Society 5.0 in business management: A bibliometric analysis

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Article Info	Abstract
	This study aims to examine the Society 5.0 approach in the field of business management through bibliometric analysis and systematic literature review methodologies, thereby enabling assessments regarding the development of Society 5.0. Seventy articles published between 2020 and 2024 from the Scopus database have been analyzed. During the bibliometric analysis phase, the distributions of publishing countries, years, and keywords are evaluated. In the systematic literature review phase, thematic areas are identified as sustainability, digital transformation, Japan, cognitive mapping, and Democracy 5.0. The study evaluates different research perspectives related to the Society 5.0 approach in social sciences, particularly in the business field, and makes determinations regarding the current state and future development. The study provides valuable insights to stakeholders and managers in social sciences, particularly in business management, as well as policymakers, concerning the current state and future of the Society 5.0 approach.

1. Introduction

Globally, a significant wave of transformation is being experienced across various aspects of life, with digital transformation acting as the fundamental driving force (Chen, 2017). This rapid transformation is likened to a double-edged sword; while it provides benefits to human life, it also possesses negative effects that may cause harm. Balancing the advantages of technological advancements with potential risks and ensuring their contribution to society as a whole will depend on the strategies and approaches adopted (Calp & Bütüner, 2022). Society 5.0 (S5.0) emphasizes the importance of technology in society by integrating virtual and real worlds and focusing on collaboration between humans and technological systems to address societal challenges. S5.0, initially emerging in Japan, responds more to human-centered technological developments (Calp & Bütüner, 2022).

In this context, humans are not merely subjects of technology but rather active agents controlling the development of science and technology (Balogun et al., 2020). S5.0 is expected to significantly contribute to societal progress by prioritizing technological advancements over human needs and promoting the enhancement of general welfare. Consequently, innovations in the business field are inevitable. This study aims to examine the Society 5.0 approach by evaluating different research perspectives related to social sciences, particularly in the business field, thereby enabling assessments regarding S5.0 development. Literature sources that can assist in identifying themes of interest related to the S5.0 approach are utilized. Furthermore, by evaluating the impact domains related to S5.0, the future direction of research is determined.

2. Literature review

Human history can be read through phases in which the economic and social order has undergone radical changes, triggered by successive revolutions and technological and social transformations. The Society 5.0 (S5.0) formula stands out today as the next stage of this evolution, spanning from hunter-gatherer society (Society 1.0) to agricultural (Society 2.0), industrial society (Society 3.0), and information society (Society 4.0). S5.0 is a vision of a

"super-smart society" that integrates advanced technologies such as artificial intelligence, autonomous robots, the Internet of Things (IoT), and big data, prioritizing well-being (Çipi et al., 2023). This situation necessitates reframing businesses and public policies towards creating measurable social/environmental impact and building ethical, fair and accessible digital ecosystems (Santos et al., 2024).

The Japan Business Federation envisions S5.0 as an "imaginative capital" that solves problems and adds value to sustainable development by digitally combining human creativity. This approach, conceived as a "system of systems," aims to reduce carbon emissions by connecting different systems via the internet through energy management and highways. It also aims to leverage advanced technologies and data sharing to achieve greater efficiency and sustainability, find solutions to problems, and raise living standards. Furthermore, it aims to foster innovation and foster positive change by collaborating across sectors and partners (Narvaez Rojas et al., 2021). In this context, S5.0 is not merely a technological innovation but a comprehensive transformation of all aspects of processes and strategies. In an increasingly complex and connected world, increasing integration is crucial for fostering innovation and maintaining competitive advantage (Kao et al., 2024).

Nagy and Hajrizi (2019) describe two goals for the initial implementations of S5.0. First, to promote the digitalization and restructuring of new values that will accelerate the pace of development in international and developed economies and societies; second, to reorganize people's lives so that individuals can achieve their desired lifestyles in a safer, more enjoyable, and more peaceful way. Furthermore, S5.0 contributes to socioeconomic spending management by focusing on people's interests through ensuring social equity through sustainable development.

Acer & Alkan (2024) identified trends in the S5.0 concept by employing bibliometric analysis methodology on articles obtained from the Web of Science database in their study. According to the analysis results, Japan was identified as the country with the highest number of publications and citations, while the term "Industry 4.0" emerged prominently among keywords. Mahat (2024) examined publications related to S5.0 in the management field in their study. Accordingly, terms such as technology, human, digital, and industry were commonly utilized. Seckin & Kose (2024) conducted a bibliometric analysis related to S5.0 on journals indexed in Scopus between 2017-2022. Consequently, keywords such as "Industry 4.0," "student," and "artificial intelligence" were observed to be prominent. Purnomo et al. (2021) found that the number of international publications in the S5.0 field increased annually as a result of bibliometric analysis of S5.0-related articles published in SCOPUS between 2017-2019.

In light of the studies summarized above, this research examines the trends of the S5.0 concept in the field of business management and its position in the literature. The research questions of the study have been defined in accordance with the study's purpose and scope. Accordingly, the research questions of the study are determined as follows:

1. Which concepts does Society 5.0 emphasize in the social sciences?

2. In which countries does it have research studies?

3. How are concepts such as sustainability and digital transformation associated in the literature?

3. Methodology

This study has complied with the Research Publication Ethics stated in "Wager E & Kleinert S (2011) Responsible research publication: international standards for authors. A position statement was developed at the 2nd World Conference on Research Integrity, Singapore, July 22-24, 2010. Chapter 50 in Mayer T & Steneck N (eds) Promoting Research Integrity in a Global Environment. Imperial College Press / World Scientific Publishing, Singapore." For this reason, the author states that she conducted the research within the framework of ethical principles. This is a bibliometric analysis and does not require ethics committee approval since it is not a human study.

This study aims to evaluate the effects of digital transformation on social sciences, particularly in the fields of "Business, Management and Accounting, Economics, Econometrics and Finance," by identifying studies focusing on S5.0 in the field of business management. For this purpose, the bibliometric analysis methodology and systematic literature review (SLR) have been employed together. In the study, a methodology has been established based on the "Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)" guidelines to enable a comprehensive and systematic examination of the literature. This section summarizes the fundamental steps of the bibliometric analysis process used in the study and the SLR methodology based on PRISMA principles.

The SCOPUS database was used for S5.0 studies in business management. The SCOPUS database was selected for bibliometric analysis to provide comprehensive content, avoid duplication of effort, and access more studies (Nair et al., 2024). Furthermore, SCOPUS's inclusion of more journals covering business and management fields reduces the risk of missing publications for this study (Baier-Fuentes et al., 2019).

In this study, the VOSviewer (VOS) software was used to visualize the clustering and similarities of registered publications within the bibliometric analysis process. VOSviewer reveals and visualizes the relationships between articles and citations (Eck & Waltman, 2010), making it an effective tool for creating bibliometric maps and visually presenting diverse information (Sajovic & Podgornik, 2022). Relevant data were collected for the selected bibliometric analysis techniques, and the PRISMA 2020 lists, which include a checklist for literature description, evaluation, and synthesis, were used for this purpose (McKenzie et al., 2021; Patalas-Maliszewska & Łosyk, 2024).

The SLR method enables the generation of qualitative and quantitative information by systematically collecting, analyzing, and interpreting studies on a specific topic over many years (Narkede et al., 2024). It also guides the identification of problem areas and basic knowledge in the literature and helps identify future research topics that need to be addressed (McKenzie et al., 2021; Patalas-Maliszewska and Łosyk, 2024).

3.1. Data search

In the study, a preliminary literature review was conducted, and keywords were determined. The terms "S5.0" or "Society 5.0" were used as search terms in titles, abstracts, and keywords from the SCOPUS database. The abstracts, summaries, and keywords of articles related to the search were automatically designed. Although no year-related restrictions were imposed during the search, since it was observed that articles using the term "S5.0" showed an increase from 2020 onwards, the search period was limited to the years 2020-2024. Additionally, the study was restricted to English-language publications and article studies.
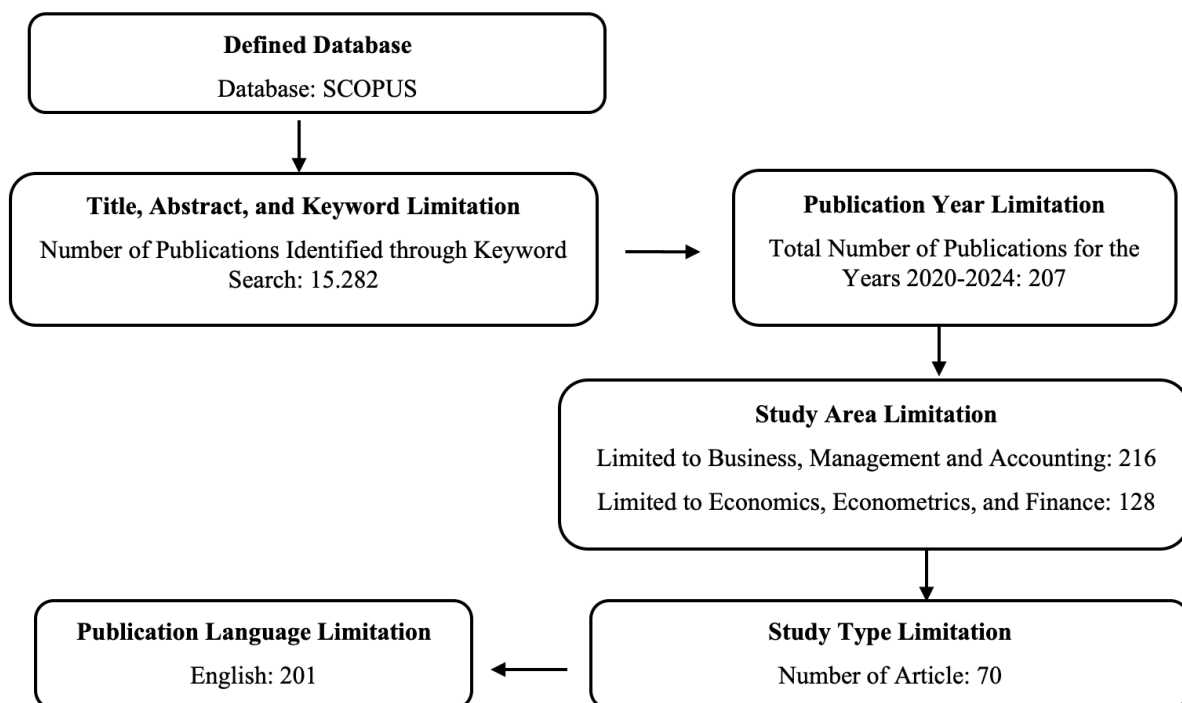

Figure 1. PRISMA Flowchart Followed in the Study

As a result of the search conducted, 15.282 studies were accessed. Since the literature study was oriented explicitly toward social sciences, the subject area was restricted. In the study, to ensure the specificity of the business field, it was determined as "Business, Management and Accounting" and "Economics, Econometrics and Finance." Within this scope, 216 studies in Business, Management, and Accounting, and 128 studies in Economics, Econometrics, and Finance were accessed. Following the removal of studies with missing data and those outside

the scope, 70 studies remained. The study process was conducted in accordance with the PRISMA process. The evaluation processes carried out to determine suitable articles for analysis in the study are shown in Figure 1.

The identified 70 studies were initially subjected to bibliometric analysis using VOSviewer software. Subsequently, in the SLR process, groupings based on bibliographic coupling were conducted, and study contents for specific thematic areas are presented in detail. During the implementation of SLR, adherence to the PRISMA protocol was maintained. Studies belonging to each thematic area were evaluated. In the study, the abstract sections of thematically determined areas were first analyzed, followed by full-text examinations of relevant studies in accordance with the themes (Rajumesh, 2023).

4. Findings

4.1. Bibliometric analysis findings

Bibliometric analysis was conducted using VOSviewer software for mapping author, journal, and country collaborations for the 70 articles identified as targets in accordance with the keywords determined in the study. VOSviewer software is widely preferred for the visualization and analysis of bibliometric networks (Afzal, 2024). VOSviewer software was also utilized to obtain bibliographic information regarding the importance of topics researched in S5.0 literature and to reveal noteworthy information and patterns regarding the importance of various themes in the research context (Ghobakhloo et al., 2024). The number of publications by years in the study is shown in Figure 2.
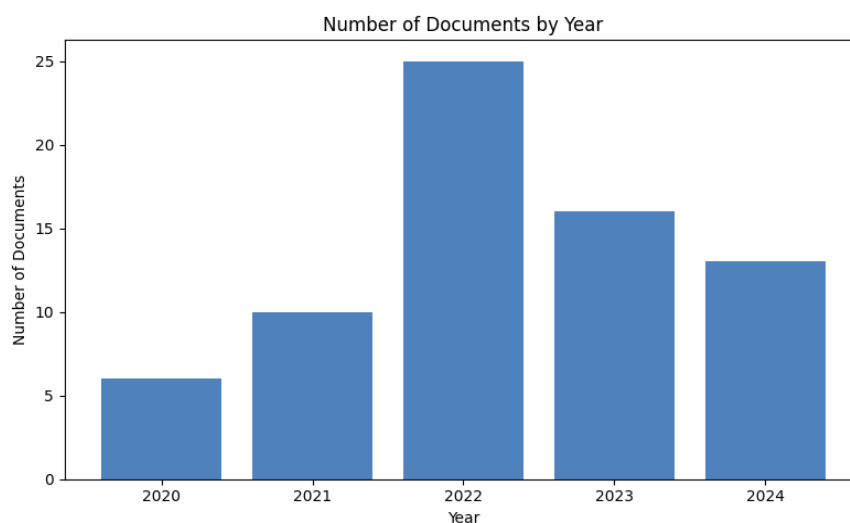
Figure 2. Distribution of article studies by year

Figure 2 shows that academic interest in the S5.0 topic experienced a significant increase, particularly in 2022. This increase in 2022 is likely attributed to the concept's greater adoption in international literature and its emergence as a prominent research topic in the business field. While interest continues in 2023 and 2024, a decrease in the number of publications is observed. The ranking of the top ten countries where publications were conducted is presented in Figure 3.

Figure 3. Distribution of the top ten countries of broadcasting

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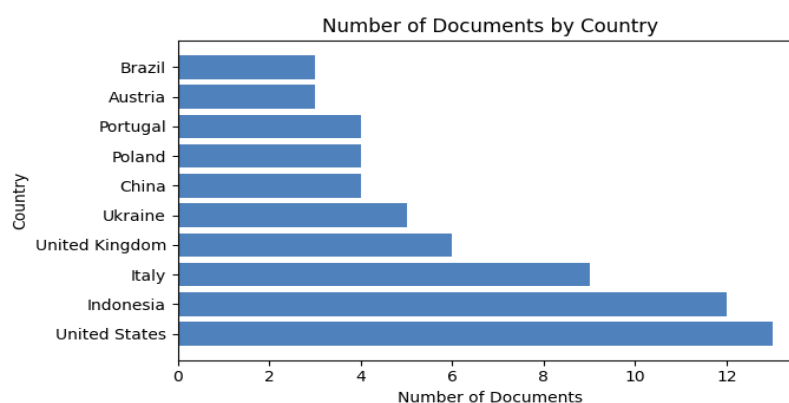According to the information provided in Figure 3, while S5.0 is a global focus of interest, more intensive research is observed particularly in the United States (USA), Indonesia, and Italy. The USA's position at the top of the list is likely due to its strong academic and technological infrastructure in this field. Using a total of 184 keywords by authors and keywords repeated at least three times, 41 keywords that exceeded the threshold value were identified. A keyword network consisting of the identified 41 elements was created. The keyword relationships used in search queries are presented in Figure 4.
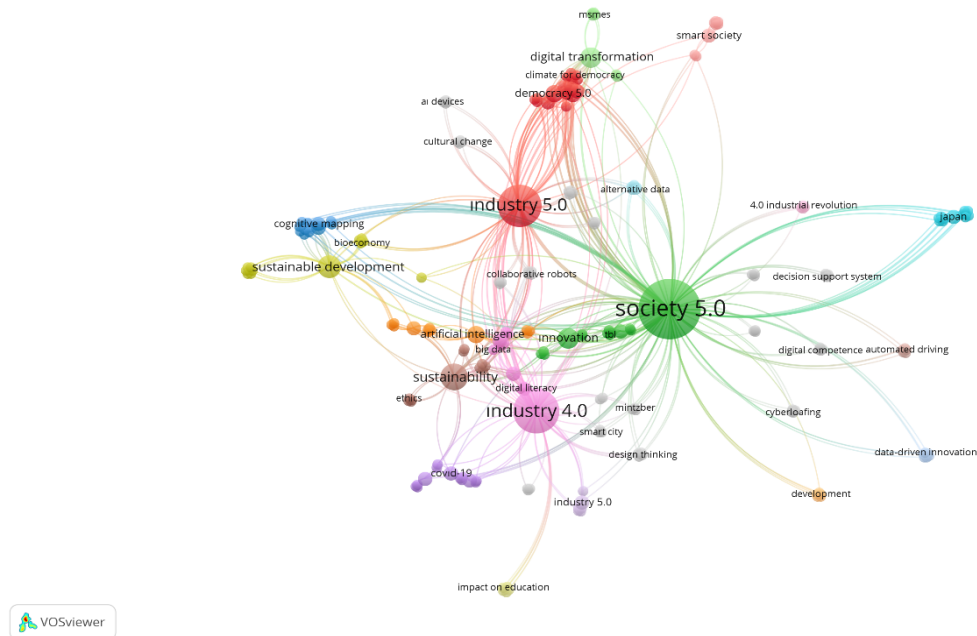

Figure 4. Distribution of the most used keywords

In the distribution of the most frequently used keywords, it is observed that terms such as "S5.0, Industry 5.0, Industry 4.0, sustainable development, innovation, sustainability, artificial intelligence, and digital transformation" are intensively utilized. According to Figure 4, the multidimensional relationships between industrial and societal processes and concepts such as sustainability, innovation, and digitalization are of critical importance in this process.

4.2. Systematic literature review findings

Within the scope of the study, in-depth content analysis was conducted on selected study texts to comprehensively reveal the reflections of the S5.0 concept in the literature. In the content analysis, the advantages and disadvantages offered by the S5.0 approach, as well as the areas and sectors intensively focused on in the literature, were systematically determined. The clustering related to thematic areas identified within the scope of SLR is shown in Table 1.

Table 1. Distribution of thematic areas identified under SLR

SOCIETY 5.0	Sustainability and sustainable development	Environmental and sustainability Social welfare Resolution of global issues
	Digital transformation	Artificial intelligence Big data Internet of things (IoT) Smart systems
	Japan	S5.0 vision Policy and strategy development
	Cognitive mapping	Human-machine interaction Emotional intelligence and technology Mental maps
	Democracy 5.0	Social governance Digital citizenship

During the review and evaluation phase, the company follows predetermined instructions and a standardized update process to ensure content analysis and security (Ghobakhloo et al., 2024). This approach allows for a holistic evaluation of the dimensions, focused ranges, and data segments addressed by the S5.0 approach in the literature.

4.3. S5.0 and sustainability

S5.0's most significant contribution focuses on returning humanity to the center of innovation. Through artificial intelligence and digital transformation, S5.0 is expected to address not only economic dimensions but also social and environmental issues, thereby improving societal well-being. One of the key elements for sustainable development in S5.0 is the implementation of a circular economy that transforms the construction of a "super-smart society" (Alimohammadlou and Khoshsepehr, 2023); this approach is aligned with the United Nations Sustainable Development Goals as it aims to address problems such as poverty, inequality, climate change and resource management through technological innovation and inclusive societal solutions (Thakur et al., 2022).

While Carayannis and Morawska-Jancelewicz (2022c) emphasize that universities and research institutions are critical drivers of digital and green transformations through collaborative use of knowledge and social innovation, they explain that S5.0 presents challenges such as data security, digital inequality, and the environmental impact of digital infrastructure; on the other hand, S5.0 aims to build a resilient, inclusive, and sustainable future by placing human well-being and sustainability at the center of innovation and encouraging cross-sectoral collaboration (Thakur et al., 2022).

4.3.1. S5.0 and digital transformation

S5.0 defines human-machine interaction not only as a technical process but also as a human-centered approach encompassing emotions and human values. The core of digital transformation is digital humanism, innovation management in 3D printing technologies, and digital literacy. Within this framework, Magni et al. (2024) explain the role of emotions and human factors in AI-human interaction, describing it as a digital vision that addresses the emotional and social needs of individuals beyond simply facilitating life. In S5.0, artificial intelligence and other digital technologies are designed and implemented to enhance human comfort (Magni et al., 2024).

Within the scope of S5.0, the human-centered and sustainable management of innovative technology plays an active role in the success of digital transformation. Particularly, three-dimensional printing technology contributes to areas such as production, cost advantage, and sustainability, while requiring new strategies and business models for effective management (Marić et al., 2023). Sá et al. (2021) state that digital literacy is one of the main challenges encountered in S5.0. Digital literacy is the competency of individuals to use digital technologies effectively, safely, and critically. For S5.0 to achieve its objectives, the digital literacy level of all individuals needs to be enhanced.

4.3.2. S5.0 and Japan

The S5.0 concept, introduced by the Japanese government, is described as a super-smart society vision where advanced technologies are integrated with human-centered values. Narvaez Rojas et al. (2021) state that S5.0 produces solutions to societal problems by utilizing technologies such as artificial intelligence, internet of things, and robotics, following hunter-gatherer, agricultural, industrial, and information societies. S5.0 presents a bold and comprehensive vision for Japan's future, integrating technological innovation with human-centered and sustainable development. The realization of this vision depends on effective leadership, supportive government policies, and inclusiveness. Japan has taken an active role in promoting S5.0, particularly in areas such as autonomous driving. Yamasaki (2024) states that the S5.0 concept emerged as a result of expectations regarding the potential of government policies to enhance safety, efficiency, and quality of life. Whittaker (2024) argues that Japan aims to create a "positive cycle" through S5.0, where economic growth supports more innovation and societal welfare. This approach recognizes that economic, social, and environmental factors are interconnected and establishes S5.0 as a framework for long-term sustainability.

Japan embodies its S5.0 vision in five main areas: health and care, mobility, supply chain, smart infrastructure, and financial technologies. In health and care, the aim is to increase both quality and efficiency through remote monitoring, personalized digital healthcare services, and care robots; in mobility, autonomous and connected transportation, smart traffic management, and rural accessibility are highlighted; in the supply chain, IoT-based traceability, data-driven demand-supply balancing, and flexible logistics networks are established; in smart infrastruc-

ture, smart city applications, sensorization, data platforms, and digital-physical infrastructure with disaster resilience are expanded; and in financial technologies, inclusive and secure services are developed through technologies such as digital payments, open banking, and blockchain (Arı, 2021). S5.0 is a growth strategy for Japan and is aligned with the United Nations Sustainable Development Goals; it aims to enhance quality of life, security, and efficiency by expanding human-centered digital transformation from manufacturing to public services (Duman, 2022).

4.3.3. S5.0 and cognitive mapping

Today, the increasing interest in the S5.0 concept in the literature has led to cognitive mapping analyses to determine the scope of studies in this field. Cognitive mapping visualizes information by integrating technologies such as artificial intelligence and machine learning. Roblek et al. (2021) examined the emergence and development of S5.0 bibliometrically and revealed that S5.0 concentrates on the axes of technology, innovation, sustainability, and societal welfare. It is also emphasized that publications related to S5.0 have increased over the years. Similarly, Purnomo et al. (2021) mapped keywords, collaboration networks, and research trends related to S5.0.

These studies demonstrate that S5.0 represents a new paradigm in terms of knowledge production, sharing, and management. Cognitive mapping, in turn, provides guidance for understanding current and societal developments, policy implementations, and research. Thus, it contributes to developing a common understanding in solving the complex situations created by digital society. For example, in smart city projects, the expectations and perceptions of different sectors can be analyzed through mapping. In this way, the human-centered solutions envisioned by S5.0 can be designed more effectively (Roblek et al., 2021; Purnomo et al., 2021; Carayannis et al., 2022a).

4.3.4. S5.0 and Democracy 5.0

The traditional innovation model is based on communication between the university, industry, and government. Carayannis & Campbell (2021a) created the "quadruple helix" by adding media and civil society to this model. Subsequently, the "quintuple helix" models were formed with the addition of the natural environment. The five dimensions defined as the quintuple helix are related to Industry 5.0 and S5.0 as definitions of developments in society, economy, and democracy (Carayannis Christodoulou et al., 2021c).

The Quadruple and Quintuple Helix innovation systems aim to optimize the design and functioning of modern, democratic societies and economies in a sustainable, inclusive, resilient, and effective manner through cyber-physical ecosystems compatible with Industry 5.0 and Society 5.0 principles. In this context, the "Quintuple Innovation Helix Framework" S5.0represents the most comprehensive, meaningful, and valuable structure and method as it encompasses the five fundamental core dimensions of modern sustainable and democratic knowledge economies and societies. These are the dimensions of "environment, civil society and government, university, and industry" (Carayannis & Campbell, 2022d). S5.0 and Democracy 5.0 envision creating a human-centered, sustainable, and inclusive societal and governance structure through technology. Countries such as Japan, Estonia, China, South Korea, and the European Union are implementing different dimensions of this vision (Gurakan & Uzunırmak, 2025).

5. Conclusion

In today's world, S5.0 represents a human-centered and sustainable society vision that addresses digital opportunities. Therefore, it produces solutions to societal problems and enhances the quality of life through advanced technologies such as artificial intelligence, the Internet of Things, and big data. This study examined the position and development of the S5.0 approach in business management literature through bibliometric analysis and systematic literature review methodologies, based on 70 articles selected from the Scopus database for the period 2020-2024. The findings reveal that S5.0 has emerged as a multidimensional research area integrating technology, sustainability, and human-centered approaches. The theoretical and practical implications of the findings, the study's limitations, and future research directions in academic discourse are summarized below.

The keyword analysis of studies on S5.0 shows that research in the business management field concentrates on terms such as "Industry 5.0, Industry 4.0, sustainable development, innovation, sustainability, artificial intelligence, digital transformation." Additionally, words related to the multidimensional relationships between industrial and societal processes, as well as sustainability, innovation, and digitalization, have been intensively used in the studies. As a result of the study, it is observed that there has been a significant increase in publications related to S5.0, particularly since 2022. Among the countries with the highest number of publications, the USA, Italy, and

Indonesia stand out. SLR analyses show that S5.0 is addressed in different dimensions such as sustainability, digital transformation, Japan, cognitive mapping, and Democracy 5.0. The sustainability perspective of S5.0 aligns with waste reduction, the circular economy, and the United Nations Sustainable Development Goals. In terms of digital transformation, it is related to human-machine interaction, digital literacy, and digital humanism. It can be said that Japan and S5.0 play an essential role in terms of government policies and societal vision.

Society 5.0 is not just about making business management more efficient; it is a strategic framework that is human-centered and increases social benefits. When technology, data, and artificial intelligence are integrated with purpose, ethics, and governance, they transform into a sustainable competitive advantage. This transformation requires a holistic redesign of everything from business models to organizational culture, performance measurement to stakeholder communication. The key to success lies in aligning technical competence with corporate purpose and ethical compass in a consistent manner.

5.1. Theoretical implications

This study demonstrates that the S5.0 literature is strongly connected to the Industry 4.0/5.0, digital transformation, and sustainability literature clusters, and highlights the need to develop integrative models between technology-focused theories and approaches that prioritize societal well-being. This finding suggests that traditional technology adoption theories should be expanded to include human-centered values and societal impact assessments. However, it also suggests that human-centered design, digital humanism, and cognitive mapping approaches require a more comprehensive theoretical consideration within the S5.0 framework. In particular, expanding the quadruple/quintuple helix models within the S5.0 context will enrich the theoretical explanation of knowledge ecosystems and innovation networks. Bibliometric patterns highlight that S5.0 represents a paradigmatic shift from technology-related approaches to socio-technical systems thinking and requires new theoretical constructs that adequately capture the complexity of human-technology-society interactions in organizational contexts.

5.2. Practical implications

At the corporate level, S5.0 implementation requires not only technological investment decisions but also a comprehensive redesign of strategy, organizational structure, performance measurement, and stakeholder communication systems. Managers must align technology strategies with corporate goals and ethical principles. Furthermore, policymakers emphasize the importance of comprehensive infrastructure investments, data security frameworks, and digital literacy programs for the implementation of the S5.0 vision. The Japanese government has stated that they have accelerated the implementation and, accordingly, that there is a greater need for policy frameworks that support both technological advancement and social inclusion.

In terms of sectoral applications, healthcare, mobility, supply chain, smart infrastructure, and financial technologies have emerged as priority areas. This necessitates the development of sector-specific implementation roadmaps and support mechanisms. Risk management considerations emphasize that potential challenges (data security, digital inequality, and the environmental impacts of digital infrastructure) must be managed through governance mechanisms, transparency, and social inclusion. The emphasis on human-centeredness in the S5.0 literature has important implications for organizational behavior theories, particularly those related to human-computer interaction, workplace digitalization, and employee well-being. The study suggests that future organizational theories should incorporate concepts such as digital humanism, emotional intelligence in AI interactions, and the psychological impact of advanced automation on workforce dynamics.

To increase the success rate of S5.0 implementations, they should prioritize digital literacy development, human-centered design practices, industry-specific pilot projects, and multi-stakeholder collaboration mechanisms. Research shows that successful implementation requires iterative approaches that enable continuous learning, adaptation, and improvement based on stakeholder feedback and performance results. Organizations should invest in change management capabilities that can support the workforce transitions, skill development, and cultural alignment required for S5.0 implementation. This includes developing new performance metrics that capture both technological efficiency and social impact outcomes.

5.3. Limitations and future research directions

This study is limited to English articles in the Scopus database, excluding Web of Science and national databases. The study examined the S5.0 literature from 2020 to 2024. This temporal limitation may impact the comprehensiveness of the trend analysis and the identification of themes. This study demonstrates that S5.0 requires both theoretical reconceptualization in the business management literature and the development of governance-focused,

human-centered strategies for practical applications. S5.0 is at a critical juncture where academic research must be closely aligned with practical implementation efforts to effectively translate its principles into real-world benefits for society. Future work will contribute to the academic and practical maturation of the S5.0 perspective and support the transition to more sustainable, inclusive, and human-centered technological societies. This transition will depend on continued collaboration among researchers, practitioners, policymakers, and civil society to ensure that technological advancement serves the broader goals of human well-being and societal progress.

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The author self-conducted the research design and implementation, analysis, and article writing without using AI applications.

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Ethical committee approval

This study has complied with the Research Publication Ethics stated in "Wager E & Kleinert S (2011) Responsible research publication: international standards for authors. A position statement was developed at the 2nd World Conference on Research Integrity, Singapore, July 22-24, 2010. Chapter 50 in Mayer T & Steneck N (eds) Promoting Research Integrity in a Global Environment. Imperial College Press / World Scientific Publishing, Singapore." For this reason, the author states that she conducted the research within the framework of ethical principles. This is a bibliometric analysis and does not require ethics committee approval since it is not a human study.