

Society 5.0: A Bibliometric Analysis from Management Approach

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Abstract

The Goals of Society 5.0 provided an innovative viewpoint on the function and significance of technological advancement in resolving contemporary social issues in contemporary society, In light of this, the researcher attempted to determine the current publication status of Society 5.0 within the field of management. The researcher applied bibliometric analysis to examine a total of 125 documents that were published within a span of five years. The findings revealed four distinct clusters that base on the themes of framework, understanding society 5.0, utilization of society 5.0, and challenges. The co-authorship network among Russia, Italy, and the United States is mostly impressive. Future studies should incorporate edited books, chapters, and monographs to boost Society 5.0's bibliometric analysis. Include all Society 5.0-related fields.

Keywords: Bibliographic, Citations, Cluster, Coauthorship, Documents, VOSviewer

Introduction

The idea of Society 5.0, which originated in Japan, is to create a digital society that is oriented on people (Rojas, Peñafiel, Buitrago, & Romero, 2021). Society 5.0 is a cornerstone of Prime Minister Shinz Abe's (Japan's leader) Abenomics policy platform (Gagan, 2020). Society 5.0 refers to a human-centric society that achieves a harmonious balance between economic progress and the resolution of social issues. This is accomplished through the extensive integration of cyberspace and physical space, enabling the provision of goods and services that effectively cater to diverse and unmet needs, irrespective of geographical location, age, gender, or language. The ultimate goal is to ensure that all individuals can lead lives of high quality, characterized by comfort and vitality (Mulya & Ali, 2023). In Society 5.0, a vast quantity of data is collected in cyberspace through sensors in the real world. Artificial intelligence (AI) processes Big Data in cyberspace and returns the findings to people in the real world in a

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number of formats (Felice, Travaglioni, & Petrillo, 2021). Data, information, and knowledge are the three components identified by Society 5.0 as being key drivers of social innovation (Deguchi, et al., 2020). Society 5.0 proposes for the integration of AI into everyday life and the rediscovery of humanity's place at the centre of events. The goal of Society 5.0 is economic development that also addresses social and environmental issues so that it may improve the world (Alimohammadlou & Khoshsepehr, 2023). Artificial intelligence in Society 5.0 considers the humanitarian aspect by transforming millions of data acquired through the internet in all facets of life, therefore reducing inequalities in people and economic difficulties that generate new values and lifestyles (Novriana & Soegoto, 2023). The initiatives of Society 5.0 encompass both institutional and individual reforms aimed at facilitating the acceptance of business models and social and economic topics that foster innovation and globalization (Çipi, Fernandes, Ferreira, Ferreira, & Kavaliauskien, 2023). The proliferation of Society 5.0 is expected to occur in the forthcoming years (Deguchi, et al., 2020). There is a growing global trend among nations to priorities the advancement of smart cities that are sustainable, inclusive, and interconnected. "Society 5.0" is a community without prejudice or discrimination of any kind. It's an effort to lessen the effects of income and education disparity on terrorism, natural disasters, cyber-attacks, and social inequality. The plan includes safeguards against joblessness and poverty as well as the use of automated machinery and robots in the workplace (Wahid, 2023). This novel social model is based on a cohesive structure that handles economic and social challenges while also putting people's needs and wants front and centre (Rojas, Peñafiel, Buitrago, & Romero, 2021). Society 5.0 aims to establish novel approaches for managing autonomous systems, wherein companies, universities, and governments autonomously endeavor to develop a cooperative operational framework facilitated by the prevailing interconnectedness of society (Aquilani, Piccarozzi, Abbate, & Codini, 2020). Society 5.0 communicates the next stage in human civilization's evolution (Žižek, Mulej, & Potočnik, 2021). In light of this context, it is essential to determine the present standing of Society 5.0 from an academic standpoint in order to elevate the concept on a worldwide scale.

In society 5.0, a variety of investigations have been carried out, some of the most important studies have been emphasized. Study on the Tracking the Rise of Modern Society 5.0 conduct by using the WOS database, identify that the past three years have seen an uptick in the usage of the phrases AI, cyber-physical systems, big data, In-industry 4.0, Industry 5.0, open innovation, Society 5.0, and super-smart society in academic writing (Roblek, Mesko, & Podbregar, 2021). Utilising the Scopus 5.0 database, a comprehensive approach was used to get a quick grasp of the present state of literature in Society 5.0. The examination of bibliometric data shows that Society 5.0 is strongly impacted by the progress of the Industrial Revolution (IR) 4.0. Engineering-related areas, artificial intelligence (AI), and the Internet of Things (IoT) dominate the intellectual framework of the Society 5.0 literature (Shahidan, Latiff, & Wahab, 2021). An analysis of the Society 5.0 phenomena using the Scopus database reveals rising trends in the number of publications devoted to the topic, the number of nations involved in collaborative output, and the variety of keywords used to describe the phenomenon.

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Sustainable societies have been spotted as interest in the topic has grown. Argue for more social science research (Gursoy & Yagmur, 2023). A similar finding was found when the Bibliometrix library in R was used to examine articles from the Web of Science database pertaining to Society 5.0 (Kabakuş, Özköse, & Ayaz, 2023). The identification of strategic planning pitfalls in Society 5.0 was conducted in the mid-90s using data from various sources such as B-On, Emerald, Science Direct, Sage Journals, and Web of Science (WoS). Result reveal the relevance of strategic planning in Society 5.0 and the application of dynamic capabilities in creating a defensive business model was explored. Additionally, two essential dimensions that have a significant impact on strategic planning were examined, along with the identification of new pitfalls in the current context (Gandrita & Rosado, 2022). A systematic Review on Knowledge Management in Society 5.0 explore two themes that are initially identified include "knowledge" and "human" in relation to "companies", "information", and "system". The supplementary themes encompassed in the study were "innovation," "development," "resources," "social," and "change" (Smuts & Merwe, 2022).

The majority of studies have contributed to the topic of society 5.0, but none of them have covered the Dimensions database. This research focuses on looking at society 5.0 from a management manuscript point of view. Therefore, this paper aims to conduct a bibliometric analysis by reviewing relevant literature to address the following research questions:

- What is the current Society 5.0 trend in management publications?
- Which nations have the most impact on Society 5.0 research from management publications?
- What is the current management document publishing citation trends for Society 5.0?
- In the management literature, what trends have emerged in terms of literature streams, visualisations, and keywords that comprise Society 5.0?

Methodology

Bibliometric analysis is widely utilized as a rigorous approach to investigating and analyse extensive quantities of scientific data (Donthu, Kumar, Mukherjee, Pandey, & Lim, 2021). Bibliometric analysis is a useful technique for tracing the intellectual framework of a particular subject of study (Bigliardi & Filippelli, 2022). It is commonly used to assess the state of research, frontier directions, and development patterns in various fields (Wang & Su, 2020). This study applied bibliometric analysis to identify the areas of study within management studies about Society 5.0.

Source and Data Collection

The data implemented in this study was acquired on July 24, 2023, from the Dimensions database, covering publications published between 2018 and 2023. The reason for selecting the Dimensions database is its extensive collection of scientific publications. Additionally, it distinguishes itself from previous databases by indexing a broader range of research content, including grants, patents, and clinical trials, surpassing the typical limitations of bibliometric

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databases that primarily focus on publications and proceedings (Stahlschmidt & Stephen, 2020).

Searching parameters

The major keywords used in this study included the terms "Society 5.0" and "Society5.0". During the keyword search process, the search features icon system was restricted to only considering the Title and Abstract, at the same time publication years were also limited from 2018 to 2023. To highlight the focus of the study, the researchers restricted the scope of publication to articles and conference proceedings. The research was conducted within the domains of Commerce OR Management OR Tourism and Services OR Strategy Management OR Organizational Behaviors OR Business Systems in Context OR Marketing OR Human Resources, and Industrial Relations. The researcher manually excludes publications in the Chinese and Japanese languages and eliminates any duplicate publications.

The preliminary search (step 1) resulted in a cumulative number of 4384 studies (Figure 1) retrieved from the Dimensions databases. Upon the application of the inclusion and exclusion criteria, Step 2 yielded a total of 2662 publications, following the implementation of filters based on publication year and publication types. After eliminating all interdisciplinary fields of research, the outcome of step 3 was 244 publications. A total of 119 publications were excluded from the present bibliometric literature review due to duplication, illegible language and a short list of the core key titles only for the researcher. Finally, it was decided that 125 papers and conference proceedings were qualified for this bibliometric study.

Data Analysis tools

MS Excel, VOS Viewer, and Wordsift are the three key tools that the researcher used in order to discover the findings. The researcher applied Microsoft Excel as a tool for data entry, storage, organizes, and observation of patterns. This software facilitated the manipulation of the screened data acquired from the search through the application of its Sort and Filter functions.

The software tool VOSViewer provides a text-mining feature that enables the construction and visualisation of correlations in article or publication citations (Eck & Waltman, 2010). The publication map can be visualized using various methods and features, including the implementation of a zoom system, scrolling functionality, and search capabilities. Therefore, it is possible to create a more comprehensive mapping of articles. VOSviewer is a software tool that effectively presents and accurately represents distinct information pertaining to bibliometric graphic maps (Sajovic & Podgornik, 2022). VOSviewers was used to display country rank, top cited paper, country coauthorship, bibliographic coupling with document and co-citation network of cited sources.

WordSift is an online interface that generates a visual and interactive depiction of chosen text (Hakuta, 2011). The keywords that were observed in the Society 5.0 based on management Publication were highlighted by the researcher using Wordsift.

2.4 Workflow

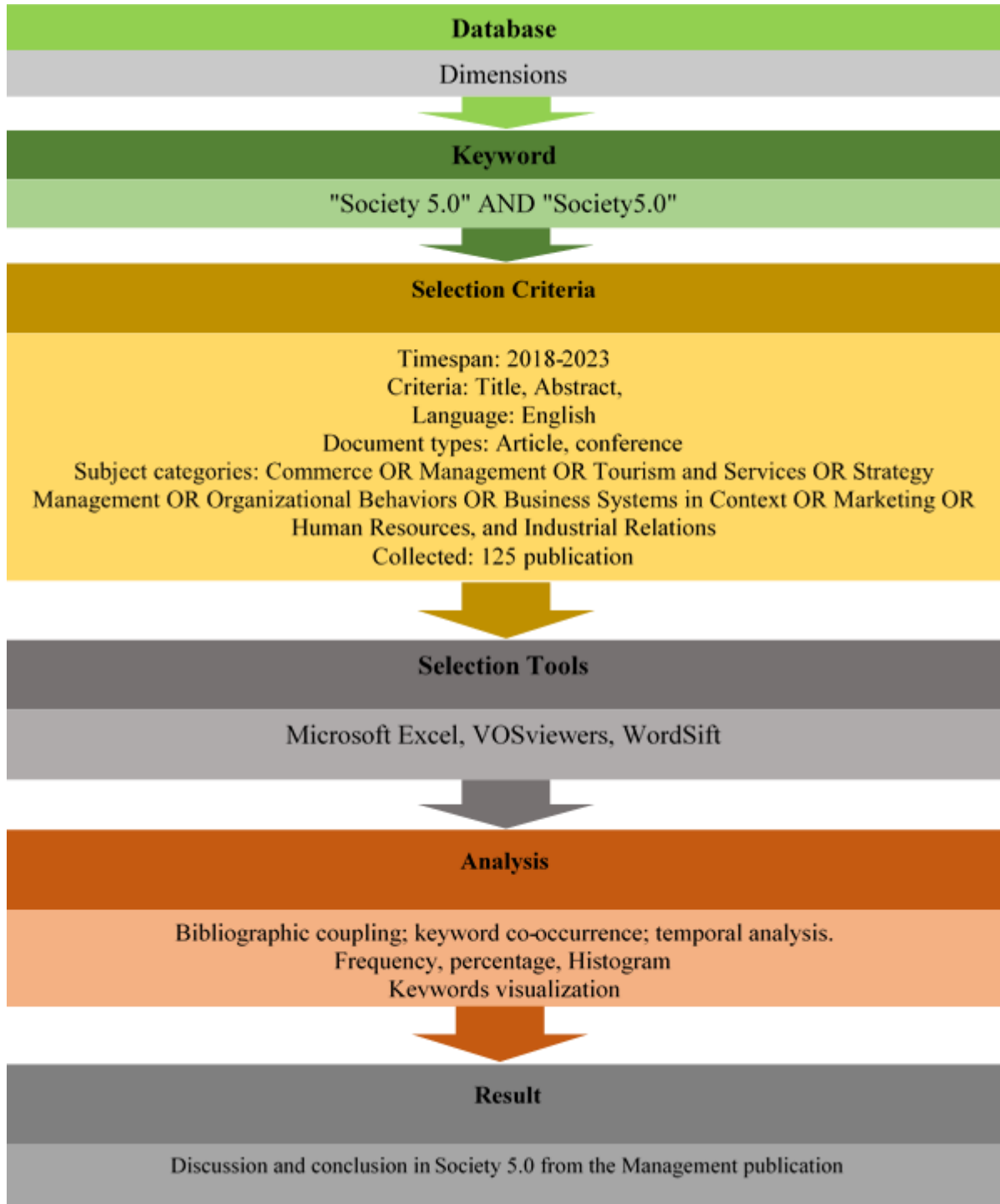


Figure 1: Workflow

Results

Number of Document Publication per Years

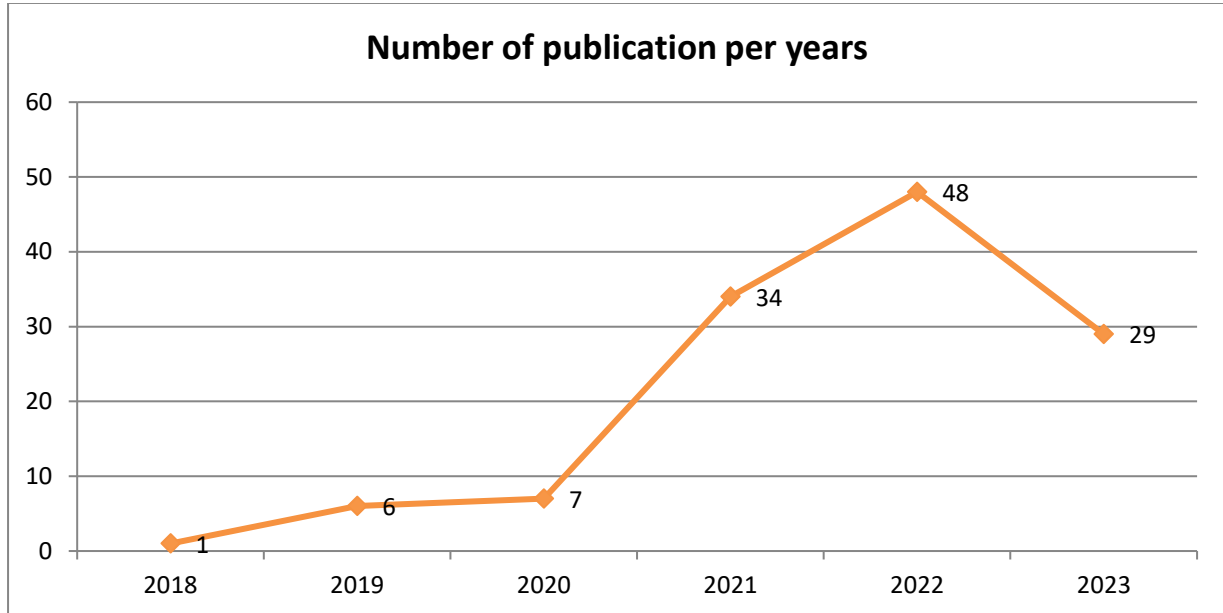


Figure 2: Document publication per year

The Dimensions database was used to display the total number of publication that has been published each year (from 2018 through 2023). An ever-increasing number of researchers are showing an interest in the subject matter. It is clear to see that there has been no increase since the year 2018 (there were one publication published in 2018 and six in 2019). On the other hand, in 2020, a fast expansion can be seen (2020 having 7 publications, 2021 having 34 publications). It is significant of notice that 48 publications were made available in the year 2022, whereas by July 21, 2023, 29 publications had been published. The findings show that researchers in the discipline of Management are paying more attention to Society 5.0.

Country Rank

Table1: Country Rank

ID	Country	Documents	Citations	Total link strength
3	brazil	3	6	0
4	china	2	5	2
7	indonesia	21	16	3
9	italy	5	147	6
10	japan	4	45	3
11	malaysia	2	3	0
14	poland	3	100	1
16	russia	3	29	3
22	turkey	2	51	1
23	united states	5	24	1

Source: Dimension Database, 2018-2023

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Out of 23 countries researcher applied minimum number of document and citation of the country limit to 2, where 10 countries meet the thresholds. The result shows the top country list base on number of research published, the total number of citations, and the overall link strength. Regarding number of document publish in society 5.0 from management field Indonesia stand with 21 documents, representing strong research position in the field. Italy and United States stand second position with five documents each and Japan with four, showcasing their research productivity. Brazil, Russia and Poland follow with four documents indicating active engagement. China Malaysia and Turkey stand with two documents reflecting moderate researcher participation in this field.

Concerning the country rank, based on the number of citation received, Italy leads with 147 citations representing significant research impact and recognition. Poland follows Italy with 100 citations indicating prominent level of research influence. Turkey, Japan, Russia, United States and Indonesia prove certain level of influence showcasing 51, 45, 29, 24 and 16 citations. On the bottom Brazil 6, China 5 and Malaysia 3 citations respectively, showing lesser research impact.

With reference to the country rank, based on the "total link strength" data present, Italy was notable for the highest link strength with a value of 6, which signifies a robust research link. Indonesia (3), Japan (3), Russia (3) and China (2) display moderate link. Poland (1), Turkey (1) and United State (1) with lowest levels of link in the research of Society 5.0 from Management field respectively. In contrast it is observed that countries link Brazil and Malaysia shows lack in link strength. The metric provides valuable insights into the degree of research link among nations within the global scientific community.

Top Cited Documents

Table 2: Top Cited Documents

ID	Authors	Document	Citations
14	Aquilani et al., (2020)	The Role of Open Innovation and Value Co-creation in the Challenging Transition from Industry 4.0 to Society 5.0: Toward a Theoretical Framework	65
110	hysa et al., (2021)	Social Media Usage by Different Generations as a Tool for Sustainable Tourism Marketing in Society 5.0 Idea	64
18	Zengin et al., (2021)	An Investigation upon Industry 4.0 and Society 5.0 within the Context of Sustainable Development Goals	51
27	mavrodieva et al., (2020)	Disaster and Climate Change Issues in Japan's Society 5.0—A Discussion	40
80	Konno et al., (2021)	Intellectual capital in Society 5.0 by the lens of the knowledge creation theory	38

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4 3	sołtysik- piorunkiewicz z et al., (2021)	How Society 5.0 and Industry 4.0 Ideas Shape the Open Data Performance Expectancy	35
9 8	del giudice et al., (2021)	Toward the human – Centered approach. A revised model of individual acceptance of AI	26
2	hendarsyah et al., (2022)	E-Commerce Di Era Industry 4.0 Dan Society 5.0	22
1 1 5	groschopf et al., (2021)	Smart Contracts for Sustainable Supply Chain Management: Conceptual Frameworks for Supply Chain Maturity Evaluation and Smart Contract Sustainability Assessment	20
1	bui et al., (2021)	Understanding the barriers to sustainable solid waste management in society 5.0 under uncertainties: a novelty of social and technical perspectives on performance driving	18

Source: Dimension Database, 2018-2023

Documents were ranked based on the number of document citations on Society 5.0. Out of 125 documents, 10 met the threshold with the implementation of a minimum citation of 16. The most cited study is "Challenges in Making the Switch from Industry 4.0 to Society 5.0," which examines how Industry 4.0 traits and supporting technologies might enable Society 5.0 transition (Aquilani, Piccarozzi, Abbate, & Codini, 2020). Hysa et al., work on social media use in the COVID-19 pandemic by diverse generations to boost tourist marketing from Society 5.0 ideas was the second most cited with 64 citations. The third most cited publication, with 51 citations, came from Turkey and attempted to identify Society 5.0 and Industry 4.0 in SDG implementation (Zengin, Naktiyok, & Kaygin, 2021). Climate change and catastrophe risk in Society 5.0 was the fourth-most-cited paper with 40 citations (Mavrodieva & Shaw, 2020). With 38 citations, Konno et al., fifth-ranked paper links the key theoretical concepts of knowledge production and knowledge assets with innovation's driving forces—purpose, leadership, and place. In the context of Industry 4.0 and Society 5.0, sołtysik-piorunkiewicz et al., document was cited 35 times and placed sixth to identify leading terms and patterns in organizational development. With 26 citations, del giudice et al., rank eighth to study how human adoption of AIs affects HRM in Society 5.0. Eighth place is hendarsyah et al., with 22 citations on local knowledge in Industrial Revolution 4.0 and Society 5.0. Groschopf et al., believe smart contracts may assist networked value chains and Society 5.0 flourish economically and socially with 20 citations, placed ninth. Tenth place has 18 citations that indicate Taiwan's Society 5.0-based solid waste management difficulties.

Country Coauthorship

Study examined a co-authorship network that was prepared based on country affiliation. This was done by implementing a set of criteria, which included a minimum number of country documents and citation 1. Out of the 23 countries analyzed, 19 countries met the threshold. The analysis further revealed the presence of three distinct clusters: Red, Green, and Blue. Russia

holds an impressive co-authorship network and maintains strong working relationships with France and Serbia, which are symbolized by the red cluster. Italy displays a significant level of coauthorship within the green cluster, indicating a closely interconnected network with Japan.

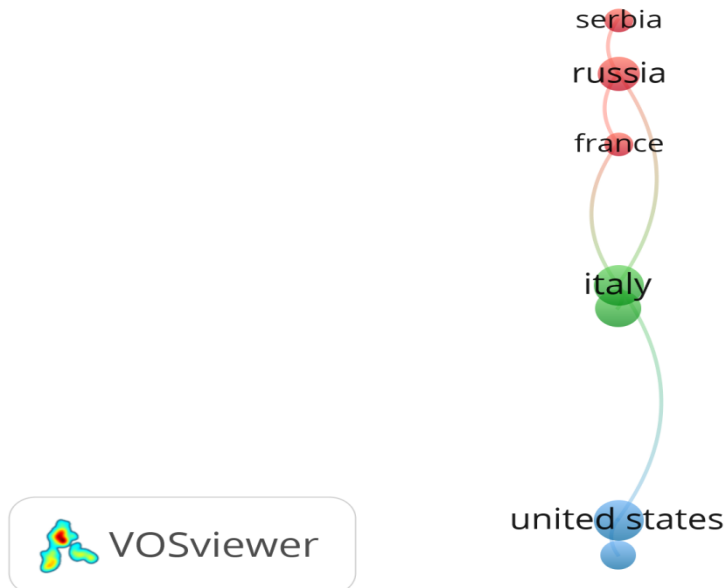


Figure 3: Country Coauthorship

Similarly, the United States shows greater levels of coauthorship within the blue cluster, indicating a close network relationship with Spain, Mexico, and China.

Bibliographic Coupling base on Document

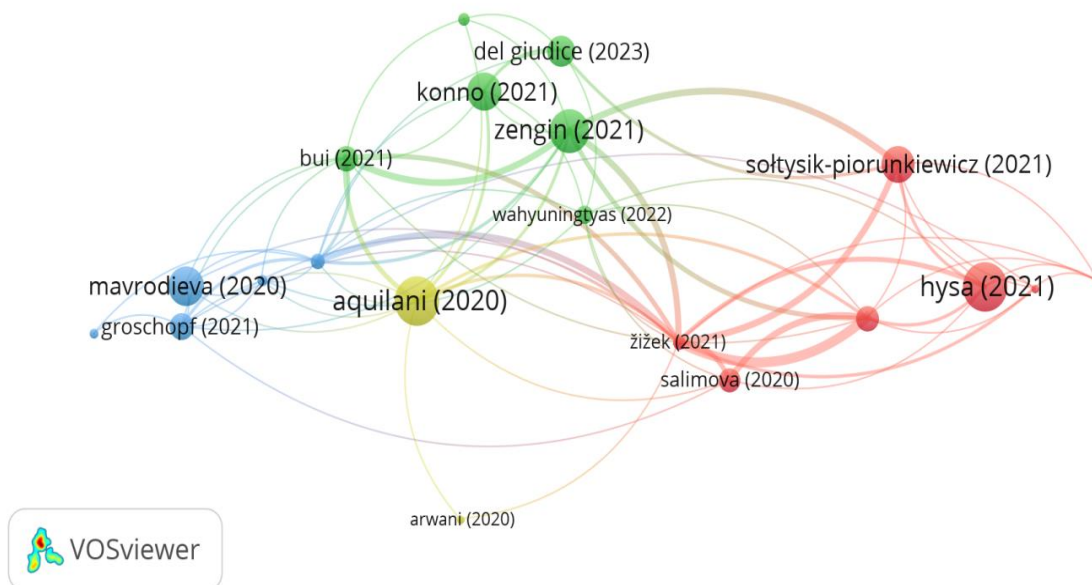


Figure 4: Bibliographic coupling

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Bibliometric coupling analysis was performed using VOSviewer in order to gain a deeper understanding of the subject matter and its dynamic themes (Saini, Lievens, & Srivastava, 2022). Out of 125 documents, 36 meet the threshold while minimum number of citations required for a document to be considered was set at 2. VOSviewer color-coded each cluster of associated documents (red, green, blue, and yellow) for convenience. These four clusters are explained below.

Red Cluster: This cluster represent seven document. Researcher on this group discovered; Design Thinking-Quintuple Helix framework perfect for information exchange among players engaged in designing and implementing Society 5.0 (Bartoloni, Calò, & Marinelli, 2022), conceptual design of Urban Agriculture5.0 to link technology, spatial, social, economic, sustainability, and systems integration in a people-centric super-smart society (Ferreira, Titotto, & Akkari, 2022), extends sustainable development, tourism, and marketing theory by providing new knowledge regarding the choices and behaviours of various generations when arranging a tourist trip and a new approach to using social media to restart tourism (Hysa, Karasek, & Zdonek, 2021), business model of transportation technology to fulfill Society 5.0 Sustainable Development Goals (SDGs) via Costless Smart Transportation (Roring & How, 2022), State the success of the digital and socio-economic transformation will rely on the efficacy and coherence of collaborative efforts between government, business, and social institutions to address domestic economy sustainability issues (Salimova, Vukovic, & Guskova, 2020), Highlight three issue i.e. human-oriented activity, sustainable development, and the physical-to-digital-to-physical period (Sołtysik-Piorunkiewicz & Zdonek, 2021), provide the enabling framework for a "Well-being Society 6.0," in which individuals may realize and define their ideals of quality of life (Žižek, Mulej, & Potočnik, 2021). In average this cluster focuses to the framework for different sectors that are related to society 5.0.

Green Cluster: Green cluster hold six documents. Researcher on this group directed to; understand sustainable solid waste management hurdles in the context of society's uncertainty. 5.0 (Bui & Tseng, 2021), Understand how humans' adoption of AIs influences HRM (Giudice, Scuotto, Orlando, & Mustilli, 2021), review social and human dimensions of innovation in the "Society 5.0" era, and evaluates the previous quarter century's worth of work on knowledge creation theory and its contributions to innovation management (Konno & Schillaci, 2021), identify the usage of metaverse research tools is still in its infancy, with most acceptance occurring in the academic and healthcare sectors (Tlili, Huang, & Kinshu, 2023), identify Digital capacity and employee resistance have little influence on digital innovation, but digital orientation and government assistance do. Digital orientation, government backing, and digital capabilities boost competitiveness. Digital innovation and employee resistance don't affect competitiveness. Digital orientation, government backing, digital capabilities, and opposition from staff did not mediate competitiveness (Wahyuningtyas, Disastra, & Rismayani, 2022), discover SDG 9,10, 11,12,13, and 14 have little impact on Industry 4.0 and Society 5.0 (Zengin, Naktiyok, & Kaygın, 2021). In sum this cluster reflect the understanding the Society 5.0 and its implementation.

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Blue Cluster: The blue cluster contains a total of five documents. Researchers interested in this group are recommended to; argue the idea that smart contracts may help Society 5.0 and the economic growth of interconnected value chains (Groschopf, Dobrovnik, & Herneth, 2021), Describes the Society 5.0 idea and its objectives, including how disasters and climate change policies fit into the new strategy and the obstacles to achieving long-term sustainability (Mavrodieva & Shaw, 2020), elucidate the Critical Success Factors (CSFs) associated with the University of the Future, as well as the Maturity Model for University Readiness within the context of Society 5.0 (Panizzon & Barcellos, 2020), In Society 5.0, Knowledge Management concepts are presented in three overlapping dimensions: society (people), environment (planet) and economic performance (profit) (Smuts & Merwe, 2022), explain Methodology of Organizations Reframing into Smart Organizations (MORSO) to determine the effect of smart leadership on sustainability, comprising smart technology, business procedures and risk management (Todorović, Puskarić, Klochkov, Simić, Lazić, & Đorđević, 2022). This cluster describes how the characteristics of Society 5.0 may be used in a variety of fields to achieve positive social outcomes.

Yellow Cluster: This cluster contains a total of two documents. Researcher in this cluster focus to; analyze the ways in which Industry 4.0 features and enabling technologies can facilitate the shift towards Society 5.0 it seeks to explore the functions of open innovation and value co-creation in this transition (Aquilani, Piccarozzi, & Abbate, 2020), explore the challenges and hopes for the sharia accounting profession with regard to zakat and waqf in order to enter the age of industrialization (Arwani, 2020). This cluster focuses to identify the challenges to transit towards society 5.0.

Co-citation network of cited sources

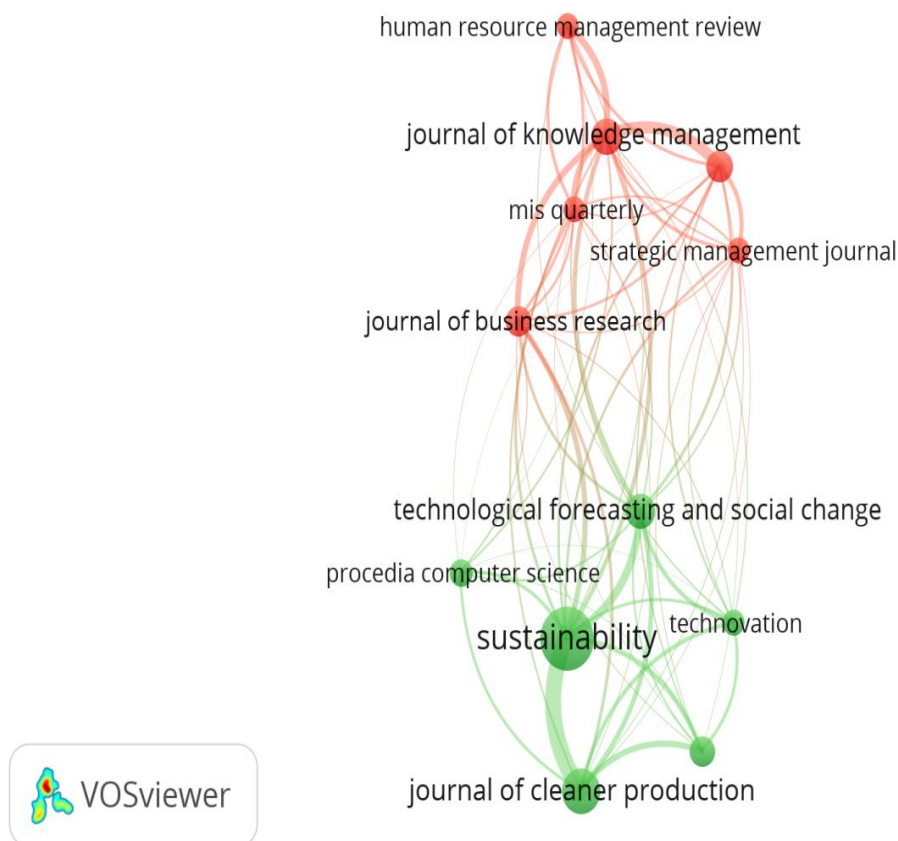


Figure 5: Co-citation network

In the context of publications co-citation analysis, the dimensions of the nodes are utilized to show the level of activity exhibited by a given journal, while the distance between two nodes signifies the frequency of citations exchanged between the respective journals. Through this approach, the overall framework of the field and the distinguishing attributes of individual journals can be discerned (Liao, Tang, Luo, Li, Chiclana, & Zeng, 2018). Table A1, the top 12 journals co-cited are classified into 2 clusters in the network, where red cluster comprised of six document headed by Journal of Knowledge management with 33 citations and 681 total link strength. These clusters focus on the area of general management. Green cluster consists of six document lead by Sustainability with 96 citation and 817 total link strength. Publication of this cluster documents related to technology management approach.

Keywords Analysis

Figure 6 presents a graphical depiction of the terms that exhibited the highest frequency in publications relating to society 5.0 within the field of management. A detailed review of keywords was undertaken in order to identify the predominant themes observed in publications related to Society 5.0.

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The study looked at a co-authorship network based on country. The red cluster represents Russia's extensive network of co-authors. While the United States has greater proportions of coauthorship inside the blue cluster, Italy has a significant amount of coauthorship within the green cluster. A bibliometric coupling analysis was conducted using VOSviewer to enhance comprehension of the subject matter and its evolving themes. The study identifies four clusters in which studies that fall under the red Cluster presented a comprehensive framework covering various sectors that connect with the concept of Society 5.0. The green cluster represents the understanding of Society 5.0 and its implementation. The blue cluster clarifies the potential use of the distinctive features of Society 5.0 across different domains, with the aim of attaining advantageous societal implications. Conversely, the yellow cluster concentrates on the identification of obstacles that must be overcome in order to transition towards Society 5.0. A co-citation network analysis was conducted based on the cited sources. The co-cited journals have been categorized into two distinct clusters within the network. The red cluster, led by the Journal of Knowledge Management, is dedicated to the field of general management. The green cluster, led by sustainability, focuses on technology and management field. A comprehensive analysis of keywords was conducted to identify the most common topics observed in publications related to Society 5.0. The term "Society 5.0" emerged as the most commonly associated keyword. Furthermore, terms such as society, management, technology, era, digital, human, and industrial were used often.

Conclusion

This paper aims to provide a comprehensive overview of Society 5.0 from the perspective of the management field, based on research conducted over the past six years and enhance researchers' understanding of this global phenomenon. The study has made a valuable contribution by identifying the patterns of growth and advancement in the terminology employed within the research domain, recognizing the academic journals that disseminate influential research on the chosen subjects, supplements the management literature on Society 5.0 by analyzing the content of recently published, relevant publications to reveal the state of the subject, emerging trends, knowledge gaps, and potential areas for future research. Researchers suggest that further investigation is required in order to sustain the concept of Society 5.0 across various disciplines, thereby enabling society to progress towards the future. In order to enhance the comprehensiveness of the bibliometric analysis in society 5.0, it is recommended that future research includes additional sources, including edited books, chapters, and monographs. Additionally, it is advisable to encompass all fields that involve to Society 5.0.

Limitation

This study depended only on the Scopus database, which may not include other sources. The dimension data base utilized in this study does not extract keywords from the document, causing viewers being unable to detect the key occurrence feature. Consequently, the study

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does not encompass the key occurrence feature. The number of publications included in this study for the analysis of results is relatively low when compared to other bibliometric analyses. Further investigation may be necessary to conduct a comprehensive study.

Appendix

Table A1: Documents List

id	source	citations	total link strength
910	sustainability	96	817
530	journal of cleaner production	51	624
591	journal of knowledge management	33	681
922	technological forecasting and social change	29	493
583	journal of intellectual capital	25	460
523	journal of business research	23	410
466	international journal of production economics	22	286
782	procedia computer science	18	185
726	mis quarterly	17	307
927	technovation	16	284
349	human resource management review	16	277
901	strategic management journal	16	256

Source: Dimension Database, 2018-2023

Table A2: Keywords List

S.N	Keyword	Numbers	Rank
1	Society 5.0	66	1
2	Society	22	2
3	Management	18	3
4	Technology	17	4
5	Era	16	5
6	Digital	15	6
7	Human	14	7
8	Industrial	13	8
9	Smart	12	9
10	Innovation	11	9
11	Sustainability	11	10
12	Intelligence	11	10
13	Sustainability	11	10
14	Revolution	11	10
15	Industry	11	10
16	Social	11	10

Source: Dimension Database, 2018-2023

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