

A Scientometric Assessment of Citation Quality and Editorial Notices among Indian Institutes of Science Education and Research (IISERs) and Indian Institutes of Technology (IITs)

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*Corresponding Author Email:	<i>This study presents a scientometric evaluation of selected Indian Institutes of Science Education and Research (IISERs) and Indian Institutes of Technology (IITs) using Scite-based citation indicators. The analysis focuses on Smart Citation classifications, including supporting, mentioning, and contrasting citations, along with editorial notices such as retractions, withdrawals, corrections, errata, and expressions of concern. The study aims to evaluate the research influence, citation integrity, and publication reliability of premier Indian higher educational institutions. Secondary data obtained from Scite was systematically organized and interpreted using descriptive analytical methods. The findings reveal that established institutions such as IISc Bangalore, IIT Delhi, IIT Bombay, IIT Kharagpur, and IIT Madras demonstrate significantly higher citation influence and publication output. However, editorial notices are also comparatively higher in institutions with larger research volumes. The study highlights the usefulness of Scite metrics in assessing both citation quality and scholarly reliability in academic research ecosystems.</i>

1. Introduction

Scientometric studies have become increasingly important in evaluating the quality, impact, and integrity of academic research. Traditional citation counts measure research influence but do not reveal whether citations support, mention, or contradict the cited work. Scite, an advanced citation analysis platform, provides Smart Citation indicators that classify citations based on their contextual intent. These indicators offer a more nuanced understanding of scholarly communication.

India's premier research institutions, including the Indian Institutes of Science Education and Research (IISERs) and Indian Institutes of Technology (IITs), contribute substantially to global scientific research. Evaluating these institutions using Scite metrics can provide deeper insights into research quality, influence, and publication reliability. This study therefore investigates citation patterns and editorial notices among selected IISERs and IITs.

2. Literature Review

Scientometric analysis has become a widely accepted approach for evaluating research productivity, scholarly impact, and institutional performance. Traditional bibliometric indicators such as publication counts, citation counts, and the h-index have been extensively used to assess research output; however, these indicators primarily measure citation frequency and do not explain the context or intent behind citations (Bornmann & Daniel, 2008; Garfield, 1972).

Recent advances in citation analytics have emphasized the importance of contextual citation analysis. Scite introduces *Smart Citations*, which classify citations as supporting, mentioning, or contrasting, thereby providing deeper insights into how research is interpreted and utilized within the scientific community (Nicholson et al., 2021). Unlike conventional citation databases, contextual citation analysis enables researchers to distinguish between citations that validate previous findings and those that challenge or merely acknowledge earlier work. Research integrity has also emerged as a critical

component of research evaluation. Editorial notices such as retractions, corrections, errata, withdrawals, and expressions of concern serve as indicators of publication reliability and scientific transparency. While retractions often arise from serious ethical or methodological issues, corrections and errata generally reflect the self-correcting nature of science (Brainard & You, 2018; Wager & Williams, 2011). Therefore, assessing editorial notices alongside citation metrics provides a more comprehensive understanding of research quality.

Several scholars have argued that responsible research assessment should combine quantitative citation indicators with qualitative measures of research integrity and scholarly influence (Moed, 2005; Waltman, 2016). In recent years, contextual citation metrics have gained increasing attention because they offer a more nuanced evaluation of scientific impact than traditional citation counts alone. India's premier institutions, including the Indian Institutes of Technology (IITs), the Indian Institutes of Science Education and Research (IISERs), and the Indian Institute of Science (IISc), have made significant contributions to global scientific research. However, most previous evaluations of these institutions have relied on conventional bibliometric indicators, with limited attention to contextual citation patterns and editorial notices. The present study addresses this gap by employing Scite Smart Citation metrics and editorial notice indicators to evaluate citation quality, research influence, and publication reliability among selected IITs and IISERs.

2. Objectives of the Study

- To examine Smart Citation indicators among selected IISERs and IITs.
- To analyze supporting, mentioning, and contrasting citation patterns.
- To evaluate editorial notices including retractions, corrections, errata, and withdrawals.
- To identify institutions with high citation influence and research reliability.
- To interpret the relationship between publication volume and editorial notices.

3. Methodology

The study is based on secondary data collected from the Scite database. Citation indicators and editorial notice data relating to selected IISERs and IITs were extracted and organized systematically. The variables considered include publication count, supporting citations, mentioning citations, contrasting citations, 2-year USI, 5-year USI, lifetime USI, and editorial notices such as retractions, withdrawals, corrections, errata, and expressions of concern. Descriptive and comparative analytical methods were employed for interpretation. The institutions were grouped into IISERs and IITs for comparative evaluation.

4. Data Interpretation and Analysis

Table 1: USI Performance and Citation Impact of IISERs and IISc

Organization	2-Year USI	5-Year USI	Lifetime USI	Total Cites
Indian Institute of Science Education and Research Berhampur	-	0.97	0.93	13,340
Indian Institute of Science Education and Research Thiruvananthapuram	-	0.95	0.94	42,175
Indian Institute of Science Education and Research, Bhopal	-	0.94	0.93	64,848
Indian Institute of Science Education and Research, Tirupati	-	0.94	0.95	22,907
Indian Institute of Science Education and Research Kolkata	-	0.94	0.93	111,171
Indian Institute of Science Education and Research Pune	-	0.94	0.94	111,881
Indian Institute of Science Bangalore	0.93	0.93	0.93	1,132,092
Indian Institute of Science Education and Research Mohali	-	0.92	0.92	83,328

Table 1 presents the Unified Science Influence (USI) scores and total citations of IISERs and IISc Bangalore. IISc Bangalore recorded the highest citation count with 1,132,092 citations and maintained a consistent 2-year, 5-year, and lifetime USI score of 0.93. IISc alone contributed

approximately 71.8% of the total citations represented in the table, indicating its dominant scholarly influence and long-standing research reputation.

Among the IISERs, IISER Berhampur achieved the highest 5-year USI score of 0.97 despite having only 13,340 citations, which accounted for less than 1% of total citations. This reflects a strong recent research influence despite a comparatively smaller publication base. IISER Thiruvananthapuram recorded a 5-year USI score of 0.95 and a lifetime USI score of 0.94 with 42,175 citations, suggesting growing research visibility and sustained scholarly impact.

IISER Bhopal recorded 64,848 citations with a 5-year and lifetime USI score of 0.94 and 0.93, respectively. IISER Tirupati demonstrated one of the highest lifetime USI scores of 0.95 despite a modest citation count of 22,907, indicating rapid growth in research quality and influence. IISER Kolkata and IISER Pune each recorded more than 111,000 citations, contributing nearly 14% of total citations combined among IISERs and IISc. Both institutions maintained a 5-year USI score of 0.94, reflecting stable and mature research ecosystems.

IISER Mohali recorded 83,328 citations with both 5-year and lifetime USI scores of 0.92, slightly lower than the other IISERs but still indicative of substantial scholarly influence. Overall, the narrow USI range between 0.92 and 0.97 across institutions demonstrates consistently high research quality among India's premier science institutions

Table 2: Citation Typologies among IISERs and IISc

Organisation	Publications	Citation Types		
		Supporting	Mentioning	Contrasting
IISc	79452	46,475	1,071,585	1,071,585
IISER Berhampur	1249	352	12916	23
IISER Thiruvananthapuram	3212	1774	40059	112
IISER Bhopal	5816	2294	62207	164
IISER Tirupati	1981	722	22054	40
IISER Kolkatta	7570	40026	106055	312
IISER Pune	7451	4656	106397	294
IISER Mohali	5992	3527	79070	296

Table 2 examines publication output and citation typologies by classifying citations into supporting, mentioning, and contrasting categories. IISc Bangalore recorded the highest publication output with 79,452 publications, along with 46,475 supporting citations, 1,071,585 mentioning citations, and a very small proportion of contrasting citations. Mentioning citations constituted more than 95% of IISc's citation interactions, reflecting extensive scholarly visibility and widespread acknowledgment within scientific literature.

Among IISERs, IISER Kolkata produced the highest publication count with 7,570 publications, accompanied by 40,026 supporting citations, 106,055 mentioning citations, and 312 contrasting citations. The institution contributed nearly 18% of the total IISER publications represented in the table. IISER Pune closely followed with 7,451 publications, 4,656 supporting citations, 106,397 mentioning citations, and 294 contrasting citations, indicating strong research recognition and scholarly engagement.

IISER Mohali recorded 5,992 publications with 79,070 mentioning citations, 3,527 supporting citations, and 296 contrasting citations, reflecting substantial citation integration. IISER Bhopal generated 5,816 publications with 62,207 mentioning citations, demonstrating strong academic visibility.

IISER Tirupati, despite having only 1,981 publications, received 22,054 mentioning citations and only 40 contrasting citations, meaning contrasting citations represented less than 0.2% of its citation interactions. Similarly, IISER Berhampur produced 1,249 publications and received 12,916 mentioning citations with only 23 contrasting citations, suggesting broad scholarly acceptance of its research findings. Overall, mentioning citations overwhelmingly dominated across all institutions, accounting for more than 90% of citation interactions in most cases, while contrasting citations remained consistently low, generally below 0.5%, indicating limited scholarly disagreement.

Table 3: Editorial Notices among IISERs and IISc

Organisation	Editorial Notices				
	Retractions	Withdrawals	Corrections	Errata	Expression of Concern
IISc	39	13	251	290	0
IISER Berhampur	1	0	19	6	0
IISER Thiruvananthapuram	2	2	24	26	0
IISER Bhopal	5	0	27	23	0
IISER Tirupati	0	0	25	15	0
IISER Kolkatta	3	1	57	42	0
IISER Pune	0	0	54	57	0
IISER Mohali	2	0	57	42	0

Table 3 presents editorial notices including retractions, withdrawals, corrections, errata, and expressions of concern. IISc Bangalore recorded the highest editorial notice counts with 39 retractions, 13 withdrawals, 251 corrections, and 290 errata. However, considering its publication output of 79,452 publications, retractions represented only approximately 0.05% of total publications, suggesting that serious publication integrity issues remain rare. Among IISERs, IISER Pune reported 54 corrections and 57 errata, representing the highest combined correction-related notices among IISERs, although it recorded no retractions or withdrawals. IISER Kolkata reported 3 retractions, 1 withdrawal, 57 corrections, and 42 errata, indicating active post-publication revision practices associated with its large research output. IISER Mohali recorded 2 retractions, 57 corrections, and 42 errata, whereas IISER Bhopal reported 5 retractions, 27 corrections, and 23 errata. IISER Tirupati reported no retractions or withdrawals but recorded 25 corrections and 15 errata, reflecting comparatively stable publication practices. Importantly, none of the institutions reported any expressions of concern, indicating the absence of unresolved major ethical controversies. Corrections and errata together constituted more than **85%** of all editorial notices across the institutions, suggesting that most notices involved minor post-publication amendments rather than severe misconduct.

Table 4 USI Performance and Citation Impact of IITs

Rank	Organization	2-Year USI	5-Year USI	Lifetime USI	Total Cites
1	Indian Institute of Technology Bhubaneswar	-	0.97	0.94	55,450
2	Indian Institute of Technology Mandi	-	0.97	0.94	48,331
3	Indian Institute of Technology Patna	-	0.96	0.95	49,642
4	Indian Institute of Technology Tirupati	-	0.96	0.95	11,376
5	Indian Institute of Technology Kanpur	-	0.95	0.93	526,955
6	Indian Institute of Technology BHU	-	0.95	0.94	86,111
7	Indian Institute of Technology Bombay	-	0.94	0.94	582,116
8	Indian Institute of Technology Delhi	0.95	0.94	0.93	624,494
9	Indian Institute of Technology Gandhinagar	-	0.94	0.94	63,524
10	Indian Institute of Technology Guwahati	-	0.94	0.93	274,444
11	Indian Institute of Technology Roorkee	-	0.94	0.93	415,035
12	Indian Institute of Technology Kharagpur	0.93	0.94	0.93	674,005
13	Indian Institute of Technology Jodhpur	-	0.93	0.92	40,300
14	Indian Institute of Technology Madras	-	0.93	0.94	516,781
15	Indian Institute of Technology Hyderabad	-	0.93	0.93	133,486
16	Indian Institute of Technology Ropar	-	0.93	0.93	53,013

17	Indian Institute of Technology Jammu	-	0.92	0.95	13,233
18	Indian Institute of Technology Indore	-	0.92	0.93	200,062
19	Indian Institute of Technology Dhanbad	-	0.91	0.93	145,123
20	Indian Institute of Technology Bhilai	-	-	0.93	14,814
21	Indian Institute of Technology Goa	-	-	0.92	5,011
22	Indian Institute of Technology Palakkad	-	-	0.92	10,050
23	Indian Institute of Technology Dharwad	-	-	0.94	8,180

Table 4 evaluates IITs using USI scores and total citation counts. IIT Kharagpur recorded the highest citation count with 674,005 citations, contributing approximately 17% of the total citations among all IITs listed. IIT Delhi followed with 624,494 citations and maintained a consistent 2-year USI score of 0.95, 5-year USI score of 0.94, and lifetime USI score of 0.93, indicating sustained research influence. IIT Bombay and IIT Madras also demonstrated strong scholarly performance with 582,116 and 516,781 citations, respectively. Together with IIT Kharagpur and IIT Delhi, these institutions contributed more than 55% of total citations among the IITs, reflecting the dominance of older IITs in India's scientific research landscape. Among newer IITs, IIT Bhubaneswar and IIT Mandi achieved the highest 5-year USI score of 0.97, despite comparatively lower citation counts of 55,450 and 48,331, respectively. IIT Patna and IIT Tirupati both achieved a lifetime USI score of 0.95, suggesting rapidly improving research quality and visibility.

IIT Jammu recorded only 13,233 citations but maintained a relatively high lifetime USI score of 0.95, indicating promising research influence despite institutional youth. Newly established IITs such as IIT Goa, IIT Palakkad, and IIT Dharwad recorded citation counts below 15,000, reflecting their emerging research status. Nevertheless, their lifetime USI scores ranging between 0.92 and 0.94 indicate competitive research quality relative to institutional age.

Overall, the narrow USI range between 0.91 and 0.97 across IITs suggests a consistently strong research ecosystem throughout the IIT system

Table 5 Citation Typologies among IITs

Organisation	Publications	Citation Types		
		Supporting	Mentioning	Contrasting
Indian Institute of Technology Bhubaneswar	7932	1765	52957	118
Indian Institute of Technology Mandi	6323	46436	12916	99
Indian Institute of Technology Patna	8099	1311	47737	74
Indian Institute of Technology Tirupati	2177	362	10878	20
Indian Institute of Technology Kanpur	45870	18308	500753	1298
Indian Institute of Technology BHU	13279	2451	82484	178
Indian Institute of Technology Bombay	55973	20988	553028	1507
Indian Institute of Technology Delhi	60154	17489	595289	1293
Indian Institute of Technology Gandhinagar	6816	2156	60705	162
Indian Institute of Technology Guwahati	29542	9088	261572	655
Indian Institute of Technology Roorkee	43578	13878	392599	1000
Indian Institute of Technology Kharagpur	61987	23092	639018	1736
Indian Institute of Technology Jodhpur	6502	1097	38795	95
Indian Institute of Technology Madras	59290	18048	490788	1267
Indian Institute of Technology Hyderabad	15253	3972	127987	322
Indian Institute of Technology Ropar	6922	1596	50908	125
Indian Institute of Technology Jammu	2745	336	12778	18
Indian Institute of Technology Indore	21929	6171	191022	444
Indian Institute of Technology Dhanbad	19489	3843	138880	299
Indian Institute of Technology Palakkad	2087	254	9656	23
Indian Institute of Technology Dharwad	1839	211	7841	12
Indian Institute of Technology Bhilai	3145	285	14119	26
Indian Institute of Technology Goa	1475	129	4797	11

Table 5 analyzes publication outputs and citation typologies among IITs. IIT Kharagpur recorded the highest publication output with 61,987 publications, along with 23,092 supporting citations, 639,018 mentioning citations, and 1,736 contrasting citations. The institution alone contributed approximately 15% of total IIT publications represented in the dataset.

IIT Delhi produced 60,154 publications with 595,289 mentioning citations and 1,293 contrasting citations, while IIT Bombay recorded 55,973 publications, 553,028 mentioning citations, and 1,507 contrasting citations. Together, IIT Delhi, IIT Bombay, IIT Kharagpur, IIT Madras, and IIT Kanpur contributed more than 72% of total publications among the IITs listed. IIT Kanpur generated 45,870 publications, 18,308 supporting citations, 500,753 mentioning citations, and 1,298 contrasting citations, indicating substantial scholarly visibility and validation. IIT Madras similarly demonstrated strong citation engagement with 59,290 publications and 490,788 mentioning citations.

Among emerging IITs, IIT Tirupati recorded 2,177 publications with 10,878 mentioning citations and only 20 contrasting citations, while IIT Goa produced 1,475 publications with merely 11 contrasting citations. Contrasting citations generally constituted less than 0.5% of citation interactions across institutions, indicating limited scholarly disagreement and strong acceptance of IIT research outputs. Mentioning citations overwhelmingly dominated citation interactions, accounting for more than 90% of total citations across most IITs, thereby reflecting extensive research visibility and integration within the global scientific literature

Table 6 Editorial Notices among IITs

Organisation	Editorial Notices				
	Retractions	Withdrawals	Corrections	Errata	Expression of Concern
Indian Institute of Technology Bhubaneswar	20	2	26	22	0
Indian Institute of Technology Mandi	10	3	29	16	0
Indian Institute of Technology Patna	3	1	26	10	0
Indian Institute of Technology Tirupati	3	1	9	2	0
Indian Institute of Technology Kanpur	31	18	96	102	0
Indian Institute of Technology BHU	16	1	36	32	0
Indian Institute of Technology Bombay	15	9	148	138	0
Indian Institute of Technology Delhi	38	6	143	123	0
Indian Institute of Technology Gandhinagar	1	0	33	27	0
Indian Institute of Technology Guwahati	17	3	58	65	0
Indian Institute of Technology Roorkee	55	14	77	119	0
Indian Institute of Technology Kharagpur	35	12	129	120	0
Indian Institute of Technology Jodhpur	8	7	16	9	0
Indian Institute of Technology Madras	38	12	139	148	0
Indian Institute of Technology Hyderabad	8	2	49	31	0
Indian Institute of Technology Ropar	2	2	19	12	0
Indian Institute of Technology Jammu	25	1	11	6	0
Indian Institute of Technology Indore	18	3	44	58	0
Indian Institute of Technology Dhanbad	64	5	65	52	0
Indian Institute of Technology Palakkad	0	0	5	3	0
Indian Institute of Technology Dharwad	1	0	4	2	0
Indian Institute of Technology Bhilai	14	0	9	7	0
Indian Institute of Technology Goa	3	1	2	2	0

Table 6 presents editorial notices associated with IIT publications. IIT Dhanbad recorded the highest number of retractions with 64 retractions, followed by IIT Roorkee with 55 retractions. However, relative to publication outputs, retractions remained proportionally low, generally below 0.35% of total publications across institutions.

IIT Delhi reported 38 retractions, 6 withdrawals, 143 corrections, and 123 errata, while IIT Bombay recorded 15 retractions, 9 withdrawals, 148 corrections, and 138 errata. IIT Madras similarly reported 38 retractions, 12 withdrawals, 139 corrections, and 148 errata. These institutions collectively accounted for nearly 40% of total correction- and errata-related notices, likely reflecting their high publication productivity.

IIT Kanpur recorded 31 retractions, 18 withdrawals, 96 corrections, and 102 errata, whereas IIT Kharagpur reported 35 retractions, 12 withdrawals, 129 corrections, and 120 errata. Corrections and errata consistently exceeded retractions and withdrawals across all IITs, together constituting more than 80% of editorial notices overall.

Among newer IITs, IIT Palakkad recorded no retractions or withdrawals and only 5 corrections and 3 errata, while IIT Dharwad reported only 1 retraction, 4 corrections, and 2 errata. These low values correspond with their comparatively smaller publication outputs.

Importantly, no IIT reported any expressions of concern, indicating the absence of unresolved major publication ethics disputes. Overall, the editorial notice profile suggests that most publication issues involved routine corrections rather than serious scientific misconduct.

6. Conclusion

The study demonstrates the importance of Smart Citation analysis in evaluating institutional research performance beyond traditional citation metrics. Scite indicators provide meaningful insights into citation quality, contextual scholarly impact, and publication reliability. The findings suggest that leading Indian research institutions maintain strong global visibility and influence, while editorial notices remain a natural component of large-scale scholarly publishing. The integration of scientometric indicators with contextual citation analysis can significantly improve research assessment frameworks in higher education.

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