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PRANJAL DEKA

*Assam University*, pranjalpriya3@gmail.com

Mukut Sarmah

*Assam University*, pranjalpriya3@gmail.com

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# Impact of NIRF Ranking on Research Publications: A Study with Special Reference to North-East Indian Universities

<sup>1</sup>Pranjal Deka, <sup>2</sup>Dr. Mukut Sarmah

<sup>1</sup>PhD Research Scholar, <sup>2</sup>Associate Professor, Department of Library and Information Science, Assam University, Silchar (Assam)

Email: [pranjalpriya3@gmail.com](mailto:pranjalpriya3@gmail.com)

## Abstract:

**Purpose:** This study aims to trace the impact of the NIRF ranking on research publications, with special reference to North-East Indian Universities, and to evaluate the research publications, citation, and h-index of the respective universities.

**Methodology:** The respective universities have been selected from the list of NIRF ranking top hundred universities. Information related to research publications, citation, and h- index is retrieved from the Web of Science database. This study deals with a scientific study of ten years of research publication from the eight selected universities, five years after NIRF ranking, and five years before ranking (2011-2015 and 2016-2020).

**Findings:** The study shows that research publications are a prime phenomenon for ranking the university and higher educational institutions. NIRF provides 70 weightage of publications and quality of publications. The study reveals that only eight universities from NE India got ranked in NIRF ranking. Tezpur University is the most prolific university in the region. The rank of universities is in a state of fluctuation year after year. The distribution of Research Publications, Citation, and h-index in the last ten years before ranking and after ranking shows that all the universities have tried to improve their scholarly output.

**Keywords:** NIRF, WoS, Research Publications, Citation, h- index. NE India.

## 1. INTRODUCTION:

The institutional ranking is a prime phenomenon for measuring an institution's potentiality and intellectual strength in changing context. The rankings of universities and other educational institutions have become popular in national and international scenarios. Higher educational institutions are a prime segment for national development, and it has a significant impact on research productivity. Continuous ranking can create an environment to evaluate the strength and weaknesses of the institutions. It has a significant role in comparing, criticizing, competition, perception, and free promotion of a university or institution. A higher position at the global and national level creates a familiar learning environment for the scholarly community.

## **2. NATIONAL INSTITUTIONAL RANKING FRAMEWORK (NIRF):**

The National Institutional Ranking Framework (NIRF) was approved by the MHRD and launched by the Honorable Minister of Human Resource Development on 29th September 2015.

This framework outlines a methodology to rank institutions across the country. The methodology draws from the overall recommendations broad understanding arrived at by a Core Committee set up by MHRD to identify the broad parameters for ranking various universities and institutions. The parameters broadly cover “Teaching, Learning and Resources,” “Research and Professional Practices,” “Graduation Outcomes,” “Outreach and Inclusivity,” and “Perception.” India Rankings – 2016, based on this framework, was released on 4th April 2016.

### **2.1 Parameters of NIRF Ranking:**

There are five parameters of NIRF Ranking

- a) Teaching, Learning & Resources (TLR)
- b) Research and Professional Practice (RP)
- c) Graduation Outcomes (GO)
- d) Outreach and Inclusivity (OI)
- e) Peer Perception

### **2.2 Research and Professional Practice (RP):**

Combined metric for Publications (PU): 35 marks

- $PU = 35 \times f(P/F_{RQ})$
- P is the weighted number of publications as ascertained from suitable third party sources.
- $F_{RQ}$  is the maximum nominal number of faculty members calculated based on a required FSR of 1:15 or the available faculty in the institution.

### **2.3 Combined metric for Quality of Publications (QP): 35 Marks**

- $QP = 20 \times f(CC/F_{RQ}) + 15 \times f(TOP25P/P)$

Here CC is Total Citation Count over the previous three years.

- P is as computed for PU.
- TOP25P: Number of citations in the top 25 percentile averaged over the previous three years.
- $F_{RQ}$  is the maximum nominal number of faculty members as calculated based on a required FSR of 1:15 or the available faculty in the institution

### **2.4 IPR and Patents: Patents Published & Granted (IPR): 15 marks**

$$IPR = IPG + IPP$$

- $IPG = 10 \times f(PG)$ ; PG is the number of patents granted over the previous three years.
- $IPP = 5 \times f(PP)$ ; PP is number of patents published over the previous three years.

## **Footprint of Projects, Professional Practice and Executive Development Programs (FPPP): 15 marks**

$$\text{FPPP} = \text{FPR} + \text{FPC} + \text{EDP}$$

- $\text{FPR} = 5 \times \text{f(RF)}$
- RF is the average annual research funding earnings (amount received in rupees) at the institute level in the previous three years.
- $\text{FPC} = 5 \times \text{f(CF)}$
- CF is the average annual consultancy amount (the amount actually received in rupees) at the institute level in the previous three years.
- $\text{EDP} = 5 \times \text{f(EP)}$
- EP = Average annual earnings from Full-Time Executive Development Programs of a minimum duration of one year in the previous three years.”

### **3. OBJECTIVES OF THE STUDY:**

- To identify some prolific universities of NE India.
- To find out a year-wise research productivity of NE Indian universities.
- To measure the research productivity before and after NIRF ranking.
- To measure the citation growth of the universities before and after NIRF ranking.
- To find out the h-index distribution of the selected universities of NE India in the last ten years.

### **4. METHODOLOGY:**

To conduct the study, the universities have been selected from the list of NIRF rankings of the top hundred universities. Information related to research publications, citation, and h- index is retrieved from the Web of Science database till October 2020. This study considers ten years of research publication of selected universities, five years after NIRF ranking, and five years before ranking (2011-2015 and 2016-2020). Collected data were analyzed accordingly.

### **5. DATA ANALYSIS AND DISCUSSION:**

#### **5.1 Basic Information of the Selected Universities:**

Table-1 shows the universities from North East India, which have got a position in the top hundred universities in NIRF ranking. In NE Indian context, only eight universities have got a position on NIRF ranking 2016-2020. Among the eight universities, only six central universities and two state universities, respectively Tezpur University, Gauhati University, Dibrugarh University, and Assam University from Assam, North-Eastern Hill University (NEHU) from Meghalaya, Mizoram University from Mizoram, Rajiv Gandhi University from Arunachal Pradesh, and Sikkim University from Sikkim are ranked in NIRF. Other NE Indian states, such as Tripura, Nagaland, and Manipur, have no universities in NIRF top hundred universities.

**Table- 1: Basic Information of the Selected Universities**

Sl. No	Name of the University	Year of Establishment	Address	Category (State/Central)	Website
1	Tezpur University	1994	Napaam, Sonitpur, Assam-784 028, INDIA	Central	<a href="http://www.tezu.ernet.in/">http://www.tezu.ernet.in/</a>
2	Gauhati University	1948	Guwahati-781014 Assam India	State	<a href="https://gauhati.ac.in/">https://gauhati.ac.in/</a>
3	North-Eastern Hill University (NEHU)	1973	North-Eastern Hill University, Umshing Mawkynroh Shillong 793022	Central	<a href="https://www.nehu.ac.in/">https://www.nehu.ac.in/</a>
4	Mizoram University	2001	Tanhril, Aizawl Mizoram, 796004	Central	<a href="https://mzu.edu.in/">https://mzu.edu.in/</a>
5	Dibrugarh University	1965	Dibrugarh University Dibrugarh-786004, Assam, India	State	<a href="https://dibru.ac.in/">https://dibru.ac.in/</a>
6	Assam University	1994	Assam University, Silchar - 788 011, Assam, India	Central	<a href="http://www.aus.ac.in/">http://www.aus.ac.in/</a>
7	Rajiv Gandhi University	1984	Rono Hills, Doimukh, Arunachal Pradesh, INDIA - 791 112	Central	<a href="https://www.rgu.ac.in/">https://www.rgu.ac.in/</a>
8	Sikkim University	2006	Sikkim University 6th mile, Samdur, P.O.: Tadong-737102 Gangtok, Sikkim	Central	<a href="https://cus.ac.in/index.php/en/">https://cus.ac.in/index.php/en/</a>

**5.2. The Rank of the University in NIRF (Top 100):**

Table-2: shows the respective position of NE Indian universities in NIRF ranking from 2016-2020. Tezpur University was in the 5<sup>th</sup> rank in 2016, 30<sup>th</sup> rank in the year 2017, 29<sup>th</sup> rank in the year 2018, 29<sup>th</sup> rank in the year 2019, and 39<sup>th</sup> rank in 2020. Gauhati University was in the 22<sup>nd</sup> rank in the year 2016, 27<sup>th</sup> rank in the year 2017, 39<sup>th</sup> rank in the year 2018, 42<sup>nd</sup> rank the year 2019, and 47<sup>th</sup> rank in the year 2020. North-Eastern Hill University (NEHU) was in 15<sup>th</sup> rank in the year 2016, 48<sup>th</sup> rank in the year 2017, 61<sup>st</sup> rank in the year 2018, 39<sup>th</sup> rank in the year 2019 49<sup>th</sup> rank in the year 2020. Mizoram University was in 51<sup>st</sup> rank in the year 2016, 58<sup>th</sup> rank in the year 2017, 81<sup>st</sup> rank in the year 2018, 76<sup>th</sup> rank in the year 2019, 67<sup>th</sup> rank in the year 2020. Dibrugarh University was in 74<sup>th</sup> rank in 2016, 74<sup>th</sup> rank in the year 2017, 84<sup>th</sup> rank in 2018, 86<sup>th</sup> rank in the year 2019, and 84<sup>th</sup> rank in 2020. Assam University was in 77<sup>th</sup> rank in the year 2016, 92<sup>nd</sup> rank in the year 2017, 87<sup>th</sup> rank in the year 2018, 97<sup>th</sup> rank in the year 2019, the university fails to hold a rank on the top hundred in the year 2020. Rajiv Gandhi University gets 99<sup>th</sup> rank in the year 2019. Moreover, Sikkim University gets 61<sup>st</sup> rank in the year 2016.

**Table-2: Rank of the Selected Universities**

Sl. No	Name of the University	Rank				
		2016	2017	2018	2019	2020
1	Tezpur University	5	30	29	29	39
2	Gauhati University	22	27	39	42	47
3	North-Eastern Hill University (NEHU)	15	48	61	39	49
4	Mizoram University	51	58	81	76	67
5	Dibrugarh University	74	74	84	86	84
6	Assam University	77	92	87	97	-
7	Rajiv Gandhi University	-	-	-	99	-
8	Sikkim University	61	-	-	-	-

**5.3 Total no of Research Publications and Citation of the Selected Universities:**

Table-3 shows the total number of research publications, citation, and h-index of the selected universities in the Web of Science database till October 2020. Tezpur University has a total number of 3243 publications with 48382 citations, an average number per paper citation is 14.92, and the h-index of the university is 77. Gauhati University has 2633 numbers of publications with 33398 citations; an average citation of the research paper is 12.68, and the h-index of the university is 74. North-Eastern Hill University (NEHU) is a total of 3245 publications with 33782 citations, the average citations of the paper are 10.41, and the h-index is 59. Mizoram University has 858 publications with 8027 citations; the average citation is 9.36, h-index of the university is 40. Dibrugarh University has 1197 publications with 12269 citations, the average number of citations is 10.25, and the h-index of the university is 42. Assam University has 1519 publications, with 15022 citations; the average citation per paper is 9.89, h-index of the university is 46. Rajiv Gandhi University has 333 numbers of publications with 2650 citations; the average citations is 7.96. h- Index of the university is 27. Sikkim University published 300 papers with a total no of 2737 citations. The average citation of the university is 9.12, and the h-index of the university is 25.

**Table- 3: Total no of Research Publications and Citation of the Selected Universities**

Sl. No	Name of the University	Total Publications	Total Citations	Average Citation Per Paper	h- Index
1	Tezpur University	3243	48382	14.92	77
2	Gauhati University	2633	33398	12.68	74
3	North-Eastern Hill University (NEHU)	3245	33782	10.41	59
4	Mizoram University	858	8027	9.36	40
5	Dibrugarh University	1197	12269	10.25	42
6	Assam University	1519	15022	9.89	46
7	Rajiv Gandhi University	333	2650	7.96	27
8	Sikkim University	300	2737	9.12	25

#### 5.4 Years- Wise Distribution of Research Publication:

Table-4 shows the year-wise distributions of the selective universities research publications in the periods of five years before and after NIRF ranking. In the years, respectively, 2011, 2012, 2013, 2014, the highest number of papers were published by Tezpur University, and Sikkim University publishes the lowest number of papers. In 2015, 2016, 2017, 2018, 2019, 2020, Tezpur University published the highest no of research publications, and Rajiv Gandhi University has published the lowest number of research papers. After the NIRF ranking, all the universities tried to publish the most scholarly content.

**Table-4: Year-Wise Distribution of Research Publications**

Sl. No	Name of the University	Publications									
		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
1	Tezpur University	152	206	251	339	288	293	349	301	303	236
2	Gauhati University	94	144	159	163	179	203	210	200	272	204
3	North-Eastern Hill University (NEHU)	105	126	155	132	145	145	164	191	200	170
4	Mizoram University	36	44	44	45	59	98	86	79	108	119
5	Dibrugarh University	76	65	61	89	74	88	97	82	100	88
6	Assam University	83	92	110	147	135	150	146	164	147	139
7	Rajiv Gandhi University	15	17	31	22	12	22	28	24	37	29
8	Sikkim University	7	10	12	8	26	29	39	43	58	56

#### 5.5 Publications in Before Ranking and After NIRF Ranking:

NIRF ranking has a significant role in improving the research productivity of universities. This study considers the publication before NIRF Ranking five years (2011-2015) and after ranking five years (2016-2021). Table-5 shows the research publications' growth rate of the respective universities. In the context of Tezpur University, 38.12%, research publications published before five years of NIRF ranking, and 44.46% of the papers published after ranking; publication growth in this period is 6.34%. In Gauhati University, 28.06% of the papers were published before five years, and 41.35% of papers were published after five years, the growth of the publication is 13.29%. In NEHU, 20.43% of the papers were published before five years of ranking, and 26.81% of the paper published after five years of ranking, the growth of publications in this five-year period is 6.38%. Mizoram University published 26.57% of the paper before the ranking, and 57.11% of the papers were published after ranking. Growth in these five years 30.54%. Dibrugarh University published 30.49% of research papers before ranking and 38.01% papers published after ranking. The growth of publications of research publications is 7.52%. Assam University published 37.32% published before the ranking, and 49.11% published after ranking; 11.79% of research publications is the growth in this period. Rajiv Gandhi University

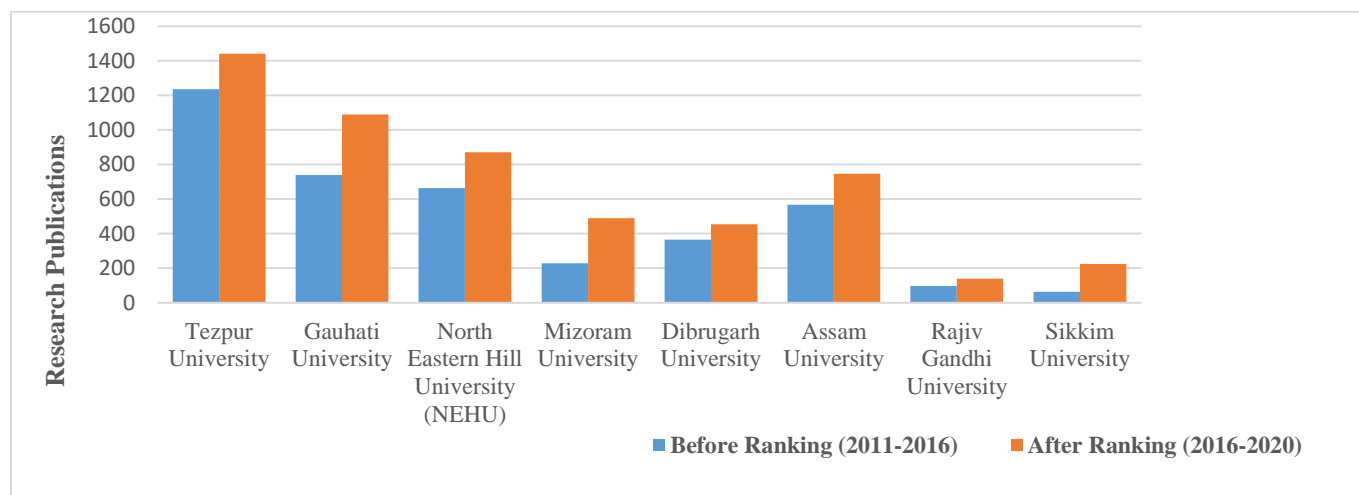
published 29.12% of the research paper before the ranking and 42.04% after ranking; its research publications' growth is 12.92%. Sikkim University published 21% of paper before the ranking, and 75% of the paper was published after the ranking; the publication's growth was 54%. The highest no publication growth of the Sikkim University is 54%, and Mizoram University is 30.54%.

**Table-5: Publications in Before Ranking and After NIRF Ranking**

Sl. No	Name of the University	Before Ranking (2011-2016)	After Ranking (2016-2020)	Difference	The percentage from total Publications %		
					Before Ranking	After Ranking	Growth
1	Tezpur University	1236	1442	206	38.12%	44.46%	6.34%
2	Gauhati University	739	1089	350	28.06%	41.35%	13.29%
3	North-Eastern Hill University (NEHU)	663	870	207	20.43%	26.81%	6.38%
4	Mizoram University	228	490	262	26.57%	57.11%	30.54%
5	Dibrugarh University	365	455	90	30.49%	38.01%	7.52%
6	Assam University	567	746	179	37.32%	49.11%	11.79%
7	Rajiv Gandhi University	97	140	43	29.12%	42.04%	12.92%
8	Sikkim University	63	225	192	21%	75%	54%

Fig-1, highlights the publications' growth of the selected universities, before and after five years of NIRF ranking.

**Fig-1: Publications in Before Ranking and After NIRF Ranking**





### 5.6 Year Wise Citation Distribution of the Selected Universities:

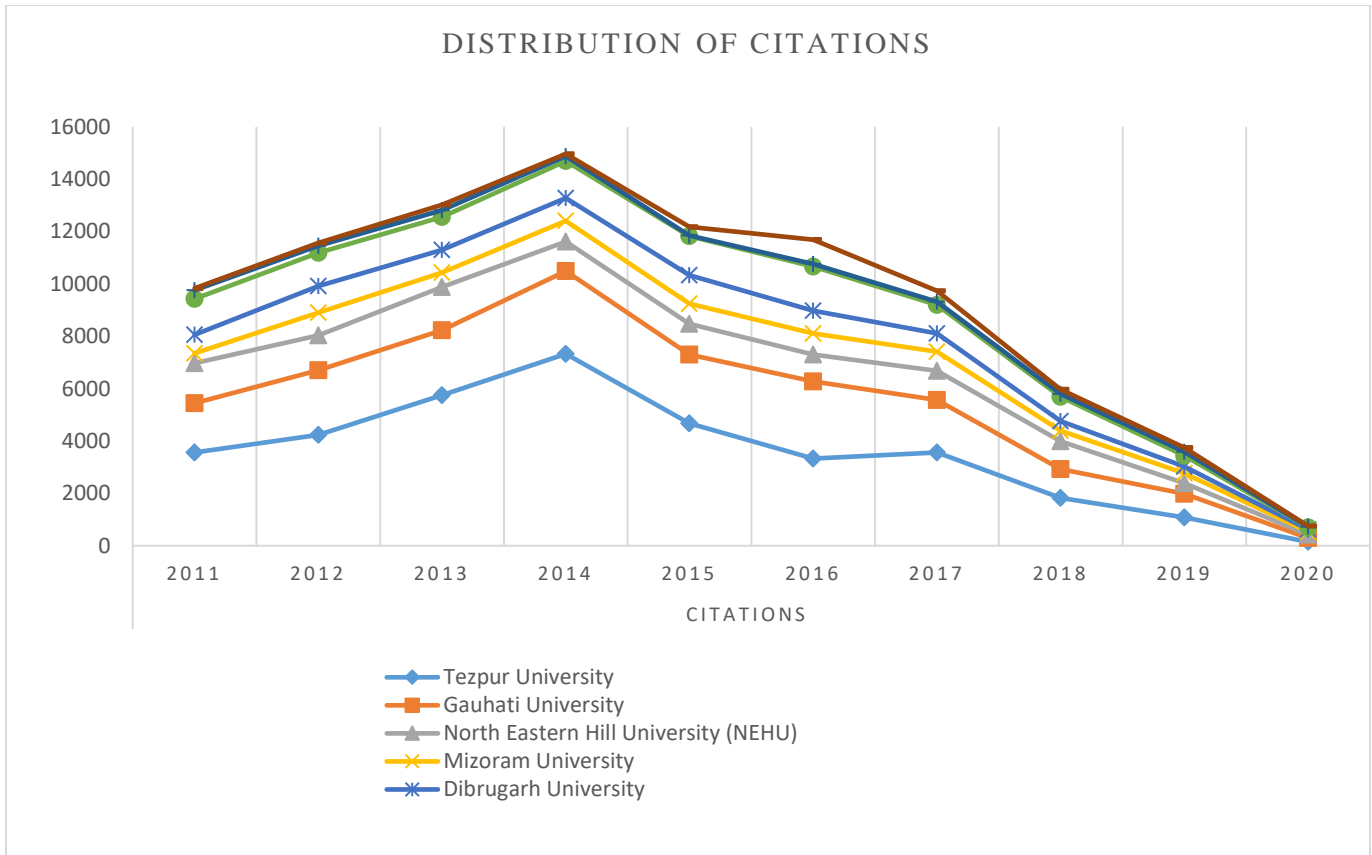
Citation is also a significant issue for considering the quality of publications. Table-6 shows the year wise distributions of the citation of their respective publications. The highest no of citations is from Tezpur University.

**Table-6: Year Wise Citation Distribution of the Selected Universities**

Sl. No	Name of the University	Citations									
		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
1	Tezpur University	3561	4239	5749	7326	4671	3327	3568	1823	1077	148
2	Gauhati University	1882	2466	2484	3163	2625	2952	1995	1102	903	148
3	North Eastern Hill University (NEHU)	1523	1335	1643	1126	1181	1022	1114	1061	414	124
4	Mizoram University	387	859	549	791	773	802	740	405	376	119
5	Dibrugarh University	702	1014	875	872	1080	870	693	373	257	83
6	Assam University	1376	1278	1253	1413	1490	1691	1092	926	419	81
7	Rajiv Gandhi University	324	264	265	186	27	101	118	114	137	21
8	Sikkim University	75	117	206	87	335	923	419	161	167	29

Fig -2 highlights the distributions of research publications of the selected universities.

**Fig-2: Distributions of Citation of Selected Universities**



**5.7 Average Citation per Paper of Selected Universities Research Publications:**

Table-7 shows the average citation per paper of the selective universities in the last ten years. Average citation per paper is also an indicator of quality publications. In 2011, the highest average citation was received by Tezpur University (23.43), and the lowest no of the average citation received by Dibrugarh University (9.24). In 2012, Tezpur University received the highest average citation of 20.58, and NEHU received the lowest average citation of 10.6. In 2013 Tezpur University received the highest average citation of 22.9, and Rajiv Gandhi University received the lowest of 8.55. In 2014, Tezpur University (21.61) received the highest average citation and the lowest average citation received by Rajiv Gandhi University (8.45). In 2015, the highest average citation received by Tezpur University (16.22), and the lowest average citation was received by Rajiv Gandhi University (2.25). In 2016, Sikkim University (31.83) received the highest average citation and the lowest average citation received by Rajiv Gandhi University (4.59). In 2017 the highest average citation received by Sikkim University (10.74) and the lowest average citation received by Rajiv Gandhi University (4.21). In 2018, Tezpur University (6.06) received the highest average citation and the lowest average citation received by Sikkim University (3.74). In 2019 the highest average citation received by Rajiv Gandhi University (3.7) and the lowest average citation received by NEHU (2.07). In the year 2020 (till October) highest citation is received by Mizoram University, and Sikkim University receives the lowest average citation.

The table shown below provides the data of the distribution of average citation per paper in the last ten years, reflecting a total no of publications of respective universities that are increased, however, but the average citation per paper is decreased.

**Table-7: Average Citation per Paper**

Sl. No	Name of the University	Average Citation Per Paper									
		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
1	Tezpur University	23.43	20.58	22.9	21.61	16.22	11.35	10.22	6.06	3.55	0.63
2	Gauhati University	20.02	17.13	15.62	19.4	14.66	14.54	9.5	5.51	3.32	0.72
3	North Eastern Hill University (NEHU)	14.5	10.6	10.6	8.53	8.14	7.05	6.79	5.55	2.07	0.73
4	Mizoram University	10.75	19.52	12.48	17.58	13.1	8.18	8.6	5.13	3.48	1
5	Dibrugarh University	9.24	15.6	14.34	9.8	14.59	9.89	7.14	4.55	2.57	0.93
6	Assam University	16.58	13.89	11.39	9.61	11.04	11.27	7.48	5.65	2.85	0.58
7	Rajiv Gandhi University	21.6	15.53	8.55	8.45	2.25	4.59	4.21	4.75	3.7	0.72
8	Sikkim University	10.71	11.7	17.17	10.88	12.88	31.83	10.74	3.74	2.88	0.52

### 5.8 Distribution of h-Index of the Selected Universities:

The h-index is defined as the maximum value of h such that the given author/journal has published h papers that have each been cited at least h times. Table-8 shows the year-wise distribution of the h-index of respective universities in the last ten years (2011-2020). The h-index of the universities was decreased after the NIRF ranking. Tezpur University holds the highest h-index (41) in 2013, Gauhati University's highest h-index (27) in 2016. NEHU's highest h-index (20) in 2011 and 2013, Mizoram universities highest h-index (16) in 2015. Dibrugarh University's highest h-index (20) in 2015. Assam University's highest h-index (20) in 2011 and 2013. Rajiv Gandhi University's highest h-index (9) in 2011 and 2013. Sikkim University's highest h-index (13) in 2017.

**Table-8: Distribution of h-Index of the Selected Universities**

Sl. No	Name of the University	h- Index									
		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
1	Tezpur University	35	35	41	40	33	27	28	18	14	5
2	Gauhati University	23	23	22	28	26	27	21	16	13	5
3	North Eastern Hill University (NEHU)	20	19	20	16	16	15	17	16	8	5
4	Mizoram University	12	15	13	14	16	14	15	10	8	4
5	Dibrugarh University	15	19	16	17	20	17	15	10	7	4
6	Assam University	20	18	20	19	19	23	16	15	9	4
7	Rajiv Gandhi University	9	8	9	8	3	5	6	8	6	3
8	Sikkim University	5	5	6	5	10	13	11	7	6	2

**6. FINDINGS OF THE STUDY:**

- The study identifies the eight universities from NE India, which have secured a position in NIRF Ranking (2016-2020).
- Tezpur University is the most prolific University in the region. On the basis of Rank, Total Publications, Total Citation, Average Citation per paper, and h-index.
- The study found that the universities' year-wise research publication is increased after ranking, but the average citation per paper is decreased.
- It is also found that, in the case of the h-index, it was increased before NIRF ranking, but it got decreased after NIRF Ranking. Out of all the universities mentioned, only Sikkim university h-index is increased after NIRF ranking.

**7. CONCLUSION:**

A research publication is an essential task for securing a good position in the NIRF ranking. The study shows that the NIRF ranking has a significant impact on the selected universities' research publications. Tezpur University and Gauhati University secured their position in the top fifty. Tezpur University has the highest number of publications (3243), citations (48382), average citation per paper (14.92), and h-index (77). The highest growth was seen in the Sikkim University research publications (54%) in the last ten years. After the NIRF ranking, it is found that there is an increase in the number of publications and a decrease in the average citation. It is also seen in the h-index, which led to a crucial impact on quality publications.

## REFERENCES:

- [1]. Mukherjee, B. (2019). Ranking Indian universities through research and professional practices of National Institutional Ranking Framework (NIRF): A case study of selected central universities in India. *Journal of Indian Library Association*, 52(4).
- [2]. Sheeja, N. K., Mathew, S., & Cherukodan, S. (2018). Impact of scholarly output on university ranking. *Global Knowledge, Memory, and Communication*.
- [3]. Mandhirasalam, M. (2016). NIRF India Rankings 2016: Ranking of Universities and other Higher Education Institutions in Tamil Nadu. In *Proceedings of the National Conference on Electronic Resources and Academic Libraries: Empowering New Trends, Technologies, Practices, Services, and Management* (pp. 577-583).
- [4]. Sivakumaren, K. S. (2017). Contributions of Publications of Indian Institute of Management in Ranking Institutions in National Institutional Ranking Framework: A Study. *Journal of Library & Information Science*, 7(2).
- [5]. Qamar, F. (2018). Measuring Performance of Higher Education Institutions (HEIs) and the National Institutional Ranking Framework (NIRF). *India Higher Education Report 2017: Teaching, Learning, and Quality in Higher Education*.
- [6]. Balasubramani, J., & Thangavel, R. (2019). Contributions of National Institutional Ranking Framework (NIRF) ranked IIT's in Research Gate and Databases: A study.
- [7]. Mandhirasalam, M. NIRF (National Institutional Ranking Framework) India Rankings 2016: An Analysis with Special Reference to Tamil Nadu.
- [8]. Abhishek Kumar, Sanjay Tiwari, Ashish Kumar Chauhan & Ramswaroop Ahirwar (2019) Impact of NIRF on research publications: A study on top 20 (ranked) Indian Universities, *COLLNET Journal of Scientometrics and Information Management*, 13:2, 219-229, DOI: 10.1080/09737766.2020.1741194
- [9]. <https://www.nirfindia.org/2020/Ranking2020.html>