Research Trends in Knowledge Management and Innovation: a Bibliometric Review

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Abstract: Due to the important role of knowledge and innovation in the development of organisations or economies, these issues continue to receive considerable attention from practitioners and researchers. Knowledge and innovation are closely related concepts. Without proper knowledge management (KM), it is difficult to design and implement changes, while, on the other hand, innovation creates a demand for new areas of knowledge and continuously develops it. The main objective of this paper is to identify the leading challenges in knowledge management and innovation, by exploring the key themes, their connections and the latest research trends in this area. Using the SCOPUS citation database, publications were reviewed to answer the following questions: (RQ1) How has the perspective of academic research addressing both knowledge management and innovation evolved over the last twenty years? and (RQ2) What are the leading research areas and new trends in research simultaneously addressing knowledge management and innovation? The analysis covered the years 2003-2023. The collected data was pre-selected and then, based on the frequency of co-occurrence of key terms, mapping was performed and keywords were extracted using VOSviewer software. In the years under review, there has been an increase in the number of publications dealing with the topic of knowledge management, including those linked to innovation. Publications in this field are mainly concentrated in three research areas: Business, Management and Accounting, Computer Science and Engineering. Most studies come from China. The dominant research unit in this research area, according to the affiliation of the researchers, is LUT University. Issues such as knowledge sharing and transfer of knowledge, learning organisations, competition or information management among others, continue to be of interest to researchers. Among the most recent trends, research is dominated by: green innovations, mediating roles, big data and covid-19. The study helps to understand the challenges that have arisen for research in the analyzed area in the last two decades. It can provide a valuable study and a guide for identifying available and future research directions on knowledge management and innovation.

Keywords: Knowledge Management, Innovation, Vosviewer, Bibliometrics

1. Introduction

Researchers have eagerly explored knowledge management (KM) and innovation for many years. Both concepts are recognised as key determinants of sustainable growth for economies and businesses. The concept of KM has gained importance with the emergence of the knowledge economy and technological advances. Knowledge management is the systematic process or practice of capturing, storing, sharing and productively using knowledge to improve learning and enhance organisational performance.(Mateu, 2014) It is an essential element in the development of tangible and intangible production that determines the effectiveness of an organisation (Tavasieva et al, 2019, Mustafa and Rexhepi, 2024). As noted by Jain (2016), with the increasing importance of knowledge for economic and business development, ethical and legal issues such as privacy, confidentiality and intellectual property are becoming increasingly relevant.

Innovation is the introduction of new or significantly improved products, operational processes, marketing methods and organisational or management methods in business practices (Ayandibu et al., 2020). They allow organisations to progress in terms of turnover and profits, as well as in terms of knowledge, experience, productivity and quality (Baporikar, 2014, Baporikar, 2015, ul Hassan, 2014). They influence productivity, consumer benefits (Young, 2015), global competitiveness (Krishnamoorthy and Damle, 2017) and economic progress in both developed and developing economies (Mehdi, 2022). In times of rapid technological development, shortened product life cycles, globalised markets and increased competitiveness, innovation is indispensable (Godin, 2017).

Due to the complex and multi-faceted relationship between knowledge management and innovation, these issues are often considered together by researchers. Many authors point to the positive relationship between knowledge management and innovation (Guetat and Dakhli, 2013, Ologbo and Nor 2015, Dow et al., 2019), which are connected through continuous and complex interactions (Guetat and Dakhli, 2013). As highlighted by Barbaroux et al (2016), the evolution of knowledge management processes is linked to the implementation of interactive, collaborative and open innovation models. They cover different types of knowledge and processes at various stages of innovation.Effective knowledge and innovation management is crucial for an organisation's competitive advantage and long-term survival (Guetat and Dakhli, 2013, García, 2020). The rapid development

of information and communication technologies (ICT) strongly influences the processes of knowledge creation, dissemination and exploitation (Nurulin et al., 2019, Martins et al., 2022). Achieving organisational success requires attention to people, processes and technology (Omotayo and Akintibubo, 2024). Employees who engage in knowledge management processes enable the company to push the boundaries of its innovation capabilities (Ologbo and Nor, 2015). To increase innovative thinking among employees, it is necessary to regularly implement knowledge management practices (Luturlean et al, 2021) and, in particular, to encourage creativity and openness in information management (Al-Zagheer et al, 2024).The issues of knowledge management and innovation are hardly new, but the dynamically changing environment allows them to be explored on different, and indeed all-new, levels. Therefore, the main objective of this study was to identify the leading challenges in knowledge management and innovation by exploring the key themes, their connections and the latest research trends in this area.Using the SCOPUS database, publications were reviewed to answer the following questions: (RQ1) How has the perspective of academic research addressing both knowledge management and innovation evolved over the last twenty years? (RQ2) What are the leading research areas and new research trends simultaneously addressing knowledge management and innovation? The focus was on articles published between 2003 and 2023. The results are presented in tabular form and as visual representations showing the resulting research clusters, generated by the VOSviewer software.

2. Data and Methodology

This paper used a bibliometric analysis to identify current research trends among leading scientific publications related to knowledge management (KM) and innovation issues, as used by many researchers (e.g. Carlsson and Noyons, 2009, Zhang et al, 2019, Ruas et al, 2017, Gudanowska, 2017; Gorzeń-Mitka,2020, Lobonţ et al, 2021). As emphasised by Klincewicz et al (2012), this method makes it possible, among other things, to determine the current state of knowledge in a given area, indicate knowledge gaps, predict future research developments in a given area and identify areas characterised by a relatively high saturation of conducted research and links between research areas.

The data for the study was obtained from Web of Science (WoS) and SCOPUS databases. Using the search mechanism of these databases, scientific publications containing the terms "knowledge management" and "innovation" in the "Article title, Abstract, Keywords" box were extracted. The analysis covered publications from the last two decades, i.e. from 2003 to 2023. Further analysis focused on the SCOPUS database due to a slightly larger number of publications indexed there. The results obtained were organised and partially aggregated. The study comprised several stages:

1. Extracting the number of publications on the analysed research area in the WoS and SCOPUS databases and assessing changes in their number in the longer term.
2. Identifying the dominant subject areas into which publications were classified based on the SCOPUS database.
3. Identifying countries/regions, scientific centres and universities of key importance for the analysed research area based on the SCOPUS database.
4. Identifying publications of key importance for the analysed research area based on the SCOPUS database citation index.
5. Identifying research sub-areas based on co-occurrence relationships of the keywords "innovation and knowledge management" in the SCOPUS database using the VOSviewer programme.

The analysis used software like Excel and VOSviewer (Visualizing scientific landscapes, version 1.6.18), as well as data analysis tools available in Web of Science and SCOPUS databases. The analysis covered bibliographic data extracted on 5 April 2024.

3. Analysis Results

At the outset of the analysis, the Web of Science and SCOPUS databases were filtered, and a time series analysis was performed, reflecting the number of included publications addressing innovation and knowledge management. Over the years, there has been a dynamic increase in the number of indexed studies dealing with these issues. The first such studies appeared in the SCOPUS database in 1994, and in Web of Science in 1996.

In the case of WoS, this was the publication by D.W. Straub, The effect of culture on IT diffusion: E-mail and FAX in Japan and the U.S., Information Systems Research, 5(1). There were two entries in the SCOPUS database: J.C. Spender, Making knowledge the basis of a dynamic theory of the firm, Strategic Management Journal 17, pp.

45-62; and R. Sanchez and J.T. Mahoney, Modularity, flexibility, and knowledge management in product and organization design, Strategic Management Journal 17.

This paper analyses publications from 2003 to 2023. By 2003, the total number of relevant papers was 7,648 in the WoS database and 8,672 in SCOPUS. (Fig. 1) Further, it should be noted that in 2007 the number of publications indexed in both databases exceeded 200 papers per year, and in the last decade it was at least 300 and 400 papers annually. The figures were slightly higher in the case of the SCOPUS database, with 600 items on the analysed issues indexed in 2003. The dynamically increasing number of publications in both databases indicates a constantly growing interest in knowledge management and innovation.

Figure 1: Publications devoted to knowledge management and innovation in the WoS and SCOPUS databases (1996-2023)

Source: own elaboration based on WoS and SCOPUS data

SCOPUS data was analysed in greater detail due to the slightly higher number of publications. Taking into account data aggregation, the publication output was analysed according to the thematic areas to which the publications were classified; the country of origin of the authors with the most publications (geographical arrangement) and the scientific centres represented by the researchers with the most frequently published and most frequently cited publications.

In the SCOPUS database, publications dealing with knowledge management and innovation are dominated by conference papers (48.65%) and scientific articles (44.55%). Together, they account for 93.20% of all papers. The other types of publications represent a small percentage of the analysed dataset. (Tab. 1)

Table 1: Main publication types

Document Type	Number of publications	Structure	Document Type	Number of publications	Structure
Conference Paper	4,152	48.647%	Editorial	23	0.269%
Article	3,802	44,546%	Note	15	0.176%
Review	256	2.999%	Short Survey	7	0.082%
Book Chapter	196	2.296%	Conference Review	3	0.035%
Retracted	48	0.562%	Data Paper	3	0.035%
Book	28	0.328%	Erratum	2	0.023%

Source: own elaboration based on SCOPUS data

An analysis of the thematic areas into which the SCOPUS publications were classified leads to the conclusion that the identified papers mainly represented two areas: business, management and accounting (22.12% of publications), as well as Computer Science (21.87% of publications). The other areas with more than 1,000 papers published in the last two decades were Engineering, Decision Sciences and Social Sciences. The distribution across all SCOPUS subject areas is shown in Figure 2.

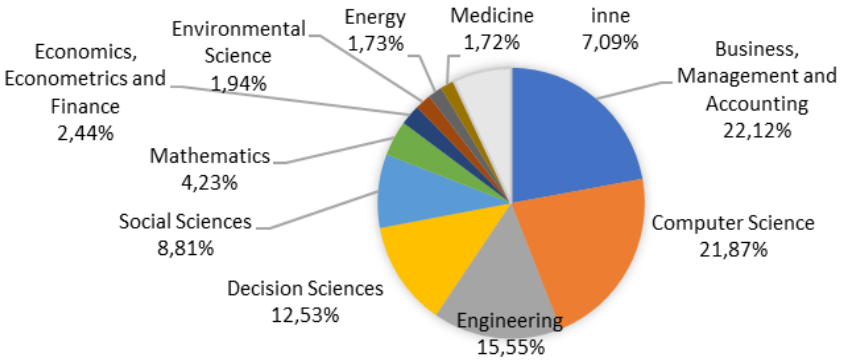

Figure 2: Main subject areas

Source: own elaboration based on SCOPUS data

The authors of publications dealing with knowledge management and innovation were mostly researchers from LUT University in Finland; Zhejiang University and Harbin Institute of Technology from China; Universidade de São Paulo in Brazil and Politecnico di Milano in Italy. (Tab. 2)

Table 2: List of research centres of origin of researchers addressing KM and innovation — Top 5

No	Affiliation	Number
1	LUT University	72
2	Zhejiang University	59
3	Harbin Institute of Technology	54
4	Universidade de São Paulo	46
5	Politecnico di Milano	42
5	Bucharest University of Economic Studies	42

Source: own elaboration based on SCOPUS data

When analysing the country/region of origin of the authors with the highest number of studies on the issue at hand, the dominant position of China is evident. Authors from the United States come second and those from the United Kingdom third. Further countries in the ranking are Germany, Spain and Italy. A list of the top ten countries and research centres of researchers addressing KM and innovation is presented in Table 3.

Table 3: List of countries of origin of researchers addressing KM and innovation — Top 10

No	Country/Territory	Number of Publications	Structure	No	Country/Territory	Number of Publications	Structure
1	China	1,437	13.26%	6	Italy	417	3.85%
2	United States	959	8.85%	7	Australia	324	2.99%
3	United Kingdom	691	6.38%	8	France	296	2.73%
4	Germany	490	4.52%	9	Taiwan	282	2.60%
5	Spain	450	4.15%	10	Brazil	275	2.54%

Source: own elaboration based on SCOPUS data

Considering the source of publications, the leader in the number of publications on knowledge management and innovation is the Journal of Knowledge Management, with 174 such publications. More than 100 research papers in this area were published in "Lecture Notes in Computer Science Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics" (133 items), "ACM International Conference Proceeding Series" (112 items) and "Communications in Computer and Information Science" (111 items). Figure 3 shows the ranking of sources with the largest number of publications dealing with the issue in question.

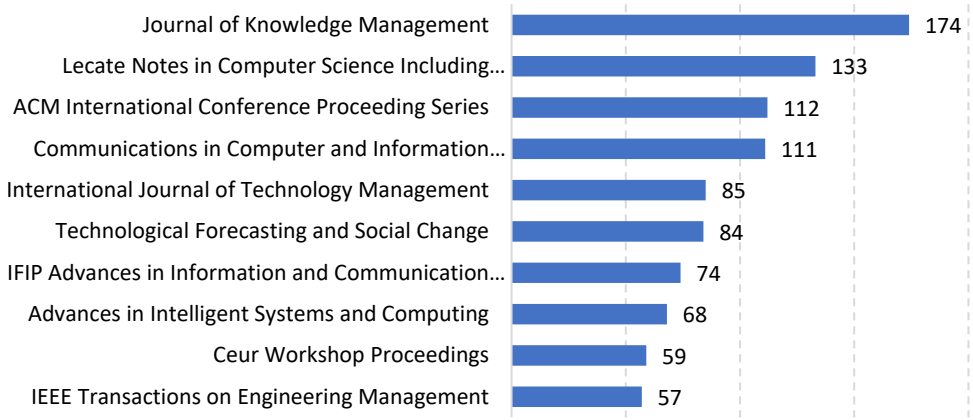

Figure 3: List of sources with the largest number of publications on KM and innovation

Source: own elaboration based on SCOPUS data

According to the SCOPUS database, the most published researchers included Gardoni, M. (20 papers), Kianto, A. and Matos, F. with 19 publications each, and Schmitt U. with 13 papers. (Fig. 4)

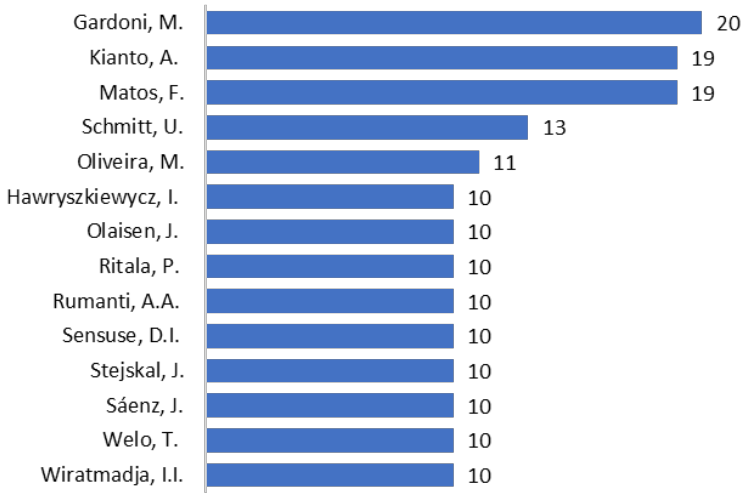

Figure 4: Authors with the highest number of publications on KM and innovation — TOP 5

Source: own elaboration based on SCOPUS data

Notably, the publications of the above researchers are not among the most cited. Of the ten most cited publications addressing both knowledge management and innovation, the article by Argote, L., McEvily, B. and Reagans, R. titled Managing knowledge in organizations: An integrative framework and review of emerging themes, published in 2003 in Management Science, ranked first with 1,494 citations. Table 4 shows a ranking of the ten most cited publications addressing knowledge management and innovation.

The next step in examining bibliometric data was word co-occurrence analysis which, as noted by Liu et al (2015), is used to identify key research topics in a research field or knowledge domain. The analysis involved preparing a map of knowledge and research trends related to knowledge management and innovation in the context of SCOPUS publications indexed between 2003 and 2023. VOSviewer — visualisation software that is particularly helpful when working with large amounts of data — was used for building and visualising bibliometric networks, as well as for scientific mapping. It was used to group and evaluate research sub-areas. The data file generated in the SCOPUS database was further analysed using the VOSviewer visualisation software. Due to the large size of the initial database (8,535 items), only articles published in the years analysed were considered for further analysis. Ultimately, 3,730 items were analysed.

It was decided that "indexed keywords" should be used in the correlation analysis because they reduce duplicate or similar terms (Zhang et al, 2016). To make the visualisation clearer, a term extraction was also performed

with an indication of words with a minimum of 15 repetitions in bibliographic descriptions. In addition, such terms as China, Australia, article, data mining, India and issue were eliminated from the set.

Table 4: Most cited publications on KM and innovation (TOP-5)

Author	Title	Journal	Year	Number of citations
Argote, L., McEvily, B., Reagans, R.	Managing knowledge in organizations: An integrative framework and review of emerging themes	*Management Science*	2003	1,494
Gertler, M.S.	Tacit knowledge and the economic geography of context, or the undefinable tacitness of being (there)	*Journal of Economic Geography*	2003	1,394
Jensen, M.B., Johnson, B., Lorenz, E., Lundvall, B.A.	Forms of knowledge and modes of innovation	*Research Policy*	2007	1,144
Schilling, M.A., Phelps, C.C.	Interfirm collaboration networks: The impact of large-scale network structure on firm innovation	*Management Science*	2007	1,090
Chen, C.-J., Huang, J.-W.	Strategic human resource practices and innovation performance - The mediating role of knowledge management capacity	*Journal of Business Research*	2009	1,011

Source: own elaboration based on SCOPUS data

Based on these assumptions, a database of 184 keywords was obtained and presented in the form of a map. (Fig. 5) The map illustrates current trends in research addressing knowledge management and innovation and shows the links detected over time. The major keywords "knowledge management" and "innovation" were removed because they appeared in all articles (Liao et al, 2023). The terms analysed were grouped by occurrence and strength of interconnection, resulting in seven clusters of terms. Each cluster is marked by a different colour: blue, green, red, purple, blue, yellow and orange.

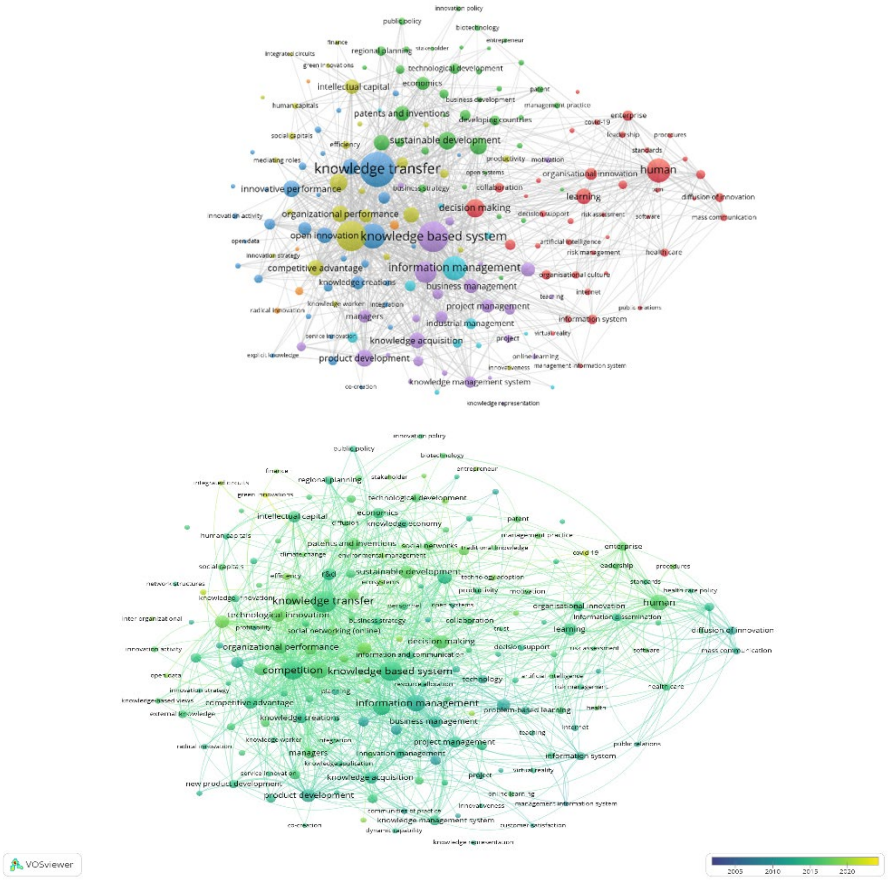

Figure 5: Maps of the intensity of link co-occurrence between keywords and links detected over time

Source: own elaboration using VOSviewer and SCOPUS.

The size of the items (nodes and font) in the maps indicates the frequency of co-occurrence of a given term and the links between network nodes represent their co-occurrence in the analysed group of publications. The larger the item, the greater its importance and popularity relative to others (Perianes-Rodriguez et al., 2016). The distance between the visualisation items roughly indicates their relatedness in the co-occurrence network, so the closer two items are to each other, the stronger their links (van Eck and Waltman, 2019). The stronger the link, the more frequently both terms appear in publications. The map created using VOSviewer features numerous links, making the network quite dense, especially in its central part. It comprises 184 items and 6,836 links, with its central part containing the most frequent keywords. The topics most strongly linked to others within the network were: "human resource management", "employee" and "information management".

The first cluster categorised in VOSviewer is the most numerous, with 40 keywords.(Tab. 6) It is marked in red. The term with the highest link strength (Tls) is "human" (Tls= 655), followed by "decision making" (Tls=512). These terms also have the highest co-occurrence rates (O) in the group, at 182 and 129, respectively.

The red cluster includes publications addressing issues related to artificial intelligence, decision-making, learning, communication and health care. This group also includes terms relating to information, information dissemination and retrieval, the information system and the "management information system". Further, it includes research relating to organisational innovation and the diffusion of innovation, as well as risk management and risk assessment. Publications in this group examine innovation and knowledge management in terms of leadership, organisational culture, trust, creativity and collaboration. There are also references to standards, procedures and TQM. The most frequent and most linked keywords in this cluster are "human" and "diffusion of innovation". Their minimum link strength is 42. References to COVID-19 and "digital storage" are relatively new. For these, the average publication years (AvgPY) are 2021 and 2018, respectively. The average publication year for all issues in the cluster is 2014.79.

The next cluster comprises 38 items and is marked in green. This cluster focuses on issues related to business development, productivity, entrepreneurship, investments, performance assessment, employment and "business strategy". The strongest and most linked relationship in this cluster relates to such keywords as "technology transfer" (Tls =441; O=111) "research and development" (Tls =413; O=101) "sustainable development" (Tls =371; O=118) and "patents and inventions" (Tls =359; O=96).

The dominant term with the highest number of links and the highest link strength (Tls =441; O=111) is "technology transfer". Other related topics are "technological development", "technological forecasting" and "technology adoption". The articles in this cluster focus on issues related to the knowledge economy, knowledge exchange, economic development, economics, research and development, patents and inventions, intellectual property, the innovation system and innovation policy. They also refer to social networks, big data, software design and sustainable development. This cluster includes knowledge management and innovation in the context of economic and enterprise development, i.e. entrepreneurs and other stakeholders. The issues at hand also relate to technological development and forecasting, as well as technology adoption and transfer.

The average year of publication for the entire cluster is 2015.8. Looking at the links detected over time, one can see that the most recent publications in the cluster refer to "big data" and "entrepreneur" (average year of publication: 2019).

The third cluster, marked blue, is related to knowledge, innovation, networks and collaboration. It comprises 35 terms. The highest link strength within the blue cluster occurs in the case of "knowledge transfer" (Tls=954; O=316). This is also the third-highest score for the entire link map. Other blue cluster keywords with high link strength include "knowledge sharing" (Tls=677; O=197) "commerce" (Tls=463; O=97) "innovative performance" (Tls=430; O=108) and "open innovation" (Tls=378; O=98). Notably, much of the research categorised into this cluster relates to networks — innovation, knowledge and social ones, as well as network structure and complexity. A significant number of keywords refer in various ways to innovation and knowledge. In the case of innovation, these include collaborative innovation, innovation activity, innovation process, service innovation and knowledge innovation. In terms of references to knowledge, the blue cluster included research referring to such things as explicit and external knowledge, as well as the creation, application, diffusion, integration and flow of knowledge, and tacit knowledge management. Co-creation, integration, absorptive capacity and crowdsourcing were also among the keywords. Looking at the average time of publication, this group's most recent studies on knowledge management and innovation refer to "open data" (AvgPY=2018.69) and "inter-organisational" (AvgPY=2018.53) issues. The average year of publication for the entire cluster is 2015.32.

The fourth cluster ranked in VOSviewer covers slightly fewer keywords — 27. It is marked in yellow. The most frequent and strongly linked cluster components are "competition" and "competitive advantage" — the strength of the link between them is 95. These terms are the most frequent and linked items not only in the cluster but also in the entire network. The main keywords characterising this cluster are "competition", "competitive advantage", "organisational performance", "technological innovation" and "human resource management". In this cluster, the term "competition" has the highest link and co-occurrence strength (Tls=1073; O=253). This group of publications primarily focuses on issues related to competition, organisational knowledge management, human capital, innovation and environmental management — "climate change" and "green innovation". Analysing the links detected over time, it is noticeable that the yellow cluster is a collection of issues that have begun appearing in publications relatively recently. The average year of publication for the entire cluster is 2016.24, with the lowest AvgPY value being 2013 for "planning" and the highest being 2014.9091 for "competition". New issues covered in innovation and knowledge management publications include green innovation, for which the average publication year is 2021.61, and "mediating roles", with an average publication year of 2020.46.

The fifth cluster ranked in VOSviewer comprises 27 keywords and is marked in purple. This research area concerns knowledge-based systems, learning organisations and product development. The most frequently used keyword in our sample of documents is "knowledge-based system (KBS)". Being the most prominent issue in the group, it is in the central part of the map. The purple cluster covers publications relating to business and project management, knowledge acquisition and information technology. These are the strongest and most linked relationships within this group. Considering the time of publication, the keywords in the purple cluster are not new issues in the context of research considering knowledge management and innovation. The average year of publication for the entire cluster is 2014.06. The keywords in this cluster also include some with an AvgPY of 2010. These are "knowledge engineering", "communities of practice" and "enterprise resource planning".

A further, sixth, cluster comprises 12 keywords. It is marked in light blue. The three main keywords characterising this cluster are "information management", "strategic planning" and "industrial management". "Information management" (Tls=796; O=183) is characterised by the greatest link and co-occurrence strength and is located close to the central part of the map. This cluster also includes publications relating to product innovation, dynamic capability, marketing and customer satisfaction. Looking at the average publication time, one can see that this cluster contains keywords that have not been heavily used in recent years. In this cluster, the most recent studies on knowledge management and innovation are related to "entrepreneurship" (AvgPY=2018.78). The average year of publication for the entire cluster is 2013.75.

The last cluster (orange) includes only 5 keywords. This cluster is the least numerous and the weakest in terms of total link strength and occurrences. The cluster covers the following keywords: "incremental innovation", "innovation capability", "knowledge management strategy", "mergers and acquisitions" and "radical innovation". In this cluster, the term "innovation capability" has the highest link and co-occurrence strength (Tls=168; O=45). The orange cluster contains publications on innovation and knowledge management in the context of innovation capability, including incremental and radical innovation, knowledge management strategy and the changes brought about by mergers and acquisitions. The correlations detected over time show that all the keywords in this cluster, although seemingly familiar, are still readily used in publications addressing innovation and knowledge management. The average year of publication for the entire group is 2015,425, and for individual keywords, it does not extend beyond the last decade. In this case, the lowest AvgPY value is 2013.75.

Looking at the map as a whole, it is also worth highlighting the keywords with the highest link strength regardless of cluster affiliation. The most frequent and most interlinked items among the selected map clusters were "technology transfer" (green cluster) and "knowledge transfer" (blue cluster) — 37 lines. Numerous links also exist between "knowledge transfer" and "competition" (yellow cluster), for which the link strength is 36.

4. Summary

This study presents the evolution of research addressing knowledge management and innovation, which are key factors in developing and building the competitive position of actors and economies. They contribute to solving the challenges of change in organisations and their environment. A co-occurrence network analysis using VOSviewer software was employed to identify new trends in this area. The analysis covered publication data from two decades. The main findings of the study are as follows:

- The number of publications indexed in the analysed databases is systematically increasing, which indicates a growing researcher interest in knowledge management and innovation.
- The issues analysed in this study are typically considered in business, management and accounting, computer science and engineering.
- By forming a keyword co-occurrence network map and simultaneously analysing research activities addressing knowledge management and innovation, it was found that the boundary themes in this research consist of seven representative areas, focused on such main keywords as competition, knowledge-based system, information management, knowledge and technology transfer, innovation capacity and sustainability.
- Recent trends in research addressing innovation and KM refer to green innovation, COVID-19, mediating roles, integrated circuits, big data and entrepreneurship.

This study aimed to identify selected challenges in an exploratory manner and may form the basis for continued work in this area. Nonetheless, it also has certain limitations that open up possibilities for further consideration. The issues of innovation and knowledge management are multidimensional, and this study analysed only the leading trends in these areas. The focus was only on major trends, limiting the analysis to data from the SCOPUS database. Further in-depth research using multiple databases would be advisable. From the point of view of research methodology, a more in-depth analysis of citations, the number of article downloads from the database or the co-existence of author or research centre relationships could be devised. Summarising the trends identified in the study, it can be concluded that knowledge management and innovation continue to pose a challenge for modern actors and economies and are areas of exploration for academic researchers.

References

Al-Zagheer, H., Alda'jah, A.K., Hammouri, Q. and Alshawabkeh, H.A. (2024) “The Role of Internal Knowledge Management Capabilities with the Internet of Things”, 2nd International Conference on Cyber Resilience, ICCR, Dubai, Code 199657.

Ayandibu, A.O., Vezi-Magigaba, M.F. and Kaseeram, I. (2020) “Innovation as an improvement tool for SMMEs”, In: Ayandibu, Ayansola Olatunji (ed) Reshaping Entrepreneurship Education with Strategy and Innovation, pp 78-107, IGI-GLOBAL BOOKS, Hershey, PA, USA.

Baporikar, N. (2014) “Drivers of innovation”, In: Patricia Ordoñez de Pablos, Luis Jovell Turró, Robert D. Tennyson and Jingyuan Zhao (eds) Knowledge Management for Competitive Advantage During Economic Crisis, pp 250-270, IGI-GLOBAL BOOKS, Hershey, PA, USA.

Baporikar, N. (2015) “Innovation knowledge management nexus”, In: Carolina Machado and J. Paulo Davim (eds) Innovation Management: In Research and Industry, pp 85-110, De Gruyter, Berlin, München, Boston.

Barbaroux, P., Attour, A. and Schenk, E. (2016) Knowledge Management and Innovation: Interaction, Collaboration, Openness, Wiley Blackwell.

Carlsson, H. and Noyons, E.C.M. (2009) “Field delineation using medical subject headings (MeSH) – An alternative way to aggregate data in the web of science”, 12th International Conference on Scientometrics and Informetrics. Rio de Janeiro; Brazil; 14-17 July 2009, pp 914-917.

Dow, R.M., Loefdahl, J., Pallaschke, S. and Baldesi, G. (2019) “Role of knowledge management in innovation: The ESA use case”, Proceedings of the International Astronautical Congress, IAC, IAC-19_D5_2_2_x54033.

García, V.H.M., Pachón, J.P.O. and Guzman, K.A.R. (2020) “Integrated Model of Knowledge Management and Innovation”, Advances in Intelligent Systems and Computing, 1159 AISC, pp 114–123.

Godin, B. (2017) “A conceptual history of innovation”, In: Harald Bathelt, Patrick Cohendet, Sebastian Henn and Laurent Simon (eds) The Elgar Companion to Innovation and Knowledge Creation, pp 25-32, Edward Elgar Publishing.

Gorzeń-Mitka, I. (2020) “The Latest Streams Of Research On Communication In Risk Management: A Large-Scale Literature Review Based On Co-Occurrence Data”, *Scientific Papers of Silesian University of Technology – Organization and Management Series*, Vol. 149, pp 219-237.

Gudanowska A.E., (2017) A Map Of Current Research Trends Within Technology Management In The Light Of Selected Literature, Management and Production Engineering Review, Vol. 8 Number , March 2017, pp 78–88.

Guetat, S.B.A. and Dakhli, S.B.D. (2013) “A framework for integration of knowledge and innovation”, World Congress on Computer and Information Technology, WCCIT, Sousse, Tunisia, pp 1-11.

Jain, P. (2016) “Ethical and legal issues in knowledge management life-cycle in business”, In: Priti Jain and Nathan Mnjama (eds) Managing Knowledge Resources and Records in Modern Organizations, pp 82-101, IGI Global.

Klincewicz, K., Żemigała, M., Mijal, M. (2012) *Bibliometria w zarządzaniu technologiami i badaniami naukowymi,* MNiSW, Warszawa.

Krishnamoorthy, B. and Damle, M. (2017) “Models of innovations: An overview of perspectives and expositions”, International Journal of Value Chain Management, Vol. 8, No. 4, pp 342-362.

Liao, H.-T., Lo, T.-M. and Pan, C.-L. (2023) “Knowledge Mapping Analysis of Intelligent Ports: Research Facing Global Value Chain Challenges”, *Systems*, Vol. 3, No. 11, Art No. 88.

Liu, Z., Yin, Y., Liu, W. and Dunford, M. (2015) "Visualizing the intellectual structure and evolution of innovation systems research: a bibliometric analysis", *Scientometrics*, 103(1), 135-158.

Lobonţ O.R., Purcariţa R., Vatavu S. and Costea F. (2021) "A Bibliometric Mapping of the Research Trends of Public Governance and Entrepreneurship Framework", *Postmodern Openings*, Vol. 12(1Sup1), pp 35-53.

Luturlean, B.S., Prasetio, A.P., Saragih, R. and Akbar, M.F. (2021) "The role of knowledge management practices on innovation performance in a public telecommunication company", *International Journal of Learning and Change*, Vol. 13, No. 3, pp 322-334.

Martins, J.M., Haider, S.A., Pereira, J.M. and Abreu, A. (2022) "Innovation Management on Waste Biorefineries", In: Eduardo Jacob-Lopes, Leila Queiroz Zepka, Mariany Costa Deprá (eds) Handbook of Waste Biorefinery. Handbook of Waste Biorefinery: Circular Economy of Renewable Energy, pp 915-932, Springer, Cham.

Mateu, L.L. (2014) "Knowledge management in the pharmaceutical services", Revista Cubana de Farmacia, Vol. 48, No. 4, pp 701-708.

Mehdi, F. (2022) "State Mechanisms for Stimulating Innovative Activities", Review of Economics and Finance, 20 (1), pp 340-352.

Mustafa, N. and Rexhepi, B.R. (2024) "Knowledge Management is the Process of Effectively Managing and Using Knowledge Within an Organization. It Involves the Collection, Organization, And Dissemination of Knowledge to Ensure a Competitive Advantage in The New Economy", International Journal of Religion, vol. 5(5), pp. 855-868.

Nurulin, Y., Skvortsova, I., Tukkel, I. and Torkkeli, M. (2019) "Role of knowledge in management of innovation", Resources, vol. 8(2), 87.

Ologbo, A.C. and Nor, K.M. (2015) "Knowledge management processes and firm innovation capability: A theoretical model", Asian Social Science, Vol. 11 No. 18, pp 10-17.

Omotayo, F.O. and Akintibubo, A.O. (2024) "Knowledge hiding in the academia: Individual and social factors predicting knowledge hiding behaviour of undergraduates of a Nigerian university", Journal of Librarianship and Information Science, Vol. 56 No. 1, pp 145-163.

Perianes-Rodriguez, A., Waltman, L. and van Eck, N.J. (2016) "Constructing bibliometric networks: a comparison between full and fractional counting", *Journal of Informetrics*, Vol. 10 No. 4, pp 1178-1195.

Ruas, T.L., Pereira, L. and Grosky, W.I. (2017) "Science, technology and innovation exploration in biophotonics through a scientometric approach", IEEE International Conference on Smart Technologies and Management for Computing, Communication, Controls, Energy and Materials, Proceedings ICSTM, pp 36-43.

Tavasieva, Z., Pozmogov, A., Kreer, M. , Kallagov, Boris and Tedeyeva, Z. (2019) "Knowledge management as a matter of vital importance for a modern organization", Proceedings of the 33rd International Business Information Management Association Conference, IBIMA 2019: Education Excellence and Innovation Management through Vision 2020, pp 4001-4007.

Than, S.T., Le, P.B., Le, T.P. and Nguyen, D.T.N. (2023) "Stimulating product and process innovation through HRM practices: the mediating effect of knowledge management capability", Evidence-based HRM, Vol. 11, No.1, pp 85-102

ul Hassan, E., Hameed, Z. , Fatima, M. and Shaheen, M. (2014) "Innovation is the key driver for corporate success", Middle – East Journal of Scientific Research, Vol. 19, No. 6, pp 843–847.

van Eck, N.J. and Waltman, L. (2019) *VOSviewer Manual. Manual for VOSviewer version 1.6.11,* software documentation.

Young, R.A. (2015) *Federal influence on innovation: Policy effects and proposals*, Nova Science Publishers, Inc, New York.

Zhang J., Yu Q., Zheng F., Long Ch., Lu Z. and Duan Z. (2016) "Comparing keywords plus of WOS and author keywords: A case study of patient adherence research", *Journal of the Association for Information Science and Technology*, Vol. 67, No. 4, pp 967–972.

Zhang, X., Estoque, R.C., Xie, H., Murayama, Y. and Ranagalage, M. (2019) "Bibliometric analysis of highly cited articles on ecosystem services", *PLoS ONE* , Vol. 14, No. 2, Art. No. e0210707.