

INNOVATIVE MANAGEMENT STRATEGIES IN THE ERA OF INDUSTRY 5.0 AND SOCIETY 5.0

Michal Fridrich¹, Martin Černek²

Abstract

The aim of this work was to explore the evolving landscape of management practices in the context of Industry 5.0 and Society 5.0. Our objective was to investigate and identify new management methods through a comprehensive review of relevant scientific literature. To achieve this, we conducted a systematic analysis of scientific articles and utilized Google Trends to examine correlations between new management methods, Industry 5.0, and Society 5.0. Additionally, we assessed the number of related scientific articles in prominent databases to gauge the current trend. The findings highlight promising new management methods aligned with the principles and requirements of Industry 5.0 and Society 5.0, revealing interdependencies among these concepts. Our research underscores the significance of embracing innovative management approaches in this era of technological advancements and societal transformations. This study contributes to the growing knowledge on new management methods and their implications for the future of industry and society.

Keywords

Management Practices, Industry 5.0, Society 5.0, New Management Methods, Societal Transformations

I. Introduction

Since the 1990s, the world economy has experienced rapid globalization, primarily driven by advancements in information and communication technologies like cell phones and the Internet. As a result, innovation has become a critical factor in driving economic growth. However, businesses are now faced with the challenge of adapting to the fast-paced nature of technological advancements, which introduces unpredictability. Over the past decade, a multitude of digital technologies has emerged, fundamentally transforming the way people live and work. Consequently, companies and industries must incorporate these technologies into their operations, leading to adjustments in vital business functions and impacting various aspects such as operations, processes, products, and services. The term "digital transformation" refers to a process that utilizes information, computers, communication, and connection technologies to significantly enhance organizational features. Digital transformation encompasses a multidimensional change that occurs at multiple levels, shaping innovation by capitalizing on the opportunities presented by the new digital paradigm. This transformative process leverages the disruptive effects of digital technologies on both society and business, highlighting the increasing importance of technology-related competitive advantages for companies' success (Čipi et al., 2023). Over an extended period, discussions have revolved around these transformations under the conceptual framework referred to as Industry 4.0.

Industry 4.0, introduced by the German government in 2011, integrates emerging technologies into manufacturing and supply chain processes. It encompasses IoT, CPSs, AI, autonomous robots, additive manufacturing, augmented reality, simulation, blockchain, and system integration. These technologies enable the development of smart factories based on a four-layer architecture aligned with interconnectivity, information transparency, decentralized decisions, and technical assistance. Industry 4.0 extends beyond manufacturing, transforming the economy, society, government, and human identity. It is a sub-category of digitalization, impacting production, supply chains, business models, and organizational management. Servitization blurs the boundaries between manufacturing

¹ PRIGO University, Vítězslava Nezvala 801, 76001 Havířov, Czech Republic. E-mail: Michal.Fridrich@prigo.cz.

² PRIGO University, Vítězslava Nezvala 801, 76001 Havířov, Czech Republic. E-mail: Martin.Cernek@prigo.cz.

and non-manufacturing industries, with transportation, logistics, wholesale, and retail trade benefiting from improved supply chain integration and real-time demand information. These advancements support more efficient "Just-in-Time/Just-in-Sequence" operations (Castelo-Branco et al., 2023). The current trajectory of development extends beyond Industry 4.0, as the discourse now encompasses the forthcoming era of Industry 5.0.

The transition from Industry 4.0 to Industry 5.0 involves a shift from a policy-driven transformation of manufacturing using digital technologies to a future-oriented and societal-driven transformation. The concept of Industry 4.0 emerged in 2011 and was integrated into the high-tech strategy of the German government. It encompasses a wide range of technologies such as cloud computing, IoT, artificial intelligence, autonomous robots, augmented reality, and blockchain, with the aim of creating smart factories. Industry 4.0 research over the past decade has laid the foundations for Industry 5.0, which recognizes the importance of human involvement in cyber-physical systems. Industry 5.0 is aligned with policy priorities focused on creating an economy that benefits people, promoting environmental sustainability (European Green Deal), and ensuring digital advancement (Europe fit for the digital age) (Barata & Kayser, 2023). Several contemporary studies (Nagy & Hajrizi, 2019); (Çipi et al., 2023) have adopted the term "Society 5.0" to denote a societal concept that aligns with the forthcoming era of Industry 5.0.

Society 5.0 involves collecting and processing real-world data using computer systems to generate practical applications. While similar to the concept of an "information society," Society 5.0 distinguishes itself by integrating systems across various aspects of life. It aims to ensure well-being in areas like energy, transportation, healthcare, and more by gathering diverse data and employing advanced IT systems like AI. Unlike traditional systems, Society 5.0 directly influences human actions and behavior, creating a cycle of data gathering, analysis, and application at a societal level. This integration bridges the gap between the digital and physical realms, enhancing happiness and comfort in people's lives (Hitachi-UTokyo Laboratory, 2020).

The advent of Society 5.0 necessitates the implementation of new management methods across diverse fields within companies. The transformative nature of Society 5.0, characterized by the integration of advanced technologies and data-driven decision-making, demands a paradigm shift in management practices. To effectively navigate the challenges and capitalize on the opportunities presented by this emerging societal framework, organizations need to embrace innovative management approaches that align with the principles of Society 5.0, such as holistic integration, real-time data analysis, and the prioritization of societal well-being. By adopting these new management methods, companies can enhance their adaptability, foster sustainable growth, and successfully navigate the dynamic landscape of Society 5.0.

The aim of this paper is to conduct a comprehensive investigation of the current scientific literature on new management methods in the context of Society 5.0. Additionally, we present an analysis of the growth and popularity of this topic using data obtained from Google Trends over the past six years. Furthermore, to gain further insights into the prevalence and research focus, we conducted a comprehensive search for keywords in the largest scientific databases. By examining both scholarly research and public interest, we seek to gain insights into the current state and emerging trends in new management methods in relation to the advent of Society 5.0. This research endeavour contributes to a deeper understanding of the evolving management practices required in various fields of companies in anticipation of Society 5.0.

II. Traditional management methods

To assess the emerging management methods discussed in this study, a comprehensive examination of traditional management methods, as documented in the existing scientific literature, will be presented. This evaluation aims to provide a comparative analysis and contextual understanding of the prevailing management practices that have been utilized to date. By drawing insights from

established literature, this research seeks to contribute to the evaluation and appraisal of the new management methods within the framework of the study.

TQM (Total quality management) - According to (Eniola et al., 2019), TQM is an integrative management philosophy that aims to continuously improve processes, products, and services by meeting or exceeding customer expectations for enhanced satisfaction and organizational performance. TQM helps organizations differentiate their products and gain a competitive edge, resulting in increased profits, market share, and superior performance. However, the relationship between TQM and performance is still debated, with mixed or negative correlations observed in some studies. Organizational culture (OC) is identified as a crucial factor influencing TQM implementation success. Aligning OC with TQM initiatives can be challenging, but it is essential to foster managerial leadership, pride in workmanship, teamwork, fear elimination, and participatory management. Changing the OC is critical for influencing employee attitudes and ensuring successful TQM implementation.

Lean management - Lean Management (LM) is a management philosophy focused on continuous improvement and waste elimination. It originated in the automotive industry as the Toyota Production System (TPS) and has been widely adopted in various sectors. LM aims to maximize value-adding activities, reduce non-value adding activities, and improve work conditions. By using tools like Value Stream Mapping, Kanban, and Standardization, LM helps organizations understand customer needs, create efficient processes, reduce inventory, and continuously enhance productivity. In healthcare, LM has been implemented at different levels and has shown positive outcomes, including reduced waiting times, fewer errors, and improved clinical pathways. However, the sustainability and employee engagement aspects of LM require further exploration. This scoping review investigates the impacts of LM practices on the health workforce, considering both technical and people-oriented strategies (Mahmoud et al., 2021).

Business process management (BPM) - (Badakhshan et al., 2019) describes this term as a management approach focused on analyzing, designing, and implementing processes across organizational units. Its goal is to establish efficiency and continuity in organizational work by defining and executing sequences of activities that provide value to customers. While traditional BPM initiatives have prioritized control and stability, recent work highlights the importance of flexibility and change in response to dynamic business environments. BPM success depends on the ability to rethink, redesign, and innovate processes to adapt to external dynamics. Alignment with external requirements and managing process changes are crucial for achieving BPM's strategic objectives. Pitfalls in BPM implementation include strategic issues, resistance to change, communication problems, lack of stakeholder involvement, and late initiation of process-change practices. Agility is recognized as a key factor for organizational success, reducing complexity, improving alignment and communication, and enabling efficient responses to change opportunities. The concept of agility offers a potential solution to address the need for change in BPM while mitigating common pitfalls.

Six sigma - Is a well-established approach used to identify and eliminate defects or failures in business processes. It focuses on improving process performance characteristics that are critical to quality. The goal of Six Sigma is to reduce process variation and costs in manufacturing and services, leading to increased customer satisfaction. It achieves this through the use of statistical and analytical tools and techniques such as quality function deployment, failure mode and effect analysis (FMEA), statistical process control (SPC), design of experiments (DOE), and analysis of variance. Six Sigma aims to measure defects, improve product quality, and reduce defects to a level of 3.4 parts per million opportunities. The integration of Six Sigma with Lean principles has led to the development of Lean Six Sigma (LSS), which is considered a powerful strategy for process management and achieving business process excellence (Singh & Rathi, 2019).

Change management - Change management is the process of effectively implementing and managing organizational change. It involves understanding different types of change, determining the appropriate process, and employing the necessary elements for success. This includes

considering the type of change, selecting the right process, and leveraging the relevant elements (human, technology, strategy) to achieve successful outcomes (Som et al., 2020).

Performance management (PM) – According to (Pulakos et al., 2019), PM is a complex and multifaceted process that involves evaluating and improving individual and organizational performance. It has evolved over time, starting with performance evaluation focused on obtaining accurate ratings. Various strategies, such as rating scale changes and rater training, have been used to improve accuracy. However, traditional PM processes, including cascading goals, competency modeling, and formal feedback, have become tedious and low-value, leading to dissatisfaction and limited impact on performance. This has resulted in organizations experimenting with innovative practices to simplify PM and drive actual performance, such as goal-setting, real-time feedback, coaching, and behavior change. Despite the significant time and cost investments, PM processes have shown little positive impact on performance and business outcomes. Future directions involve simplifying or eliminating formal PM processes and adopting practices that have been shown to positively impact performance.

Strategic management - Refers to the process of conceiving and implementing the global direction of an organization. It involves formulating long-term goals and objectives, adopting actions, allocating resources, and selecting activities that establish a sustainable competitive advantage in the market. The concept of strategy has evolved over time and draws from various perspectives, including rational planning, adaptive coordination, systemic vision, and political commitment. SM considers factors such as the competitive environment, external and internal restrictions, resource-based advantages, and future vision. It aims to guide, control, and encourage the organization as a whole to achieve its desired state and is supported by elements such as mission, vision, values, and global objectives (Fuertes et al., 2020).

Project management - (Magano et al., 2021) describes project management as a widely utilized system and technique in companies for gaining a competitive advantage and achieving success. However, project failure is still common, often attributed to people factors. Success in projects is linked to the development of project management competencies, including technical and social skills. Transferable skills, such as leadership, communication, and teamwork, are increasingly valued. There is a gap between the skills possessed by engineering graduates and the skills sought by organizations, highlighting the need to integrate diverse competencies. Reimagining project management education and training approaches is necessary, considering changing student profiles and diverse learning styles. Ultimately, project management involves effective communication, collaboration, and leadership within project teams, aiming for successful outcomes.

Leadership development - Is a field focused on enhancing the knowledge, skills, abilities, self-views, and schemas of individual leaders and the collective capacity for leadership within groups. It has gained recognition as a separate discipline from traditional approaches to studying leadership. LD has become a multibillion-dollar industry, with organizations investing significant resources in developing leadership at various levels. The effectiveness of LD programs has been supported by research, highlighting their impact on building leadership capacity. LD aims to improve leadership competencies and facilitate personal and professional growth, ultimately contributing to organizational success (Vogel et al., 2021).

III. Emerging management methods in context of Society 5.0

In the context of Society 5.0, an emerging paradigm, novel management approaches are being developed to address the complex socio-technological challenges and opportunities, fostering collaboration, co-creation, and the utilization of knowledge and advanced technologies to advance societal well-being and progress. The forthcoming text will undertake a review of contemporary literature on management methods aligned with the principles and concepts of Society 5.0.

Knowledge management - Knowledge management (KM) encompasses the acquisition, organization, and utilization of information and knowledge within organizations to enhance

performance and drive innovation. It involves managing both explicit knowledge (codified information) and tacit knowledge (personal insights and expertise). The objective of KM is to capture, share, and effectively utilize relevant knowledge to improve decision-making, foster learning, encourage collaboration, and enhance overall organizational effectiveness. This involves creating a knowledge-sharing environment, establishing knowledge repositories, implementing transfer mechanisms, and utilizing technology to support knowledge-related activities. KM recognizes knowledge as a valuable strategic asset, enabling organizations to leverage intellectual capital, promote innovation, and facilitate continuous learning. In the context of digital innovation, KM incorporates digital tools and platforms to facilitate knowledge creation, dissemination, and access. Technologies such as intranets, collaboration software, social media platforms, and data analytics tools enable organizations to harness big data and make data-driven decisions, further enhancing KM processes. Ultimately, effective knowledge management empowers organizations to leverage their knowledge assets, drive innovation, and adapt to dynamic business environments, promoting continuous learning and improved performance (Di Vaio et al., 2021).

In traditional management methods, knowledge management was often seen as a way to improve organizational efficiency, productivity, and competitive advantage. It focused primarily on internal knowledge sharing within organizations and optimizing business processes. However, with the advent of digital technologies and the increasing interconnectedness of society, knowledge management has evolved to encompass a broader perspective.

In the context of Society 5.0, knowledge management extends beyond organizational boundaries and embraces the idea of open innovation and collaboration. It emphasizes the importance of collective intelligence, co-creation, and shared knowledge across various stakeholders, including government, businesses, academia, and citizens. The goal is to leverage knowledge and technology for the betterment of society and to address complex societal challenges such as sustainability, healthcare, education, and urban development.

Design thinking - is an approach to problem-solving that utilizes tools traditionally employed by designers. It involves iterative processes, collaboration, rapid prototyping, and interaction with users. Design thinking encompasses a cycle of empathizing and observing, defining the problem, generating ideas, prototyping, and testing. It is recognized for its contributions to business and management practices and is increasingly taught in higher education programs. Design thinking is considered a process and mindset that addresses complex problems by establishing mindsets, offering tools, and promoting flexibility and experimentation. It emphasizes fulfilling needs, considering different stakeholder perspectives, and approaching problem-solving in a productive and adaptable manner (Panke, 2019).

In the context of Society 5.0, design thinking can be described as a valuable approach to addressing complex societal challenges and promoting human-centered innovation. It offers a mindset and process that aligns with the principles of Society 5.0, which aims to integrate technology and human capabilities for the betterment of society. Design thinking allows for the identification and exploration of user needs, encourages collaboration and co-creation with diverse stakeholders, and emphasizes rapid prototyping and testing of solutions. By applying design thinking principles in the context of Society 5.0, organizations and individuals can foster sustainable development, inclusivity, and the enhancement of quality of life through innovative and human-centric solutions that leverage technological advancements and address the evolving needs and aspirations of society.

Open innovation - Open innovation is a paradigm shift in how organizations approach innovation, emphasizing the intentional inflow and outflow of knowledge to accelerate internal innovation and expand external markets. It recognizes that valuable ideas can come from internal and external sources, necessitating collaboration with various stakeholders and the exchange of knowledge, technology, and resources across organizational boundaries. Open innovation has gained significant attention from academics and practitioners, with a growing body of research exploring its principles and applications. It has become an important area of study in innovation management, attracting

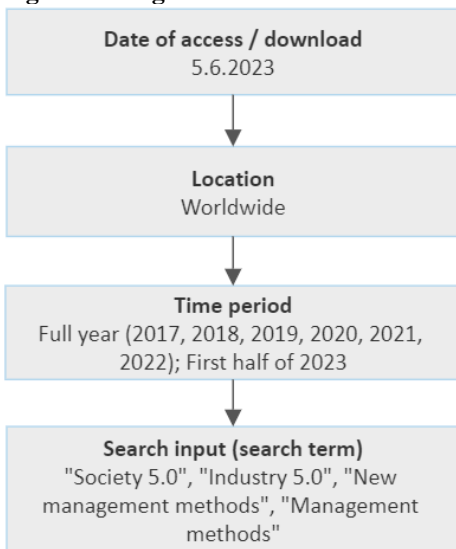
interest from diverse disciplines. By tracking its evolution and examining thematic areas, researchers aim to enhance understanding and identify opportunities for future research (Bigliardi et al., 2021).

Open innovation plays a crucial role in driving societal progress and addressing complex challenges. Society 5.0 envisions a human-centered society that leverages advanced technologies, such as artificial intelligence, robotics, and the Internet of Things, to create a sustainable and inclusive future. Open innovation aligns with this vision by promoting collaboration and knowledge exchange among diverse stakeholders, including businesses, governments, academia, and citizens. By embracing open innovation principles, Society 5.0 can foster collective intelligence, co-create solutions, and leverage external expertise to tackle societal issues effectively. It emphasizes the importance of permeable boundaries and partnerships, enabling organizations to tap into external knowledge, resources, and perspectives to drive innovation and societal transformation. Open innovation within Society 5.0 enables the integration of technological advancements with human needs and values, leading to holistic and inclusive progress.

III. Analyzing Google trends data to unveil emerging new management methods in the context of Society 5.0

Google Trends is a web-based tool provided by Google that allows users to analyze and explore the popularity of search terms and topics over time. It provides insights into the relative search interest for specific keywords or topics across different regions and languages. Google Trends offers data on search volume patterns, related queries, and regional interest, enabling users to track and compare the popularity of various search terms and topics. It can be a valuable resource for businesses, researchers, marketers, and individuals interested in understanding and analyzing search trends, identifying emerging trends, and gaining insights into user behavior and interests (Google Trends, 2023).

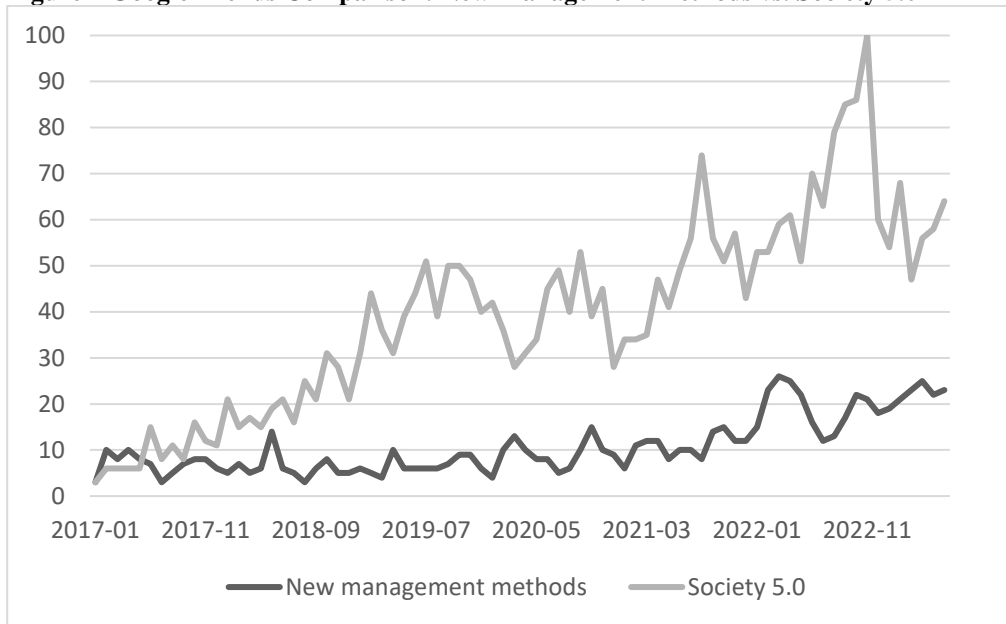
Figure 1 Google trends search methodology



Source: own processing

We employed a distinct methodology to identify and analyze trends. Specifically, we utilized Google Trends as a tool for our analysis. The methodology involved accessing Google Trends on the date of June 5, 2023, with a worldwide location setting. The time period considered spanned from 2017 to the first half of 2023, encompassing the years 2017, 2018, 2019, 2020, 2021, 2022, and the first half of 2023. Our search inputs consisted of four specific terms: "Society 5.0," "Industry 5.0," "New management methods," and "Management methods." By employing this methodology, we aimed to identify and explore the patterns and trends associated with these terms over the specified time frame.

Figure 2 Google Trends Comparison: New Management Methods vs. Society 5.0

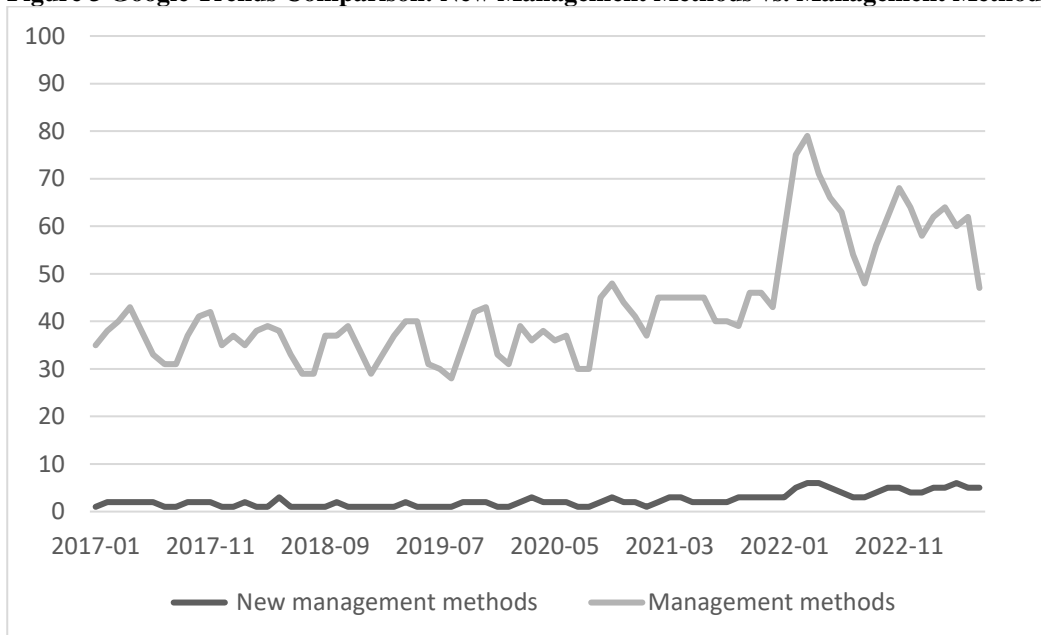


Source: own processing

Figure 2 shows, that in January 2017, both "New management methods" and "Society 5.0" had a search interest score of 3. As the months progressed, the search interest for both terms fluctuated. However, there are some notable differences between the two trends. The search interest for "New management methods" experienced some peaks and valleys, with a peak of 26 in March 2022. After that, the interest declined slightly, reaching a score of 23 in June 2023. On the other hand, the search interest for "Society 5.0" showed a relatively steady increase over time. It experienced a peak of 100 in November 2022 and maintained a relatively high level, with a score of 64 in June 2023.

These trends suggest that "Society 5.0" has consistently garnered higher search interest compared to "New management methods". It's important to note that the specific context and factors influencing these trends may vary, and further analysis would be needed to understand the underlying reasons for the differences in search interest between the two terms.

Figure 3 Google Trends Comparison: New Management Methods vs. Management Methods



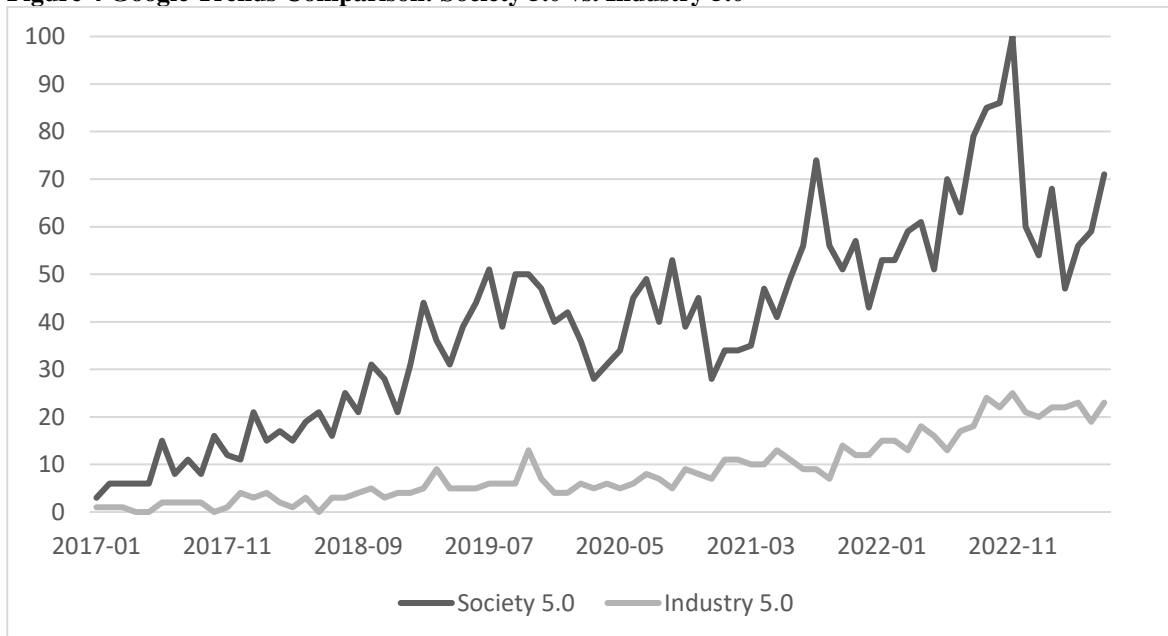
Source: own processing

From January 2017 to June 2023, the search interest for "New management methods" remained relatively low compared to "Management methods", as it is possible to see in **Figure 3**. This discrepancy suggests that the general interest in "New management methods" may be lower when considering search queries across the entire Google platform. However, it's important to note that this observation is specific to the context of general Google searches and may not reflect the interest levels in scientific databases or other specialized platforms.

In contrast, the search interest for "Management methods" consistently displayed higher levels of interest throughout the given time period. This term experienced fluctuations but generally maintained a higher average search interest compared to "New management methods". This could indicate that "Management methods" as a broader concept may have a more established presence and interest within the management field.

However, it is important to note that further analysis of scientific databases in this study may reveal different trends and levels of interest for the terms "New management methods" and "Management methods". The search behavior within scientific literature and specialized platforms could present a distinct perspective on the relative interest and prominence of these concepts within the academic and research communities.

Figure 4 Google Trends Comparison: Society 5.0 vs. Industry 5.0



Source: own processing

The dataset shown in **Figure 4** compares the search interest over time for "Society 5.0" and "Industry 5.0". Both terms exhibit an upward trend, indicating growing interest in these concepts. It is important to note that "Society 5.0" first appeared in Japan in 2017, which could explain its initially lower interest compared to "Industry 5.0". However, "Society 5.0" consistently receives higher search interest and shows larger spikes compared to "Industry 5.0" throughout the available years of data. These trends suggest that both terms have become increasingly popular topics of interest, with "Society 5.0" garnering more attention overall. In the context of the topicality of the basic starting points, an analysis of the frequency of individual key terms (*Industry 5.0* and *Society 5.0*) in selected electronic databases was carried out, which is presented in **Table 1**. This is the absolute occurrence of key words in scientific articles.

Table 1 frequency of keywords

Databáze/termín		Industry 5.0					Society 5.0				
WoS	<i>year</i>	19	20	21	22	23	19	20	21	22	23
	<i>sum</i>	2149	1961	1941	2301	419	831	890	1051	866	137
Scopus	<i>year</i>	19	20	21	22	23	19	20	21	22	23
	<i>sum</i>	185	273	313	441	248	124	138	181	253	86
JSTOR	<i>year</i>	19	20	21	22	23	19	20	21	22	23
	<i>sum</i>	876	538	531	300	79	2299	1662	998	857	218
Google Scholar	<i>year</i>	19	20	21	22	23	19	20	21	22	23
	<i>sum</i>	6550	8170	11600	13700	4840	8580	11000	14500	17300	5650
ProQuest	<i>year</i>	19	20	21	22	23	19	20	21	22	23
	<i>sum</i>	36584	41367	52798	51614	18637	50693	56776	67854	60843	18911
Science Direct	<i>year</i>	19	20	21	22	23	19	20	21	22	23
	<i>sum</i>	11216	15237	18613	19821	12289	5782	7368	9116	9641	6148

Source: own processing

The following analysis describes the trends observed in the table, taking into account the data from 2019 to 2023 for the terms "Industry 5.0" and "Society 5.0" in various databases. It is important to note that the drops in occurrences during 2023 can be attributed to the fact that data for this year is only available for the first half, and therefore, the results are not yet complete.

Table 2 analyzes in the same way the rate of frequency in individual years for the terms *Management methods* and *New management Methods*.

Table 2 frequency of keywords

Databáze/termín		Management methods					New management methods				
WoS	<i>year</i>	19	20	21	22	23	19	20	21	22	23
	<i>sum</i>	171617	190850	202906	191368	53596	48414	52700	62001	54069	11396
Scopus	<i>year</i>	19	20	21	22	23	19	20	21	22	23
	<i>sum</i>	66944	74781	83256	88253	38522	9690	10886	11845	12728	5453
JSTOR	<i>year</i>	19	20	21	22	23	19	20	21	22	23
	<i>sum</i>	1527	1084	592	582	132	1459	1054	580	568	122
Google Scholar	<i>year</i>	19	20	21	22	23	19	20	21	22	23
	<i>sum</i>	269000	272000	219000	147000	49500	241000	242000	176000	136000	32800
ProQuest	<i>year</i>	19	20	21	22	23	19	20	21	22	23
	<i>sum</i>	245427	286077	355526	333988	114052	201217	237515	294331	285556	98175
Science Direct	<i>year</i>	19	20	21	22	23	19	20	21	22	23
	<i>sum</i>	110832	125838	149212	156772	98822	80105	91435	109545	116531	73615

Source: own processing

In the Web of Science (WoS) database, the number of articles related to these terms shows fluctuating patterns over the years, with a peak in 2021. Similarly, the Scopus database reflects a steady increase from 2019 to 2022. JSTOR shows relatively low numbers of articles on these terms throughout

the years. Google Scholar and ProQuest databases indicate a relatively high volume of articles, with fluctuations over the years. Science Direct shows a steady increase in the number of articles until 2022. Please note that the data for the year 2023 is incomplete, and the trends observed so far may change as more data becomes available.

IV. Conclusion

In conclusion, the advent of Society 5.0, characterized by the integration of advanced technologies and data-driven decision-making, presents a paradigm shift in management practices. Traditional management methods have played a crucial role in organizational success, but the fast-paced nature of technological advancements and the evolving societal framework of Society 5.0 necessitate the adoption of new management approaches.

The emergence of new management methods in the context of Society 5.0 is driven by the need to address complex socio-technological challenges and leverage opportunities for societal well-being. These emerging approaches include knowledge management, design thinking, and other innovative strategies that emphasize collaboration, co-creation, and the utilization of knowledge and advanced technologies.

Knowledge management focuses on capturing, sharing, and effectively utilizing information and knowledge within organizations to drive innovation and improve decision-making. It has evolved to incorporate digital tools and platforms, enabling organizations to harness big data and make data-driven decisions.

Design thinking, on the other hand, is an approach to problem-solving that utilizes tools traditionally employed by designers. It emphasizes empathy, collaboration, rapid prototyping, and user interaction to address complex problems and fulfill the needs of different stakeholders.

These new management methods go beyond traditional boundaries and embrace open innovation and collaboration across government, businesses, academia, and citizens. They aim to leverage knowledge and technology to address societal challenges such as sustainability, healthcare, education, and urban development.

To navigate the dynamic landscape of Society 5.0 successfully, organizations need to embrace these innovative management approaches that prioritize holistic integration, real-time data analysis, and the well-being of society. By adopting these methods, companies can enhance their adaptability, foster sustainable growth, and contribute to the progress of Society 5.0.

The comprehensive investigation of the current scientific literature on new management methods in the context of Society 5.0, along with the analysis of growth and popularity using data obtained from Google Trends, contributes to a deeper understanding of the evolving management practices required in various fields of companies in anticipation of Society 5.0. This research endeavor provides valuable insights into the current state and emerging trends in new management methods, guiding organizations in their journey towards embracing the transformative potential of Society 5.0.

References

- Badakhshan, P., Conboy, K., Grisold, T., & Vom Brocke, J. (2019). Agile business process management: A systematic literature review and an integrated framework. *Business Process Management Journal*, 26(6), 1505–1523. Doi: 10.1108/BPMJ-12-2018-0347.
- Barata, J., & Kayser, I. (2023). Industry 5.0 – Past, Present, and Near Future. *Procedia Computer Science*, 219, 778–788. Doi: 10.1016/j.procs.2023.01.351.
- Bigliardi, B., Ferraro, G., Filippelli, S., & Galati, F. (2021). The past, present and future of open innovation. *European Journal of Innovation Management*, 24(4), 1130–1161. Doi: 10.1108/EJIM-10-2019-0296.

- Castelo-Branco, I., Amaro-Henriques, M., Cruz-Jesus, F., & Oliveira, T. (2023). Assessing the Industry 4.0 European divide through the country/industry dichotomy. *Computers & Industrial Engineering*, *176*, 108925. Doi: 10.1016/j.cie.2022.108925.
- Çipi, A., Fernandes, A. C. R. D., Ferreira, F. A. F., Ferreira, N. C. M. Q. F., & Meidutė-Kavaliauskienė, I. (2023). Detecting and developing new business opportunities in society 5.0 contexts: A sociotechnical approach. *Technology in Society*, *73*, 102243. Doi: 10.1016/j.techsoc.2023.102243.
- Di Vaio, A., Palladino, R., Pezzi, A., & Kalisz, D. E. (2021). The role of digital innovation in knowledge management systems: A systematic literature review. *Journal of Business Research*, *123*, 220–231. Doi: 10.1016/j.jbusres.2020.09.042.
- Eniola, A. A., Olorunleke, G. K., Akintimehin, O. O., Ojeka, J. D., & Oyetunji, B. (2019). The impact of organizational culture on total quality management in SMEs in Nigeria. *Heliyon*, *5*(8), e02293. Doi: 10.1016/j.heliyon.2019.e02293.
- Fuertes, G., Alfaro, M., Vargas, M., Gutierrez, S., Ternero, R., & Sabattin, J. (2020). Conceptual Framework for the Strategic Management: A Literature Review—Descriptive. *Journal of Engineering*, *2020*, 1–21. Doi: 10.1155/2020/6253013.
- Google Trends. (2023, May 18). *Google Trends*. <https://trends.google.com/trends/>.
- Hitachi-UTokyo Laboratory (Ed.). (2020). *Society 5.0: A People-centric Super-smart Society*. Springer Singapore. Doi: 10.1007/978-981-15-2989-4.
- Magano, J., Silva, C. S., Figueiredo, C., Vitoria, A., & Nogueira, T. (2021). Project Management in Engineering Education: Providing Generation Z With Transferable Skills. *IEEE Revista Iberoamericana de Tecnologías Del Aprendizaje*, *16*(1), 45–57. Doi: 10.1109/RITA.2021.3052496.
- Mahmoud, Z., Angelé-Halgand, N., Churruca, K., Ellis, L. A., & Braithwaite, J. (2021). The impact of lean management on frontline healthcare professionals: A scoping review of the literature. *BMC Health Services Research*, *21*(1), 383. Doi: 10.1186/s12913-021-06344-0.
- Nagy, K., & Hajrizi, E. (2019). Building Pillars for Adapting Society 5.0 in Post-Conflict Countries. *IFAC-PapersOnLine*, *52*(25), 40–45. Doi: 10.1016/j.ifacol.2019.12.443.
- Panke, S. (2019). Design Thinking in Education: Perspectives, Opportunities and Challenges. *Open Education Studies*, *1*(1), 281–306. Doi: 10.1515/edu-2019-0022.
- Pulakos, E. D., Mueller-Hanson, R., & Arad, S. (2019). The Evolution of Performance Management: Searching for Value. *Annual Review of Organizational Psychology and Organizational Behavior*, *6*(1), 249–271. Doi: 10.1146/annurev-orgpsych-012218-015009.
- Singh, M., & Rathi, R. (2019). A structured review of Lean Six Sigma in various industrial sectors. *International Journal of Lean Six Sigma*, *10*(2), 622–664. Doi: 10.1108/IJLSS-03-2018-0018.
- Som, R., Raksmeay, C., & Dumitrascu, D. (2020). *UNDERSTANDING TYPE, PROCESS AND ELEMENTS OF CHANGE: A CONCEPTUAL REVIEW ON THE FRAMEWORK OF CHANGE MANAGEMENT*. International Management Conference. Doi: 10.24818/IMC/2020/03.01.
- Vogel, B., Reichard, R. J., Batistič, S., & Černe, M. (2021). A bibliometric review of the leadership development field: How we got here, where we are, and where we are headed. *The Leadership Quarterly*, *32*(5), 101381. Doi: 10.1016/j.leaqua.2020.101381.