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## MAPPING OF RESEARCH TRENDS OF MALAYSIAN JOURNAL OF LIBRARY AND INFORMATION SCIENCE - A SCIENTOMETRIC ANALYSIS

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# Mapping of Research Trends of Malaysian Journal of Library and Information Science- A Scientometric Analysis

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## ABSTRACT

The present study aims to investigate a mapping of 211 research articles published in the Malaysian Journal of Library and Information Science (MJLIS) between 2011 and 2020. The scientometric analysis emphasizes Issue-wise & Volume-wise distribution of articles, authorship pattern, and most prolific author, length of articles, reference distribution, and geographical distribution. Out of 210 articles, the majority of 174 (82.86%) articles were multiple authorship publications and 36 (17.14%) were single-author publications. The study came out with an Authorship pattern showing a majority of contributions from collaborative authors, a maximum contributed by 159 authors. Malaysia has the highest number of contributing authors, followed by China (84), Iran (53), etc. Renowned author Prof. Dr. A. Abrizah, University of Malaya, Malaysia is the most prolific contributor with 18 research articles during 2011-2020. Out of 210, 159 (75.71%) articles in domestic collaboration. The majority of 163 (77.62%) research articles were published within a page length of 11-20 pages. Total 7769 references were cited from 210 research articles with an average of 37 per article. The scientometric tools such as Annual Growth Rate (AGR), Degree of Collaboration (DC), Collaboration Index (CI), Collaborative Coefficient (CC), and Modified Collaborative Coefficient (MCC) were also used to analyze the data and interpretation. *The outcomes* achieved from the present study constitute a roadmap for intensifying the scholarly research in the field of library and information science.

## KEYWORDS

Malaysian Journal of Library and Information Science, MJLIS, Scientometric, Research Trends, Authorship Pattern, Geographic distribution, Measures of Collaboration

## **INTRODUCTION**

Academic or professional or journals, forms a paramount medium of scholarly communication for the researchers and academicians. The manuscripts are extensively reviewed and revised by specific subject experts before getting approved for publication. To measure mapping of research trends in this thriving subject area it is best to consider a scientometric analysis of this subject. The scientometric analysis includes studies associated to growth of literature, authorship pattern, length of articles, reference distribution, geographical distribution, collaborative trends of authors and degree of collaboration among them productivity, obsolescence of documents, a distribution which help to monitor the annual growth rate (AGR), authorship trends, and pattern of research.

In this paper, efforts have been made for conducting a scientometric study on mapping of research trends of Malaysian Journal of Library and Information Science for the period of 2011-2020. The study analyzed 210 articles to explore the research trends, authorship pattern, and collaborative research, length of articles, references distribution, and geographical distributions recognized by scientometric analysis.

## **MALAYSIAN JOURNAL OF LIBRARY AND INFORMATION SCIENCE (MJLIS)**

The Malaysian Journal of Library and Information Science (MJLIS) is a peer-reviewed, international and open-access journal. The first edition was launched in 1996. Between the year 1996-2008, the frequency of publication of the journal was half-yearly and was published in both print and electronic form. From the year 2009 onwards, the frequency of publication of the journal is being published thrice in the year (April, August, and December) and only in electronic versions. The journals especially emphasize unique scholarly articles covering the domain of Library and Information Science in conjunction with other interrelated areas that encompass information and knowledge. It not only boosts the professional approach and practices but also reassures proactive progress in the LIS arena. The journal offers an opportunity for scholarly communication between LIS professionals to bring together new ideas, theories, methodologies, structures, and technologies. The journal is being indexed and abstracted by Social Science Citation Index (ISI), SCOPUS, LISA (Library and Information Science Abstracts), LISTA, and Journal of Academic Librarianship.

## REVIEW OF LITERATURE

Rajendran, Jeyshankar, and Elango (2011) in their work on "Scientometric Analysis of Contributions to Journal of Scientific and Industrial Research". The work analyses 633 papers published during 2005-2009 highlighting authorship pattern, number of contributions, author productivity, length of articles, average citations, and collaborative papers. The author productivity is 0.34 and most of the contributors were Indian authors. Maximum papers 582 (91.94%) contributed by Multi-author and degree of collaboration is 0.92. The study conducted by Majhi and Maharana (2012) on "Research Productivity of Physical Science Disciplines in Sambalpur University (Orissa): A Scientometric Study" to evaluate intellectual productivity of the researcher from the physical science discipline of the Sambalpur University. The study covers the period of 1971-2010, includes 417 research papers reflected in Scopus Database. The study diagnosed year-wise growth of publications, authorship pattern, subject-wise distribution, ranking of authors, and journals. The findings of the study will be taken into account by various funding agencies and policymakers like, UGC, NAAC, Ministry of HRD, etc., of Sambalpur University. Noruzi & Abdekhoda (2013) in their study on "Scientometric analysis of Iraqi-Kurdistan universities' scientific productivity" during 1970-2012 covered 459 articles. Data gathered from the Scopus Database. Results indicated 237 (52%) articles have international collaboration and 60% of research papers were not cited. The study recommended that Iraqi-Kurdistan universities should develop repositories both at the regional and institutional levels to upsurge the influence of research. In the paper titled "A Scientometric study of Journal of Bio-Chemistry and Biophysics (IJBB)" Bala and Singh (2014) covered 316 research papers. The paper covered several articles, a form of the document cited most-cited journals, etc. Findings explained that the maximum number of 162 (51.3%) articles contributed by Multi authors and authors from India contributed somewhat higher than the rest of the world. In another study, Kumar, K. (2014) in a paper titled "A Scientometric Study of Digital Literacy in Online Library Information Science and Technology Abstracts (LISTA)" for the year 1997-2011 to analyzed year-wise distribution of articles, authorship pattern, language, subject, and geographical distribution. Bradford's law was used to estimate the scattering of articles published in the LISTA database. Findings explain maximum articles published on academic education and International Information & Library Review have the largest number of research papers on digital literacy.

A study attempted by Paliwal, Sangeeta (2015) examines 177 research papers published in *Annals of Library and Information Studies* between 2009-2013 to find authorship trends and calculate collaboration coefficients. Her work also lays stress on profile contributors, subject-wise distribution, and geographical distribution. Velmurugan & Radhakrishnan (2016) in their paper on "Malaysian Journal of Library and Information Science: A Scientometric Profile" covered duration of 2008-2014 analyzed that author highest productivity was 74 (2.64) in the year 2011. Results explained average author per paper was 2.36 and the average productivity per author was 2.42. Prabakar et al. (2017) in their research on "Research productivity of Indian Institute of Astrophysics (IIAP) during 2005-2014: A scientometric study" lay stressed on the research performance of IIAP, Bangalore during the period of 2005-2014, covered 1005 papers to examine authorship pattern, predominant authors, degree of collaboration, citations, maximum cited articles and H index. "Astrophysical Journal" published by AAS, USA considered as the most preferred journal for publication. The study was explored by Batcha, Jahina, and Ahmad (2018) on a Scientometric analysis on 227 papers published during 2001-2012 in the *DESIDOC Journal*. The study adopted statistical tools to determine factual results. The findings of the study show that majority of articles (65%) having contents between 6-10 pages. Kumar, Satish (2018), researched "Scientometric study of Research productivity of ARIES, Nainital" covered 574 papers published during 2001-2015. Data retrieved from Web of Science database to examine most prolific authors, citation, H-index, and collaborating institutes. Out of 574, 510 articles were found to be refereed articles and the rest were seminars, conferences, bulletins, etc. Rai, Singh, and Varma (2019) in their research on "Global Research Trend on Cyber Security: A Scientometric Analysis" covered 2720 papers published during 2001-2018 on 'Cyber Security' retrieved from the Scopus database. Results revealed that the USA has the maximum publication on Cybersecurity followed by the UK, China, and India. The study found Cyber Security has an emerging tendency of collaboration in research. Suradkar, Kalbande and Digamba (2019) study on "Scientometric Analysis of Quarterly E-journals of Health Science" analyzed 20724 research papers during 2001-2013. Findings reveal the highest number of contribution 2335 (11.27%) published in the year 2011. Maximum articles contributed by Multi-author and majority of articles 9472 (45.71%) published by more than three authors. English is the most preferred language used for communication.

Sarkar and Pal (2020) conducted a study on “Authorship Pattern of 21st Century Data Science Research: A Scientometric Evaluation” for the period of 2001-2018. The study highlights authorship pattern, the annual growth rate of articles, degree of collaboration, author’s collaboration, and adaptation of Lotka’s law of author productivity. Findings reflect the highest AGR 46.43% in 2016 followed by 39.53% in 2014 and 37.67% in 2015. The lowest AGR -20.75% in 2002. Maximum articles 78.17% contributed by collaborative authors. The highest Collaborative Index is 5.06 in 2001 and the lowest Collaborative Index was 2.63 in 2015. The Degree of Collaboration is 0.78 and finally, data retrieved from this research greatly tracks Lotka’s law of author productivity. Prabakar and Radhakrishnan (2020) in their work on “Scientometric analysis on scholarly communications of National Institute of Mental Health and Neurosciences (NIMHANS), India” include 2009-2018 data shown in the Web of Science database. The work comprised 1694 articles with 20158 citations. The work inspected the author’s productivity, most prolific authors, a contribution made by the institutions, impact factor, and most highly cited article. Lotka’s law was used to test the scientific productivity of the author. The maximum contribution of NIMHANS is from the USA, UK, and Australia and the degree of collaboration is 0.99. Victoria, P. (2021) assumed their study on “Research Output on ICT during the Period 2016-2020: A Scientometric Analysis” emphasizing the contributions made by the authors in the domain of ICT published on the Web of Science database covered 8103 articles. Results revealed a maximum number of articles 2067 (25.51%) published in 2020. The majority of papers 90.40% contributed by multi-authored articles and the highest (21.09%) articles were contributed by three authors. Maximum articles contributed by China, followed by USA, Spain, and UK in the area of ICT. The relative growth rate (0.84) and degree of collaboration (0.90).

## **OBJECTIVES**

The present study has been commenced with the following objectives: -

1. To determine the year-wise distribution of contribution published during the period of study.
2. To find out the Annual Growth Rate (AGR) of research articles.
3. To determine year-wise Authorship Pattern of Contributions per volume.
4. To find out the total number of authors v/s total number of articles.
5. To find out the Authorship Pattern with the cumulative distribution of the publication.

6. To study the single and co-authorship distribution of articles.
7. To rank the most prolific authors.
8. To study the length of articles.
9. To study the reference distribution of articles.
10. To classify the geographical distribution of contributors.
11. To explore Papers in Single country collaboration v/s International collaboration.
12. To ascertain the measure of collaboration: Degree of Collaboration (DC), Collaboration Index (CI), and Collaboration Coefficient (CC) on the data under study.

## METHODOLOGY

The data required for the present study was downloaded from the website of MJLIS website (<https://mjlis.um.edu.my/index.php/MJLIS/issue/archive>) for the period of 10 years (2011-2020). A total of 210 research articles were analyzed from a volume no. 16-25. The collected data were tabulated and analyzed using an MS Excel sheet and illustrated using a graphical presentation to meet the above-mentioned objectives of the study.

## DATA ANALYSIS

The study enclosed all the bibliographic descriptions of research papers published from the year 2011-2020 contains 10 volumes (Volume 16 to Volume 25). It covers 210 articles published by renowned authors globally. Pertinent records were collected and interpreted for the purpose to undertake a scientometric analysis as elucidated below.

### 1. Year wise Distribution of Contributions

Table 1: Year wise Distribution of Contributions

| Year | Vol. No. | Issue No. |    |   | No. of Contributions | Percentage (%) |
|------|----------|-----------|----|---|----------------------|----------------|
|      |          | 1         | 2  | 3 |                      |                |
| 2011 | 16       | 10        | 10 | 8 | 28                   | 13.33          |
| 2012 | 17       | 6         | 7  | 7 | 20                   | 9.52           |
| 2013 | 18       | 8         | 7  | 7 | 22                   | 10.48          |
| 2014 | 19       | 7         | 7  | 6 | 20                   | 9.52           |
| 2015 | 20       | 7         | 7  | 6 | 20                   | 9.52           |

|       |    |    |    |    |     |      |
|-------|----|----|----|----|-----|------|
| 2016  | 21 | 7  | 7  | 6  | 20  | 9.52 |
| 2017  | 22 | 7  | 6  | 7  | 20  | 9.52 |
| 2018  | 23 | 7  | 7  | 6  | 20  | 9.52 |
| 2019  | 24 | 7  | 7  | 6  | 20  | 9.52 |
| 2020  | 25 | 7  | 6  | 7  | 20  | 9.52 |
| Total |    | 73 | 71 | 66 | 210 | 100  |

Table 1 presented the distribution of 210 research articles published in the MJLIS during the year 2011-2020 in tabular format in both setup Volume-wise and Issue-wise. The maximum number of research papers were published in Volume-16 during the year 2011 (13.33%), followed by volume-18 during 2013 (10.48%) and the journal showed a total number of published articles during the year 2017 and from 2014-2020 remains stable counted with 20 articles published per year.

## 2. Annual Growth Rate (AGR) of research articles

The Annual Growth Rate (AGR) is used to measure annual increase or decrease in the number of publications. The formula of AGR is given below:

$$AGR = \frac{\text{End value} - \text{First value}}{\text{First value}} \times 100$$

Table -2 Annual Growth Rate (AGR) of research articles

| Year | Volume No. | No. of Contributions | AGR |
|------|------------|----------------------|-----|
| 2011 | 16         | 28                   |     |
| 2012 | 17         | 20                   | -8  |
| 2013 | 18         | 22                   | 2   |
| 2014 | 19         | 20                   | -2  |
| 2015 | 20         | 20                   | 0   |
| 2016 | 21         | 20                   | 0   |
| 2017 | 22         | 20                   | 0   |
| 2018 | 23         | 20                   | 0   |
| 2019 | 24         | 20                   | 0   |
| 2020 | 25         | 20                   | 0   |

Table 2 showed, the end value is 20 publications in the year 2012, the first value is 28 publications in the year 2011, and the AGR in the year 2012 is -8, which indicates the negative change. Similarly, the AGR in the year 2014 is -2 which also indicates the negative change. Only the AGR of 2013 is 2, which indicates positive change. As the number of publication remains same during the year 2015-2020 i.e. 20 contributions per year the AGR indicate no change.



### 3. Year - Wise Authorship Pattern of Contributions

Table -3 Year - Wise Authorship Pattern of Contributions

| Year | Vol. No. | One Author | Two Author | Three Author | Four Author | Five Author | Six Author | Seven Author | Eight Author | Nine Author | Total |
|------|----------|------------|------------|--------------|-------------|-------------|------------|--------------|--------------|-------------|-------|
| 2011 | 16       | 3          | 14         | 7            | 1           | 2           |            | 1            |              |             | 28    |
| 2012 | 17       | 6          | 3          | 7            | 2           |             |            |              | 1            | 1           | 20    |
| 2013 | 18       | 3          | 9          | 7            | 1           | 1           |            | 1            |              |             | 22    |
| 2014 | 19       | 4          | 8          | 7            | 1           |             |            |              |              |             | 20    |
| 2015 | 20       | 2          | 7          | 7            | 2           | 1           | 1          |              |              |             | 20    |
| 2016 | 21       | 5          | 7          | 8            |             |             |            |              |              |             | 20    |
| 2017 | 22       | 1          | 9          | 6            | 2           | 1           | 1          |              |              |             | 20    |
| 2018 | 23       | 5          | 3          | 7            | 5           |             |            |              |              |             | 20    |
| 2019 | 24       | 4          | 7          | 5            | 2           | 1           |            | 1            |              |             | 20    |
| 2020 | 25       | 3          | 7          | 4            | 1           | 4           | 1          |              |              |             | 20    |
|      |          | 36         | 74         | 65           | 17          | 10          | 3          | 3            | 1            | 1           | 210   |

Figure 2.1 Year - Wise Authorship Pattern of Contributions

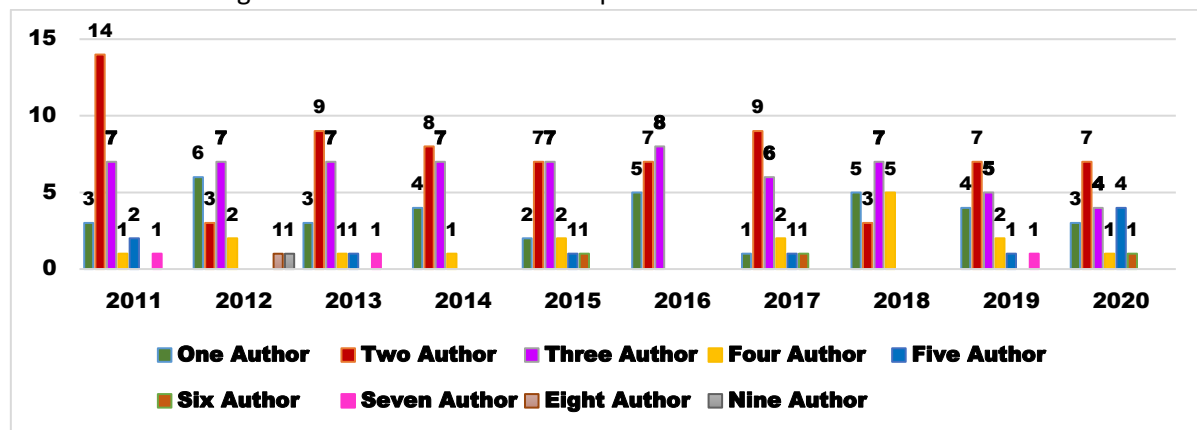


Table 3 and figure 3.1 represent the authorship trend of the articles published in the journal MJLIS during 2011-2020. The two authors' articles were highest in MJLIS i.e. 74 (35.24%), followed by three authors 65 (30.95%), single-author 36 (17.14%). The 17 (8.1%) articles were published under the joint authorship of four authors and 10 (4.76 %) articles were published under the joint authorship of five authors. 3 (1.43%) articles each were published under the joint authorship of six authors and seven authors. Only 1 (0.48%) articles were each published under the joint authorship of eight authors and nine authors. The present data shows a mounting trend on the way to collaborative research.

### 4. Total number of Authors v/s Total Number of Articles

Table 4 – Total number of Authors v/s Total Number of Articles

| Year | Total Authors | Total |
|------|---------------|-------|
|      |               |       |

|              |            |            |
|--------------|------------|------------|
| 2011         | 73         | 28         |
| 2012         | 58         | 20         |
| 2013         | 58         | 22         |
| 2014         | 45         | 20         |
| 2015         | 56         | 20         |
| 2016         | 43         | 20         |
| 2017         | 56         | 20         |
| 2018         | 52         | 20         |
| 2019         | 53         | 20         |
| 2020         | 59         | 20         |
| <b>Total</b> | <b>553</b> | <b>210</b> |

Figure 4.1 Total number of Authors v/s Total Number of Articles

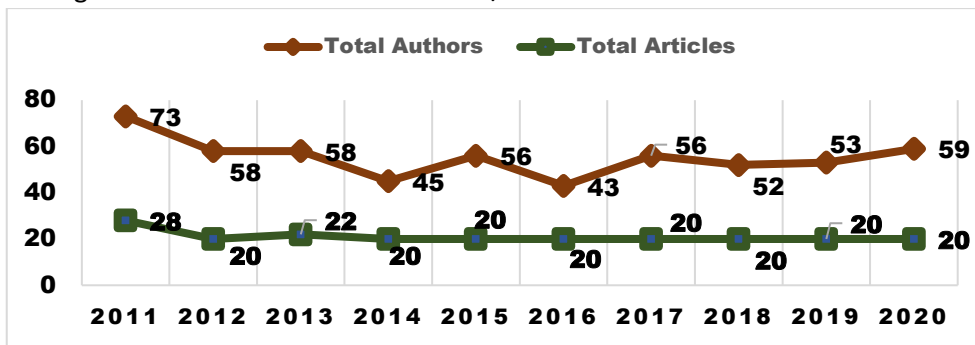


Table 4 and figure 4.1 demonstrate the Total number of Authors v/s Total Number of Articles published during 2011-2020. The year 2011 points out a maximum number of 73 authors who contributed 28 published papers and the year 2016 indicates a minimum number of 43 authors contributed 20 published papers.

#### 5. Authorship Pattern with Cumulative Distribution

Table -5 Authorship Pattern with Cumulative Distribution

| Authorship Pattern | No. of Publications | Cumulative Publications | Percentage (%) |
|--------------------|---------------------|-------------------------|----------------|
| One Author         | 36                  | 36                      | 17.14          |
| Two Author         | 74                  | 110                     | 52.38          |
| Three Author       | 65                  | 175                     | 83.33          |
| Four Author        | 17                  | 192                     | 91.4.          |
| Five Author        | 10                  | 202                     | 96.13          |
| Six Author         | 3                   | 205                     | 97.62          |
| Seven Author       | 3                   | 208                     | 99.05          |
| Eight Author       | 1                   | 209                     | 99.52          |
| Nine Author        | 1                   | 210                     | 100            |

Table -5 shows the cumulative distribution of the authorship pattern. Among 210 publications, 166 of them has been published either by two authors or by three authors, followed by 36 single author which indicates that the

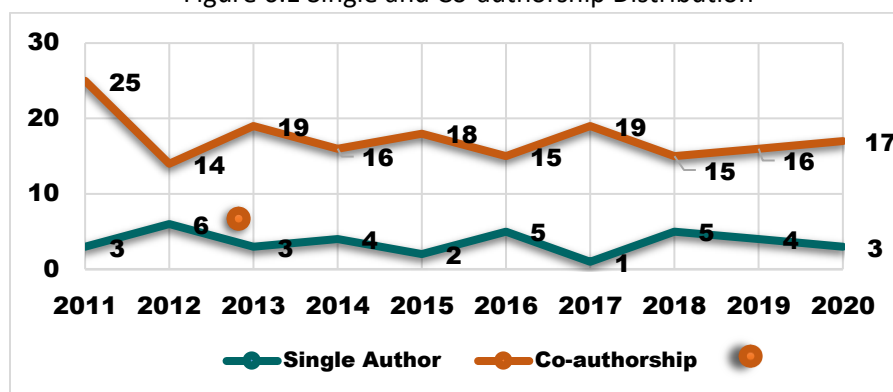
researchers either prefer to work in a small group of two to three authors or work in single as against to large group of authors.

## 6. Single and Co-authorship Distribution

Table -6 Single and Co-authorship Distribution

| Year         | Single Author | Co-authorship |
|--------------|---------------|---------------|
| 2011         | 3             | 25            |
| 2012         | 6             | 14            |
| 2013         | 3             | 19            |
| 2014         | 4             | 16            |
| 2015         | 2             | 18            |
| 2016         | 5             | 15            |
| 2017         | 1             | 19            |
| 2018         | 5             | 15            |
| 2019         | 4             | 16            |
| 2020         | 3             | 17            |
| <b>Total</b> | <b>36</b>     | <b>174</b>    |

Figure 6.1 Single and Co-authorship Distribution



From table 6 and figure 6.1, we can realize that most of the publications in MJLIS during 2011-2020 are collaborative research (174) as compared to single-author publications (36). It reveals that the researchers are taking more interest in conducting collaborative research.

## 7. Most Prolific Authors

Table -7 Most Prolific Authors

| Name of the Author | Institute            | No. of Contributions |
|--------------------|----------------------|----------------------|
| Abrizah            | University of Malaya | 18                   |
| A.M. Zainab        | University of Malaya | 13                   |
| Noorhidawati       | University of Malaya | 11                   |
| N.H.A.Karim        | University of Malaya | 8                    |

|            |                      |   |
|------------|----------------------|---|
| Kiran Kaur | University of Malaya | 6 |
|------------|----------------------|---|

Table 7 depicts the most prolific authors of MJLIS during 2011-2020 were A. Abrizah who scored the highest number of publications with 17 research articles, followed by A.M. Zainab with 13 research articles occupies 2nd position, A Noorhidawati with 11 articles scored 3rd position, N.H.A Karim holds 4th position with 8 articles and Kiran Kaur occupies 5th position with 6 articles. All the five contributors hold the top 5 positions of most prolific authors belongs to the University of Malaya, Malaysia.

### 8. Length of the Articles

Table -8 Length of the Articles

| Year         | Volume | 1-10      | 11-20      | 20-30     | Total      |
|--------------|--------|-----------|------------|-----------|------------|
| 2011         | 16     | 3         | 24         | 1         | 28         |
| 2012         | 17     | 4         | 14         | 2         | 20         |
| 2013         | 18     | 4         | 18         |           | 22         |
| 2014         | 19     | 2         | 18         |           | 20         |
| 2015         | 20     | 3         | 15         | 2         | 20         |
| 2016         | 21     | 2         | 14         | 4         | 20         |
| 2017         | 22     | 1         | 17         | 2         | 20         |
| 2018         | 23     |           | 16         | 4         | 20         |
| 2019         | 24     |           | 10         | 10        | 20         |
| 2020         | 25     |           | 17         | 3         | 20         |
| <b>Total</b> |        | <b>19</b> | <b>163</b> | <b>28</b> | <b>210</b> |

Figure 8.1 – Length of the Articles

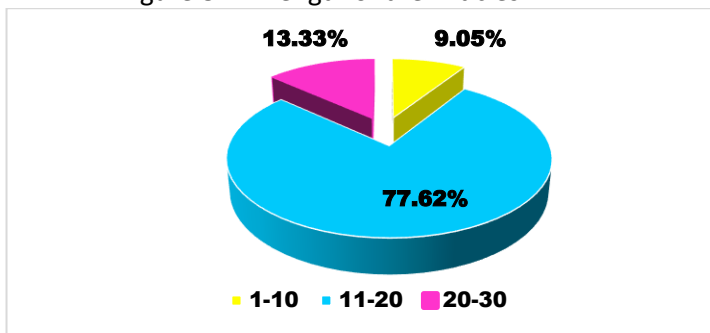


Table 8 and pie graph figure 8.1 shows the length of articles published in MJLIS during 2011-2020. The majority of 163 (77.62%) research articles were published within page length of 11-20 pages, followed by 28 (13.33%) articles published within a length of 20-30 pages and 19 (9.05%) articles within page length of 1-10.

### 9. References Distribution Pattern

Table – 9 Reference Distribution Pattern

| Year         | Vol | No. of Articles | Total no. of References | Cumulative References | Average References per Article |
|--------------|-----|-----------------|-------------------------|-----------------------|--------------------------------|
| 2011         | 16  | 28              | 816 (10.5%)             | 816 (10.5%)           | 29.14                          |
| 2012         | 17  | 20              | 617 (7.94%)             | 1433 (18.45%)         | 30.85                          |
| 2013         | 18  | 22              | 548 (7.05%)             | 1981 (25.5%)          | 24.91                          |
| 2014         | 19  | 20              | 685 (8.82%)             | 2666 (34.32%)         | 34.25                          |
| 2015         | 20  | 20              | 792 (10.19%)            | 3458 (44.51%)         | 39.6                           |
| 2016         | 21  | 20              | 715 (9.2%)              | 4173 (53.71%)         | 35.75                          |
| 2017         | 22  | 20              | 835 (10.75%)            | 5008 (64.46%)         | 41.75                          |
| 2018         | 23  | 20              | 828 (10.66%)            | 5836 (75.12%)         | 41.4                           |
| 2019         | 24  | 20              | 928 (11.94%)            | 6764 (87.06%)         | 46.4                           |
| 2020         | 25  | 20              | 1005 (12.94%)           | 7769 (100%)           | 50.25                          |
| <b>Total</b> |     | <b>210</b>      | <b>7769 (100%)</b>      |                       | <b>37</b>                      |

Table 9 gives the Reference distribution pattern published in MJLIS for the period of the year 2011-2020. The table shows a total number of 7769 references were cited from 210 articles with an average of 37 references per article during the period of the year 2011-2020, in which 2020 (Vol. 25) has recorded the highest number of 1005 (12.94%) references with an average of 50.25 references per Article, followed by 2019 (Vol. 24) with second-highest 928 (11.94%) references with 46.4, followed by 2017 (Vol. 22) of 835 (10.75) with average reference per article 41.75, the year 2018 (Vol. 23) of 828 (10.66) with an average reference per article 41.4. The lowest number of references recorded in the year 2013 (Vol. 18) of 548 (7.05%) with an average reference per article of 24.91.

#### 10. Geographical distribution of Contributions and Contributors

Table 10 - Geographical distribution of Contributions and Contributors

| Name of the country                                      | Total number of Contributions | Name of the country | Total number of Contributions |
|--|-------------------------------|---------------------|-------------------------------|
| Malaysia   | 159                           | Singapore           | 22                            |
| China  | 84                            | Kuwait              | 11                            |
| Iran   | 53                            | Nigeria             | 10                            |
| Taiwan   | 40                            | UK                  | 7                             |
| Pakistan   | 26                            | Croatia             | 6                             |
| India  | 24                            | Saudi Arab          | 6                             |
| Thailand   | 23                            | South Korea         | 5                             |
| USA  | 17                            | Spain               | 5                             |
| Belgium  | 13                            |                     |                               |
| Jordon, Romania, Germany, South Africa, Morocco (3 each) |                               |                     |                               |

|   |
|---|
| Bangladesh, Poland, Czech Republic, Australia, Indonesia (2 each)   |
| Republic of Benin, UAE, Tanzania, Montenergo, Cuba, Slovakia, Turkey, Hong Kong, New Zealand, Peru (1 each) |

Table 10 illustrates the country’s contribution in terms of research productivity during 2011-2020. Out of 210 total research articles, the maximum number of 159 contributors from Malaysia, followed by 84 contributors from China, 53 contributors from Iran, 43 contributors from Taiwan, and authors from the rest of the world were contributed both in a single country and international collaboration collectively.

**11. Papers in Domestic collaboration v/s International collaboration**

Table 11 – Papers in Domestic collaboration v/s International collaboration

| Year         | Papers in Domestic Collaboration | Papers in International Collaboration | Total Articles |
|--------------|----------------------------------|---------------------------------------|----------------|
| 2011         | 22                               | 6                                     | 28             |
| 2012         | 17                               | 3                                     | 20             |
| 2013         | 18                               | 4                                     | 22             |
| 2014         | 17                               | 3                                     | 20             |
| 2015         | 13                               | 7                                     | 20             |
| 2016         | 15                               | 5                                     | 20             |
| 2017         | 14                               | 6                                     | 20             |
| 2018         | 14                               | 6                                     | 20             |
| 2019         | 15                               | 5                                     | 20             |
| 2020         | 14                               | 6                                     | 20             |
| <b>Total</b> | <b>159 (75.71%)</b>              | <b>51 (24.29%)</b>                    | <b>210</b>     |

Table 11.1 – Papers in Domestic collaboration v/s International collaboration

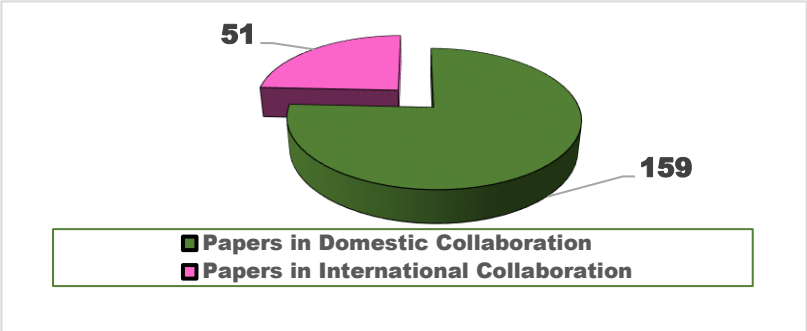


Table 11 and figure 11.1 explain the pattern of domestic country contribution v/s international contribution published in the MJLIS journal. Data showed that out of 210 contributed research papers, 159 (75.71%) papers were produced by domestic country collaboration, and only 51 (24.29%) papers were published under the international collaboration.

**12. Measures of Collaboration**

## 12A Degree of Collaboration

Table 12A portrays the Degree of Collaboration of research papers published in MJLIS during 2011-2020. It also directs a pattern of single and joint authorship collaboration in the publication. While analyzing the Degree of Collaboration, the mathematical formula given by K. Subramanyam (1983) was  
(Where DC= Degree of Collaboration; Nm= Number of multiple authors and Ns= Number of single authors).

Table -12A Degree of Collaboration

| Year         | Volume | Single    | Co-authorship | Total      | DC          |
|--------------|--------|-----------|---------------|------------|-------------|
| 2011         | 16     | 3         | 25            | 28         | 0.89        |
| 2012         | 17     | 6         | 14            | 20         | 0.7         |
| 2013         | 18     | 3         | 19            | 22         | 0.86        |
| 2014         | 19     | 4         | 16            | 20         | 0.8         |
| 2015         | 20     | 2         | 18            | 20         | 0.9         |
| 2016         | 21     | 5         | 15            | 20         | 0.75        |
| 2017         | 22     | 1         | 19            | 20         | 0.95        |
| 2018         | 23     | 5         | 15            | 20         | 0.75        |
| 2019         | 24     | 4         | 16            | 20         | 0.8         |
| 2020         | 25     | 3         | 17            | 20         | 0.85        |
| <b>Total</b> |        | <b>36</b> | <b>174</b>    | <b>210</b> | <b>0.83</b> |

The analysis of Degree of Collaboration depicts that in the year 2011, it was 0.89 and has increased to 0.95 in the year 2017. Except for a minor decrease in 2012 showing 0.7 and 2016 & 2018 showing 0.75. The overall Degree of Collaboration of MJLIS during 2011-2020 was 0.83.

## 12B Collaboration Index (CI)

The formula of collaboration index is given by Lawani (1980) as follows.

Where,

j = the number of authors in an article i.e. 1, 2, 3, 4.....

f<sub>j</sub> = the number of j authored articles

N = the total number of articles published in a year, and

A = the total number of authors per article

Table 12B – Collaborative Index

| Year | One Author | Two Author | Three Author | Four Author | Five Author | Six Author | Seven Author | Eight Author | Nine Author | Total Authors | Total Joint Articles | CI   |
|------|------------|------------|--------------|-------------|-------------|------------|--------------|--------------|-------------|---------------|----------------------|------|
| 2011 | 3          | 28         | 21           | 4           | 10          | 0          | 7            | 0            | 0           | 73            | 25                   | 2.92 |
| 2012 | 6          | 6          | 21           | 8           | 0           | 0          | 0            | 8            | 9           | 58            | 14                   | 4.14 |
| 2013 | 3          | 18         | 21           | 4           | 5           | 0          | 7            | 0            | 0           | 58            | 19                   | 3.05 |
| 2014 | 4          | 16         | 21           | 4           | 0           | 0          | 0            | 0            | 0           | 45            | 16                   | 2.81 |
| 2015 | 2          | 14         | 21           | 8           | 5           | 6          | 0            | 0            | 0           | 56            | 18                   | 3.11 |
| 2016 | 5          | 14         | 24           | 0           | 0           | 0          | 0            | 0            | 0           | 43            | 15                   | 2.87 |
| 2017 | 1          | 18         | 18           | 8           | 5           | 6          | 0            | 0            | 0           | 56            | 19                   | 2.95 |
| 2018 | 5          | 6          | 21           | 20          | 0           | 0          | 0            | 0            | 0           | 52            | 15                   | 3.47 |

|      |   |    |    |   |    |   |   |   |   |    |    |      |
|------|---|----|----|---|----|---|---|---|---|----|----|------|
| 2019 | 4 | 14 | 15 | 8 | 5  | 0 | 7 | 0 | 0 | 53 | 16 | 3.31 |
| 2020 | 3 | 14 | 12 | 4 | 20 | 6 | 0 | 0 | 0 | 59 | 17 | 3.47 |

Table 12B shows the authorship pattern and Collaborative Index (CI), in MJLIS during 2011-2020. The variation of Collaborative Index from lowest 2.81 in the year 2013 and highest 4.14 in the year 2012.

### 12C Collaboration Coefficient (CC)

The formula for collaboration coefficient (CC) is given by Ajiferuke et al. (1988).

Where,

j = the number of authors in an article i.e. 1, 2, 3, 4.....

f<sub>j</sub> = the number of j authored articles

N = the total number of articles published in a year, and

A = the total number of authors per article

Table 12C – Collaborative Coefficient

| Year | One Author | Two Author | Three Author | Four Author | Five Author | Six Author | Seven Author | Eight Author | Nine Author | Total | CC   |
|------|------------|------------|--------------|-------------|-------------|------------|--------------|--------------|-------------|-------|------|
| 2011 | 3          | 14         | 7            | 1           | 2           |            | 1            |              |             | 28    | 0.53 |
| 2012 | 6          | 3          | 7            | 2           |             |            |              | 1            | 1           | 20    | 0.47 |
| 2013 | 3          | 9          | 7            | 1           | 1           |            | 1            |              |             | 22    | 0.53 |
| 2014 | 4          | 8          | 7            | 1           |             |            |              |              |             | 20    | 0.47 |
| 2015 | 2          | 7          | 7            | 2           | 1           | 1          |              |              |             | 20    | 0.56 |
| 2016 | 5          | 7          | 8            |             |             |            |              |              |             | 20    | 0.44 |
| 2017 | 1          | 9          | 6            | 2           | 1           | 1          |              |              |             | 20    | 0.58 |
| 2018 | 5          | 3          | 7            | 5           |             |            |              |              |             | 20    | 0.5  |
| 2019 | 4          | 7          | 5            | 2           | 1           |            | 1            |              |             | 20    | 0.5  |
| 2020 | 3          | 7          | 4            | 1           | 4           | 1          |              |              |             | 20    | 0.55 |
|      | 36         | 74         | 65           | 17          | 10          | 3          | 3            | 1            | 1           | 210   | 0.51 |

Table 12C shows the Collaborative Co-efficient of MJLIS in 2011 and 2013 is 0.53, in 2012 and 2014 is 0.47, in 2018 and 2019 is 0.5. The highest collaborative coefficient in the year 2017 is 0.58 and the lowest in the year 2016 is 0.44. The overall Collaborative Coefficient is 0.51, which shows the high degree of Collaboration observed in MJLIS during 2011-2020

### 12D Modified Collaborative Coefficient (MCC)

The modified collaboration coefficient (MCC) counted by the formula which is suggested by Savanur and Srikanth, (2010). The formula represents as:

Where,

j = the number of authors in an article i.e. 1, 2, 3, 4.....

f<sub>j</sub> = the number of j authored articles

N = the total number of articles published in a year, and

A = the total number of authors per article

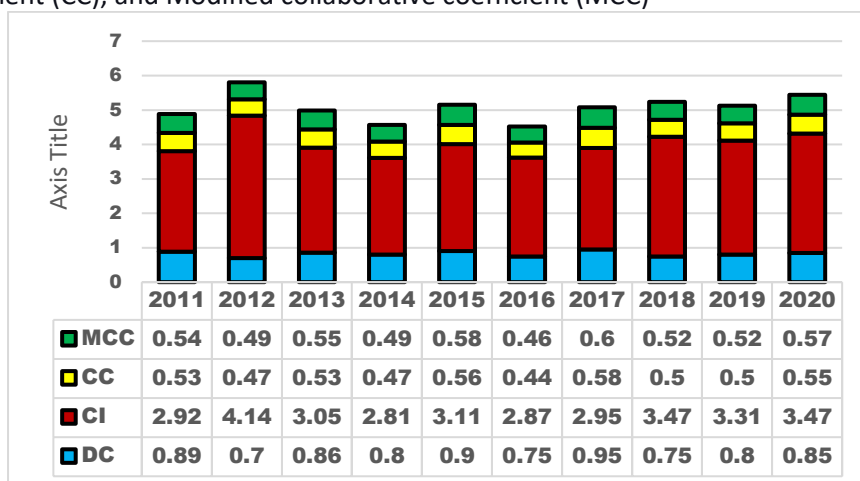


Table 12D – Modified Collaborative Coefficient

| Year  | One Author | Two Author | Three Author | Four Author | Five Author | Six Author | Seven Author | Eight Author | Nine Author | Total | MCC  |
|-------|------------|------------|--------------|-------------|-------------|------------|--------------|--------------|-------------|-------|------|
| 2011  | 3          | 14         | 7            | 1           | 2           |            | 1            |              |             | 28    | 0.54 |
| 2012  | 6          | 3          | 7            | 2           |             |            |              | 1            | 1           | 20    | 0.49 |
| 2013  | 3          | 9          | 7            | 1           | 1           |            | 1            |              |             | 22    | 0.55 |
| 2014  | 4          | 8          | 7            | 1           |             |            |              |              |             | 20    | 0.49 |
| 2015  | 2          | 7          | 7            | 2           | 1           | 1          |              |              |             | 20    | 0.58 |
| 2016  | 5          | 7          | 8            |             |             |            |              |              |             | 20    | 0.46 |
| 2017  | 1          | 9          | 6            | 2           | 1           | 1          |              |              |             | 20    | 0.6  |
| 2018  | 5          | 3          | 7            | 5           |             |            |              |              |             | 20    | 0.52 |
| 2019  | 4          | 7          | 5            | 2           | 1           |            | 1            |              |             | 20    | 0.52 |
| 2020  | 3          | 7          | 4            | 1           | 4           | 1          |              |              |             | 20    | 0.57 |
| Total | 36         | 74         | 65           | 17          | 10          | 3          | 3            | 1            | 1           | 210   | 0.51 |

Table 12D illustrates a better explanation of the modified collaborative coefficient (MCC) during the year 2011-2020. The average MCC was 0.51 was observed between 2011 and 2020. The highest MCC was measured in the year 2017 with 0.60, followed by the year 2015 with 0.58, the year 2020 with 0.57, the year 2013 with 0.55, and the year 2018 & 2019 with 0.52. The lowest MCC was in the year 2016 with 0.46.

Figure 12 Measures of Collaboration –Degree of Collaboration (DC), Collaborative Index (CI), Collaborative Coefficient (CC), and Modified collaborative coefficient (MCC)



The above figure 12 presents the comparative analysis of various indicators of collaboration DC, CI, CC, and MCC for the journal MJLIS for the years 2011-2020.

## FINDINGS OF THE STUDY

1. The maximum number of research papers were published in Volume-16 during the year 2011 (13.33%), followed by volume-18 during 2013 (10.48%) and the journal showed a total number of published articles during the year 2017 and from 2014-2020 remains stable counted with 20 articles published per year.
2. The AGR in the year 2012 was -8, and 2014 was -2 indicates the negative change. Only the AGR of 2013 is 2, which indicates positive change. As the number of publications remains the same during the year 2015-2020 i.e. 20 contributions per year the AGR indicates no change.
3. The two authors' articles were highest in MJLIS i.e. 74 (35.24%). Most of the 174 (82.86%) of research articles were by joint authorship and only 36 (17.14%) of research articles by a single author.
4. The year 2011 points out a maximum number of 73 authors who contributed 28 published papers and the year 2016 indicates a minimum number of 43 authors who contributed 20 published papers.
5. Among 210 publications, 166 of them has been published either by two authors or by three authors, followed by 36 single author which indicates that the researchers either prefer to work in a small group of two to three authors or work in single as against to large group of authors.
6. The majority of the publication in MJLIS during 2011-2020 are collaborative research (174) as compared to single-author publications (36). It reveals that the researchers are taking more interest in conducting collaborative research.
7. The most prolific authors of MJLIS during 2011-2020 were A. Abrizah who scored the highest number of publications with 17 research articles, followed by A.M. Zainab with 13 research articles occupies 2nd position, A Noorhidawati with 11 articles scored 3rd position, N.H.A Karim holds 4th position with 8 articles and Kiran Kaur occupies 5th position with 6 articles. All the five contributors hold the top 5 positions of most prolific authors belong to the University of Malaya, Malaysia.
8. The majority of 163 (77.62%) research articles were published within page length of 11-20 pages, followed by 28 (13.33%) articles published within the length of 20-30 pages and 19 (9.05%) articles within page length of 1-10.
9. A total number of 7769 references were cited from 210 articles with an average of 37 references per article during the period of the year 2011-2020, in which 2020 (Vol. 25) has recorded the highest number of 1005

(12.94%) references with an average of 50.25 references per Article and the lowest number of references recorded in the year 2013 (Vol. 18) of 548 (7.05%) with an average reference per article 24.91.

10. Out of 210 total research articles, a maximum number of 159 contributors from Malaysia, followed by 84 contributors from China, 53 contributors from Iran, 43 contributors from Taiwan, and authors from the rest of the world were contributed both in a single country and international collaboration collectively.
11. Out of 210 contributed research papers, 159 (75.71%) papers were produced by domestic collaboration, and only 51 (24.29%) papers were published under the international collaboration.
12. The overall Degree of Collaboration of MJLIS during 2011-2020 was 0.83. . The variation of Collaborative Index from lowest 2.81 in the year 2013 and highest 4.14 in the year 2012. The overall Collaborative Coefficient is 0.51, which shows the high degree of Collaboration observed in MJLIS during 2011-2020. The average MCC was 0.51 was observed between 2011 and 2020. The highest MCC was measured in the year 2017 with 0.60 and the lowest MCC was in the year 2016 with 0.46.

## **CONCLUSION**

The present scientometric study was conducted on mapping of research trends of Malaysian Journal of Library and Information science for the period of 10 years (2011-2020) to portray an investigative representation of the research trends, authorship pattern, and collaborative research. The study highlights various aspects of research trends, authorship pattern, most prolific authors, reference distribution, length of articles, and geographical distribution. The research draws attention towards collaborative pattern between 2011 and 2020 and with an objective of further research work with the trends of forthcoming issues of MJLIS.

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