*. Nova Science Publishers.

Collins, H. (2010) "Creative Research: The Theory and Practice of Research for the Creative Industries" AVA Publications

Deetz, S. "Describing Differences in Approaches to Organization Science: Rethinking Burrell and Morgan and their Legacy," *Organization Science* (7:2), 1996, pp. 191–207

Ellitan, L. (2020). *Competing in the Era of Industrial Revolution 4.0 and Society 5.0*. *Jurnal Maksipreneur: Manajemen, Koperasi, dan Entrepreneurship*,10(1), 1-12.

- Falagas, M. E., Pitsouni, E. I., Malietzis, G. A., & Pappas, G. (2008). Comparison Of Pubmed, Scopus, Web Of Science, And Google Scholar: Strengths And Weaknesses. *The FASEB Journal*, 22(2), 338-342.
- Foresti, R., Rossi, S., Magnani, M., Lo Bianco, C. G., Delmonte, N. (2019). Smart Society and Artificial Intelligence: Big Data Scheduling and the Global Standard Method Applied to Smart Maintenance, *Engineering*, 1-12.
- Fukuyama, M. (2018). Society 5.0: Aiming for a New Human-Centered Society. *Japan Economic Foundation Special Article* 2, 4.
- Gemma, Joe; Verl, Alexander & Litzenberger, Gudrun (2017). How Robots Protect The EU In Global Competition, *World Robotics Industrial Robots, Statistics, Market Analysis, Forecasts and Case Studies*, IFR Press Conference, 29 September, Frankfurt.
- Guba, E. G. & Lincoln, Y. S. (2001). Evaluation Paradigms: Worldviews Or Belief Systems That Guide Evaluators.
- Günbayı, I, & Sorm S. (2018). Social Paradigms İn Guiding Social Research Design: The Functional, Interpretive, Radical Humanist And Radical Structural Paradigms. *International Journal On New Trends İn Education and Their Implications*. 9(2). 57-76.
- Günbayı, I. (2019). Liderlik ve Toplumsal Degisme [Leadership and Social Development]. In N. Guclu & S. Kosar. *Egitim Yonetiminde Liderlik; Teori, Arařtırma ve Uygulama*. Pegem Akademi. Ankara.
- Hamdanunsera, H. (2018). Industri 4.0: Pengaruh Revolusi Industri pada Kewirausahaan Demi Kemandirian Ekonomi. *Jurnal Nusamba*, 3(2), 2–4.
- Harayama, Yuko (2017). Society 5.0: Aiming for a New Human-centered Society. *Collaborative Creation through Global R&D Open Innovation for Creating the Future: Volume 66 Number 6 August 2017*. Hitachi Review.
- Holloway, I. & Wheeler, S. (2010). *Qualitative Research İn Nursing And Healthcare*. Blackwell Publishing Ltd.
- Hood, W. W., & Wilson, C. S. (2001). The Literature Of Bibliometrics, Scientometrics, And İnformetrics. *Scientometrics*, 52(2), 291-314.
- Ilma, AZ., K. Adhelacahya¹ & E. Y. Ekawati¹. (2021). Assessment for learning model in competency assessment of 21st century student assisted by google classroom. *2020 National Physics Seminar, SNF 2020*.
- J. Takase, M. Fukui, A. Honda, Y. Oura, T. Shimura (2018) Care training robot joint load material of basic consideration technical introduction. *Transactions of Japanese Society for Medical and Biological Engineering*.

- Jabali, K.A.; Ashiq, M.; Ahmad, S.; Rehman, S.U. A Bibliometric Analysis of Research Productivity on Diabetes Modeling and Artificial Pancreas 2001 to 2020. *Libr. Philos. Pract.* 2020, 1–19.
- Keidanren (Japan Business Federation) (2016). Toward realization of the new economy and society. Reform of the economy and society by the deepening of “Society 5.0”.
- Keidanren, P. and A. (2018). *Society 5.0 -Co-Creating the future-*. 2.
- Matsuda, K., Uesugi, S., Naruse, K. & Morita, M. (2019). Toplumla Üretim Teknolojileri 5.0. 2019 6. Uluslararası Davranışsal, Ekonomik ve Sosyo-Kültürel Hesaplama Konferansı (BESC), 1-4.
- Mavrodieva, AV and Rajib Shaw (2020) Disaster and climate change issues in japan's society 5.0-a discussion. *Sustainability* (Switzerland).
- Miśkiewicz R, Wolniak R. Practical Application of the Industry 4.0 Concept in a Steel Company. *Sustainability*. 2020; 12(14):5776.
- Nagpaul, P. S., K. C. Garg, B. M. Gupta (1999), (Eds), *Emerging Trends In Scientometrics*. New Delhi, Allied Publishers Ltd, New Delhi.
- Natalia, I. & Ellitan, L. (2019). Strategies to Achieve Competitive Advantage in Industrial Revolution 4.0. *International Journal of Research Culture Society*, 3(6), 10–16.
- Peraković D., Periša M., Cvitić I., Zorić P. (2020). Information And Communication Technologies For The Society 5.0 Environment. XXXVIII Simpozijum o novim tehnologijama u poštanskom i telekomunikacionom saobraćaju – PosTel 2020, Beograd.
- Pranckutė, R. (2021). Web of Science (WoS) and Scopus: The Titans of Bibliographic Information in Today's Academic World. *Publications*, 9(1), 12.
- Rashid, S., Rehman, S. U., Ashiq, M., & Khattak, A. (2021). A Scientometric Analysis of Forty-Three Years of Research in Social Support in Education (1977–2020). *Education Sciences*, 11(4), 149.
- Reeves, T. & Hedberg, J. (2003). *Interactive learning systems evaluation*, Englewood Cliffs, New Jersey: Educational Technology Publications.
- Reker, J. & Böhm, K. (2013). *Digitalisierung im Mittelstand*. Deloitte.
- Ritchie, J., Lewis, J., Nicholls, C. M., & Ormston, R. (Eds.). (2013). *Qualitative Research Practice: A Guide For Social Science Students And Researchers*. Sage.
- Salgues, B. (2018). *Society 5.0: Industry of the future, technologies, methods*, First Edition. New York: ISTE Ltd and John Wiley & Sons, Inc.

Shiroishi, Y., Uchiyama, K., & Suzuki, N. (2018). Society 5.0: For Human Security And Well-Being. *Computer*, 51(7), 91-95. doi:10.1109/MC.2018.3011041

Terre Blanche, M & Durrheim, K. 1999. *Research in practice*. Cape Town: UCT Press.

Waldenberger, F. (2018). *The Digital Future, Society 5.0: Japanese Ambitions and Initiatives*. International Reports.

Wilson, C. S. (2001), *Informetrics*. In: M. E. Williams, (Ed.), *Annual Review of Information Science and Technology*, Vol.34, Medford, NJ: Information Today, Inc. For the American Society for Information Science, pp. 3–143.

World Economic Forum (WEF) *The Future of Jobs Report 2020* (ss. 1-163).

Internet Resources

Elsevier. (2020). Scopus. Expertly Curated Abstract and Citation Database. https://www.elsevier.com/solutions/scopus?dgcid=RN_AGCM_Sourced_300005030

Elsevier. (t.y.). Why choose Scopus—Scopus benefits | Elsevier solutions. Elsevier.Com. Geliş tarihi 23 Mayıs 2021, gönderen <https://www.elsevier.com/solutions/scopus/why-choose-scopus>

Google Trendler. (t.y.). Google Trends. Geliş tarihi 23 Mayıs 2021, gönderen <https://trends.google.com/trends/explore?date=today%205-y&q=Society%205.0>

Participation in CeBIT 2017 with largest pavilion ever | Archive 2017—JETRO Topics—About Us—Japan External Trade Organization—JETRO. (t.y.). Geliş tarihi 23 Mayıs 2021, gönderen https://www.jetro.go.jp/en/jetro/topics/2017/1703_topics3.html

Figures

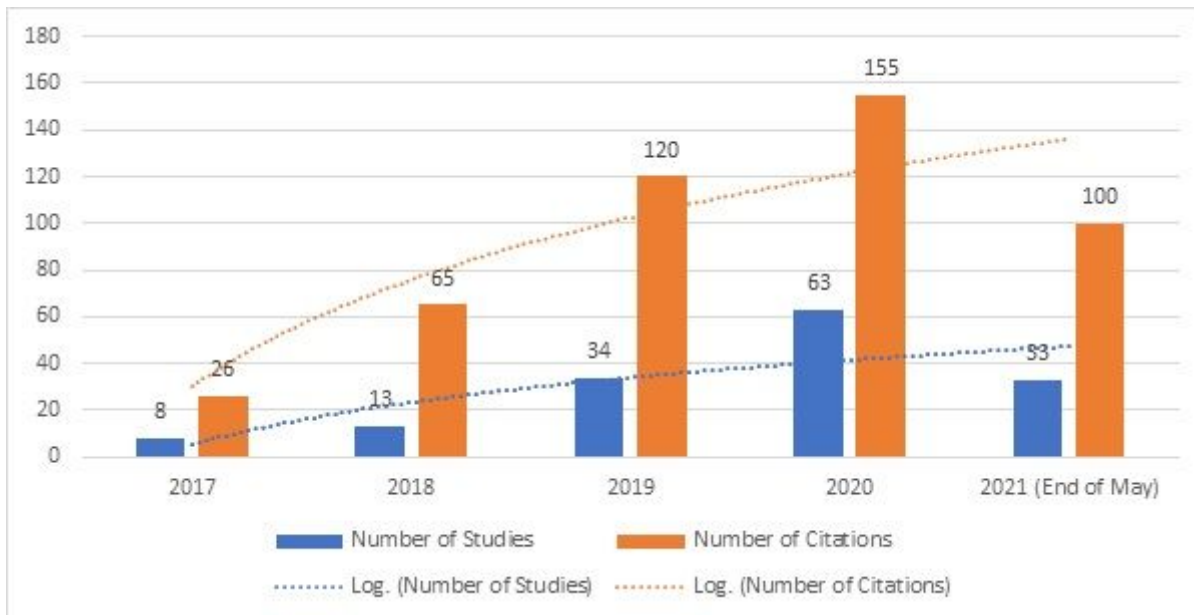


Figure 1

Study and Citation Numbers and Trendlines

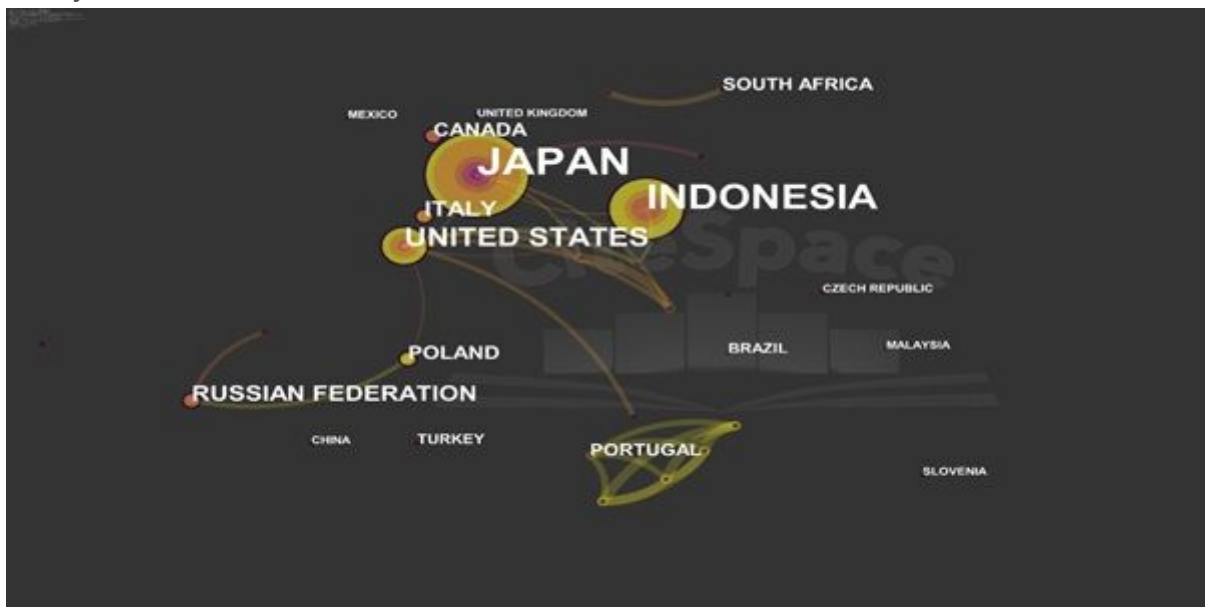


Figure 2

Network Map of Countries

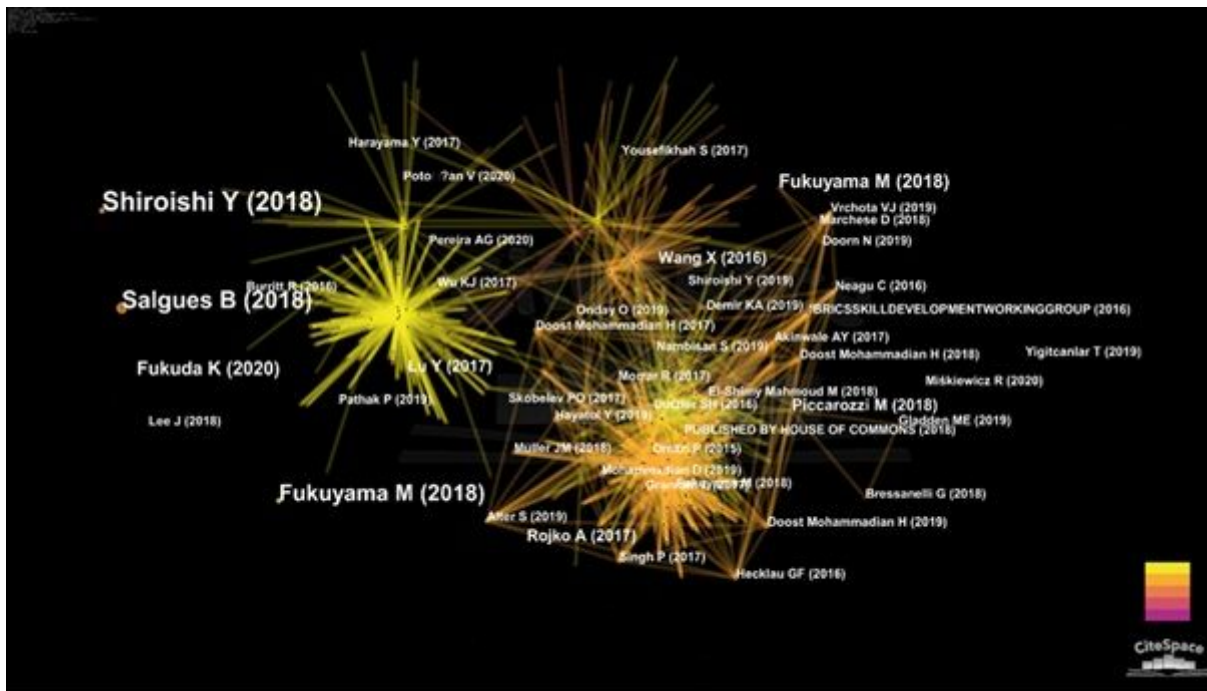


Figure 3

Network Map of Clusters of References Included in Society 5.0 Studies

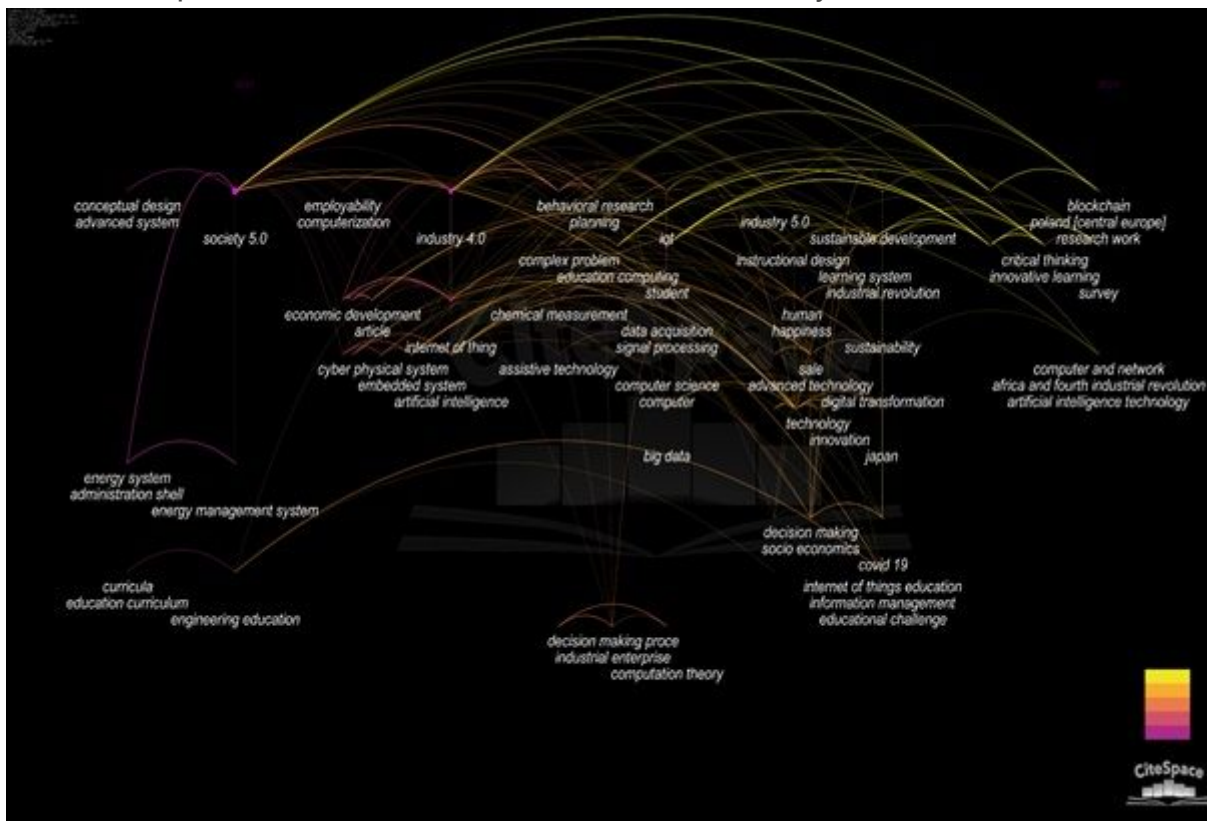


Figure 4

Keyword Network Map by Years



Figure 5

General Common Keyword Cluster Map