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Scholarly Communications of Mizoram University on Web of Science in Global Perspective: A Scientometric Assessment

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Scholarly Communications of Mizoram University on Web of Science in Global Perspective: A Scientometric Assessment

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Abstract

Objectives: *Scientometric assessment of the performance of scholarly communications of Mizoram University in world scenario.*

Methods: *The ten years of scholarly communications have been retrieved from Web of Science for Mizoram University. The study analyses the scholarly communications, citations data, h-index, prolific contributors, forms of scholarly communications, funding agencies, highly cited scholarly communications, top areas of scholarly communications, authorship patterns and degree of collaboration.*

Results: *Physics and Chemistry subjects found the highest productive area of scholarly communications, multiple authorship is prevalent with high degree of collaboration among authors, Department of Science and Technology (DST) as the topmost funding agency, South Korea found the strong collaborative country with Mizoram University in academic research, “Tiwari D” as the highest cited author, “Thapa RK” as the highest productive author, and increased growth in number of scholarly communications as well as citations.*

Contributions: *The study analyzed the scholarly communications in terms of scientometric assessment and presented the current scenario of Mizoram University’s scholarly communications at the world level based on WoS database. It gives the insight to understand the situation of scholarly communications and make the future course of action accordingly. Mizoram University’s academic departments may also take the future course of action for more research to boost-up the university’s contribution at the global level.*

Keywords: Scholarly Communications, Web of Science, Research Performance, Scientometric Assessment, International Research Collaboration, Citations, h-index, Mizoram University.

1. Introduction

Research is one of the major activities of the university or any higher institute. The outcomes of research act as a vehicle for future researchers in the concerned field for further growth of the discipline and also have a reflective impact for imparting quality education. The research publications are also referred as scholarly communications. The scholarly communication of

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academia, particularly in a peer-reviewed journal, is considered as the main medium for assessing their academic performance which not only helps in promotion but also academic recognition as well. In this way, scholarly communications and its impact is the key factor to evaluate overall performance and ranking of university or higher education institutions. Vishakhi & Gupta (2015) advocates that “the evaluation of research output of an organization helps to frame a research policy and develop strategies for the future course of research. It also helps to obtain funding for its research programs, fix priorities in research and recognize and reward the eminent researchers”.

Mizoram University was established as a central university in April 2000 and started functioning from 2nd July 2001. Presently, there are 31 Under Graduate colleges, including 2 professional institutions and 1 constituent college. There are 64 Professors, 21 Associate Professors and 129 Assistant Professors working in the Mizoram University. Academic departments continue to make consistent progress in teaching and research activities. There are 82 ongoing research projects, out of which are 67 major and 10 minor projects from different funding agencies like UGC, DST, DBT, IITM, ICSR, ICSSR, TISS, UMN, World Bank, ADB, JICA, DEITY, MoEF, MoES, MoC, BRNS, ICFRE, ICMR, MHRD and others. Faculty from different departments participated and presented papers in more than 840 international, national and state level seminars/ symposia (Mizoram University, 2016).

Web of Science (WoS) is one of the prestigious databases in the field of Science and Technology, Social Sciences, Arts & Humanities which covers full-text articles, reviews, editorials, abstracts, technical reports, proceedings and many more item types starting from 1900 to present. It covers more than 90 million records from more than 12000 journals, 50000 books, and 160,000 conference proceedings from all around the world and from more than thousands of publishers (Wikipedia, n.d.).

2. Review of Literature

Jeevan & Gupta (2002) analyzed research output of IIT Kharagpur and suggested a methodology for studying the quantitative profile of a research university, performance, and impact of research by its various departments. Kumar et al. (2015) analyzed 760 research publications of Gujarat University in terms of most prolific authors; authorship patterns and trends; most preferred publications; and found a steady increase in the number of publications since 2008. Kumbar et al. (2008) analyzed strong and weak areas of university research, their growth rate, and impact in terms of average citation received, productive authors, their share of contribution, and characteristics of highly cited papers. A similar study conducted by Radhakrishnan & Velmurugan (2015) focused on publication trends, authorship pattern, document types, country-wise distribution of authors, individual author’s research, and their citation score etc. Further, the quantitative growth and development of Bangalore University was analyzed by Savanur & Konnur (2012) using Science Citation Index and found total 2,188 publications with 9,401 citations, 54.7 papers as average publication per year, and the USA was on the top amongst 27 collaborating countries. Web of Science based study for Manonmaniam Sundaranar University was conducted by Thirumagal (2012) in which he focused upon publishing trend, impact factor, authorship pattern, types of articles, institutional collaboration, affiliated institutions of authors, countries of contributing authors and individual author’s research productivity and their TLCS,

TGCS, TLCR, and TLCSb and concluded that university's scientists produced papers in collaboration with South Korea, United States of America, and Japan.

A methodology for studying the quantitative profile of a research and teaching institute with a view to getting idea about major research contributions, performance and impact in different fields of Science and Technology was suggested by Singh et al. (2005), and they found three subjects namely Mathematics, Biology and Clinical Medicine contributing smaller number of papers but secured higher rank in terms of average normalized impact factor per paper. The Scopus based study conducted by Visakhi et al. (2015) for five IISERs and found a total of 2542 research publications during the period of 2010-2014 and examined in terms of publication growth, research impact, national and international collaboration share, contribution and impact of authors and organizations, major areas of research and preferred channels of research communications, and characteristics of highly cited papers. Maurya & Shukla (2017) studied research trends in LIS in African countries and found Nigeria and South Africa as the most research productive country in LIS research and in terms of receiving citations also. Shukla (2018) studied LIS research performance of Asian countries and concluded that China is the most productive country in LIS research and in terms of receiving citations also among Asian region followed by Taiwan and India.

3. Objectives of the Study

The objectives of the present study are to:

- a) Evaluate quantitatively the scholarly communications of Mizoram University.
- b) Analyze the citations to scholarly communications from Mizoram University.
- c) Find out the prolific forms of scholarly communications from Mizoram University.
- d) Find out prolific contributor of scholarly communications from Mizoram University.
- e) Identify the prevalent authorship pattern among contributors from Mizoram University.
- f) Assess the Degree of Collaboration among contributors of scholarly communications.
- g) Assess the international research collaboration of Mizoram University.
- h) Identify the top areas of scholarly communications from Mizoram University.
- i) Identify the top funding agencies for research projects of Mizoram University.
- j) Identify the leading journals for publishing of scholarly communications from Mizoram University.
- k) Know the highly cited scholarly communication during the study period.

4. Scope/ Limitations of the Study

The study is confined to explore and examine the scholarly communications (scientific research publications) of Mizoram University which have been indexed in Web of Science (WoS) database during 2007 to 2016. There are a total of 404 scholarly communications retrieved from the WoS for Mizoram University during the period of study.

5. Methodology

The research data for the study was retrieved from the Web of Science (Core Collection Online) database on May 3, 2017. Science Citation Index Expanded (SCI-EXPANDED), Social Science Citation Index (SSCI), Arts & Humanities Citation Index (A & HCI), and Emerging Sources Citation Index (ESCI) were used as a data source for the study. The Advanced Search conducted using field tag "OG=Mizoram Univ" and the result was restricted by "All Languages", "All

Document Types”, and “Period from 2007 to 2016” which resulted to 404 number of records for Mizoram University. The retrieved data has been recorded, processed and analyzed using MS-Excel.

6. Data Analysis and Interpretation

a) Number of Scholarly Communications and Citations

The Mizoram University published a total of 404 scholarly communications in different disciplines of Science & Technology during 2007-2016, as seen from Web of Science databases. From the observation and analysis of Table 1, during the period, scholarly communications rise significantly by 8 times from 2007 to 2016. More than 60% scholarly communications published during 4 year period from 2013 to 2016 and the highest contribution of scholarly communications came out on in the year 2016 with 24.25%. The annual average growth rate calculated and found decreased two times, in the year 2010 by -27.27% and in the year 2014 by -2.38%. The highest annual average growth rate (91.66%) observed in the year 2008 followed by the year 2016 (58.06%) and 2015 (51.21%). There are 2073 citations observed for 404 scholarly communications during the period. It is observed that the number of citations increasing significantly each year; and average citations per scholarly communication calculated @5.13 citations. The highest number of citations observed in the year 2016 (28.21%) followed by 2015 (21.75%) and 2014 (14.37%). More than 50% citations received during 2 year period from 2015 to 2016 whereas more than 87% citations received during 5 year period from 2012 to 2016. Citations growth rate has been calculated and significant growth found in the number of citations during the ten year period.

Table 1: Scholarly Communications (SC) and Citations (year-wise)

Year	No. of SC	% of Total SC	SC Growth Rate (%)	No. of Citations	Citations Growth Rate (%)	Citations per SC	% of Total Citations
2007	12	2.97	---	2	---	0.16	0.09
2008	23	5.69	91.66	9	350%	0.39	0.43
2009	33	8.16	43.47	33	266.66%	1.0	1.59
2010	24	5.94	-27.27	96	190.90%	4.0	4.63
2011	31	7.67	29.16	121	26.04%	3.9	5.83
2012	38	9.4	22.58	211	74.38%	5.55	10.17
2013	42	10.39	10.52	267	26.54%	6.35	12.87
2014	41	10.14	-2.38	298	11.61%	7.26	14.37
2015	62	15.34	51.21	451	51.34%	7.27	21.75
2016	98	24.25	58.06	585	29.71%	5.96	28.21
Total	404	100	---	2073	---	5.13	100

Figure 1 represents linear forecast trendline for scholarly communications and it shows the growing trend for 2 more consecutive time periods (years) after 2016. Figure 2 represents linear forecast trendline for citations and shown a significant growing trend for 2 more consecutive time periods (years) after 2016. From the analysis of both figures, it is evidenced that number of scholarly communications and number of citations are significantly growing.

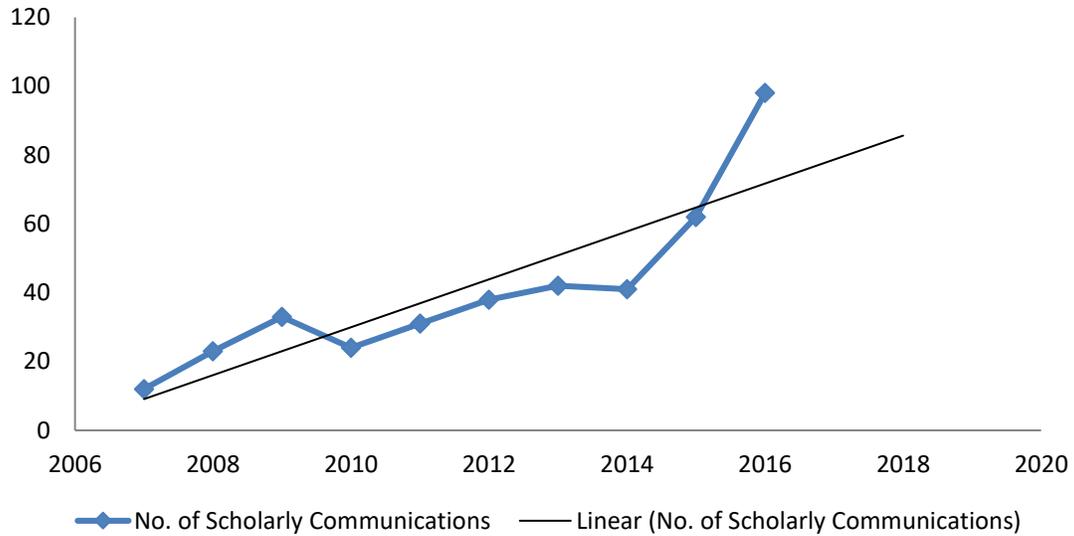


Fig. 1: Linear forecast trendline of scholarly communications (2007-2016)

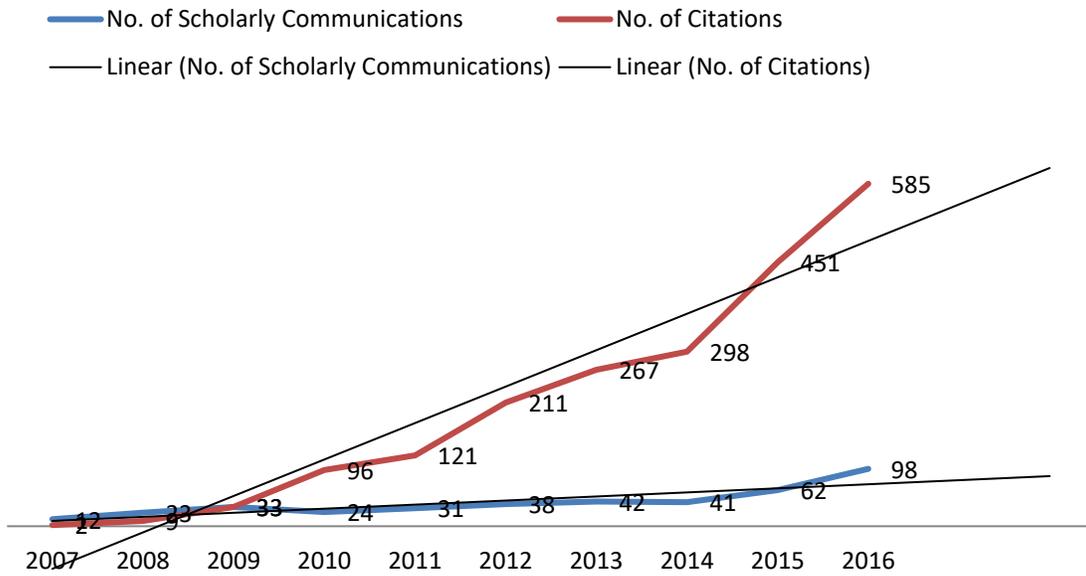


Fig. 2: Linear forecast trendline for citations and scholarly communications (2007-2016)

b) Forms of Scholarly Communications

There are total 404 scholarly communications from Mizoram University in WoS as shown in Table 2. On the analysis, it has been found that 8 forms of scholarly communications appeared in WoS for Mizoram University; and amongst them the majority (93.56%) of scholarly communications communicated in the form of “Article” followed by “Review”, and “Proceedings paper” etc. The least communicated form of scholarly communication is “Letter”, “Correction”, and “Book Review”.

Table 2: Medium of Scholarly Communications

Medium of SC	No. of SC	% of Total SC
Article	378	93.56
Review	14	3.46
Proceedings Paper	9	2.22
Meeting Abstract	6	1.48
Editorial Material	3	0.74
Letter	1	0.24
Correction	1	0.24
Book Review	1	0.24

c) Prolific Contributor of Scholarly Communications

Table 3 represents the prolific contributors of scholarly communications from Mizoram University along with citations to the scholarly communications, average citation per paper, and h-index. Table 3 covered prolific contributors those have more than 10 scholarly communications during the study period. In terms of the number of scholarly communications, ‘Thapa RK’ has been contributed the highest number (61 scholarly communications) of contributions followed ‘Tiwari D’ (46), and ‘Kumar NS’ (24). In terms of citations to the scholarly communications communicated by contributors, ‘Tiwari D’ has received the highest number of citations (614 citations) followed by ‘Rai PK’ (315 citations) and ‘Thapa RK’ (219 citations). In the case of average citation per paper (ACPP), ‘Rai PK’ has the highest average citation ratio (15 citations per paper) followed by ‘Tiwari D’ (13.34 citations per paper) and ‘Tiwari RP’ (5.13 citations per paper). The h-index of contributors has been obtained from WoS database and it has been found that ‘Tiwari D’ has the highest (13) h-index followed by ‘Thapa RK & Rai PK’ (each has 9 h-index) and ‘Tiwari RP’ (5 h-index) amongst top contributors of scholarly communications.

Table 3: Prolific Contributor of Scholarly Communications (SC)

Contributor's Name	SC in WoS	Citations in WoS	Average Citation/ Paper	h-index
Thapa RK	61	219	3.59	9
Tiwari D	46	614	13.34	13
Kumar NS	24	43	1.79	3
Tiwari RP	22	113	5.13	5
Rai PK	21	315	15	9
Nautiyal BP	20	37	1.85	3
Singh BP	18	35	1.94	2
Khanduri VP	13	45	3.46	4
Hazarika TK	13	26	2	3
Shukla AC	11	18	1.63	2
Sahoo UK	11	14	1.27	2
Nachimuthu SK	11	12	1.09	2

d) *Authorship Pattern and Degree of Collaboration*

Table 4: Authorship Pattern

Year	Authorship Pattern								Total SC
	One	Two	Three	Four	Five	Six	Seven	More Than Seven	
2007	0	2	4	3	1	0	0	2	12
2008	3	6	6	2	5	1	0	0	23
2009	7	3	5	14	2	2	0	0	33
2010	7	3	3	4	4	2	0	1	24
2011	2	6	9	7	4	2	0	1	31
2012	6	12	6	3	4	5	0	2	38
2013	2	12	15	8	1	1	1	2	42
2014	2	7	11	11	3	2	1	4	41
2015	4	2	13	20	8	10	3	2	62
2016	3	10	16	18	16	15	5	15	98
Total	36	63	88	90	48	40	10	29	404
% of SC	8.91	15.59	21.78	22.27	11.88	9.9	2.47	7.17	

Multiple authorship patterns and higher research collaboration is evident in the field of scientific research. Table 4 shows the trend of authorship in scholarly communications of Mizoram University during 2007 to 2016. On the observation of Table 4, it has been found that 8.91% scholarly communications published in single (one) authorship during study period; 15.59% scholarly communications published in two authorship pattern; 21.78% scholarly communications published in three authorship pattern; 22.27% scholarly communications published in four authorship pattern which is the highest amongst all authorship patterns; 11.88% scholarly communications published in five authorship pattern while 9.9% scholarly communications published in six authorship pattern. There were 2.47% scholarly communications published in seven authorship pattern and 7.17% scholarly communications published with more than seven authorship pattern. From the analysis, it has been an inference that four authorship pattern is most prevalent amongst all authorship patterns. It is also evident that more than 91% scholarly communications published in multiple authorship patterns while 8.91% scholarly communications published in single authorship.

Table 5 displays the year-wise Degree of Collaboration. The Degree of Collaboration (C) of the contributors has been calculated using the Subramanyam formula:

$$\text{Degree of Collaboration (C)} = \frac{Nm}{Nm+Ns}$$

Where, C = Degree of Collaboration, Nm = Number of multiple authors, Ns = Number of single authors

$$C = \frac{368}{368+36=404} \quad \text{or } C = 0.91$$

The Degree of Collaboration has been calculated for the study period from 2007 to 2016. Single author contribution is 36 and multiple authors' contribution is 368. Year-wise Degree of Collaboration falls in the range of 0.7 to 1.0. The overall Degree of Collaboration between contributors of Mizoram University is 0.91 which indicates very significant research collaboration among contributors of scholarly communications. More the Degree of Collaboration tends towards more collaborative research and vice-versa.

Table 5: Degree of Collaboration

Year	Single Author (Ns)	Multi Authors (Nm)	Total (Ns+Nm)	Degree of Collaboration
2007	0	12	12	1
2008	3	20	23	0.86
2009	7	26	33	0.78
2010	7	17	24	0.70
2011	2	29	31	0.93
2012	6	32	38	0.84
2013	2	40	42	0.95
2014	2	39	41	0.95
2015	4	58	62	0.93
2016	3	95	98	0.96
Total	36	368	404	0.91

e) International Collaboration with Mizoram University

Table 6 shows international collaboration with Mizoram University. Contributors belong to foreign nations have the research collaboration with Mizoram University researchers. During the study period, total 27 foreign countries researchers have collaboratively published 150 scholarly communications (37.13% of total scholarly communications) with Mizoram University researchers. Out of 150 scholarly communications, the highest (42, 10.39%) scholarly communications were collaborated with South Korea followed by Nepal (20, 4.95%), PR China (18, 4.45%), Algeria (18, 4.45%), Ireland (12, 2.97%), and Japan (6, 1.48%). There are 11 foreign countries with single research collaboration each, 8 foreign countries with 2 research collaboration each, the single country with 3 and 4 research collaborations. From the analysis, it is evident that South Korea is the best collaborating country with Mizoram University.

Table 6: International Collaboration

Countries	No. of Scholarly Communications	%	Rank
South Korea	42	10.39	1
Nepal	20	4.95	2
Peoples R China	18	4.45	3
Algeria	18	4.45	3
Ireland	12	2.97	4

Japan	6	1.48	5
Singapore	4	0.99	6
Saudi Arabia	3	0.74	7
USA	2	0.49	8
Ukraine	2	0.49	8
Sweden	2	0.49	8
Germany	2	0.49	8
England	2	0.49	8
Canada	2	0.49	8
Austria	2	0.49	8
Australia	2	0.49	8
Slovakia	1	0.24	9
Russia	1	0.24	9
Poland	1	0.24	9
Netherlands	1	0.24	9
Malaysia	1	0.24	9
Italy	1	0.24	9
Iran	1	0.24	9
Hungary	1	0.24	9
France	1	0.24	9
Czech Republic	1	0.24	9
Argentina	1	0.24	9

f) Top Areas of Scholarly Communications

Table 7 shows the top 10 areas of scholarly communications (research publications) from Mizoram University during the study period. From the analysis, it has been found that ‘Physics’ emerged as the highest area of scholarly communications (64) followed by Chemistry (62), Environmental Sciences Ecology (54), and Engineering (49). The contribution of ‘Physics’ is 15.84% of total scholarly communications from Mizoram University whereas Chemistry also shared 15.34% scholarly communications. Under the top ten areas of scholarly communications, ‘Science Technology related Other Topics’ covered significantly 10.39% share of scholarly communications. Plant Sciences, Material Science, Agriculture, Geology, and Pharmacology Pharmacy also shared the significant number of scholarly communications.

Table 7: Top Areas of Scholarly Communications

Research Areas	No. of Scholarly Communications	%	Rank
Physics	64	15.84	1
Environmental Sciences Ecology	54	13.36	3
Chemistry	62	15.34	2
Engineering	49	12.12	4
Science Technology Other Topics	42	10.39	5
Plant Sciences	31	7.67	6
Materials Science	31	7.67	6
Agriculture	26	6.43	7

Geology	17	4.20	8
Pharmacology Pharmacy	15	3.71	9

g) *Top Research Projects Funding Agencies*

Table 8 displays top ten funding agencies under which collaborative research work carried out in Mizoram University during the period of 2007-2016. The Department of Science and Technology, India funded projects have produced the highest number (59, 14.6%) of scholarly communications during the period followed by University Grant Commission, New Delhi, India (52, 12.87%) funded projects, Korea Government, MEST (33, 8.16%) funded projects, Department of Biotechnology, India (32, 7.92%) funded projects, and Council of Scientific and Industrial Research, India (28, 6.93%) funded projects. Among the top ten funded projects, Korea Government funded projects produced the highest number of scholarly communications followed by Beijing Computational Science Research Center, China, and Deanship of Scientific Research, King Saud University. Mizoram University funded projects have produced 7 scholarly communications and ranked at 7th position amongst top ten funding agencies for scholarly communications production.

Table 8: Top Project's Funding Agencies

Funding Agency	No. of Scholarly Communications	%	Rank
Department of Science and Technology, India	59	14.6	1
University Grant Commission, New Delhi, India	52	12.87	2
Korea Government, MEST	33	8.16	3
Department of Biotechnology, India	32	7.92	4
Council of Scientific and Industrial Research, India	28	6.93	5
Ministry of Earth Sciences, Government of India	8	1.98	6
Beijing Computational Science Research Center, China	8	1.98	6
Mizoram University	7	1.73	7
Naval Research Board, India	7	0.99	8
Deanship of Scientific Research, King Saud University	3	0.74	9

h) *Journal-wise Distribution of Scholarly Communications*

Table 9 shows the top 20 journals of scientific disciplines where Mizoram University related scholarly communications published during the study period. A total of 240 journals identified for publishing of 404 scholarly communications during the study period. The highest number of scholarly communications (12, 2.97%) published in the journal "Current Science" followed by "Chemical Engineering Journal" (10 scholarly communications, 2.47%), and "Zootaxa" & "Journal of Alloys and Compounds" each has published 9 scholarly communications (2.22% each).

Table 9: Top Journals with Scholarly Communications

Source Titles	No. of Scholarly Communications	%
Current Science	12	2.97
Chemical Engineering Journal	10	2.47
Zootaxa	9	2.22

Journal of Alloys and Compounds	9	2.22
Indian Journal of Physics	8	1.98
Environmental Monitoring and Assessment	8	1.98
Desalination and Water Treatment	7	1.73
Genomics Data	6	1.48
Environmental Science and Pollution Research	6	1.48
RSC Advances	5	1.23
Range Management and Agroforestry	5	1.23
Physica B Condensed Matter	5	1.23
Mitochondrial DNA Part A	5	1.23
Journal of the Geological Society of India	5	1.23
Indian Journal of Agricultural Sciences	5	1.23
Nordic Journal of Botany	4	0.99
Journal of Environmental Biology	4	0.99
International Journal of Phytoremediation	4	0.99
Genetic Resources and Crop Evolution	4	0.99
Asian Journal of Chemistry	4	0.99

i) Top Cited Scholarly Communications

The impact of scholarly communication (research) is ascertained in terms of citations received by the scholarly communications. During the study period, numbers of scholarly communications from Mizoram University have been found with citations. Out of that, top ten highly cited scholarly communications have been displayed in Table 10 which shows the details of scholarly communications with total citations received till study period along with average citation per year for particular scholarly communications. Out of these 10 highly cited papers, 50% scholarly communications published with international collaboration and 30% scholarly communications published with national collaboration whereas 20% scholarly communications published individually. From the Web of Science (WoS) citation data, scholarly communication titled “Organo and inorgano-organo-modified clays in the remediation of aqueous solutions: An overview” authored by “Tiwari, Diwakar” has received the highest 106 citations with 21.2 average citations per year. Based on current citations (accessed on 08.06.2018) retrieved from Google Scholar (GS) for top cited scholarly communications, scholarly communication titled “Towards a more complete and accurate experimental Nuclear Reaction Data Library (EXFOR): International collaboration between Nuclear Reaction Data Centres (NRDC)” authored by “Lalremruata, B” has received the highest 217 citations.

Table 10: Top Cited Scholarly Communications

Author(s) / Title / Source Title / Publication /Year	Citations from WoS	Average Citation / Year	Current Citations from GS*
Lee, Seung Mok; Tiwari, Diwakar / Organo and inorgano-organo-modified clays in the remediation of aqueous solutions: An overview / Applied Clay Science / 2012	106	21.2	203
Rai, P. K. / Heavy metal phytoremediation from aquatic ecosystems with special reference to macrophytes / Critical	84	12	199

Reviews in Environmental Science and Technology / 2009			
Otuka, N.; Lalremruata, B. , et al. / Towards a more complete and accurate experimental Nuclear Reaction Data Library (EXFOR): International collaboration between Nuclear Reaction Data Centres (NRDC) / Nuclear Data Sheets / 2014	70	23.33	217
Senthilkumar, N. ; Varma, Pushkala; Gurusubramanian, G. / Larvicidal and adulticidal activities of some medicinal plants against the Malarial Vector, Anopheles stephensi (Liston) / Parasitology Research / 2009	61	7.62	139
Lee, Seung-Mok; Laldawngliana, C.; Tiwari, Diwakar / Iron oxide nano-particles-immobilized-sand material in the treatment of Cu(II), Cd(II) and Pb(II) contaminated waste waters / Chemical Engineering Journal / 2012	55	11	100
Tiwari, Diwakar ; Kim, Hyoung-Uk; Lee, Seung-Mok / Removal behavior of sericite for Cu(II) and Pb(II) from aqueous solutions: Batch and column studies / Separation and Purification Technology / 2007	43	4.77	82
Lee, Seung-Mok; Kim, Won-Gee; Laldawngliana, C.; Tiwari, Diwakar / Removal behavior of surface modified sand for Cd(II) and Cr(VI) from aqueous solutions / Journal of Chemical and Engineering Data / 2010	41	6.83	62
Srivastava, A. K. ; Bhargava, P.; Thapar, R.; Rai, L.C. / Salinity-induced physiological and proteomic changes in <i>Anabaena doliolum</i> / Environmental and Experimental Botany / 2008	39	4.87	64
Rai, P. K. / Technical note: Phytoremediation of Hg and Cd from industrial effluents using an aquatic free floating macrophyte <i>Azolla pinnata</i> / International Journal of Phytoremediation / 2008	36	4	89
Ningthoujam, R. S.; Singh, L. Robindro ; Sudarsan, V.; Singh, S. Dorendrajit / Energy transfer process and optimum emission studies in luminescence of core-shell nanoparticles: YVO ₄ :Eu-YVO ₄ and surface state analysis / Journal of Alloys and Compounds / 2009	33	4.71	51

*Google Scholar (GS) citations retrieved on 08.06.2018.

7. Research Findings

The major findings are drawn based on the data analysis during the period of study. The findings are:

- During the ten years of the study period (2007-2016), a total of 404 scholarly communications have been retrieved for Mizoram University from Web of Science (WoS) database. The number of scholarly communications increases during the period and the highest share of scholarly communications observed in 2016.
- With the increase of the number of scholarly communications, the number of citations to the scholarly communications also increased during the period. Citations per scholarly

communications ratio found increased during the period and year 2016 share the highest citations (28.21%).

- c) Linear forecast trendline for the number of scholarly communications and citations displayed significant growth for future also.
- d) Forms of scholarly communications have been analyzed and found that “Article” is the most prevalent form (93.56%) followed by “Review” (3.46%) and “Proceedings Paper” (2.22%).
- e) “Thapa RK” has been found as the prolific contributors of scholarly communications during the period followed by “Tiwari D” and “Kumar NS”. In terms of citations based on WoS, “Tiwari D” has the highest number of citations to his scholarly communications followed by “Rai PK” and “Thapa RK”. Web of Science based *h*-index has been calculated and “Tiwari D” has the highest *h*-index followed by “Thapa RK” & “Rai PK”, and “Tiwari RP”.
- f) Multiple authorship patterns are prevalent in Mizoram University scholarly communications. Among multiple authorship patterns, four and three author’s pattern is mostly used by contributors. The degree of Collaboration among authors has been found to be very high and significant.
- g) The research collaboration of Mizoram University’s scholarly communications with overseas is good in terms of the number of countries. There are 27 countries with which international research collaboration established during the period. From among the collaborating countries, South Korea is on the top in terms of the number of collaborative scholarly communications followed by Nepal, and PR China & Algeria.
- h) In terms of highly productive areas of scholarly communications of Mizoram University, “Physics” is on the top followed by “Chemistry”, and “Environmental Sciences Ecology”.
- i) Department of Science and Technology (DST), India emerged as the top funding agency for the projects of Mizoram University followed by University Grants Commission (UGC), New Delhi, India, and Korea Government, MEST.
- j) The sources where scholarly communications of Mizoram University took place were identified and found that “Current Science” is the source where the highest scholarly communications published followed by “Chemical Engineering Journal”, and “Zootaxa”.
- k) The study has been conducted to know the top cited scholarly communication of Mizoram University and it has been found that scholarly communication entitled “Organo and inorgano-organo-modified clays in the remediation of aqueous solutions: An overview” authored by “Tiwari D” has received the highest number of citations as per WoS database while based on current Google Scholar citation data “Towards a more complete and accurate experimental Nuclear Reaction Data Library (EXFOR): International collaboration between Nuclear Reaction Data Centres (NRDC)” authored by “Lalremruata, B” has received the highest citations.

8. Discussion and Conclusion

The study gives emphasis on scholarly communications of Mizoram University based on Web of Science (WoS) database for the ten years starting from 2007 to 2016. Mizoram University records 404 scholarly communications during ten years of period from all the academic disciplines. The number of scholarly communications during the study period increased but comparatively less number of scholarly communications published in the WoS indexed sources from among all the faculty members of Mizoram University. The major contribution of scholarly communications observed during the period of 2013-2016 while before 2013, less than 10% contributions of scholarly communications observed every year. The number of citations and

growth rate of citations also increased during the period which tends to increasing citations per scholarly communications ratio. There is hope for growing number of scholarly communications as well as citations in future as shown by Linear forecast trendlines for number of scholarly communications and citations separately. Scholarly communication communicated in the form of “Articles” is prevalent whereas some forms of scholarly communications are rarely used. Mizoram University face scarcity in terms of contributors those have published scholarly communications in double digits. “Thapa RK” has been found as the prolific contributor of scholarly communications who is publishing 6 articles per year in the WoS. Multiple authorship has been prevalent in the scholarly communications of Mizoram University with strong Degree of Collaboration among authors. International research collaboration is found significant during study period which needs to be increased more. More than 37% scholarly communications are internationally collaborated and South Korea becomes the best collaborator amongst all collaborating countries. Nepal, China, Algeria, Ireland, Japan, and Singapore are also has higher number of collaborative scholarly communications.

The area of “Physics” and “Chemistry” become top areas of scholarly communications amongst all scholarly communications. The contributor “Thapa RK” and “Tiwari D” belongs to “Physics” and “Chemistry” respectively who contributed the highest number of scholarly communications among all contributors. More than 26% of scholarly communications have been contributed by these two contributors alone which made their subject area on top. More than 58% scholarly communications have been published with the support of funding agencies and out of total scholarly communications DST, India funded projects have produced more than 14% scholarly communications followed by UGC, New Delhi (12.87%). Korea Government funded projects have produced 8.16% scholarly communications out of total scholarly communications. Amongst all foreign countries funding agencies, Korea Government funded projects have produced the highest number of scholarly communications. “Current Science” has the highest number of scholarly communications from Mizoram University during the study period which shows most favored journal amongst contributors followed by “Chemical Engineering Journal”. “Tiwari D” has been found as the highest cited contributor for the individual article as well as for total citations also whereas Google Scholar citation database records the highest citation for “Lalremruata, B” followed by “Tiwari D”. From the study, it has been observed that some contributors especially “Kumar NS” uses different author name like “Senthilkumar N” and “Nachimuthu SK” which breaks the counting of scholarly communications as well as citations and *h*-index. This makes different counting at different places for the particular contributor. It is advised to every contributor that they should use their names uniformly in the scholarly communications.

The study observed the collaborative research among the institutions and found that South Korea is well associated with Mizoram University in terms of research funding as well as the publication of scholarly communications. South Korea’s MEST is one of the third highest funding agencies for research collaboration with Mizoram University. Further, there is a necessity to explore new areas of research collaboration with the developed as well as technologically sound countries in all the academic disciplines. Simultaneously, the research collaboration should be more emphasized in the emerging areas of Science and Technology. Moreover, faculty members should be encouraged by the university to do research projects by providing incentives to boost up the moral support for better quality achievement; and also

provides a platform to collaborate with other institutions of higher learning as well as industrial research laboratories in India and abroad. The moral, as well as technical support by the university, will give rise to the progress of Mizoram University in all terms.

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