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# 47 Years of Interpretive Structural Modelling (ISM) as a Methodology: A Worldwide View

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**Abstract**
This study aims to review a worldwide view of the evolution, dissemination, keyword frequency and collaboration among authors and countries in ISM. Using the Scopus database, this paper used the bibliometric analysis to examine 556 scholarly works related to ISM from 1974 to December 2021. This study`s finding shows that India dominates the ISM study in terms of authors, institution and country. Even though the Business, Management and Accounting field dominate the research of ISM, other fields have begun to use ISM as a methodology in their research. The implication of this study is summed up in the presentation of a worldwide view of the ISM in 47 years, which allows other researchers to use this methodology in various fields as a starting point for additional analyses.
**Keywords:** Bibliometric, Scopus, Review, Interpretive Structural Modelling, ISM

## Introduction

ISM is one of the most distinctive and intriguing research methodologies for application. ISM was discovered for the first time by Harary in 1965. The mathematical foundation for ISM approach can be found in Harary's research, and Warfield provided the philosophical foundation that led to the establishment of this approach in 1974 (Khaba & Bhar, 2017; Mannan et al., 2016). This approach is a computer-assisted process that organises people's ideas into a graphical map structure that depicts a more manageable elemental relationship (Warfield, 1974).

ISM organises individual ideas into a group discussion by mapping the relationships between various elements (Attri et al., 2013; Kaur & Sharma, 2017). In ISM, the resulting process is formed by the knowledge and experience of individuals involved in in-depth discussions and analysis of an issue (Rana et al., 2019). Thus, every decision made in ISM must consist of experts, decision-makers or stakeholders. The researcher must organise several brainstorming sessions to understand the complementary effect of one driver on others and reach an expert consensus (Piya et al., 2020).

The number of experts involved is not fixed and depends on the researcher. For example, Janes (1988) suggested seven to eight experts. Ghazali et al (2020) also used eight

experts, Jamil (2016); Chauhan et al (2018); Hsu et al (2019) used nine experts, Nilashi et al (2019) with ten experts and Chen et al (2021) used 11 experts. However, Janes argued that the experts used were unnecessary to be many as it would take a long time to discuss and argue about the study.

ISM is easier to analyze using Concept Star software (Yahaya et al., 2018). This software can compare pair-wise to describe complex issues as elements based on the numbering concept of sorting the elements with contextual relationships to produce a graphical map. The identified factors were structured into a hierarchical model using this method (Anantatmula & Kanungo, 2010). In addition, ISM generates a hierarchical graph with nodes and directed arcs, where the nodes represent the system's variables (elements) and the arcs represent the direction of the associations (Bashir & Ojiako, 2020a; Mathiyazhagan et al., 2013).

In the resulting model, problem-solving will be more systematic and structured in order of correct priority. Each element derived from literature studies will be arranged in graphic form following an expert agreement, which is unique to ISM (Abdullah & Siraj, 2018; Chen et al., 2021). These elements serve as guidelines for the dimensions that are formed in the model. According to Srivastava and Sushil (2013) as well as Janssen et al (2018) and Agrawal et al. (2020), the ISM methodology consists of several distinct steps.

(1) Identify the experts based on their years of experience and expertise in both the industry and academia.
(2) Determine the factors, elements, and barriers that are relevant to the research question based on literature review and expert`s opinion
(3) Determine the relationship between the factors that have been identified and their context.
(4) Create the structural self-interaction matrix (SSIM) for each factor based on the expert's recommendations.
(5) Compile and analyse the reachability matrix in light of the SSIM, as well as the transitivity. Specifically, the primary assumption in ISM is related to the transitivity of the contextual relation, which is to say that if factor A is related to factor B and factor B is also related to factor C, then factor A is also related to the factor C.
(6) After conducting a transitivity analysis, divide the factors into different levels based on the final reachability matrix.
(7) Create the digraph, which the ISM model will follow.

**Problem Statement**

Nonetheless, the field of study that applies to ISM, on the other hand, is still uncommon (Rahman et al., 2021). Although the matrix formula is featured in ISM (Ahmad et al., 2019; Sushil, 2012), its application is not limited to mathematics, business and management, or engineering. ISM is universal because the majority of ISM`s research participants are experts, and they are not solely limited to one field. Remember that each field has its own experts.

According to Table 1, there is still a limited number of ISM studies indexed in the Scopus Database. There were only 437 total publications in journals as of December 2021, 92 from conference proceedings, 25 total publications in book series, and another two from a book and undefined source types. All of this resulted in a total of 556 publications indexed in the Scopus database.

**Table 1**. **Source type**

| Source Type | TP | % |
|---|---|---|
| Journal | 437 | 78.60 % |
| Conference Proceeding | 92 | 16.55 % |
| Book Series | 25 | 4.50 % |
| Book | 1 | 0.18 % |
| Undefined | 1 | 0.18 % |
| Total | 556 | 100.00 % |

*Notes*: TP=total number of publications

As a result, bibliometric studies must be conducted to identify the evolution, dissemination, cooperation, and keywords associated with ISM. Bibliometrics is a method of retrieving and statistically analysing metrics in published documents (Saha et al., 2020). Bibliometric analysis frequently uses information system tools to conduct a thorough search of relevant documents that appear in multiple databases (Wang et al., 2017). The database information will be quantitatively analysed and visually presented (Shiau & Dwivedi, 2013). In other words, bibliometrics are an active field of research devoted to developing methods and statistics to assist researchers in taking advantage of all types of data provided by a publication (Cowhitt et al., 2019). As a result, bibliometrics are the best methodologies for analysing ISM metadata in order to be more detailed in numerical terms.

This study conducted a bibliometric analysis of ISMs based on three major research questions: (1) How has ISM research evolved and disseminated? (2) Who are the major authors and countries involved in ISM research, and how do they collaborate? (3) What is the frequency, co-occurrence, and evolution of keywords in ISM research? This bibliometric analysis addresses the following aspects in order to answer these three questions:

(1) Evolution and dissemination
- Evolution by year
- Dissemination by subject areas

(2) Frequency of keywords
- Top keywords
- Co-occurrence keywords
- Evolution of co-occurrence article keywords

(3) Co-authorship network
- Top authors
- Co-authorship author network
- Co-authorship countries network

## Methodology

A bibliometric analysis is becoming more popular as one method for determining the trend and pattern of research (Ahmi et al., 2020). The research trends can be seen by categorising the publications by year, author, institution, or country. The impact and performance can also be measured using matrices such as the number of citations, citations per year, h index, and g index. Furthermore, state of the art in publications can be mapped and visualised by employing various indicators such as co-authorship, co-citation, keyword or phrase occurrences, and bibliographic coupling (Zakaria et al., 2021). According to this study, 556 documents from the SCOPUS database were analysed with Harzing's Publish or Perish, Microsoft Excel and visualised by VOSviewer software.

The statistics were obtained on 31st December 2021 from the Scopus database. Scopus was chosen since it included over 82 million entries from 7000 publishers. Scopus now contains 1.7 billion cited references since 1970. As a result, the search phrase "Interpretive Structural Model *" in the article title is utilised to locate relevant publications linked to research employing Interpretive Structural Model* in the subject of study. The symbol of an asterisk (*) was used refers to several terms used in this study, including "modelling," "modeling," and "models." Furthermore, data search is not restricted by year or language. Everything is still utilised to obtain valuable data. In the following step, all data obtained through searches in the Scopus database was exported into comma-separated values (.csv) and research information systems (.ris) formatted files.

## Results and Discussion

### Evolution and Dissemination

#### *Evolution by Year*

Table 2 displays statistics on yearly publications of ISMs research from 1974 to 2021, indicating the rising trend in the number of publications. For 47 years, 1974 was the first year that documents on ISMs were published and indexed by Scopus with only four papers. The earliest documents were published by Waller from Magdelen College, United Kingdom, Farris from Evansville, United States and Malone from the American University of United States. Another author is Fitz, but unfortunately, this author has no affiliation history in Scopus.

From 1974 through 2013, the Scopus database had less than 20 documents about ISMs. Surprisingly, the number of publications published on ISMs increased dramatically beginning in 2014, with 27 documents released that year. The number progressively rose in 2018 with 75 documents, indicating the rising interest in ISMs. Even though there were just 78 articles in 2021, this analysis was done soon after December 2021. As a result, the whole year's worth of documents had yet to be released. In contrast, several journals had already published their 2020 publications, and the Scopus database recorded these figures as well.

**Table 2. Publication by year**

| Year | TP | NCP | TC | C/P | C/CP | h | g |
|---|---|---|---|---|---|---|---|
| 2021 | 78 | 38 | 109 | 1.40 | 2.87 | 5 | 7 |
| 2020 | 63 | 48 | 379 | 6.02 | 7.90 | 11 | 17 |
| 2019 | 70 | 58 | 665 | 9.50 | 11.47 | 14 | 23 |
| 2018 | 75 | 63 | 830 | 11.07 | 13.17 | 17 | 25 |
| 2017 | 56 | 53 | 1166 | 20.82 | 22.00 | 17 | 32 |
| 2016 | 44 | 41 | 939 | 21.34 | 22.90 | 18 | 30 |
| 2015 | 32 | 31 | 1202 | 37.56 | 38.77 | 17 | 32 |
| 2014 | 27 | 23 | 664 | 24.59 | 28.87 | 11 | 25 |
| 2013 | 17 | 16 | 672 | 39.53 | 42.00 | 12 | 17 |
| 2012 | 12 | 10 | 740 | 61.67 | 74.00 | 6 | 12 |
| 2011 | 19 | 17 | 1177 | 61.95 | 69.24 | 14 | 19 |
| 2010 | 7 | 6 | 196 | 28.00 | 32.67 | 4 | 7 |
| 2009 | 11 | 10 | 145 | 13.18 | 14.50 | 5 | 11 |
| 2008 | 4 | 3 | 484 | 121.00 | 161.33 | 3 | 4 |
| 2007 | 6 | 6 | 279 | 46.50 | 46.50 | 4 | 6 |
| 2006 | 3 | 3 | 103 | 34.33 | 34.33 | 2 | 3 |
| 2005 | 1 | 1 | 143 | 143.00 | 143.00 | 1 | 1 |
| 2003 | 2 | 2 | 219 | 109.50 | 109.50 | 1 | 2 |
| 2002 | 2 | 1 | 26 | 13.00 | 26.00 | 1 | 2 |
| 1995 | 1 | 1 | 7 | 7.00 | 7.00 | 1 | 1 |
| 1993 | 1 | 1 | 3 | 3.00 | 3.00 | 1 | 1 |
| 1992 | 1 | 1 | 41 | 41.00 | 41.00 | 1 | 1 |
| 1990 | 1 | | 0 | 0.00 | | 0 | 0 |
| 1989 | 1 | 1 | 17 | 17.00 | 17.00 | 1 | 1 |
| 1988 | 3 | 3 | 99 | 33.00 | 33.00 | 2 | 3 |
| 1985 | 1 | | 0 | 0.00 | | 0 | 0 |
| 1984 | 1 | 1 | 3 | 3.00 | 3.00 | 1 | 1 |
| 1981 | 1 | 1 | 2 | 2.00 | 2.00 | 1 | 1 |
| 1980 | 3 | 3 | 32 | 10.67 | 10.67 | 2 | 3 |
| 1979 | 1 | 1 | 2 | 2.00 | 2.00 | 1 | 1 |
| 1978 | 1 | 1 | 120 | 120.00 | 120.00 | 1 | 1 |
| 1977 | 3 | 3 | 23 | 7.67 | 7.67 | 2 | 3 |
| 1976 | 1 | 1 | 11 | 11.00 | 11.00 | 1 | 1 |
| 1975 | 3 | 3 | 405 | 135.00 | 135.00 | 3 | 3 |
| 1974 | 4 | 3 | 8 | 2.00 | 2.67 | 2 | 2 |

*Notes*: TP=total number of publications; NCP=number of cited publications; TC=total citations; C/P=average citations per publication; C/CP=average citations per cited publication; h=h-index; and g=g-index.

***Dissemination by Subject Areas***

Table 3 indicates that ISM was used in 23 subject areas. Even though there are many publications in the Business, Management and Accounting field (TP = 264, 47.48 %), the Engineering field (TP = 220, 40.11 %) is driving this trend by 44 complete publications (7.37 %) differences. Nevertheless, ISM is still used in a variety of fields, including Computer Science (TP = 114, 20.50%), Decision Sciences (TP = 107, 19.24%), Social Science (TP = 71, 12.77%) and

other fields. Subject areas are consistent with the ISM function, which is an ideal tool for managing complex and ambiguous problems to become more organised in various fields (Chauhan et al., 2018; Sushil, 2012). This diversity of research makes ISM is universal and can be further expanded in various fields.

**Table 3. Subject areas**

| Subject Area | TP | % |
|---|---|---|
| Business, Management and Accounting | 264 | 47.48% |
| Engineering | 220 | 40.11% |
| Computer Science | 114 | 20.50% |
| Decision Sciences | 107 | 19.24% |
| Social Sciences | 71 | 12.77% |
| Environmental Science | 63 | 11.33% |
| Energy | 36 | 6.47% |
| Mathematics | 28 | 5.04% |
| Medicine | 24 | 4.32% |
| Economics, Econometrics and Finance | 21 | 3.78% |
| Materials Science | 15 | 2.70% |
| Chemical Engineering | 14 | 2.52% |
| Agricultural and Biological Sciences | 13 | 2.34% |
| Earth and Planetary Sciences | 10 | 1.80% |
| Psychology | 8 | 1.44% |
| Biochemistry, Genetics and Molecular Biology | 7 | 1.26% |
| Multidisciplinary | 5 | 0.90% |
| Chemistry | 5 | 0.90% |
| Health Professions | 4 | 0.72% |
| Physics and Astronomy | 4 | 0.72% |
| Arts and Humanities | 1 | 0.18% |
| Nursing | 1 | 0.18% |
| Pharmacology, Toxicology and Pharmaceutics | 1 | 0.18% |

*Notes*: TP=total number of publications

**Frequency of Keywords**

***Top Keywords***

Following Table 4, the most popular keywords all pointed to the same meaning of the term ISM. Nevertheless, one of the analyses in ISM (MICMAC Analysis) had also been designated as a keyword among the authors. This keyword can be associated with the MICMAC function in ISM, which is used to identify critical variables based on both their direct and indirect impacts on one another, using a classification system to identify critical variables (Bashir & Ojiako, 2020). Additionally, other keywords related to ISM's application in specific areas, such as 'supply chain management, 'sustainability,' and 'manufacture,' are included as top keywords and have an impact on the total number of publications in the ISM study.

**Table 4. Top keywords**

| Keywords | TP | % |
|---|---|---|
| Interpretive Structural Modeling | 201 | 36.15% |
| Interpretive Structural Modelling | 113 | 20.32% |
| ISM | 109 | 19.60% |
| Structural Modelling | 55 | 9.89% |
| Interpretive Structural Modelling (ISM) | 49 | 8.81% |
| Supply Chain Management | 49 | 8.81% |
| MICMAC Analysis | 47 | 8.45% |
| Interpretive Structural Modeling (ISM) | 40 | 7.19% |
| Decision Making | 36 | 6.47% |
| India | 35 | 6.29% |
| Sustainable Development | 35 | 6.29% |
| Manufacture | 30 | 5.40% |
| MICMAC | 28 | 5.04% |
| Barriers | 25 | 4.50% |
| Sustainability | 23 | 4.14% |
| Structural Analysis | 22 | 3.96% |

*Notes*: TP=total number of publications

***Co-occurrence Keyword***

Co-occurrence analysis examines the most frequently used keywords, resulting in a more in-depth understanding of the most popular topics and research trends (Chiaraluce et al., 2021). This paper recorded the co-occurrence analysis of author keywords as 1334 keywords from 1974 to December 2021. With a minimum of five occurrences, 26 keywords were chosen by threshold. As a result of Figure 1, the 26 keywords become divided into three clusters based on red, green and blue colours. Despite being divided into three clusters, the theme of ISM remains the most important keyword in each. Although in Table 4, the 'modelling' 'modeling', 'MICMAC', and 'MICMAC analysis' differences produce a different total publication, in order to create alignment, both are combined using a thesaurus in Microsoft Excel before being analysed by VOSviewer, as shown in Figure 1.

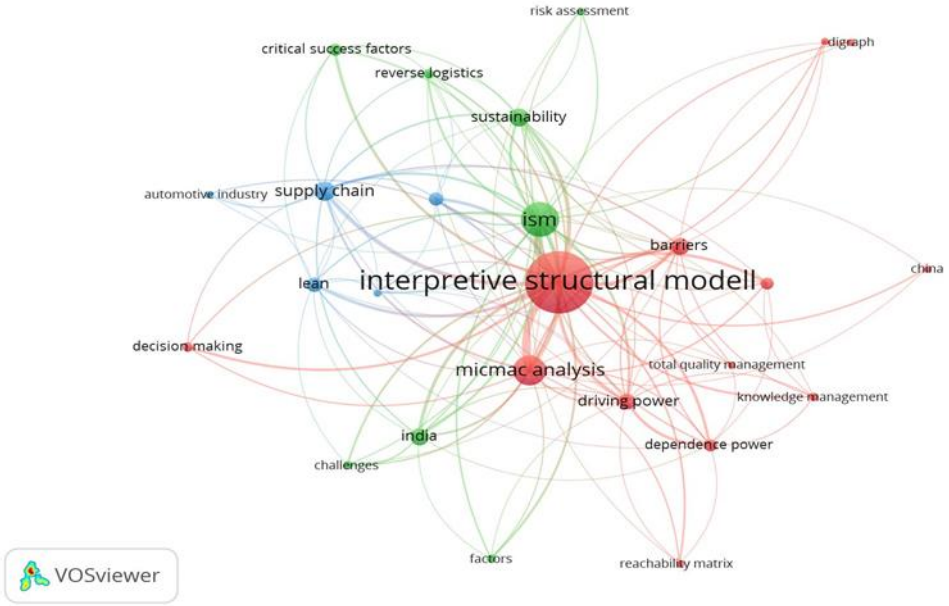


**Figure 1.** Network visualisation map of the author keywords

***Evolution Co-occurence Article Keyword***

This study also broadens Figure 1 by making it available as a visualization in the form of a Visual Overlay utilizing VOSviewer. Figure 2 indicates that "element", "structure", "concept"`, "group", and "problem" are all within the purple range, indicating they were all previously published. ISM-based research is in its infancy and is only in a nascent stage in numerous fields of knowledge. However, since 2017, keyword evolution from the article has accelerated by expanding on the "design methodology approach" search intent. ISM is also applied in various fields, including education, psychology, and the arts and humanities. Expert consensus is used as a decision-maker, using the ISM (Lan et al., 2021). Unsurprisingly, the keywords "decision making" and "expert opinion" are also included in the green-labeled co-occurrence article keyword list.

The latest ISM study is in the early stages of Total Interpretive Structural Modelling (TISM). From Figure 2, it is evident that the latest keywords for TISM appear in yellow. TISM is ISM's extended version to supply interpretation for the direct research and significant transitive linkages in a directed graph (Jena et al., 2017). These are graphical models, according to Sushil (2018), that represent hierarchical relationships and aid in better and more precise conceptualization. In a digraph, ISM only interprets the nodes, whereas TISM interprets both nodes and links.

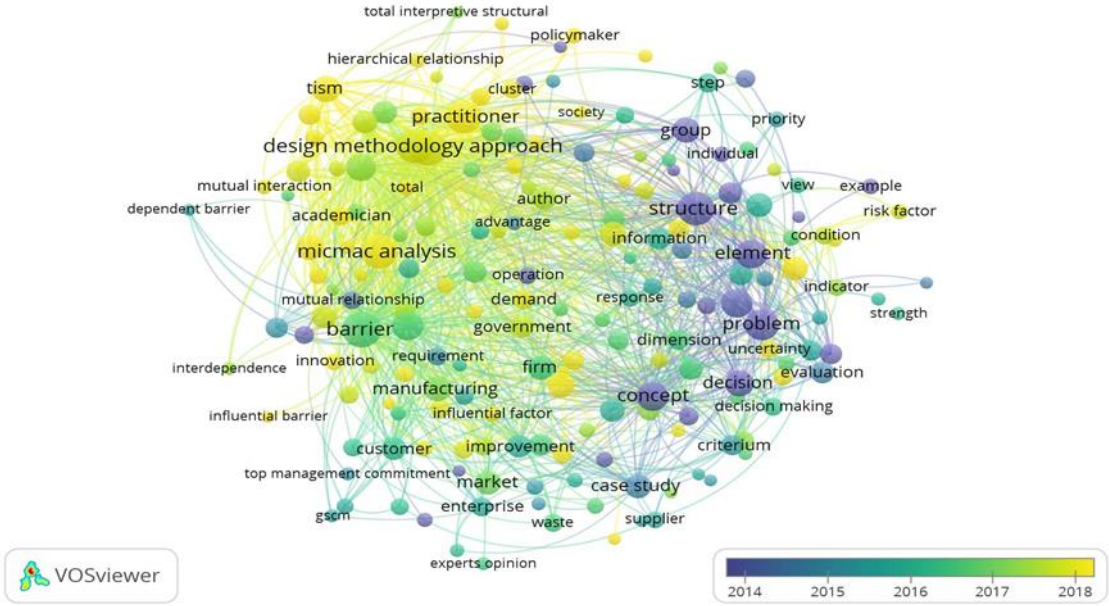


**Figure 2.** Overlay visualisation of co-occurrence title and abstract keywords

**Co-authorship Network**

Collaboration between authors from different countries is strongly encouraged in the academic world. The most current knowledge can be shared and combined through collaboration to produce more solid and powerful results (Wahid et al., 2020). Authors from various countries can apply their knowledge and experience to the application of ISM. The publications produced by the researchers can also help the institution's academic reputation.

The bibliometric analysis generates maps that depict relationships between authors and countries (Ahmi et al., 2020). The visual overview of this VOSviewer demonstrates the collaborative relationship that has been established between authors from various countries regarding ISM in their studies. Therefore, the thickness of the connecting lines of the visual overview represents the strength of the relationship between the terms (Wahid et al., 2020), whereas the size of the nodes represents the frequency with which the terms appear in the text.

***Top Authors***

This study also determines the top authors in ISMs research and is shown in Table 5. From a worldwide view, eleven authors are identified according to most publications, and this list is limited with a minimum of six total publications only. Based on the number, eight out of eleven authors from India and only three authors from the United Kingdom. Even though India dominates the top author's list with many publications, the first ranking is Rana from the University of Bradford, the United Kingdom, with 11 publications. Although she was productive in publishing, the number of citations she received was less than Sushil from the Indian Institute of Technology Delhi, with 715 citations of the six published publications.

**Table 5.Top authors**

| Author Name | Institution | Country | TP | TC |
|---|---|---|---|---|
| Rana | University of Bradford | United Kingdom | 11 | 326 |
| Vinodh | National Institute of Technology Tiruchirappalli | India | 10 | 205 |
| Dhir | Indian Institute of Technology Delhi | India | 8 | 94 |
| Dubey | Liverpool Business School | United Kingdom | 8 | 511 |
| Dwivedi | Swansea University | United Kingdom | 8 | 303 |
| Shankar | Indian Institute of Technology Delhi | India | 8 | 503 |
| Gardas, B.B. | University of Mumbai | India | 6 | 111 |
| Seth | Indian Institute of Foreign Trade | India | 6 | 67 |
| Singh | Management Development Institute | India | 6 | 155 |
| Sushil | Indian Institute of Technology Delhi | India | 6 | 715 |
| Tripathy | Kalinga Institute of Industrial Technology | India | 6 | 58 |

*Notes*: TP=total number of publications; TC=total citations

***Co-authorship Author Network***

There were 1221 authors in the co-authorship author's network published on ISM from 1974 to December 2021. This study removes publication with more than 25 co-authors to avoid insignificant contributions in the network map. At a minimum, three documents and three citations for each author are set as threshold values. With the threshold resolution, 84 authors have been identified for each author, but only 33 are visually mapped in Figure 3. The number is the fact that not all authors are connected.

Figure 3 depicts the cluster of the author's inter-relationship in five different colours. However, not all of these co-authorship deals involve top authors, as shown in Table 5. Nonetheless, Rana from the United Kingdom outperformed the other authors with 11 publications. Apart from Hughes, there is a co-authorship between Rana and Indian authors like Mathyizhagan, Dwivedi, Singh, Dhir, and Luthra, as shown in Figure 3.

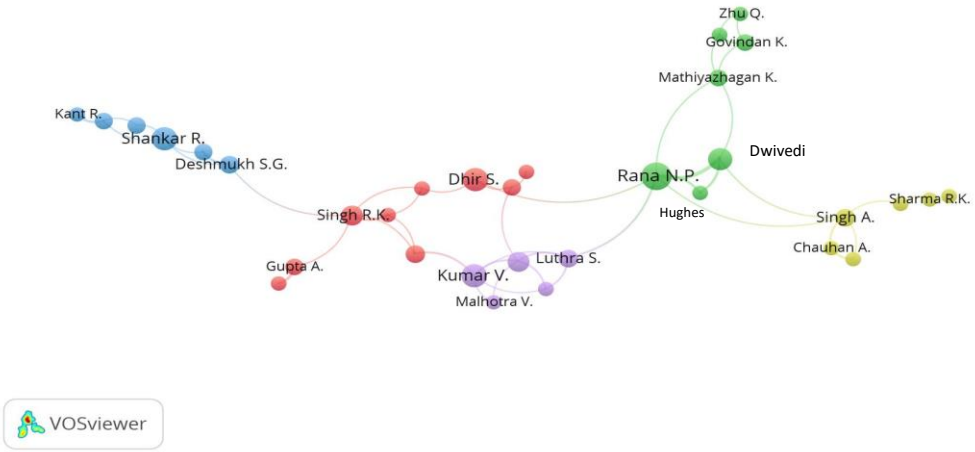


**Figure 3.** *Network visualisation map of the co-authorship.*

***Co-authorship Countries Network***

From 1974 to August 2021, 63 countries were recorded for co-authorship in VOSviewer. With threshold, a minimum of three documents was published per country, each with at least three citations; 29 countries were chosen and divided into three clusters. However, only 28 countries are visually mapped in Figure 4. According to other countries, India remains at the top of the list with strong links, according to Figure 4. India is still ranked first, as shown in Table 6, with 292 total publications (TP) and 7221 total citations (TC). This ranking is not surprising given the fact that India is still dominating all institution lists based on Table 7. Based on Table 7, the Indian Institute of Technology, Delhi, gives a large amount of research using ISM as a methodology of 40 full publications and 2079 total citations.

In terms of co-authorship, Figure 4 shows clear red links for India cooperating with the United States, China, Canada, Australia, Thailand, Poland, France, Denmark, Brazil, the United Kingdom, South Africa, Qatar, Oman, and the United Arab Emirates. However, while India dominates the top rankings as top countries and institutions, other countries are equally unpredictable. According to Table 6, even though the United States is ranked fourth with 34 total publications, the total number of citations received is quite high at 1146 compared to China and Iran which are respectively in the second and third rank. The United States has also developed co-authorship with India, France, Taiwan, the United Kingdom and China.

**Table 6. Top countries**

| Country | TP | NCP | TC | C/P | C/CP | h | g |
|---|---|---|---|---|---|---|---|
| India | 292 | 252 | 7221 | 24.73 | 28.65 | 45 | 76 |
| China | 56 | 43 | 934 | 16.68 | 21.72 | 15 | 30 |
| Iran | 50 | 35 | 222 | 4.44 | 6.34 | 7 | 13 |
| United States | 34 | 30 | 1273 | 37.44 | 42.43 | 15 | 34 |
| Indonesia | 23 | 16 | 54 | 2.35 | 3.38 | 4 | 5 |
| United Kingdom | 23 | 20 | 811 | 35.26 | 40.55 | 12 | 23 |
| Taiwan | 14 | 12 | 348 | 24.86 | 29.00 | 7 | 14 |
| Australia | 13 | 10 | 169 | 13.00 | 16.90 | 6 | 13 |
| Japan | 13 | 10 | 62 | 4.77 | 6.20 | 5 | 7 |
| Malaysia | 10 | 10 | 64 | 6.40 | 6.40 | 4 | 7 |

*Notes*: TP=total number of publications; NCP=number of cited publications; TC=total citations; C/P=average citations per publication; C/CP=average citations per cited publication; h=h-index; and g=g-index.

**Table 7.Top institutions**

| Institution | Country | TP | TC |
|---|---|---|---|
| Indian Institute of Technology Delhi | India | 40 | 2079 |
| Symbiosis International Deemed University | India | 23 | 737 |
| Indian Institute of Technology Roorkee | India | 16 | 575 |
| National Institute of Technology Tiruchirappalli | India | 14 | 380 |
| Aligarh Muslim University | India | 13 | 379 |
| J.C. Bose University of Science and Technology, YMCA | India | 12 | 150 |
| Birla Institute of Technology and Science, Pilani | India | 11 | 175 |
| Amity University | India | 10 | 146 |
| Motilal Nehru National Institute of Technology Allahabad | India | 9 | 503 |
| Delhi Technological University | India | 9 | 168 |

*Notes*: TP=total number of publications; TC=total citations

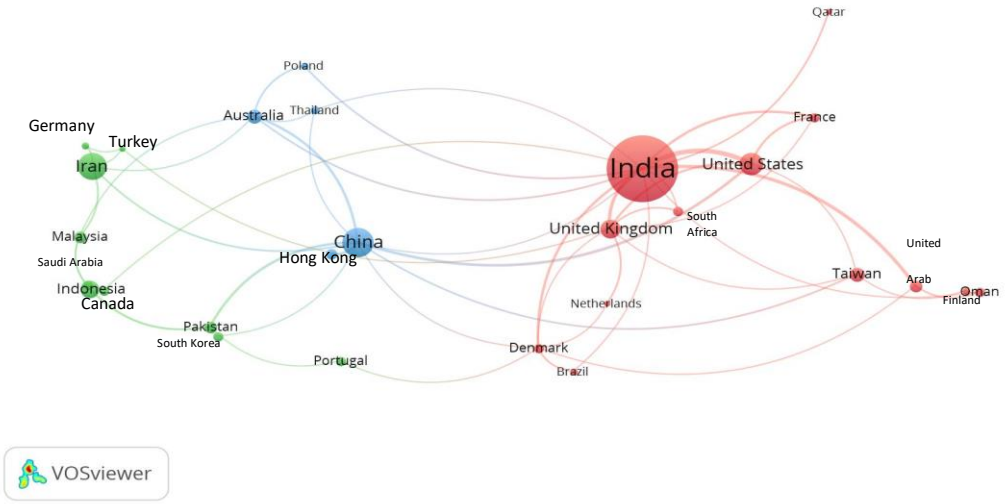


**Figure 4.** Network visualisation map of the co-authorship by countries

**Limitation and Conclusion**

This analysis is limited to the Scopus database. We did not look at additional databases like the web of Science (WOS), Google Scholar, or others that did not fit our search criteria. The keywords used in this study are also limited in document titles. Extending text analysis to abstracts may offer new information and frequencies. Also, some authors or institutions may have entered multiple names or spellings into Scopus, resulting in erroneous affiliations or production data.

In conclusion, all the matters discussed have answered this research question regarding evolution, dissemination, frequency of keywords and collaboration among authors and countries in ISM, using the Scopus database. The findings of the bibliometric analysis highlighted the collaboration among authors, countries, and the global evolution of ISMs research. For 47 years, ISM has been disseminated into 23 subject areas and dominated by the Business, Management and Accounting fields. In addition, productive authors and countries generating publications in ISM are Indians. India also shows the thickness colour in visuals by VOSviewer, which means their co-authorship networks with the United States, China, Canada, Australia, Thailand, Poland, France, Denmark, Brazil, the United Kingdom, South Africa, Qatar, Oman, and the United Arab Emirates. The rapid network of co-operation of the writer from various countries has also spurred the use of keywords either from authors or titles and abstracts in the article. Because the ISM is solidly named, the keywords used also carry the meaning associated with ISM either "interpretive structural modelling", "interpretive structural modeling" and "ISM". Regarding the evolution of co-occurrence title and abstract keywords, featured from purple to yellow shows the progress of keywords from "element", "structure", "concept", "group" and "problem" to "design methodology approaches", which is then expanded into "TISM".

As a suggestion, the findings of this paper can be used as evidence that shows the gap in the study in terms of methodology for various fields when using ISM. In addition, ISM is not limited to the Business, Management, Accounting or engineering fields, but also social science such as education can also implement ISM as a data collection method. Therefore, the

application of ISM to various fields must be expanded so that researchers can make the best use of their expertise and expert knowledge in the future.

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