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Mapping the Landscape of Management Information Systems: A Bibliometric Approach

Abeykoon, B.B.D.S.[1] and Sirisena, A.B.[2]

[1]Lecturer

Faculty of Management and Finance, University of Ruhuna

ORCID ID: 0000-0002-0899-0710

[2]Professor in Marketing

Faculty of Management and Finance, University of Ruhuna

Amila@badm.ruh.ac.lk

Abstract

The discipline of management information systems (MIS) has been profoundly impacted by a large volume of scientific works published in the last few years. In order to make a scholarly accomplishment, this investigation recognizes the contributions that have exerted the most significant influence on the field of MIS research. The study objectives are: (1) to reflect the contemporary state of the MIS research field, and (2) to identify the knowledge gaps that require more attention, and promote MIS. The study utilized bibliometrics, performance analysis, and science mapping, preceded by Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA). The analysis was executed using the Scopus database, which consisted of 1253 journal articles from 324 sources produced between 2018 and 2022. The study carried out the descriptive analysis and main analysis pertaining primarily to sources, authors, counties, and keywords. Furthermore, the health sector was identified as a key element contributing to the MIS. The findings of the study contribute to the advancement of academic knowledge in MIS and provide insights into the emerging trends in the field while facilitating the expansion of MIS research.

Keywords: Bibliometrics, Management Information Systems, Performance Analysis, Science Mapping, Scopus

JEL Codes: L86, D83, G14

Introduction

We live in an information economy and use information every day of our lives (Gandy, 2021). Information itself has a significant and considerable value, and already the information systems along with the computers have changed businesses and the way people live (Brown & Duguid, 2017). An information system can be interpreted as a group of interrelated components working together to achieve a common set of goals, which include the collection, manipulation, storage, and publicization of information that delivers feedback (Mishra et al., 2015). It consists mainly of the following major components: users, data, business processes, hardware, and software. Record tracking, enhancing internal and external collaboration in organizations, and producing evidence for policymakers to make sound decisions are the main reasons for developing a management information system (Karim, 2011). The traditional paper-based approach has been changed in this information age, and MIS has become the central storage of data in an organization, and it distributes the data and information to almost all the departments in a company (Alawamleh et al., 2021). The organizations strive to work towards objectives such as maximizing earnings, improving customer earnings, enhancing efficiency and accuracy, and minimizing costs (Kaydos, 2020). Also, information systems are very important in making key business decisions in the industry. Decisions made by management and key stakeholders are the revolving bodies of the major operations in an organization (Collier, 2015). Building up a good information system is crucial, as decisions are made with the information available. Hence, people should be familiar at least with the fundamental information systems, regardless of the industry they are involved in. Both private entities and public entities are employing them to mitigate the emergence of potential issues that can be a threat to the survival of an organization (Setyowati et al., 2021).

A multitude of research studies in the world conducted globally have examined the application of MIS (Armenta-Medina et al., 2020; Knapczyk et al., 2020; Yu & Muñoz-Justicia, 2020). Although there have been significant advancements in the domain, there is still a lack of notable research specifically focussing on bibliometric analysis, except for a few studies (Alfawareh et al., 2021; Gür & Ayden, 2023; Özköse et al., 2023; Özköse & Gencer, 2017). The quantitative bibliometric analysis technique helps to identify trends in research, most relevant statistics on authors, sources, documents, and affiliations. However, it has not been effectively utilized to its fullest potential. This research gap is especially noticeable with the rapid evolution of MIS with relevant to technology breakthroughs. Consequently, the limited visibility of the scholars on citation patterns, collaborative networks, and thematic progressions in the past studies has resulted in a research gap in the domain of MIS. Also, the majority of the studies on MIS have concentrated exclusively on particular countries or areas, and primarily focused on limited sample sizes. The lack of this comprehensive analysis hinders the ability to compare MIS research with other domains, limiting the research endeavours. Moreover, the research efforts that incorporate bibliometrics have not explained any systematic technique or procedure in detail in the studies. Through the systematic approach of bibliometric techniques, the researchers could reveal the uncovered research areas required further investigation. Thus, the current study uses bibliometric approach with PRISMA guidelines to successfully address the research gap, and comprehensively covers several aspects of MIS with the following research questions:

RQ1: What is the annual scientific production and citation pattern?

RQ2: Which authors have the highest productivity in the domain?

RQ3: What are the most influential sources?

RQ4: Which nationalities are prominent in the theme?

RQ5: What are the prevailing themes in the context?

RQ6: What are the discovered gaps in Management Information Systems studies?

Literature Review

Diverse industries use information systems for different purposes, and scholars propose novel information systems in different studies (Wang, 2014). For example, researchers may suggest developing a conceptual basic outline and structure for a Farm Management Information System (FMIS), which establishes the interrelationships between farm machinery and their surroundings (Fountas et al., 2015). Health management information systems in several countries have been built to avoid the weaknesses of a lack of reliable data and inadequate management and planning of health services (Heeks, 2006). Research studies in some countries have analyzed the data and found poor utilization practices and inadequate financial resources were the common issues that affected the efficiency of systems (Adane et al., 2021). Business management information systems can empower the community in the field of small and microbusinesses (Hananto et al., 2022). The growth of small and medium enterprises needs information and communication technology support for the long run (Hananto et al., 2022). Also, integrated MIS is a key to ensuring successful outcomes of military activities (Bogusz, 2020). The management work has increased exponentially as the scale of postgraduate education reform has deepened and expanded. Thus, many universities have established postgraduate MIS to standardize management functions and improve the level of efficiency (Ma & Feng, 2021). Large amounts of scientific data on various grounds can be examined with the widely used bibliometric approach, which reveals the emerging zones (Donthu et al., 2021). However, the utilization of bibliometrics in business research is still in its early stages and lacks significant advancement. In recent years, bibliometric techniques have become immensely popular among academics, uncovering the performance of authors, sources, and collaborated countries (Chakraborty et al., 2021). Also, the Scopus and Web of Science databases and the VOSviewer application facilitate the collection and analysis of substantial amounts of bibliometric components (Burton et al., 2020).

Methodology

The current study's methodology is established upon bibliometric analysis along with the PRISMA framework, which was chosen for its capacity to offer a thorough and meticulous framework as in Figure 1. Biblioshiny and RStudio were utilized to perform the analysis for Scopus data. In relation to network visualization and density visualization, the VOSviewer was adopted for these purposes.

Given that bibliometrics handle vast quantities of data, the study's scope was delineated through the application of different criteria towards overarching aims and objectives. The researchers were able to locate journal articles that appeared between 2018 and 2022 in the Scopus database, where substantial coverage of literature exists.

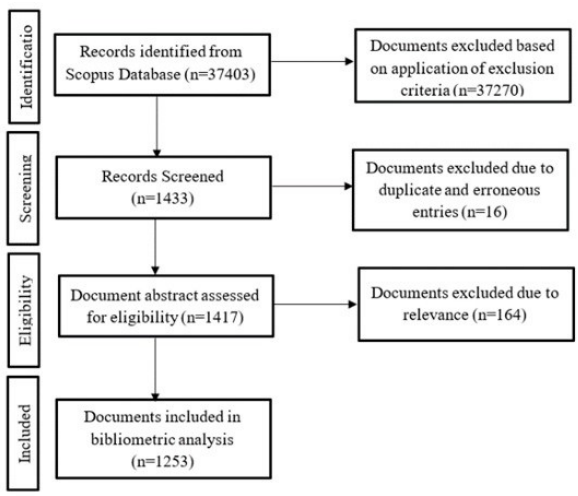

Figure 1: PRISMA Framework for the

PRISMA was subsequently employed as a systematic path in the current study under methodology. The database's inclusion criteria were established on journal articles at the final stage, and the articles in press were omitted, while the reason to select journal articles was due to their peer-reviewed nature. The database included articles written in English, and excluded conference papers, book chapters, conference reviews, and editorials. In addition, data cleansing was performed essentially as the Scopus database is multipurpose. For the current study, the searching query was used as follows:

(TITLE-ABS-KEY ("Management Information System*" OR "MIS") AND (LIMIT-TO (PUBSTAGE,"final")) AND (LIMIT-TO (DOCTYPE,"ar")) AND (LIMIT-TO (LANGUAGE,"English")) AND (LIMIT-TO (SRCTYPE,"j")) AND (LIMIT-TO (PUBYEAR,2022) OR LIMIT-TO (PUBYEAR,2021) OR LIMIT-TO (PUBYEAR,2020) OR LIMIT-TO (PUBYEAR,2019) OR LIMIT-TO (PUBYEAR,2018)))

Results and Discussion

Descriptive Analysis

The study examined 1253 journal articles published in 689 sources by 4881 authors in the period of 2018 and 2022. The publications were reviewed leveraging bibliometric analysis, which featured 4064 keywords and 49836 references.

In addition, 6.24% of the yearly growth rate value and a value of 8.463 citations per document were yielded from the analysis. The entire corpus contains 119 single-authored documents; however, it boasts 115 authors. Moreover, the result for collaborative co-authors per document is 4.61, with a value of 28.65, an approximate percentage of international co-authorship.

Description	Results
Timespan	2018:2022
Sources (Journals)	689
Documents	1253
Annual Growth Rate %	6.24
Average citations per doc	8.463
References	49836
DOCUMENT CONTENTS	
Author's Keywords (DE)	4064
AUTHORS	
Authors	4881
Authors of single-authored docs	115
AUTHORS COLLABORATION	
Single-authored docs	119
Co-Authors per Doc	4.61
International co-authorships %	28.65

Main Analysis

Annual scientific production, average annual citations, most relevant sources, authors, and countries, production of sources and authors, and collaboration networks of keywords, authors, and countries were analysed under the main analysis. Furthermore, network visualisation and density visualization of keyword occurrences were performed.

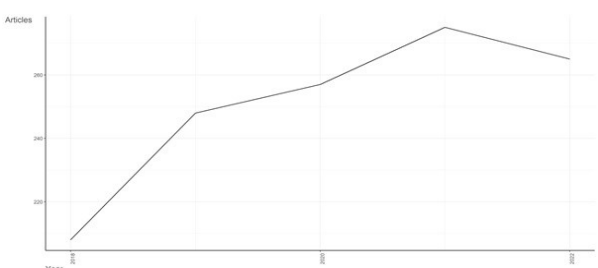

Figure 2: Annual Scientific Production

Production of research articles per year shows the article quantity generated between 2018-and 2022 is inclined towards interpreting the significant concern of the scholars about MIS. It is depicted in Figure 2 with a graph titled "Annual Scientific Production." The data indicates a consistent increase in scientific productivity over the early years, starting at 208 articles in 2018 and reaching approximately 257 articles by 2020. This steady increase over time indicates a period of intense research effort. However, a slight decline in production is visible in 2022, potentially due to limitations in resources, shifts in research focus, or any other external factor influencing publication rates.

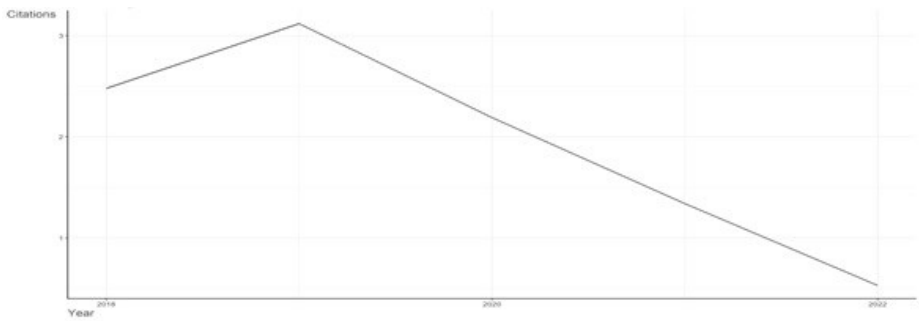

Figure 3: Average number of citations

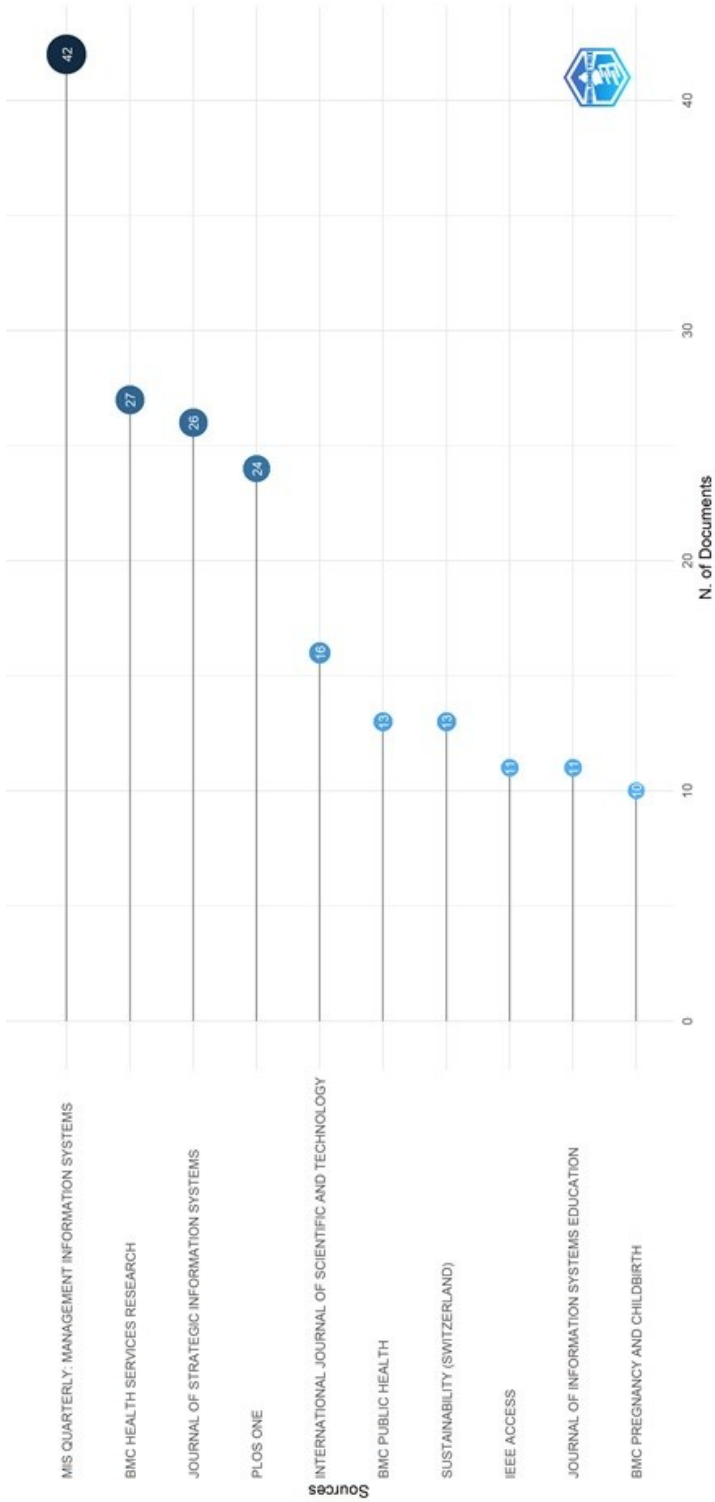

Figure 3: Average number of citations

Table 2: Top 25 most relevant sources

Sources	Articles
MIS Quarterly: Management Information Systems	42
BMC Health Services Research	27
Journal of Strategic Information Systems	26
PLOS ONE	24
International Journal of Scientific and Technology Research	16
BMC Public Health	13
Sustainability (Switzerland)	13
IEEE Access	11
Journal of Information Systems Education	11
BMC Pregnancy and Childbirth	10
International Journal of Environmental Research and Public Health	10
Mobile Information Systems	10
International Journal of Innovation, Creativity and Change	9
BMC Medical Informatics and Decision Making	8
Communications of the Association for Information Systems	8
Computational Intelligence and Neuroscience	8
Computers and Electronics In Agriculture	8
Health Policy and Planning	8
Global Health Science and Practice	7
International Journal of Recent Technology and Engineering	7
Journal of Theoretical and Applied Information Technology	7
Library Philosophy and Practice	7
Malaria Journal	7
BMJ Open	6
Frontiers in Public Health	6

Figure 3 displays the average citations per year with notable fluctuation in the average number of citations obtained by publications from 2018 to 2022. Starting at just above 2 citations per article in 2018, the average number of citations progressively increased, reaching its highest point of 3 citations per article in 2019. Nevertheless, a marked decline is following the peak, dropping the citations to approximately 1 citation per article by 2022. Alterations in research topics, or broader shifts in citation behaviours might be the possible reasons for the decrease in the value

The analysis of the article distribution across various sources reveals a significant concentration in a few primary sources, as shown in Figure 4 and the Table 2. Accordingly, MIS Quarterly: Management Information Systems has the highest number of publications with 42 articles, followed by BMC Health Services Research and Journal of Strategic Information Systems with 27 and 26 articles, respectively. These three sources make up nearly 30% of the total 307 articles that were analysed. In addition, PLOS ONE and the International Journal of Scientific and Technology Research, each provide 24 and 16 articles, respectively. As a result, the top five journals collectively account for approximately 44% of the total. The next seven journals, each publishing between 10 to 15 articles together, represent 25% of the total, while the remaining 13 journals, which have fewer than 10 articles, account for around 33%. The distribution exhibits a skewed pattern, focusing a substantial amount of article publication in few high-volume journals, while several other journals publish at a lower frequency.

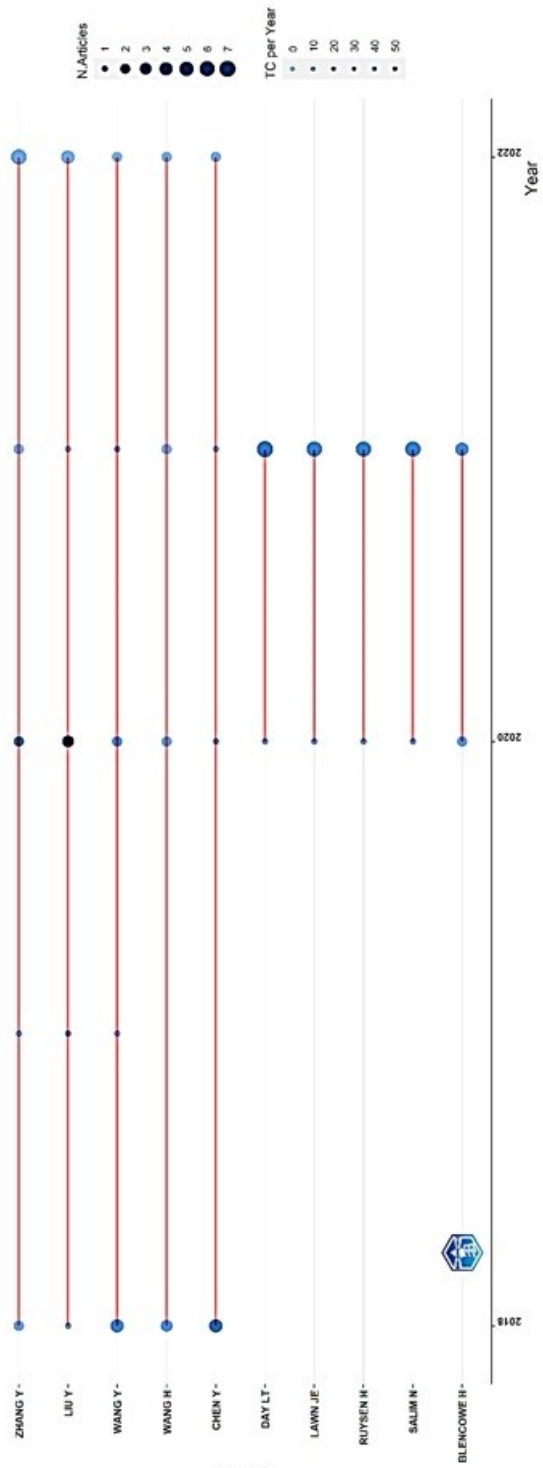

Figure 5: Author's production over time

Authors	Articles
Zhang Y	13
Liu Y	10
Wang Y	10
Wang H	9
Chen Y	8
Day Lt	8
Lawn Je	7
Ruysen H	7
Salim N	7
Blencowe H	6
Gurung R	6
Kc A	6
Li Y	6
Peven K	6
Rahman Qs-U	6
Shamba D	6
Thakur N	6
Wang L	6
Wu J	6
Zaman Sb	6
Ameen S	5
Boggs D	5
En-Birth Study Group	5
Gordeev Vs	5
Gore-Langton Gr	5

The Figure 5 coupling with Table 3 depicts the authors production over time, highlighting both the number of publications they have and their citation impact over time. The publishing track of authors is illustrated using markers, with the size indicating the number of articles published in a given year. In addition, the colour intensity reflects the total number of citations per year. Accordingly, the three most productive scholars during the period were Zhang Y, Liu Y, and Wang Y. They show a steady pattern of publishing, with Zhang Y being more prolific with 13 articles, followed by Liu Y and Wang Y, each with 10 articles. Wang H. and Chen Y each authored 9 and 8 articles, respectively, while Day LT and Lawn JE have shown their highest level of productivity in the later years, with 8 and 7 articles. Overall, this combined analysis presents a comprehensive overview of the scholarly publication trends and academic influence in the context of MIS, emphasizing fluctuations in productivity and citation impact over time.

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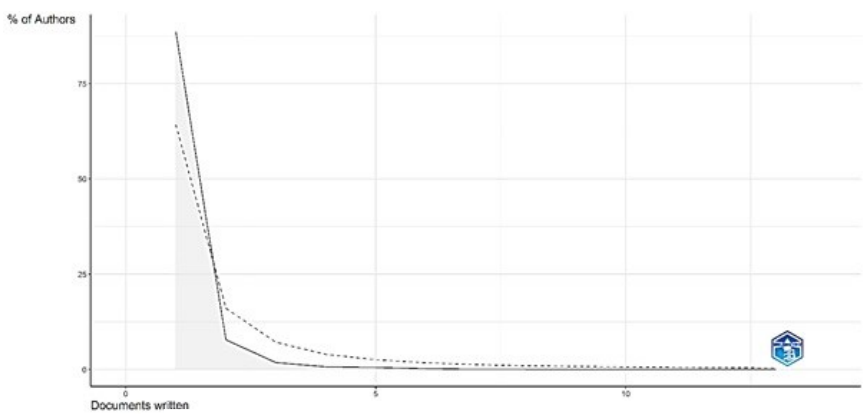

Figure 6: Author productivity through Lotka's law

The Lotkas's law is a principle that explains the distribution of scientific productivity. Figure 6 portrays the level of production of authors in the field of MIS using Lotka's law as a framework. The x-axis of the diagram denotes the number of documents written by authors, while the y-axis shows the percentage of authors. The plot reveals a significantly skewed distribution, where the large majority of authors contribute few articles, while a small fraction of extremely productive authors produces multiple publications. This pattern corresponds to Lotka's inverse-square law, emphasizing that the majority of the scholarly work is done by a few scholars while the rest make minimal contributions (Potter, 1981; Thamaraiselvi et al., 2020). These findings are crucial for comprehending the dynamics of knowledge production and the focus of expertise in the MIS research community.

The bar chart in Figure 7 presents the distribution of journal articles across various countries on MIS, categorizing them into single-country publications (SCP) and multiple-country publications (MCP). Accordingly, China is the clear leader in terms of the highest number of documents, primarily including SCPs. The United States of America also demonstrates a combination of both SCPs and MCPs while India and Indonesia being notable contributors to SCPs.

The United Kingdom has contributed majorly to MCPs as a country. The figure illustrates the global interest in MIS research with substantial contributions from different continents. Moreover, the balance between SCPS and MCPs reflects both the localized emphasis and collaborative global endeavours in advancing the MIS research domain.

Consequently, the world map in Figure 8 nurtures the national cooperation across the globe, highlighting the intensity and extent of the international interactions. The varying thickness of the lines presumably indicates the volume of these relationships. The wider lines signify stronger research collaborations in the context of MIS. The extensive interconnections stemming mostly from the nations in North America, Europe, and East Asia serve them as the central nodes in MIS research collaboration. relationships. A basic line is employed to illustrate the links between two nodes. The figure reveal that the United States of America is the country that contributes to MIS research the most. Also, it shows strong collaborations with other nations such as the United Kingdom, China, Canada, Tanzania, and Sweden. Minor collaborations can be seen between South Korea, Belgium, Vietnam, Kenya, and Namibia.

A Sankey diagram in Figure 9 was used to study the flow and the relationship between authors, keywords, and publications. The figure is composed of three columns: authors (AU) on the left, keywords (DE) in the middle, and publication sources (SO) on the right. The interconnections across these columns visualize how specific authors contribute to diverse study areas and disseminate their work across different journals. Accordingly, Wang H., Zhang Y., Li Y., and Wang Y. are the authors with high quantity of diverse terms, indicating their broader research impact. In addition, the words *data quality, health management information system, machine learning, performance, big data, higher education, etc.*, are most prominent, excluding the searching keyword management information system. Overall, the Sankey diagram aids in comprehension of the distribution of research focus and the primary contributors within the MIS domain.

Uncovering the evolution and dynamics of the clusters is identified through keyword co-occurrence analysis (Chakraborty et al., 2021). As stated by many authors, the straightforward and significant characteristics pave the way to implementing numerous bibliometric investigations in wide-spread fields. (Armenta-Medina et al., 2020; Knapczyk et al., 2020; Yu & Muñoz-Justicia, 2020). As shown in Figure 10, the word cloud generated for the study has five clusters with the colors red, blue, green, yellow, and purple. Accordingly, the most prominent red color cluster is with the significant term management information systems, as the searching keyword was the same. The cluster has other noteworthy words such as decision making, machine learning, e-learning, change management, social media, etc., These keywords in the cluster seem more focused on technological aspects.

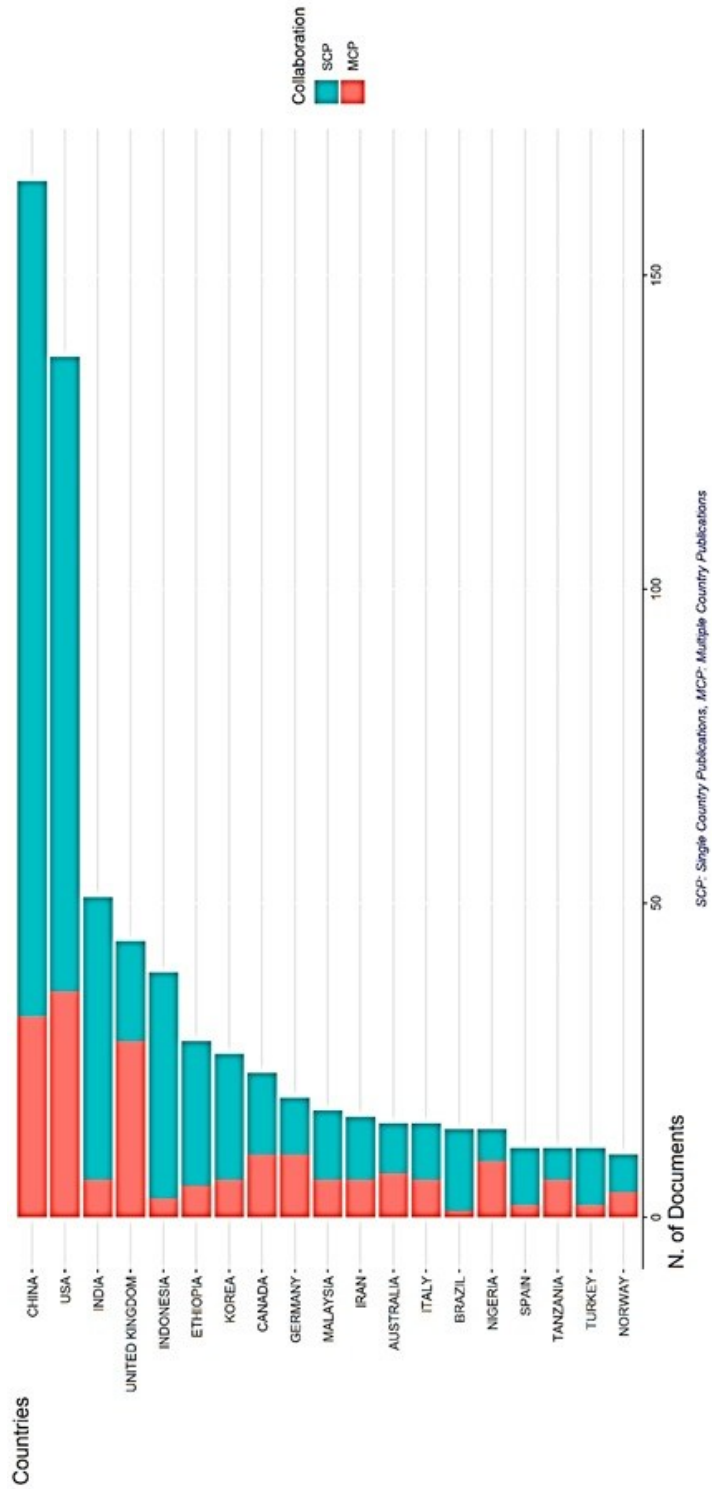

Figure 7: Most relevant countries

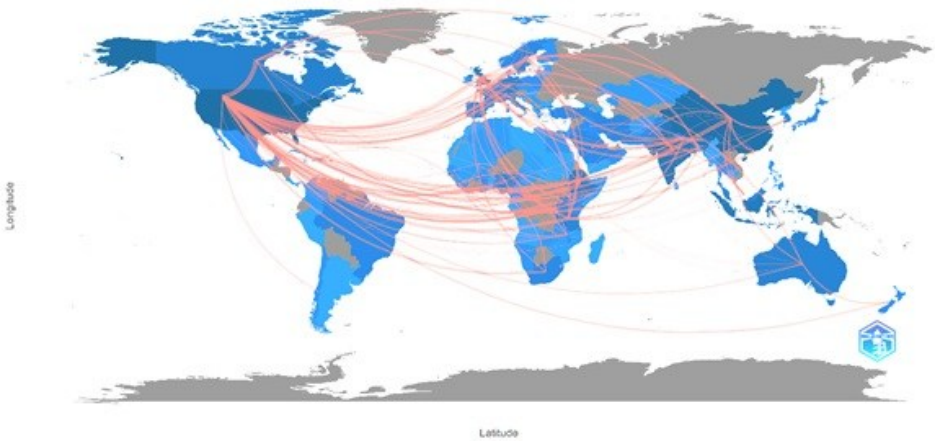

Figure 8: National cooperation map

The second green color cluster is composed of prominent words such as medical information system, health care facility, data accuracy, data quality, etc., and is more geared towards the health-related aspects and attributes of data. The third blue color cluster shows the terms major clinical study, child, adolescent, age, infant, risk factor, etc., as its most significant keywords. This cluster of keywords is more relevant to age groups and health. The fourth yellow color cluster is almost maternally related, and the keywords pregnancy, maternal, live birth, clinical trial, cesarean section, etc., are evidence for that. The purple cluster keywords, economics, housing, family, etc., all together are in the direction of life status-related information. Considering all these clusters, the authors of the study are of the opinion that the majority of the MIS related research is mostly based on health information, and the rest has been focused on thematic areas such as technology, attributes of data, and life status.

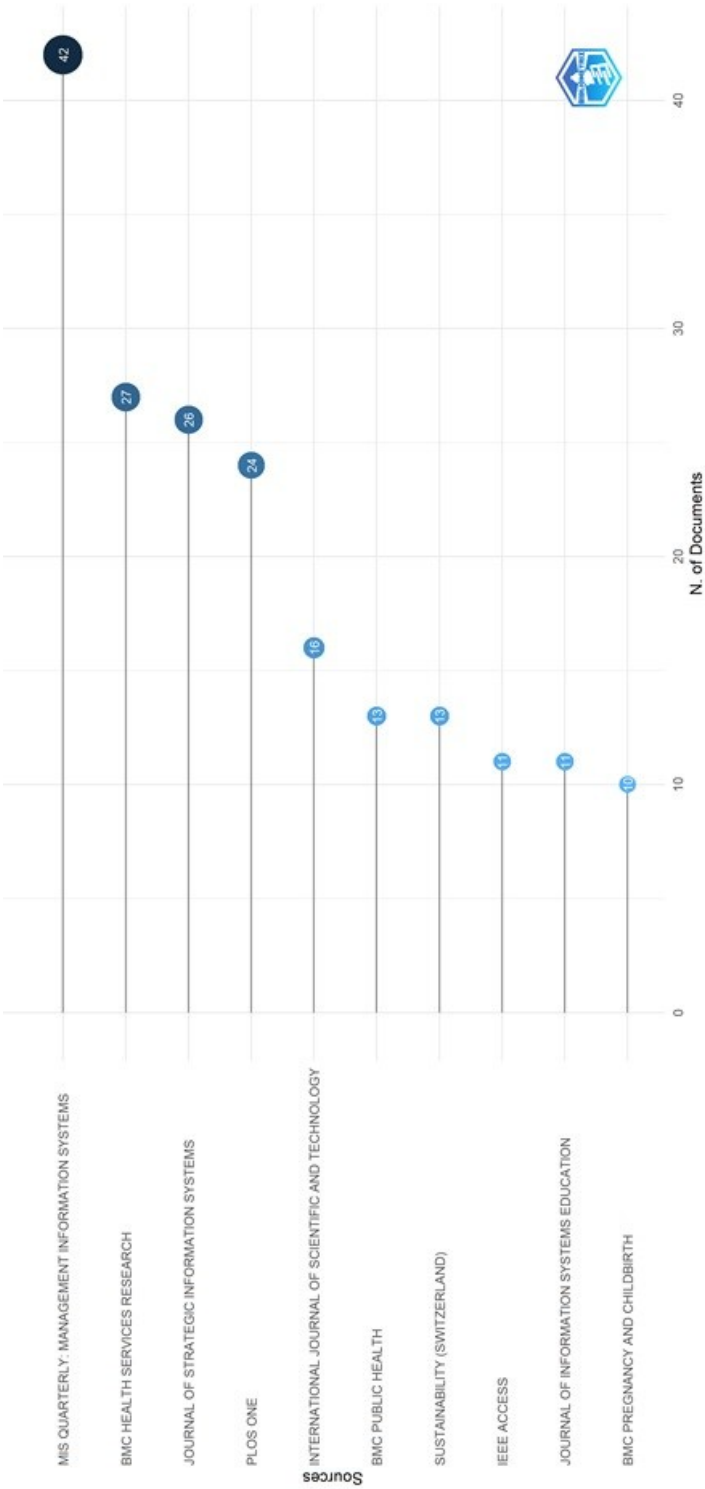

Figure 9: Sankey diagram of MIS research (author-keyword-publication linkages)

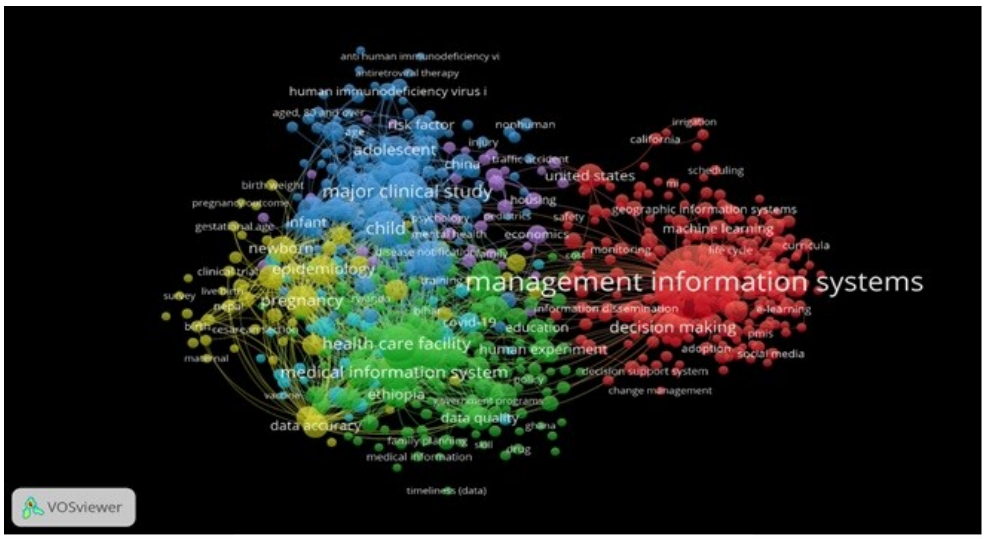

Figure 10: Network Visualization Diagram

The density visualization of keyword occurrences depicted in Figure 11 shows that the red color area indicates established knowledge in the research area (Priyashantha & Dilhani, 2022). While keywords found in the green area indicate that very little study has been done, those found in the yellow color area imply a reasonable degree of investigation (Priyashantha, 2023). Accordingly, as in the network visualization diagrams, the author's searched keyword area is the densest area with the red color, and it shows another denser area for health care facilities and medical information systems. This shows us that established knowledge exists for medical information related MIS. In addition, moderate knowledge has been generated for topics such as machine learning, decision making, data quality, data accuracy, adolescence, education, government programs, etc., related to MIS. However, insufficient knowledge is indicated on the topics of change management, safety, economics, housing, and social media. Therefore, worldwide researchers should be more attentive to these topics in the future.

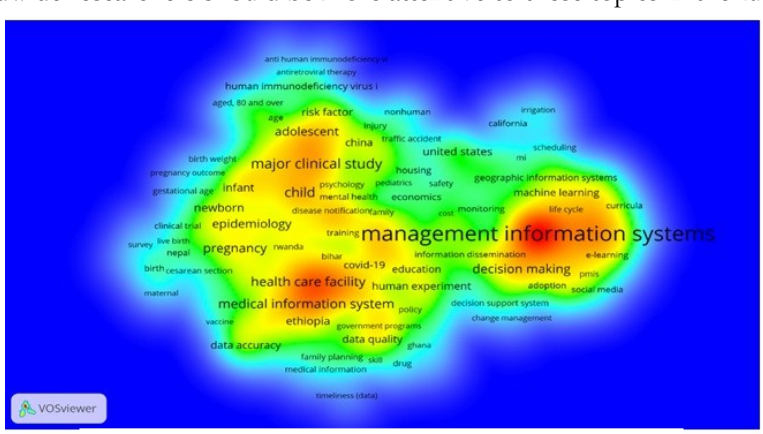

Figure 11: Network Visualization Diagram

A multiple correspondence analysis (MCA) was used to investigate the conceptual framework of MIS research (Demiroz & Haase, 2019; Mostafa, 2020). As seen in Figure 12, the map has revealed two clusters. The red cluster sheds emphasize on the function of MIS in general. So, with MIS, decision making is heavily emphasized. The keywords health care delivery and medical information systems explore the potential of MIS to act as an effective and informative tool. Moreover, the image can be further interpreted as the studies steered so far have focused on the procedures in information use and data accuracy with respect to the keywords. The blue color cluster mostly contains the different age groups uncovered by the scholars in their studies. An insight can be produced expressing that, the MIS is fetching the information of adolescent, middle aged, young, child, infant, and new born-level details.

The authors of the study observed a relationship between the medical information systems and the age categories on the map. The study's thematic map, shown in Figure 13, classifies the research concentrations according to their levels of centrality and density (Mobin et al., 2021). The first quadrant's topics are well developed and connected both inside and outside. The high density and low centrality themes belong to the second quadrant, called niche themes. The third quadrant reflects weak external and internal ties. The final quadrant has basic themes with sharp external ties and insignificant internal ties (Rejeb et al., 2022). Accordingly, the most impactful themes have the keywords: public health, health services research, covid-19, big data, data quality, performance, adoption, UTAUT, higher education, project management, and health management information systems.

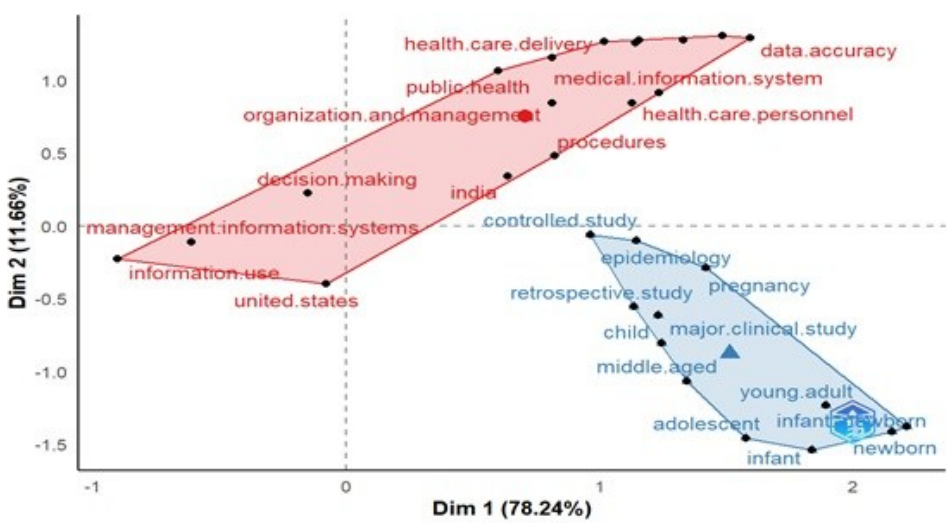

Figure 12: Conceptual Structure Map

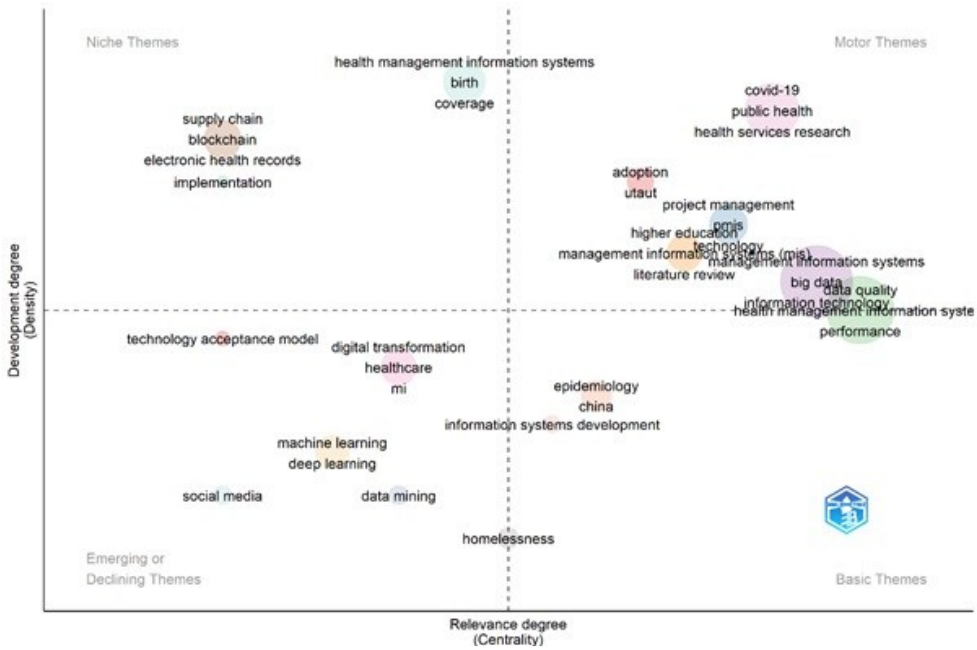

Figure 13: Thematic map in MIS research

Conclusion

The bibliometric indicators, such as influential authors, sources, contributed countries, etc., summarize the evolution of MIS for the years from 2018 up to 2022. This study lays the foundation for academics, practitioners, and policymakers to conduct more future research and leads to advancing management information system research in regions with a research gap. Also, the study directs the attention of the scholars towards new opportunities and trends. The findings enhance the understanding of academics in MIS research and support finding value adding collaborations and sources. The developing countries are especially still required to conduct more research on MIS, even though the academic community has conducted a considerable number of research studies in recent years. Moreover, the network analysis can help promote collaborations between the countries and the authors in the domain. A comprehensive study such as content analysis can be conducted through these findings to obtain a wide-ranging understanding of the underlying causes that accelerated the rise in publications of MIS research. Also, future studies can consider sources such as conference papers, proceedings, and books, as this study used only peer-reviewed journal articles. Another shortcoming of using only the Scopus database can be omitted with using other databases such as Web of Science, which might have led to critical MIS research. Furthermore, non-English publications can be added to the research database to increase the number of relevant publications.

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