DESIDOC Journal of Library & Information Technology, Vol. 44, No. 2, March 2024, pp.77-87, DOI : 10.14429/djlit.44.2.19309

Knowledge Management: A Bibliometric Review from 2003-2022

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ABSTRACT

Research in the knowledge management field has been a point of attraction for innovation and sustainability. The need for research and the effort by the researchers are important to be analysed to know the overall status of contributions and contributors. The purpose of this paper is to identify trends in knowledge management research and forecast future trends through bibliometric analysis. The study also aims to identify the highest contribution of articles by the authors, the institutions, the journals, and the countries. Microsoft Excel and VOSViewer software were used for the analysis of the data extracted from the scopus database for the period 2003–2022. It found Bontis. N. of Canada stood out as the highest contributing author in knowledge management research; the Hong Kong Polytechnic University of China proved to be the top contributing institution in the field; the Journal of knowledge management ranks first amongst the most contributing journals in the field; and the United States was the highest contributing country. Furthermore, the study found four clusters based on the co-occurrence of keywords. "Artificial Intelligence," "Big Data," and "Knowledge Hiding" are the budding areas in the field.

Keywords: Knowledge management; Knowledge acquisition; Knowledge transfer; Artificial intelligence; Bibliometric review

1. INTRODUCTION

Changing environmental dynamics require organisations to foster innovation on a continuous basis to stay ahead of competition. Developing absorptive capacity within the organisation to capture the trends and convert them into sustainable and innovative solutions has increased the importance of knowledge management system with passing time. The role of Knowledge Management (KM) in providing impetus to R&D innovation and organisational performance in the manufacturing industry[1] and creating dynamic capability in the service sector[2] is significant. Knowledge is considered an economic resource[3] and a source of competitive advantage[4]. KM is understood as the methodical management of a company's knowledge assets to generate value in line with strategic needs[5]. KM can refer to a process of effective management of knowledge creation, acquisition, communication, application, and utilisation[6]. KM process, if aligned with organisational strategy, influences innovation in organisations[7]. Introduced before five decades by Pritchard[8], bibliometric research has been evolved and refined by many authors.[9]"Bibliometric analysis facilitates a comprehensive understanding of a research area, the mapping of its boundaries, the identification of influential authors, and new directions for future research"[9-10].

The enormous growth of KM literature has attracted the attention of business leaders and researchers. A bibliometric study is a new trend to get an overview of a particular field of research. Many bibliometric studies have been done by eminent researchers and can be segregated into two parts: (1) studies on a specific journal and (2) studies on a particular subject area. Among the studies on specific journals, the work of Raja and Malik[11] and Chaudhuri[12], *et al.* on papers published in the *Journal of Knowledge Management* from 2009-2016 and 1997-2020 respectively, both papers have found the USA and UK as the most contributing countries, Lakehead University and McMaster University of Canada as the most contributing institutions, and Serenko Alexander and Bontis, Nick were the most productive authors in KM research. Chaudhuri[12] et al. also found that knowledge management was the most researched keyword , followed by knowledge sharing and innovation.

Garg and Singh[13] have investigated articles published in *DESIDOC Journal of Library and Information Technology* for 27 years of study during 1994-2020. It also found that the USA contributes the most papers among 51 countries, followed by Canada and the UK, Florida State University of the USA tops among 393 institutions, followed by the University of Western Ontario of Canada, Stivilia, Besiki of USA and Savolainen, Reijo of Finland, and Gross, Melissa of USA contributed 10, 10, and 9 papers published among 1389 authors. They also found that in both domestic and international collaborations for publishing papers, the USA tops the list.

Barik and Jena[14] examined the papers published in the *Journal of Knowledge Management Research and Practice* during the period of 2008-2012. The study found that the USA is the most contributing country, followed by

Received : 19 July 2023, Revised : 19 September 2023
Accepted : 07 December 2023, Online published : 04 April 2024

Malaysia and India which publish 34, 29, and 24 papers respectively. It has also been found that single-authored articles are more common than the multiple-authored articles. Apart from that, among 180 papers, 69.4 % comprise 11-20 pages.

Though the literature displays a large number of publications on bibliometric analysis in individual journals, research in the knowledge management field is scanty. Akhavan[15] *et al.* investigated a bibliographic overview of KM studies during 1980-2014. The authors identified the multiple-authored papers as more than the single-authored papers. The *Journal of Knowledge Management* remains the most effective outlet for publishing KM research. Qiu & Lv[16] found KM as an individual, multidisciplinary scientific field by studying knowledge management research through the electronic database, Web of Science. Their study included all subject areas for the duration of 1993-2012. They identified the keywords viz. 'knowledge management', 'knowledge sharing', 'ontology', 'innovation', 'knowledge transfer', 'intellectual capital', 'organisational learning', and 'knowledge' as the most studied areas. They also identified 'e-learning' and 'semantic web' as flourishing areas in KM research, whereas information technology and 'information management' are found to be diminishingy focused areas.

The most recent paper[17] published with the time span of 2015-2021on the topic of 'knowledge management'. It has examined trends in research publication, citations, authors' contribution and collaboration, title terms and author keywords, abstract terms, and publishers of knowledge management articles by considering 643 papers. Another paper by Kaba & Ramaiah[18] published in the KM research area with a time span of 57 years (1960-2017) by accessing the Scopus database. As far as the time span of publication is concerned, there is a huge gap in the area of KM research. This is essential to updating the research trend and progress. Now, in 2023, the recent trend needs to be updated. Moreover, the methodology adapted by the previous researchers[15] to select the number of articles for bibliographic analysis has the scope of bias. So, the present study, by applying an unbiased methodology, is an attempt to identify the following in KM research:

1. Year wise spread of KM research
2. Highly contributing authors
3. Highly contributing journals
4. Highly contributing institutions
5. Highly contributing institutions countries and
6. Keywords associated with "Knowledge Management" and
7. Forecasting the future trend

2. METHODOLOGY

2.1 Data Source and Retrieval Search Strategy

For this study on identifying KM research trends, the SCOPUS database was selected. As shown in Fig. 1 the data search using the electronic database was conducted on March 10, 2023, by using the keywords "knowledge management" OR "KM" only as in these search terms, a huge number of studies have been done, including all elements of KM within the selected time frame. The search terms were limited to article title, abstract, and keywords. The initial search yielded 579070 results, after which it was reduced by using the inclusion and exclusion criteria illustrated below.

2.2 Inclusion and Exclusion Criteria

For further refinement in the search process reasonable for the purpose of this study, we chose the duration of the year 2003-2022 (20 years) considering the substantial number of research studies done from the year of 2003. We restricted the subject area only to business, management and accounting to identify the specific research done in this subject area. We chose only published articles in English from the journals. The articles not meeting the above criteria were excluded. This stage yielded 8329 publications which were considered for stage 1 analysis (Fig. 1).

2.3 Data Extraction and Cleaning

For identifying recent trend analysis and forecasting in the KM research area, articles published in the last five years (2018-2022) were chosen, yielding 2834 articles. Out of 2834 articles, a total of 500 articles were selected by extracting 100 top-cited articles from each year from 2018 to 2022 to avoid the bias of neglecting the less-cited articles due to the number of years passed from publication until 2022. For instance, the article published in 2018 might have yielded more citations than the article published in 2022. If we select the top 500 cited articles directly from 8329 articles, sure chances are there of neglecting good articles from 2021 and 2022, which can provide a glance at the very recent scenario in business organisations.

The two sets of data- 8329 articles for stage 1 analysis and 500 articles for stage 2 analysis were exported in CSV format with the details, viz., citation information, bibliographical information, abstracts and keywords, funding details, and references. After downloading, the researchers went for data cleaning, as some rows were added as extras that were not part of the selection.

2.4 Data Analysis and Visualisation

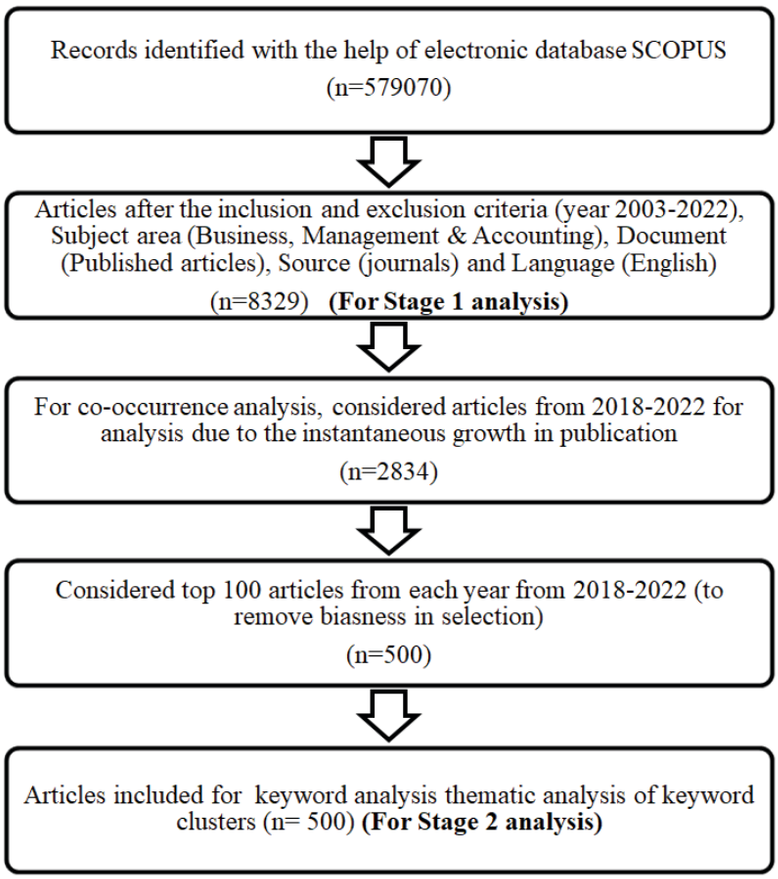
Data analysis has been done in two stages. Stage 1 includes the analysis of 8329 articles to identify the year-wise growth of KM research publications and research contributions from the top 10 authors, the top 10 institutions, the top 10 journals, and the top 15 countries using Microsoft Excel. Stage 2 includes the analysis of author keywords and thematic analysis based on the keyword clusters using the Vosviewer software version 1.6.18.

3. ANALYSIS

3.1 Current Status of KM Research (Stage-1)

3.1.1 Year Wise Growth of Publication

Figure 2 illustrates the growth of KM articles from



Source: Authors

Figure 1. Flow diagram of research methods.

2003 to 2022 (20 years). The graph overall represents the upward growth of the publications. Though the graph displays a slight zigzag line, it is in an upward direction. The difference in the number of publications between 2003 and 2022 is 408, which is 201 % up. The highest number of articles is published in 2020. Of a total of 8329 articles, the average production of papers is 416.45. So, it is evident that KM research has been attracting researchers' fraternity significantly since 2003.

3.1.2 Highly Contributing Authors

During the period 2003-2022, Bontis, N. of DeGroote School of Business, Hamilton, Canada, has contributed the highest number of articles (27) followed by Serenko, A. (19) of Ontario Tech University, Oshawa, Canada, and Desouza, K.C. (17) of QUT Business School, Brisbane, Australia, as displayed in Table 1. As per the total number of citations (TNC) received for the published articles, Bontis, N. (1902), tops the list, followed by Serenko, A. (1588) and Kianto, A. (1449) of LUT University, Finland. Though Desouza, K.C. and Kianto, A. have published the same number of papers in these 20 years, Kianto, A. has received a considerably high number of citations, indicating the qualityand importance of the studies. As per CPP, Kianto, A. topped the list, indicating 85.23 citations received for each of 17 papers in these years. Fig. 3 is the visual representation of TNC and CPP for the papers published by the authors. Serenko, A. comes second in the list of CPP (83.57), followed by Bontis, N. (70.44). In Table 1, it is clearly illustrated that Serenko, A. has conducted the research individually in six articles and thirteen research studies with the collaboration of other authors. Bontis, N. has highest number (27) of collaborations, resulting in the highest TNP. Serenko, A. stands out consistently as a sincere researcher, which is reflected in his papers as the first author in 13 research papers.

3.1.3 Highly Contributing Institutions

Table 2 displays the total number of papers and percentage contribution of the top 10 contributing institutions in KM research. The Hong Kong Polytechnic University is reflected as the top institution in contributing KM research articles by publishing 87 papers which are 17 % of the total number of papers contributed by the top 10 institutions. The City University of Hong Kong and the National University of Singapore have secured 2nd and 3rd positions, respectively, by producing 56 (11 %) and 55 (10 %) papers. These top 10 institutions contribute nearly 16 % of the total papers published in the period 2003-2022.

Figure 2. Year wise publication of papers on KM research (n=8329).

Table 1. Top 10 authors contributing to KM research

S. no	Author name	TNP	TNC	CPP	Institution	Country	h-index	Single author	Co-author	1st author
1	Bontis, N.	27	1902	70.44	DeGroote School of Business, Hamilton	Canada	51	0	27	3
2	Serenko, A.	19	1588	83.57	Ontario Tech University, Oshawa	Canada	36	6	13	13
3	Desouza, K.C.	17	970	57.05	QUT Business School, Brisbane	Australia	37	4	13	8
4	Kianto, A.	17	1449	85.23	LUT University, Lappeenranta	Finland	27	0	17	3
5	Durst, S.	16	321	20.06	TallinnaTehnikaülikool, Tallinn	Estonia	22	0	16	8
6	Bolisani, E.	15	342	22.8	UniversitàdegliStudi di Padova, Padua	Italy	19	0	15	7
7	Vrontis, D.	15	932	62.13	University of Nicosia, Nicosia	Cyprus	43	0	15	1
8	Oliveira, M.	14	185	13.21	PontificiaUniversidade Católica do Rio Grande do Sul, Porto Alegre	Brazil	15	0	14	2
9	Scarso, E.	13	270	20.76	UniversitàdegliStudi di Padova, Padua	Italy	14	0	13	4
10	Jasimuddin, S.M.	12	499	41.58	KEDGE Business School, Talence	France	19	1	11	6

Note: TNP=Total number of papers, TNC=Total number of citations, CPP-Citations per paper

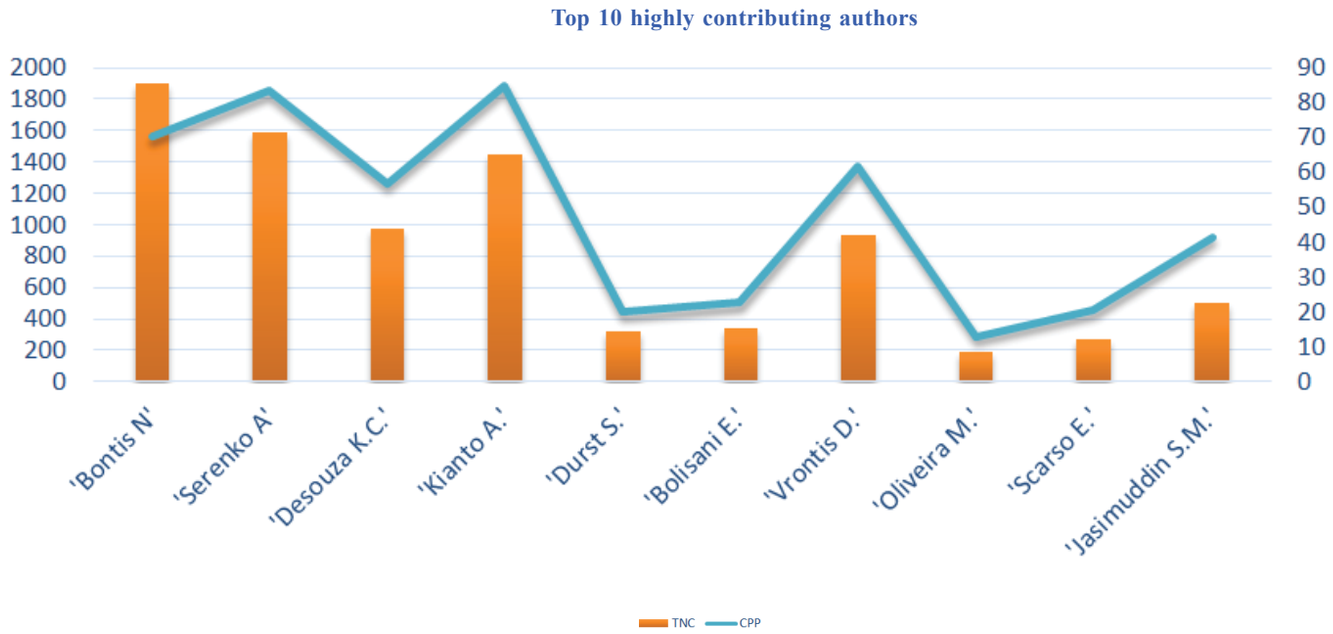


Figure 2. Year wise publication of papers on KM research (n=8329).

Table 2. Top 10 institutions contributing in KM field

S. no.	Institution	Country	TNP	% contribution
1	Hong Kong Polytechnic University	China	87	17%
2	City University of Hong Kong	China	56	11%
3	National University of Singapore	Singapore	55	10%
4	LUT University	Finland	48	9%
5	National Cheng Kung University	Taiwan	48	9%
6	Loughborough University	England	48	9%
7	Tampere University	Finland	46	9%
8	UniversitàdegliStudi di Torino	Italy	46	9%
9	Universidade de São Paulo	Brazil	45	9%
10	RMIT University	Australia	44	8%
	Total		**523**	**100%**

3.1.4 Highly Contributing Journals

Table 3 below illustrates the top 10 highly contributing journals in KM research. As per TNP, TNC, and CPP, the *Journal of Knowledge Management* remains at the top of the list. Considering CPP as one of the parameters for assessing the quality and importance of the study during the period, the *Information and Management* (CPP= 84.68) journal comes in second after the *Journal of Knowledge Management (CPP= 105.9).* The CPP of each journal has been influenced by the highly cited papers in that journal. Ardichvili[15] *et al.* gained popularity by investigating the influence of cultural factors on knowledge sharing strategies among communities of practice in three countries: China, Brazil, and Russia. It found that a sharing strategy should be adopted based on the prevalent culture of the community.

3.1.5 Top 15 Countries Contributing to KM Field

The above map in Figure 4 displays the highly contributing countries in KM research. The darker the colour, the more contribution the country has. As clearly shown in the above map, the United States stood first among all 15 countries in contributing

Table 3. Top 10 highly contributing journals in KM research

S. no	Journal	TNP	TNC	CPP	h-index	Publisher	Country	Top cited paper/NC
1	Journal of Knowledge Management	921	97540	105.9	124	Emerald Publishing	United Kingdom	Ardichvili, *et al.* (2003)/1083
2	Journal of Cleaner Production	327	10730	32.81	232	Elsevier	United Kingdom	Roberts (2004)/238
3	International Journal of Knowledge Management	209	2104	10	14	Inderscience Publishers	United Kingdom	Fidalgo-Blanco, *et al.* (2014)/63
4	Knowledge and Process Management	190	3951	20.79	46	Wiley-Blackwell	United Kingdom	Serenko and Bontis (2004)/233
5	Technological Forecasting and Social Change	153	7452	48.7	134	Elsevier	United States	Phaal (2004)/787
6	Knowledge-Based Systems	149	4319	28.98	135	Elsevier	Netherlands	Lu, *et al.* (2015)/576
7	International Journal of Knowledge Management Studies	145	706	4.86	14	Inderscience Publishers	United Kingdom	Obeidat, *et al.* (2017)/84
8	Information and Management	114	9654	84.68	170	Elsevier	Netherlands	Chang and Chuang (2011)/711
9	Industrial Management and Data Systems	106	4532	42.75	109	Emerald Publishing	United Kingdom	Yeh, *et al.* (2006)/221
10	Decision Support Systems	101	5728	56.71	161	Elsevier	Netherlands	He, *et al.* (2009)344

***TNP-Total number of papers, TNC-Total number of citations, CPP-Citations per paper, NC-Number of citations**

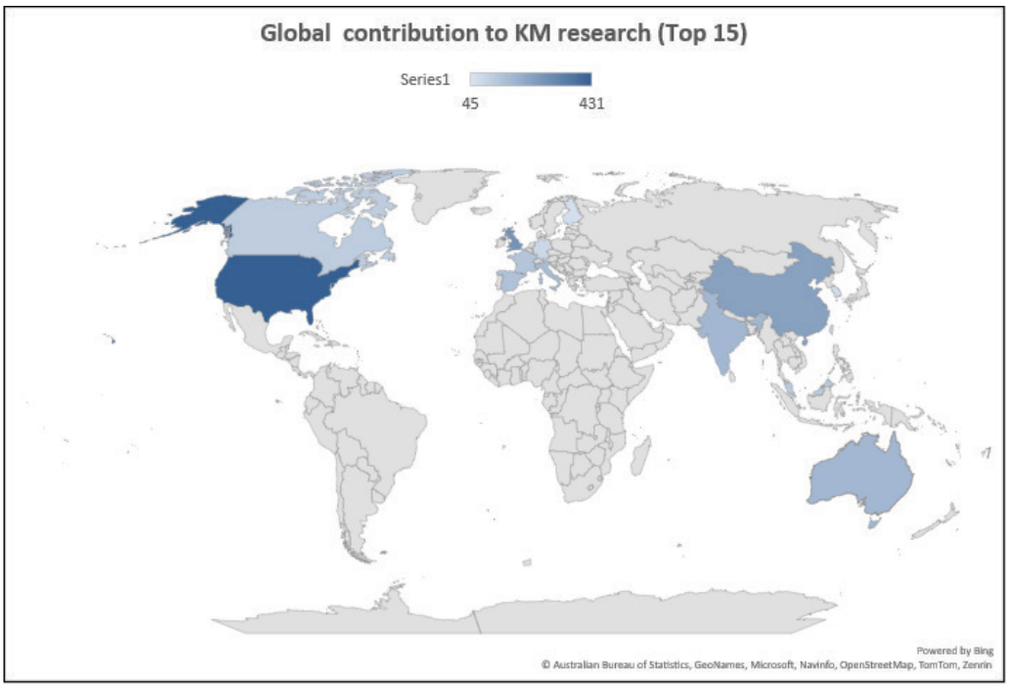


Figure 4. Top 15 global contribution to KM research.

more research by publishing 431 articles. The United Kingdom ranks second by publishing 283 articles followed by China for 242 publications. After China, Australia, and India have acquired the fourth position by publishing 179 articles each, Italy has published 167, Spain 147, France 136, Malaysia 122, Canada 115, Taiwan 92, Germany 85, South Korea 68, Finland 65, and Hong Kong 45 research articles.

3.2 Co-occurrence Analysis of Keywords (Stage 2)

3.2.1 Network Visualisation of Keyword Clusters

A total of 1706 keywords were found in 500 selected documents. A threshold of at least 7 occurrences of a keyword was considered, of which 27 keywords met the threshold. From the co-occurrence of keyword analysis here in Fig. 5, the display of network visualisation of 27 keywords segregated into 4 clusters (represented in

4 different colours). The circles in different colours are called nodes. Each node is connected to other individual nodes with a line representing the frequency of association between them. The thicker the line, the more frequency of association they have. The distance between nodes also represents the frequency of co-occurrences between the items. "Knowledge Management" occurs 129 times with 23 other keywords directly, and the frequency of association of these keywords is clearly visible. The greatest number of occurrences of 'knowledge management' is with 'innovation', which occurs 12 times.

3.2.2 Thematic Analysis of Keyword Clusters

Cluster 1: Knowledge Transfer and Innovation

Institutional and economic sustainability are valued highly over environmental sustainability to influence investments in innovation[19-20]. Both external and internal knowledge play a key role in the success of innovation. To get the benefits of external knowledge, collaboration and absorptive capacity are equally essential. Arfi[21], *et al.*, identified the importance of absorptive capacity in getting green innovation from both external and internal sources of knowledge. Green innovation, or eco-innovation, refers to a process that helps develop new products and technology with the intention of lowering environmental hazards, such as pollution and the unfavourable effects of resource extraction[22]. Collaboration with research organisations, competitors, and suppliers to acquire the external knowledge that is the key to innovation capability is possible in the presence of absorptive capacity[23]. Tuning to the absorptive capacity of the highly turbulent environment while collaborating with offshore R&D can bring innovation[24]. Secundo[25], *et al.* identified motivation for adapting and replicating knowledge as knowledge transfer activities leading to open innovation.

Cluster 2: Knowledge Sharing and Dynamic Capabilities

The KM process leads to firm performance through dynamic capabilities[26]. Tacit knowledge sharing and knowledge quality can be influenced through trust and shared norms[27]. The role of dynamic capability in teamwork is significant because of willingness to share and integrate information through knowledge development and storage[28] otherwise it may lead to knowledge hiding. Škerlavaj[29], *et al.* identified the reasons: perceived time pressure and low prosocial motivation behind the knowledge-hiding behaviour of the employees, and perspective-taking mediates this relationship. Chen[30], *et al.* through their study of multiple cases of different enterprises identified data-driven dynamic capabilities as a solution for the problems arising from knowledge hiding.

Cluster 3: Knowledge Management (KM) and Artificial Intelligence (AI)

Organisations efficient in big data analytics achieve improved performance through efficient decision-making by exploiting and processing huge amounts of data from internal and external sources[31]. The B2B marketing rational decision-making impacts firm performance through user knowledge creation and external market knowledge creation[32]. In fashion retailing organisations, knowledge co-creation, which is a product or service design process through the interaction of customers and the sales force, can achieve a good return through efficient decision-making be assisted by big data[33].

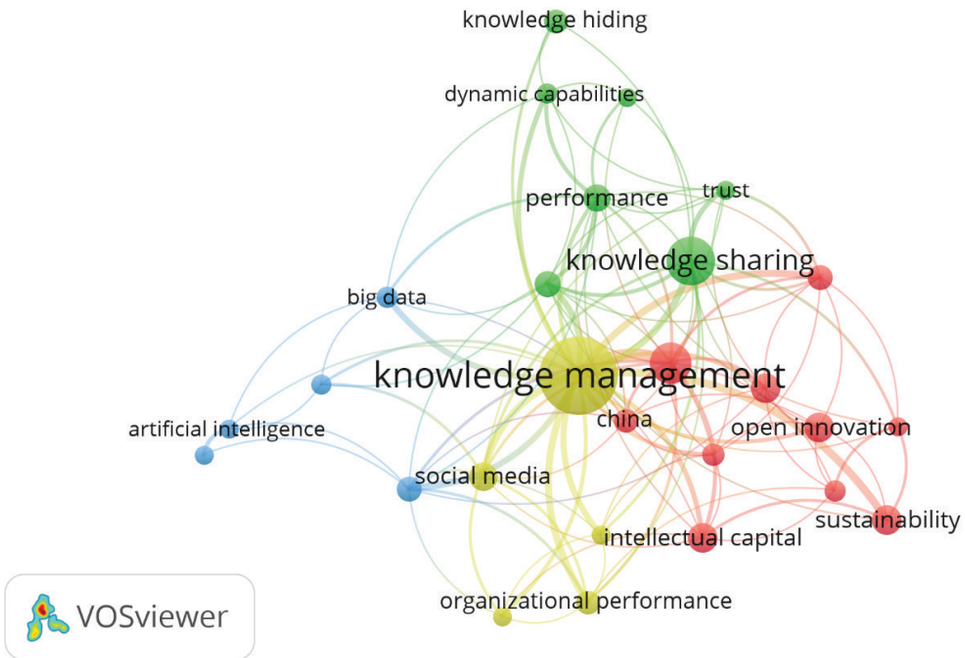


Figure 5. Network visualisation of co-occurrence of keywords.

Table 4. Distribution of author keywords into four clusters

Clusters	Keywords	Research papers
Cluster 1	Absorptive capacity China Green innovation Innovation Innovation performance Intellectual capital Knowledge transfer Open innovation Structural equation modeling sustainability	Ben Arfi, *et al*., 2018; Takalo, *et al.,* 2021; NajafiTavani, *et al.*, 2018; Flor, *et al.*, 2018; Rantala, *et al.*, 2018; Saunila, *et al.*, 2018; Secundo, *et al.*, 2019; Liu, *et al.*, 2019; Gross-Golacka, *et al.*, 2021; Srikalimah, *et al.*, 2020; Yusliza, *et al.*, 2020
Cluster 2	Dynamic capabilities Knowledge hiding Knowledge management (km) Knowledge sharing Performance Smes Trust	Chen, *et al.*, 2022; Santoro, *et al.*, 2019; Oliva, *et al.*, 2019; Gonzalez, *et al.* 2019 Ganguly, *et al.* 2019 Škerlavaj, *et al.* 2018
Cluster 3	Artificial intelligence Big data Firm performance Machine learning Organisational learning	Ferraris, *et al.*, 2019; Rialti, *et al.*, 2020; Acharya, *et al.*, 2018; Paschen, *et al.*, 2019; Bag, *et al.*, 2021; Sturm, *et al.*, 2021; Nakash and Bouhnik, 2021
Cluster 4	Knowledge creation Knowledge management Organisational performance Social capital Social media	Philip, 2018; Nisar, *et al.*, 2019; Zhang, *et al.*, 2020; Nyame, *et al.*, 2022; Petter, *et al.*, 2020; Sun, *et al.*, 2022; Ghaedi, 2018; Rezaei, *et al.*, 2020; Mayasari and Chandra, 2020

Paschen[34], *et al.* identified six fundamental components of Artificial Intelligence (AI) and the transformation of big data into information and knowledge thereafter by different combinations of those components. Machine learning (ML) and human learning together increase the organisation's stock of knowledge by enhancing organisational learning[35] even in challenging circumstances against a huge investment in the initial stage. The development of automated knowledge flow systems that rely on machine learning technologies, artificial intelligence, and improved cognitive capacities is what KM will look like in the future[36].

Cluster 4: Social Capital and Knowledge Management

Social capital has a significant effect on the innovation performance of an organisation by enhancing knowledge creation and knowledge transfer[37]. The role of social capital in KM is significant even in cross-cultural environments and creative industries where only internal sources of knowledge are insufficient[38-39]. If co-creation between customers and business organisations for new product development is enabled by social media, structural aspects among all three aspects of social capital (structural, cognitive, and relational) have the potential to improve organisational performance through knowledge transfer[40]. Strategic knowledge sharing among the community of practice based discussion groups through social media enhances labour productivity and return on investment[41].

4. DISCUSSION

The current study aimed to identify the recent trends in the field of KM research published in 2003-2022 and forecast the future trend. The time span has witnessed an upward growth in publication in KM research. Bontis, N.

was found as the most contributing author in KM research. In this regard, the findings of the work of Serenko[42] are also similar to those of this study. However, Kianto. A.tops the list as per the average citation. Kaba & Ramaiah[18] found Wickramasinghe, N. to be the most contributing author in KM research, but the study was done considering multiple subject areas, whereas this study focused only on Business, Management & Accounting subject areas. The Hong Kong Polytechnic University was proven to be the highest contributing institution, which is similar to the findings of Qui and LV[16]. The Journal of Knowledge Management is the most contributing journal to producing KM research. The same findings can be found in the studies Kaba & Ramaiah[18]; Serenko & Bontis[43]; Qui & Lv[16] and, Akhavan[15], *et al.* which found that the United States is the most productive country in KM research publications.

Akhavan[15], *et al.* in 2016 identified Australia in 5th and India in 13th position in contributing KM research. Study findings by Barik & Jena[14] ; Garg & Singh[13] analysed the publication of individual journals also state the same. The current study identified Australia and India both in the 4th rank. Undertaking this study to update the research trend has proven its worth. The research institutions of the countries may look into the reason for the research productivity and modify the research policy to develop the research potential in their institutions by getting this information. In keyword analysis by the authors, the study found knowledge management is the most researched keyword, followed by knowledge sharing. It indicates that knowledge sharing is an important element of the KM process. However, the current study remains novel in terms of identifying the future research trend by analysing the keywords studied in very recent years and applying an unbiased research method. The study Raja & Malik[11] in 2018 and Chaudhuri[12], *et al.* also found the same.

'E-learning' and 'semantic web' were the budding areas identified[16] in 2014. The current study in 2023 identified the flourishing areas 'AI', 'big data', 'machine learning', and 'trust' in relation to KM. Four themes for four clusters of 27 keywords are identified through thematic analysis of the articles, viz., cluster 1 is for *knowledge transfer and Innovation*, cluster 2 is for *knowledge sharing and dynamic capabilities,* cluster 3 is for *Knowledge Management (KM) and Artificial Intelligence (AI)* and cluster 4 is for *Social capital and Knowledge Management* indicating the most studied areas in the field. Research scholars in the field, business leaders, and R&D organisations can get insights into current trends and further research scope from this study.

5. CONCLUSION

Aligned with the objectives of the current study, it found Bontis, N. has been the highest contributor to KM research.

Among the journals focusing mostly on "KM," the *Journal of Knowledge Management* has been the top contributor. The US is continuously at the top of the list among the countries in KM research. Through thematic analysis of the articles identified in keyword clusters, it can be concluded that innovation is possible only when knowledge gets transferred. Knowledge can only be transferred in the presence of absorptive capacity. Knowledge sharing is one of the elements of the KM process and is the most researched area after KM.

In the last five years (2018-2022), through knowledge sharing, the quality of knowledge shared has been given importance that can be influenced through trust and shared norms. However, knowledge hiding is a rising matter of concern that can be addressed by dynamic capabilities. In the era of big data and AI, the importance of knowledge management has even been enhanced for business decision-making. The role of social media and social capital cannot be avoided as a good source of knowledge for the creative industry. The unbiased research methods adopted by this study had success in identifying budding research areas: big data, AI, and machine learning in connection with the KM research field. This study gives scope for further research on the budding research areas identified. Further study on identifying the factors affecting sustainable research productivity among the most contributing authors, institutions, and countries can be carried out.

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