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MANAGEMENT (JISTM)**www.jistm.com**TECHNOLOGY-DRIVEN KNOWLEDGE MANAGEMENT: A
BIBLIOMETRIC EXPLORATION OF EMERGING TRENDS**Nurul Amira Azmi¹, Zaherawati Zakaria^{2*}, Nazni Noordin³, Mohd Zool Hilmie Mohamed Sawal⁴¹ Faculty of Business and Management, Universiti Teknologi MARA Cawangan Kedah, Malaysia

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This work is licensed under [CC BY 4.0](https://creativecommons.org/licenses/by/4.0/)**Abstract:**

This paper offers a systematic and thorough examination of the convergence of emerging technologies and Knowledge Management (KM). Using data from the Scopus database, the study examines 956 publications over 11 years, applying bibliometric methodologies to identify patterns and deficiencies in the existing academic environment. The study emphasizes a strong academic interest in incorporating technologies such as blockchain, artificial intelligence (AI), and the Internet of Things (IoT) into KM methods. To obtain comprehensive and reliable results, the researchers used various analytical tools, including exclusion criteria to refine the search, Microsoft Excel to calculate the frequency and percentage of published materials, Harzing's Publish and Perish software to calculate citation metrics, and to create bibliometric networks and visualizations. The bibliometric analysis reveals significant findings, such as a total citation count of 10,399, an average of 945.2 per year, and 10.88 per paper. These results highlight the long-lasting influence of the analyzed collection of documents. An examination of research trends provides valuable insights into the continuous development of the subject, highlighting initial patterns centered around fundamental technologies and the growing emphasis on multidisciplinary approaches. To summarise, this study, based on Scopus, not only brings together the scattered nature of existing research but also offers a proactive view of upcoming patterns. This assists academics and professionals in navigating the ever-changing field of KM, which is influenced by evolving technology.

Keywords:

Bibliometric Analysis, Knowledge Management, Technology, Scopus

Introduction

Emerging technologies significantly enhance knowledge management efficacy in organizations by offering digital platforms for accessing and sharing knowledge. The Internet of Things (IoT) and artificial intelligence (AI) play a significant role in the development of knowledge management systems, leading to improved productivity and innovation outputs (Okatan, 2022). Digitizing knowledge guarantees universal accessibility to all employees, averting loss and facilitating utilization by any individual within the organization at any given moment (Siddhartha Paul Tiwari, 2022). Furthermore, these technologies enable the acquisition, identification, acquisition, and dissemination of shared knowledge and expertise within communities, hence enhancing decision-making and problem-solving capabilities (Yu Chung Wang et al., 2022; X. Wang et al., 2022).

Over the past several years, the subject of Knowledge Management (KM) has experienced substantial changes as a result of rapid advancements in technologies such as blockchain, AI and the IoT (Smith et al., 2021). The combination of emerging technologies with KM is not only an important subject for academic research but also has significant implications for strategic implementations in businesses. Organizations are becoming more aware of the significant impact that these technologies may have on knowledge processes. They provide fresh possibilities for decision-making, foster innovation, and improve operational efficiency (Raharso, 2021; Limna, 2023).

Although there is an increasing recognition of the powerful capabilities of these technologies, there is a lack of comprehensive research on their impact on KM strategy. An in-depth examination of the connections between emerging technologies and knowledge management is crucial for a nuanced comprehension and successful incorporation into organizational plans. The current corpus of research regarding emerging technologies in KM is growing, but, there is a noticeable lack of a comprehensive analysis and synthesis. Previous research frequently examines certain technologies or lacks a thorough examination of the complete scope (Alavi & Tiwana, 2002). Furthermore, the ever-changing characteristics of technology and KM require ongoing assessment to encompass the most recent advancements and patterns.

The objective of this study is to address these deficiencies by conducting a thorough bibliometric analysis, which will present a full picture of the existing research landscape and provide significant insights for academics and practitioners to inform future endeavours. The study sought to accomplish the specific objectives which are:

1. To identify the subject area that contributes to technology and KM.
2. To identify the trend of technology and KM publications based on the number of publications per year.
3. To identify the 10 most active source titles that contribute to technology and KM.
4. To illustrate the network visualization of the authors' keywords.

The proposed bibliometric study has significant ramifications for both academics and practical implementations. The objective of this study is to offer scholars a thorough examination of the present research on the incorporation of emerging technologies in KM, by consolidating the existing literature. Having this comprehension is crucial for recognizing deficiencies, investigating novel research directions, and progressing theoretical frameworks in the field.

Furthermore, the results of the study provide valuable insights for professionals who aim to improve KM processes by strategically utilizing emerging technology.

Although this study aims to provide a comprehensive analysis of the literature, it is crucial to recognize specific limitations. Bibliometric analyses rely on the availability and reliability of the data they are based on, and can be affected by biases in publishing, citation methodologies, and the comprehensiveness of the database (Bornmann & Mutz, 2015; Mingers & Leydesdorff, 2015). While bibliometric analyses are valuable for uncovering organizational and developmental characteristics of research topics, they have limits in capturing subtle nuances and contextual components that influence scholarly discourse. Therefore, it is essential to analyze the findings of the study within the wider framework of research on KM.

Potential avenues for future research can be discerned by considering the discoveries and constraints of this work. Longitudinal studies that track the progress of research on new technologies in KM can offer valuable insights into trends, patterns, and growing areas of interest. In addition, performing comparative research that examines the adoption and effects of new technologies in different organizational settings and industries can provide valuable knowledge about the factors that influence successful implementation and results.

Methods

Data Source

This bibliometric study utilized the scientific database Scopus to analyze publications containing the terms "technology" OR "technologies" AND "knowledge management" AND "university" OR "tertiary education" AND "knowledge management" in the title, abstract, or keywords. The study examined all types of papers published in the Scopus database between 2013 and 2023 to provide a comprehensive perspective on the world's research output. Scopus is widely regarded as one of the primary sources of relevant information in the international scientific community, given its status as one of the most important sources of essential data. The study employed bibliometric analysis, which according to Zupic and Cater (2015), involves a quantitative and statistical evaluation of published studies, and is commonly used as a method of conducting a literature review.

Defining Keywords

This research was performed on February 13, 2024, using keywords in the form of search strings relevant to technology and KM where keywords are searched based on the title, keywords, and abstract of the article as follows: TITLE-ABS-KEY ("technology" OR "technologies" AND "knowledge management" AND "university" OR "tertiary education" AND "knowledge management").

Search Strategy

This study gathers a collection of materials published in digital government using the online Scopus database. Due to its reputation as the largest citation and abstract database in technology, social science, business, and management, Scopus online database was chosen for this study.

Refinement of Search Result

After obtaining the initial results, researchers conducted a screening of all articles based on the exclusion criteria determined in this research. There are two (2) exclusion criteria used to screen the search results: (i) year 2024 (ii) discontinued coverage in Scopus. The frequency and percentage of the published materials were calculated using Microsoft Excel 2013 to produce the pertinent charts and graphs; the bibliometric networks were created and visualized using VOSviewer (version 1.6.18); and the citation metrics were calculated using Harzing's Publish and Perish 8 software. Table 1 summarizes the amount of all articles obtained after the refinement process.

Table 1. Refinement of Search Result

Search Keyword	Number of Scopus documents
TITLE-ABS-KEY ("technology" OR "technologies" AND "knowledge management" AND "university" OR "tertiary education" AND "knowledge management") AND PUBYEAR > 2012 AND PUBYEAR < 2024 AND (LIMIT-TO (DOCTYPE , "cp") OR LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (PUBSTAGE , "final")) AND (LIMIT-TO (SRCTYPE , "p") OR LIMIT-TO (SRCTYPE , "j"))	956

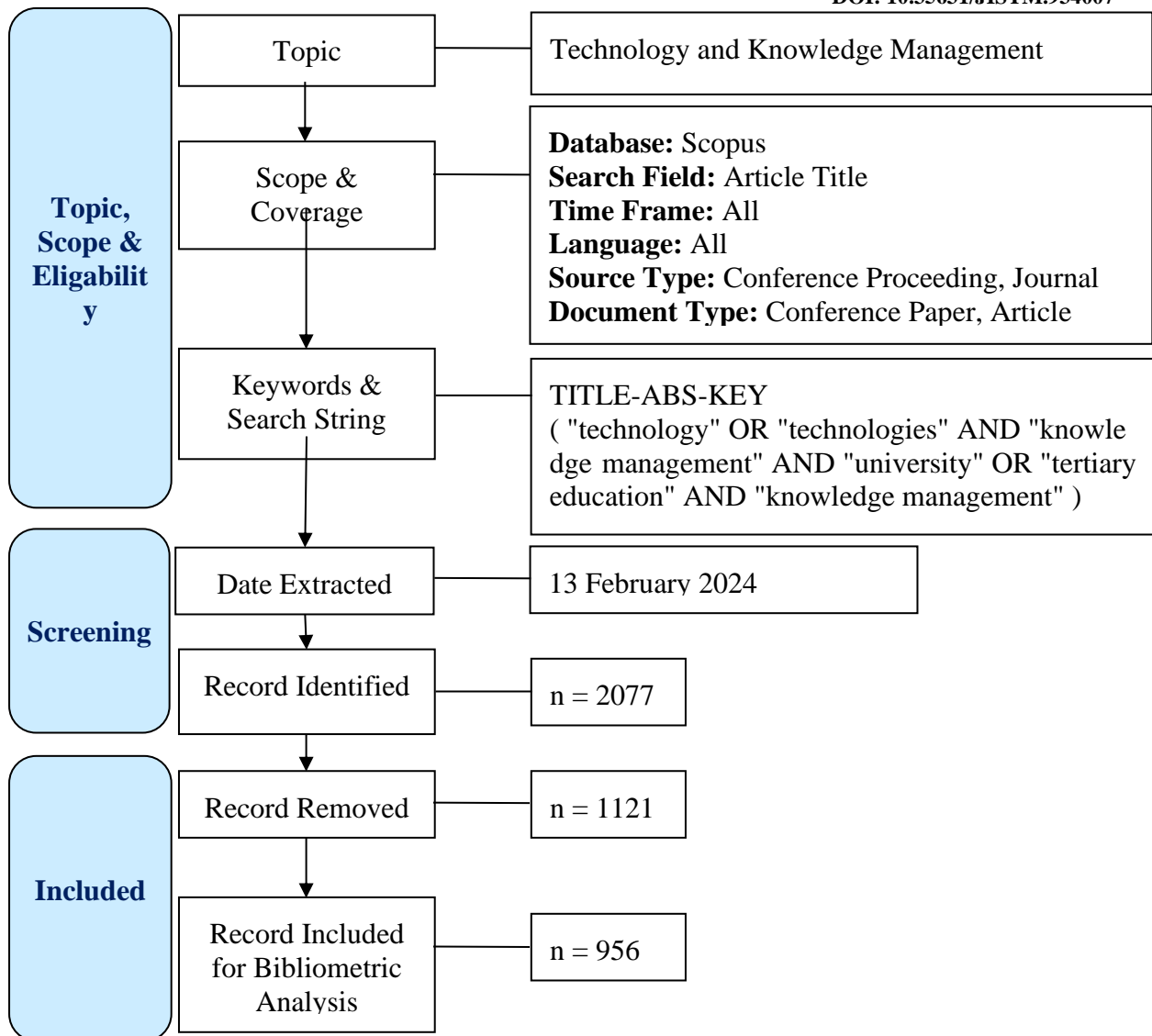


Figure 1. Flow Diagram of The Search Strategy.

Source: Zakaria, R., Ahmi, A., Ahmad, A. H., & Othman, Z. (2020) Worldwide Melatonin Research: A Bibliometric Analysis of the Published Literature between 2015 and 2019, *Chronobiology International*. <https://doi.org/10.1080/07420528.2020.1838534>

Modified from PRISMA (Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. *PLoS Med* 6(7): e1000097. doi:10.1371/journal.pmed1000097)

Result

The analysis for the extracted academic work in the search process was based on the following attributes: document and source types, languages of documents, subject area, year of publication, top 10 countries that contributed to the publication, most active source titles, citation metrics, top 20 highly cited articles, and keywords analysis.

Documents Profiles

Table 2 displays an examination of the various document types found in the academic corpus being studied. It offers a thorough summary of how publications are distributed among different categories. The dataset consists of 956 publications, which are categorised into two

main document types: Conference Papers and Articles. The most common document type in the sample is the Conference Paper, accounting for 513 publications or 53.66% of the total. Conference papers are widely used for scholarly communication in academic conferences, providing researchers with a means to distribute their discoveries, exchange knowledge, and interact with the academic community. The significant presence of Conference Papers highlights the importance of conferences as platforms for scholarly interaction and the distribution of innovative research. The second primary document category is the Article, which consists of 443 publications, accounting for 46.34% of the entire dataset. Articles, commonly found in academic journals, are essential contributions to scholarly discussions, including thorough analyses, theoretical structures, and empirical discoveries.

Table 2. Document Type

Document Type	Total Publications (TP)	Percentage (%)
Conference Paper	513	53.66
Article	443	46.34
Total	956	100.00

Table 3 presents a thorough examination of the many source types that contribute to the academic corpus. It illustrates how publications are distributed into two main categories: journals and conference proceedings. This table provides significant insights on the sources of scholarly knowledge dissemination, including a total of 956 articles. Conference Proceedings, which make up 52.82% of the total publications, are the most common source type in the collection, with a total of 505 items. Conference Proceedings are comprehensive collections of academic papers that document the scholarly contributions made in a wide array of subjects at academic conferences. Journals, which consist of 451 publications, make up 47.18% of the entire dataset and are the second most significant source category. Journals are highly regarded mediums for scholarly communication, enabling meticulous peer-review procedures and the distribution of comprehensive research publications.

Table 3. Source Type

Source Type	Total Publications (TP)	Percentage (%)
Conference Proceeding	505	52.82
Journal	451	47.18
Total	956	100.00

Table 4 presents a thorough analysis of the languages used to distribute scholarly papers within the academic corpus. The table presents the distribution of total publications among different languages, providing significant insights into the linguistic diversity of the research output. English dominates as the primary language for academic communication, accounting for a significant 93.34% of all publications. The presence of 897 English documents highlights the dominant position of English as the principal language for academic communication on a global scale. The percentage of publications in Spanish is 4.27%, with a total of 41 documents. The inclusion of Spanish papers is a significant and valuable addition to the academic conversation within specific intellectual domains. The Portuguese language accounts for 0.83% of the overall publications, with 8 pieces. Although they make up a lesser percentage, publications in Portuguese language play a significant role in the worldwide scholarly output, potentially reaching audiences in Portuguese-speaking regions or fields of study. The Chinese, Persian, German, Russian, Arabic, and Polish languages individually make up a lesser

proportion of the overall publications, ranging from 0.42% to 0.10%. Although each language mentioned - Chinese, Persian, German, Russian, Arabic, and Polish - contributes a very small portion, their inclusion emphasises the diverse and complex nature of the academic corpus. These languages can serve particular regional or disciplinary communities, promoting inclusiveness in the sharing of research findings.

Table 4. Languages

Language	Total Publications (TP)*	Percentage (%)
English	897	93.34%
Spanish	41	4.27%
Portuguese	8	0.83%
Chinese	4	0.42%
Persian	4	0.42%
German	3	0.31%
Russian	2	0.21%
Arabic	1	0.10%
Polish	1	0.10%

*one document has been prepared in dual languages

Table 5 presents a comprehensive analysis of the subject areas addressed in the scholarly articles of the academic corpus that was studied. The table displays the distribution of total publications among several subject groups, offering an understanding of the thematic makeup of the research output. Computer Science is the predominant field, with a significant 46.76% of all publications, comprising a total of 447 papers. The field of engineering is a substantial area of academic inquiry, with 271 published works, which represents 28.35% of the whole amount. The intersection of Business, Management, and Accounting is a prominent area of research, accounting for 27.62% of all publications, totaling 264 articles. Social Sciences is a prominent area of study, comprising 261 publications, which make up 27.30% of the total number. The discipline of Decision Sciences is a significant field, representing 16.74% of the total publications, with a total of 160 pieces. The academic disciplines of Mathematics, Physics and Astronomy, Medicine, Earth and Planetary Sciences, Environmental Science, Energy, Materials Science, and Psychology each contribute to the overall diversity of themes in academia, representing specific areas of focus within the broader academic field. The disciplines displayed here exhibit a transdisciplinary character of research, with percentages ranging from 5.02% to 0.42%. The disciplines of Economics, Econometrics and Finance, Arts and Humanities, Health Professions, Agricultural and Biological Sciences, Biochemistry, Genetics and Molecular Biology, Chemical Engineering, Chemistry, Multidisciplinary, Neuroscience, Nursing, Pharmacology, Toxicology and Pharmaceuticals exhibit varying degrees of representation. These subject areas focus on the multidisciplinary and specialized parts of study, which together contribute to the wide range of academic knowledge.

Table 5. Subject Area

Subject Area	Total Publications (TP)	Percentage (%)
Computer Science	447	46.76%
Engineering	271	28.35%
Business, Management and Accounting	264	27.62%
Social Sciences	261	27.30%
Decision Sciences	160	16.74%

Mathematics	55	5.75%
Physics and Astronomy	48	5.02%
Medicine	37	3.87%
Earth and Planetary Sciences	34	3.56%
Environmental Science	30	3.14%
Energy	29	3.03%
Materials Science	29	3.03%
Psychology	29	3.03%
Economics, Econometrics and Finance	22	2.30%
Arts and Humanities	21	2.20%
Health Professions	9	0.94%
Agricultural and Biological Sciences	6	0.63%
Biochemistry, Genetics and Molecular Biology	6	0.63%
Chemical Engineering	6	0.63%
Chemistry	6	0.63%
Multidisciplinary	5	0.52%
Neuroscience	4	0.42%
Nursing	4	0.42%
Pharmacology, Toxicology and Pharmaceutics	1	0.10%

Research Trends

An overview of the specific statistics of technology and knowledge management publications from 2013 to 2023 is shown in Figure 2. According to Scopus statistics, the graph shows a noticeable variation in the number of publications across the analysed time frame. A graphic analysis reveals a significant rising trend between 2014 and 2019, signifying a period of higher research productivity. The graph exhibits prominent peaks that correspond to the years 2019, 2020, and 2021, indicating the periods with the biggest volumes of scholarly contributions, totaling 121 documents. The use of graphical representation allows for a more distinct observation of the fluctuations in publication counts, making it easier to comprehend peak years and prospective trends. The graph depicts the gradual decrease in publications from 86 to 57 between the years 2022 and 2023, in comparison to the years of highest publishing rates. It offers a visual representation of the most recent patterns.

Documents by year

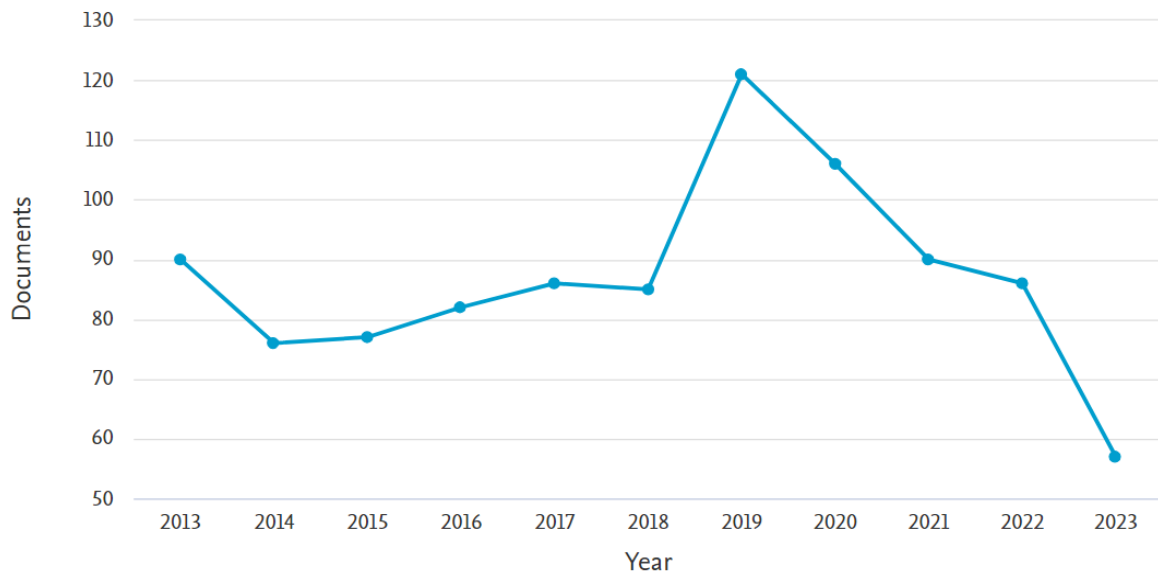


Figure 2. Number of Documents By Year

Table 6 provides a detailed analysis of the 10 most active source titles, showcasing their respective contributions to the scholarly landscape. Ceur Workshop Proceedings leads with 6.80%, emphasizing its pivotal role in disseminating research outputs, followed closely by Proceedings of the European Conference on Knowledge Management (ECKM) at 6.07%, underscoring its impact on KM research. The Journal of Technology Transfer, with 3.35%, exhibits a specialized focus on technology transfer, while the ACM International Conference Proceeding Series, contributing 2.09%, signifies the Association for Computing Machinery's influence across computing disciplines. Technological Forecasting and Social Change, at 1.88%, contributes to interdisciplinary discourse, and the Proceedings of the International Astronautical Congress (IAC), at 1.57%, concentrates on space-related research. Additionally, the International Journal of Emerging Technologies in Learning, Proceedings of the European Conference on Innovation and Entrepreneurship (ECIE), ASEE Annual Conference and Exposition Conference Proceedings, and Research Policy each play crucial roles in disseminating knowledge within their respective domains, collectively representing a diverse range of disciplines from learning technologies to engineering education and research policy.

Table 6. 10 Most Active Source Title

Source Title	TP	Percentage (%)
Ceur Workshop Proceedings	65	6.80%
Proceedings Of The European Conference On Knowledge Management Eckm	58	6.07%
Journal Of Technology Transfer	32	3.35%
ACM International Conference Proceeding Series	20	2.09%
Technological Forecasting And Social Change	18	1.88%
Proceedings Of The International Astronautical Congress Iac	15	1.57%
International Journal Of Emerging Technologies In Learning	10	1.05%

Proceedings Of The European Conference On Innovation And Entrepreneurship Ecie	10	1.05%
ASEE Annual Conference And Exposition Conference Proceedings	9	0.94%
Research Policy	9	0.94%

Notes: TP=total number of publications

Citation Analysis

Table 7 outlines the citation metrics for the scholarly corpus under examination, providing a comprehensive overview of its impact and influence. With a total of 956 papers, the corpus has garnered a substantial 10,399 citations over 11 years, resulting in an average of 945.2 citations per year. The citation per paper stands at 10.88, showcasing the scholarly impact of individual publications. Furthermore, the Cites_Author metric, reflecting an average citation count per author, is notable at 3716.46, emphasizing the cumulative impact authors have had within the corpus. The Papers_Author metric, denoting the average number of papers per author, is 403.37, while the Authors_Paper metric, indicating the average number of authors per paper, is 3.15. The h_index and g_index, standing at 48 and 83, respectively, underscore the robustness and significance of the scholarly corpus in terms of both productivity and impact. These metrics collectively underscore the corpus's enduring scholarly influence and the meaningful contributions made by authors to the academic community, with each metric offering a nuanced perspective on the scholarly impact of the examined papers.

Table 7. Citations Metrics

Metrics	Data
Papers	956
Number of Citations	10399
Years	11
Citations per Year	945.2
Citations per Paper	10.88
Cites_Author	3716.46
Papers_Author	403.37
Authors_Paper	3.15
h_index	48
g_index	83

Keywords Analysis

The present study employed VOSviewer to conduct a network visualization analysis of author keywords. Figure 2 depicts a network visualization of the author keywords, employing attributes such as color, circle size, font size, and line thickness to emphasize their connection with other keywords. The study revealed seven clusters in Scopus, which were generated based on the author's keywords. Cluster 1, characterized by a conspicuous deep red hue, encompasses a substantial collection of 175 keywords, including academic consulting, academic entrepreneurship, best practices, cognitive skills, collaborative research projects, human capital, innovation systems, KM, knowledge transfer, and the knowledge economy. The second cluster, indicated by the color green, consists of 119 items that include educational programs, information technology, the internet, humans, mobile applications, and program development. The third cluster of the azure blue comprises 80 parts and centers around topics such as education computers, efficient learning, digital devices, e-learning, innovative learning,

innovative teaching, and knowledge and experience. Cluster 4, indicated in chartreuse, comprises 75 entries encompassing terminology related to bibliometric analysis, body of knowledge, digitalization, digital economy, Industry 4.0, and information communication. Cluster 5 consists of 72 pieces and includes various activities such as collaborative research, information exchanges, intelligent agents, international collaboration, open systems, and project management. These activities are symbolized by the color royal purple. Cluster 6, represented by the color teal, comprises 56 elements that prioritize benchmarking, business intelligence, cognitive systems, data collecting, digital libraries, and educational data mining. Cluster 7 exhibits a vivid orange hue and consists of 53 pieces. It includes keywords pertaining to academics, adoption, collaborative knowledge, computer engineering, the effectiveness of knowledge, e-learning technology, education, and knowledge dissemination. Cluster 8 consists of 51 parts related to computer software, data analysis, decision support systems, educational environment, information systems, and higher education systems. These products are accentuated with a subdued brown hue. Cluster 9, represented by a pink blush hue, has 50 entities encompassing artificial intelligence, e-government, digital transformation, individual learning, competitive advantage, knowledge management, and libraries. Cluster 10, comprising 49 parts, encompasses a wide range of topics such as deep learning, higher education institutions, blockchain technology, factor analysis, knowledge application and generation, information theory, intelligent computing, and interactive learning. Cluster 11, shown by the pale green hue, comprises 48 constituents encompassing active learning, computer modeling, digital technology, the educational process, science technologies, STEM, and student engagement. Cluster 12 consists of 35 elements related to cloud technology, distance education, educational organization, massive open online courses (MOOCs), information resources, and social learning. Cluster 13, represented by a light yellow hue, comprises 31 elements focused on knowledge acquisition, learning experiences, education quality, self-efficacy, multimedia, technology adoption, and technology management. Cluster 14 consists of 29 elements and centers around subjects like e-learning environment, efficient communication, culture of sharing knowledge, machine design, and applications of social networking. Cluster 15 comprises 24 elements that emphasize phrases like bridge, e-learning platforms, educational systems, digitalization, transfer, knowledge graph, and ontologies, all of which are linked to the turquoise topic. Cluster 16, highlighted in peach, consists of 24 items related to cloud services, evaluation, explicit knowledge, knowledge base, learning scenarios, and personalized learning. Cluster 17 comprises 17 constituents and centers around ecosystems, edge computing, emerging technologies, the industrial sector, knowledge-based approaches, and research and development. Cluster 18, illustrated in a subtle shade of lavender, comprises 10 elements that highlight blended learning, cloud stack, computer science trainers, and ICT abilities. The cluster 19 cluster, comprising a mere 2 parts, is exclusively devoted to the examination of collective intelligence and its manifestations.

The linguistic study highlights the overwhelming prevalence of English, accounting for 93.34% of the papers, confirming its worldwide prominence in academic discourse. While other languages make a small contribution, they enhance the diversity of the academic corpus. The inclusion of Spanish, Portuguese, Chinese, Persian, German, Russian, Arabic, and Polish languages exemplify inclusivity, as it caters to distinct linguistic and regional settings. Computer Science dominates with a majority of 46.76% in terms of address, showcasing the convergence of technology and KM. Following are Engineering, Business, Management and Accounting, and Social Sciences, highlighting the interdisciplinary aspect of the topic. The spread across several subject areas demonstrates the comprehensive comprehension necessary in the study of emerging technologies in KM.

The analysis of publishing trends over time in Figure 2 reveals variations, characterized by peaks in 2019, 2020, and 2021, indicating an increase in scholarly activity. The decrease observed in 2022 and 2023 indicates possible changes in research priorities or external factors that are impacting publishing patterns. Having a nuanced perspective is crucial for comprehending the changing dynamics of the area. The discovery reveals that the most active sources are Ceur Workshop Proceedings and Proceedings of the European Conference on Knowledge Management (ECKM), which are in the forefront. These sources are important platforms for sharing knowledge, each making a unique contribution to academic discussions. The discovery demonstrates the significance of the corpus in terms of citation metrics, emphasizing its scholarly influence. The corpus exhibits a consistent impact with an average of 945.2 citations per year and an h-index of 48. The Cites_Author statistic focuses on the overall influence of authors, whereas the Papers_Author and Authors_Paper metrics provide information on author productivity and patterns of collaboration. The keyword analysis conducted with VOSviewer (Figure 2) demonstrates the presence of many clusters, encompassing a wide range of topics such as academic consulting and e-learning. This highlights the diverse and complex nature of research issues related to new technologies and KM.

Conclusion

Ultimately, this study offers a thorough analysis of the academic terrain where rising technologies and KM intersect. The presence of a variety of document kinds, the prevalence of the English language, and the distribution across many topic areas highlight the intricate and abundant nature of this interdisciplinary discipline. The examination of time reveals changing patterns, while citation metrics confirm the long-lasting scholarly influence of the corpus. The cooperative aspect of research, as demonstrated in multidisciplinary fields and partnerships among authors, highlights the joint endeavor to enhance comprehension. The highlighted sources and active keywords are helpful resources for scholars and practitioners who wish to stay updated with the most recent advancements in the subject. Although this study significantly enhances our comprehension of the present research status, it is crucial to recognize specific constraints. Bibliometric analyses, although potent, are limited by the availability of data and biases inherent in databases. Continuous evaluations are required to capture the newest breakthroughs in technology and KM due to their ever-changing nature. This study establishes the groundwork for future avenues of inquiry. Longitudinal studies can investigate the development of trends over time, while comparative research can examine differences across various organizational contexts. The clusters of keywords that have been identified provide valuable insights into theme concentrations, which can be used to guide future inquiry. In summary, this study not only strengthens current knowledge but also

highlights opportunities for future investigation, promoting a more profound comprehension of the complex connection between developing technologies and KM.

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