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Research Output of Kuvempu University in the field of Chemical Science: An Altmetric Analysis

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ABSTRACT

The present study is an attempt to investigate the correlation of altmetric score and citations received by the Chemical science literature of Kuvempu University researchers during 1992-2023. It was observed that the research output in the field of Chemical Science, comprising 1,180 publications, has received considerable recognition within the scientific community, as evidenced by the 22,412 citations. Concerning the first research question, it was found more AAS was collected from Mendeley than other sources such as Blogs, Facebook, Twitter, Wikipedia, and book reviews. Facebook and Twitter have a greater membership. Further, the impact of chemical science publications in policy-related sources, news outlets, and blogs appears to be relatively modest. These findings provide insights into the online visibility and influence of these articles across different platforms.

Keywords: Altmetrics, Chemical Science, Kuvempu University, Dimensions, Metrics

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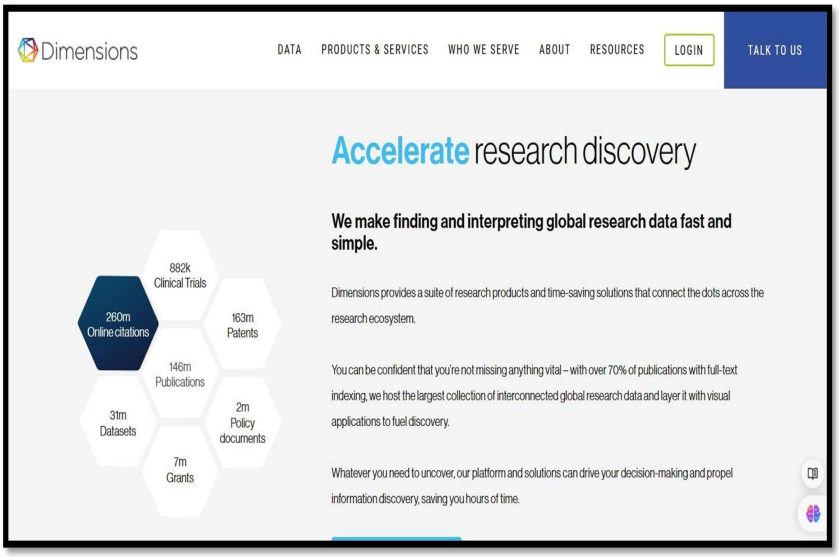
1. Introduction

Today the academic publishing world has changed significantly from traditional to present trends with the use of technology. Present scenario numerous metrics are available to assist in the evaluation of scientific scholarship. Similarly, the metrics approach to assessing scientific productivity has changed from Librametrics to Bibliometrics, Scientometrics, Webometrics to Altmetrics today. Altmetrics is one of the scientific research output analysis metrics. Journal Impact Factor, Cite Score & SNIP, h-Index, SJR, PlumX, Altmetrics attention score, Article Influence Score, and Google Scholar Citations are the most popular metrics used in the analysis of scholarly communication (Fire and Guestrin, 2019); (Fisher 2019); (Ezema and Ugwu, 2017).

Traditionally, it was believed that highly cited papers would always be recognized but there is a considerable time between publication and citation. AAS gives the real-time impact of papers by including mentions on the internet and in social media. Various databases, such as PLOS, PlumX, and Dimension, are prominent in providing AAS data to indexed literature. Apart from some papers published in a Scientometrics study on chemical science literature however, there is no study published on papers with high AAS on chemical science literature of Kuvempu University, India. Hence, this study has been conducted using the Dimension database to remedy this. In recent years Altmetrics (Alternative metrics) has grown as a most powerful metrics tool for capturing communication around scientific content access wide range of social media platforms. Altmetrics tracks online readers of scientific research from various sources such as Facebook, Twitter, Blogs, News, Mendeley, CiteULike and so on.

The increased reputation of altmetrics in a recent time prompted many scientists to study the correlation between citation and altmetric score. With respect to chemical science literature, there is no such study found to study the correlation between citation and altmetric score. Therefore, the study aims to assess the citation pattern in chemical science publications of Kuvempu University researchers.

2. Dimension.ai Database



Screenshot-1. Dimension.ai Database

Dimensions is a linked research knowledge system that re-imagines discovery and access to research. Developed by Digital Science in collaboration with over 100 leading research organizations around the world, Dimensions brings together grants, publications, citations, alternative metrics, clinical trials, patents and policy documents to deliver a platform that enables users to find and access the most relevant information faster, analyze the academic and broader outcomes of research, and gather insights to inform future strategy (Dimensions, 2024).

Dimensions provide a suite of research products and time-saving solutions that connect the dots across the research ecosystem. With over 70% of publications with full-text indexing, Dimension hosts the largest collection of interconnected global research data and layers it with applications to fuel discovery (https://www.dimensions.ai/).

3. Definition of the Key Terms

a. Altmetrics: Altmetrics, or alternative metrics, are new measures that take into account online reader behavior, network interactions with content, and social media. Altmetrics are meant to complement, not completely replace, traditional impact measures and are measures of online attention and engagement (libguides.com).

b. Citation: A citation identifies for the reader the original source for an idea, information, or image that is referred to in a work. In the body of a paper, the in-text citation acknowledges the source of information used. At the end of a paper, the citations are compiled on a References or Works Cited list (https://guides.library.ucsc.edu).

c.Dimensions.ai: Dimension is a database of abstracts and citations and of research grants, which links grants to resulting publications, clinical trials and patents (Wikipedia, 2023).

d. Altmetric Attention Score (AAS): The Altmetric Attention Score is a value that indicates the amount of attention received by an article across the internet. Sources that are being tracked include the mass media, policy documents, scholarly blogs, Wikipedia, open peer reviews, academic syllabi, and a variety of social media, including Reddit, Twitter and, Facebook (http://dimensions.freshdesk.com).

4. Objectives of the Study

The objectives of the study are:

To identify the most highly-rated AAS Chemical Science publications.

- To identify the highly cited articles in the Chemical Science publications.
- To study the major online attention for the articles published in Chemical Science.
- To know the social media platforms used to share academic publications related to Chemical Science.
- To identify the highly cited researchers and their contributions to the field of Chemical Science.

- To know the tweeting statistics for the articles published in Chemical Science.

- To examine the citation analysis and co-citation analysis of the publications of chemical science

5. Methodology

For the present study, Dimensions.ai database has been selected to collect literature on Chemical science literature. The researcher searched for the phrase " Kuvempu University " in the Dimensions database, and articles published in the field of Chemical Science were filtered out based on Altmetric Attention Score. A total of 1180 articles from 1992 to 2023 were evaluated for bibliographic data and altmetrics. These AAS papers were published in different leading journals or preprint repositories. First, descriptive statistics and then correlation analysis between traditional bibliographies and altmetrics were performed. Further, data was analyzed and calculated based on the objectives.

6. Scope and Limitations of the Study

The scope of the present study is confined to publications of chemical science researchers in Kuvempu University during 1992-2023. The data has been gathered from Dimension database (https://app.dimensions.ai/discover/publication). The online attention captured by the articles in terms of mentions, news, blogs, reads and shares on Blogs, Facebook, Mendeley, Twitter are estimated. Further, the study considered five document types, viz. articles, policy documents, grants, patents and clinical trials. The citation analysis and co-citation analysis of the researchers also have been analyzed in this study.

7. Analysis and Discussion

7.1 Selection of Literature @ Dimension.ai

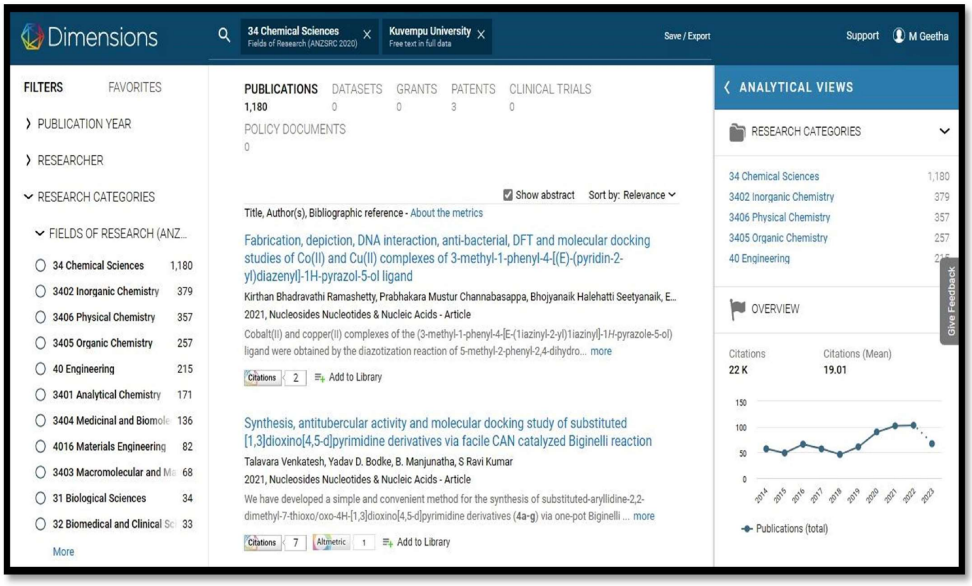


Figure 1. Chemical Science Publications @ Dimension.ai

Dimensions is the largest database of research insight in the world. It represents the most comprehensive collection of linked data related to the global research and innovation ecosystem available in a single platform. Publications in Dimension include research articles, books/chapter, monographs preprint and conference proceedings. For the present study the researcher has selected chemical science publications of Kuvempu University researchers (Figure-1).

7.2 Publication Citations

Publication citations refer to the number of times that a publication has been cited by other publications in the dimension database. The details of these citations have been presented in Table.1.

Type	Counts
Publications	1,180
Citations	22,412
Citation (mean)	19.01

Table 1. Number of Publications

Table 1 reveals that there are a total of 1,180 publications associated with this research output in the field of Chemical Science. These publications could include research papers, articles, and other scholarly works related to chemical research. These publications have accumulated a substantial total of 22,412 citations. These citations represent instances where other researchers have referred to or cited these publications in their work, indicating the influence and importance of the research in the field of Chemical Science. The average number of citations per publication, often referred to as the "citation mean," is approximately 19.01. This indicates that, on average, each publication has been cited nearly 19 times. This high average citation count suggests that the research output in Chemical Science is highly regarded and influential within the field, with many of its publications being extensively cited by other researchers.

Publication Type	Number
Article	1,127
Proceeding	22
Preprint	18
Edited book	8
Chapter	5
Total	**1,180**

Table 2. Types of Publication

Table 2 shows the distribution of publications by type, with a total of 1,180 publications. It is found that the majority of publications fall into the "Article" category, with 1,127 articles. This is the most common publication type, indicating that the researcher or research group has primarily focused on publishing their work in academic journals. "Proceeding" publications, with 22 counts, represent a smaller but significant portion of the total. Further "Preprint" publications, with 18 counts, indicate that the researcher(s) have shared some of their research findings in preprint archives before they undergo formal peer review and publication in journals. The small number of publications includes "Edited book" with 8 publications, and "Chapter" with 5 publications. The result shows a diverse range of publication types, with a heavy emphasis on academic journal articles.

Name of the Journal	**Publication**	**Citation**	**Citations Mean**
Journal of Molecular Structure	52	749	14.40
International Journal of Electrochemical Science	41	881	21.49
Medicinal Chemistry Research	36	453	12.58
Chemical Data Collections	36	366	10.17
Journal of Electroanalytical Chemistry	34	1,464	43.06
ChemInform	29	10	0.34
Phosphorus Sulfur and Silicon and the Related Elements	26	290	11.15
Inorganic Chemistry Communications	26	156	6.00
European Journal of Medicinal Chemistry	24	1,493	62.21
Journal of Molecular Liquids	21	656	31.24
Total	**325**	**6518**	**212.64**

Table 3. Top 10 Journals Contributing Highest Publications

Table 3 shows the top 10 journals based on their publication counts. It is noted that the "European Journal of Medicinal Chemistry" and the "Journal of Electroanalytical Chemistry" stand out with a high average citation count i.e.,1,493 citations and 1,464 citations reflecting their significance in the field of medicinal chemistry. Furthermore the "Journal of Molecular Structure" and the "International Journal of Electrochemical Science" are the leading journals in terms of publication count with 52 and 42 publications and 749 and 881 citation counts followed Journal of Molecular Liquids '' has 656 citations and 'Medicinal Chemistry Research' has 453 citations. It is also observed that "ChemInform" has a relatively low publication count (29) and citation count (10), resulting in a very low citation mean, suggesting that it may not be as widely recognized or cited in the field. The table also provides an overview of the cumulative statistics for all the listed journals in terms of publications, citations, and the average number of citations per publication in the field of chemical science.

It's worth noting that the field of chemical science is diverse, and these journals cover a wide range of topics and research areas within the discipline.

Article No.	Title of the Article	Citation	Recent Citations	FCR	RCR	AAS
1	Click chemistry approach: Regioselective one-pot synthesis of some new 8-trifluoromethyl quinoline based1,2,3-triazoles as potent antimicrobial agents	67	12	8.82	1.22	15
2	Diastereoselective Reduction of the Enone Intermediate of Travoprost	9	0	1.24	NA	15
3	Quantum chemical and electro chemical studies of lysine modified carbon paste electrode surfaces for sensing dopamine	30	13	4.17	NA	14
4	Theoretical and Cyclic Voltametric Analysis of Asparagine and Glutamine Electrocatalytic Activities for Dopamine Sensing Applications	8	8	NA	NA	10
5	A Comprehensive Map of the Human Urinary Proteome	164	22	12	4.56	9
6	ZnO nanoparticle as catalyst for efficient green one-pot synthesis of coumarins through Knoevenagel condensation	101	21	12	NA	9
7	Palladium-Catalyzed Suzuki Cross-Coupling of 2-Halo-Deazapurines with Potassium Organ trifluoroborate Salts in the Regioselective Synthesis of Imidazole[4,5-b] pyridine Analogues	12	3	1.88	NA	9
8	Electrode materials for aqueous rechargeable lithium batteries	89	7	7.93	NA	9
9	A review of recent progress in polymeric electro spun nanofiber membranes in addressing safe s water global issue	71	58	NA	5.18	8
10	Ketosulfone Drug as a Green Corrosion Inhibitor for Mild Steel in Acidic Medium	94	22	12	NA	8
	Total	**645**	**166**	**60.04**	**10.96**	**106**

Table 4. Top 10 Articles with Highest Altimetric Scores

The data provided in Table 4 shows the top 10 articles based on their Altimetric Attention Score (AAS) along with corresponding citation statistics, such as recent citations, Field Citation Ratio (FCR), and Relative Citation Ratio (RCR).

It is found that article 1 has received a high number of recent citations, indicating significant attention in the research community. The Field Citation Ratio (FCR) of 8.82 suggests its importance within its field. Articles 1 and 2 have Altimetric Score (AAS) of 15 which indicates a notable online presence and engagement followed by Article 3 has an AAS of 14, indicating a good level of online attention, Article 4 has received 8 recent citations and has an FCR and RCR values not available. It has an AAS of 10, indicating moderate online attention, and Articles 5,6,7, and 8 have an AAS of 9, suggesting moderate online attention. Articles 9 and 10 have received a substantial number of recent citations, and it has a notable Relative Citation Ratio (RCR). However, the Field Citation Ratio (FCR) is not available, and the Article Altmetric Score (8) is relatively low.

Article No.	Patents	Policy Sources	News Outlets	Blog	Posted	Peer Review Sites	Mendeley	Cite ULike
1	5	0	0	0	0	0	55	0
2	5	0	0	0	0	0	4	0
3	0	0	1	1	0	0	16	0
4	0	0	0	1	2	1	7	0
5	3	0	0	0	0	0	135	3
6	9	0	0	0	0	0	145	0
7	5	0	0	0	0	0	4	0
8	4	1	0	0	0	0	125	0
9	0	0	1	0	2	0	151	0
10	0	0	0	1	1	0	79	0
Total	**31**	**1**	**2**	**3**	**5**	**1**	**721**	**3**

Table 5. Online Attention for Top 10 Articles

Table 5 provides an overview of the online attention received by the top 10 articles. It appears that these articles have garnered a substantial amount of attention on reference management platforms like Mendeley, with a total of 721 citations. The study found the total 31 patents among the total publications.

It was observed that Mendeley has the best coverage of altimetric data sources. Regarding this Article 9 has the highest Mendeley readers with 151 followed by Article 6 with 145 readers, Article 5 with 135, Article 8 has 125 readers, Article 10 with 79 readers, and Article 1 has 55 readers. The remaining articles have a smaller number of Mendeley readers.

While the articles received relatively few mentions in policy sources (1 mention), news outlets (2 mentions), and blogs (3 mentions), they have been shared and posted online quite a bit. Additionally, it's important to

note that the articles have received some peer reviews (1 mention), indicating a level of academic scrutiny.

The data summarizes the combined online attention metrics for all 10 articles, providing a comprehensive view of their overall impact and reach in various online contexts.

Readers	**(N=10)**	**Percent**
Associate Professor	13	2.65
Bachelor Student	22	4.48
Professor	0	0.00
Lecturer	0	0.00
Researcher	357	72.71
Postgraduate Student	99	20.16
Unspecified	0	0.00
Others	0	0.00
Total	491	100

Table 6. Readers by Category

Table 6 shows the distribution of readers in different professional categories in the field of chemical science. It was observed that the majority of readers (72.71%) are Researchers, indicating that the publication has significant relevance and value to professionals actively engaged in research. This was followed by a notable percentage (20.16%) of readers are Postgraduate Students. This suggests that the publication is of interest to those pursuing advanced degrees or engaged in research at the graduate level. A small percentage (4.48%) of the readers are Bachelor students. Only a small percentage of the readers (2.65%) are Associate Professors. Surprisingly, there are no Professors among the readers. This could be due to the specific subject matter or academic level of the publication. Similar to Professors, there are no Lecturers among the readers, which could suggest that the content may not align with their professional interests. There are no readers classified as Unspecified" and "Others," meaning that all readers fall into one of the specified categories.

Table 7 lists various countries and the number of readers from each country who engage in tweeting. The result revealed that India has the highest number of readers engaged in tweeting, with 13 individuals, which makes up 31.71% of the total readers. This suggests a significant Twitter presence and activity from India. The United Kingdom, Colombia, Switzerland, and Poland have 4, 2, 2, and 2 readers, respectively, engaged in tweeting. This represents 9.76%, 4.88%, 4.88%, and 4.88% of the total readers, indicating a notable Twitter presence in these countries. Many countries, such as the United States, Russia, Singapore, Portugal, Spain, Pakistan, Vietnam, Belgium, Serbia, Sweden, Ireland, Ukraine, Mexico, Argentina, and Costa Rica, have a small number of readers who engage in tweeting. Each of these countries contributes less than 3% of the total readers, with some having only 1 reader. Further, Germany and South Africa have no readers engaged in tweeting according to the data.

Country	Readers (N=10)	Percent
United States	1	2.44
India	13	31.71
Russia	1	2.44
Singapore	1	2.44
Spain	2	4.88
Germany	0	0.00
Portugal	1	2.44
Poland	2	4.88
Italy	2	4.88
United Kingdom	4	9.76
Pakistan	1	2.44
Vietnam	1	2.44
Belgium	1	2.44
Serbia	1	2.44
Sweden	1	2.44
South Africa	0	0.00
Ireland	1	2.44
Colombia	2	4.88
Switzerland	2	4.88
Ukraine	1	2.44
Mexico	1	2.44
Argentina	1	2.44
Costa Rica	1	2.44
Total	**41**	**100.00**

Table 7. Country-wise Tweeting

7.3 Co-authorship analysis

Co-authorship analysis can provide valuable information about an author's academic connections, the interdisciplinary nature of research, and trends in specific fields of study. Dimension has integrated a web-based version of Vos Viewer to instantly visualize bibliometric networks such as co-authorship analysis or co-

citation analysis from within the analytical views panel.

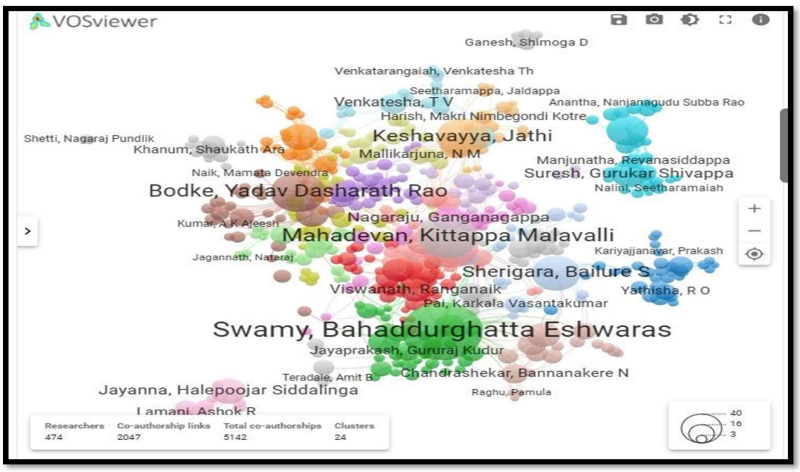


Figure 2. Co-authorship Analysis of Researchers

Figure 2 shows the co-authorship analysis of Chemical Science researchers created using Vos Viewer software integrated in Dimension. This visualization provides a comprehensive overview of a research network, including the following key components: the total count of researchers, the connections between them through co-authorship links, the overall number of co-authorship collaborations, and the presence of distinct clusters within the network. Moreover, users can access detailed information about individual researchers by clicking on their names, allowing them to explore and review the specific co-authorship relationships associated with each researcher.

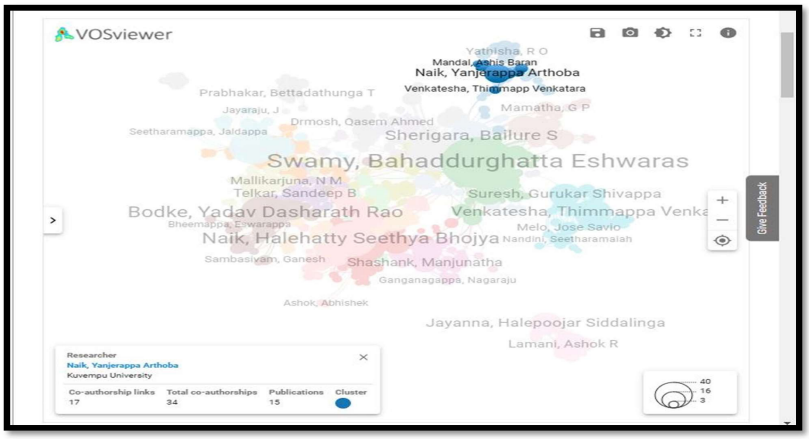


Figure 3. Co-authorship Analysis of Individual Researcher

Figure 3 shows the co-authorship analysis of individual researcher. Clicking on an author's name will instantly reveal information about that researcher, including their name, university affiliation, co-authorship connections, the total number of co-authorships they've engaged in, their publication history, and the clusters to which they belong as shown in the above visualization.

7.4 Citation Analysis

Citation analysis in altmetrics considers how and where research output is cited across this range of sources. Altmetrics recognizes the impact of scholarly works on social media platforms such as Twitter, Facebook, and LinkedIn.

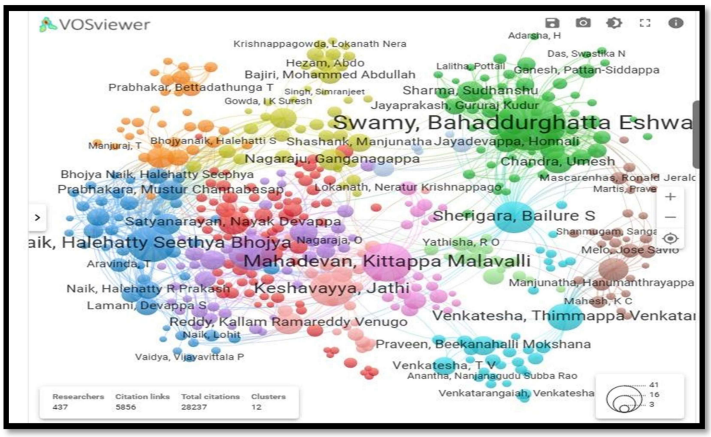


Figure 4. Citation Analysis of Researchers

Figure 4 shows the citation analysis of researchers in chemical science subject. It encompasses a substantial dataset involving a total of 437 researchers, 5,856 citation links, and a cumulative count of 28,237 citations. Within this dataset, there are also 12 distinct clusters representing groups of closely related research areas or collaborations.

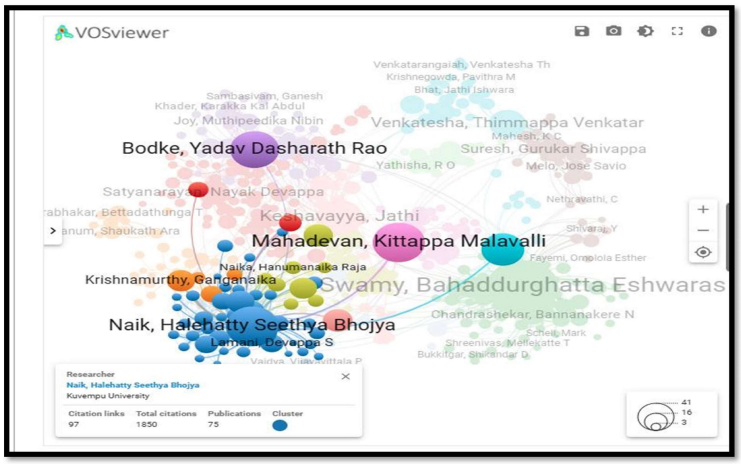


Figure 4. Citation Analysis of Individual Researcher

Figure 4 shows the citation analysis of individual researcher. In the above visualization, the researcher selected the author Naik, Halehatty Seethya Bhoijya to show the citation analysis counts. When clicking on an individual author's name, the visualization will instantly display a detailed citation analysis for that specific researcher. This analysis includes the researcher's name, the number of citation links associated with their work, the total count of citations they have received, the total number of publications attributed to them, and the clusters. This information offers a comprehensive view of that researcher's impact and publications within the context of the citation analysis. In the case of the selected author, "Naik, Halehatty Seethya Bhoijya," their profile reveals a substantial 97 citation links, a noteworthy total of 1,850 citations, a publication history comprising 75 works, and no cluster affiliations.

8. Findings of the Study

The major findings of this study are:

• The research output in the field of Chemical Science, comprising 1,180 publications, has received considerable recognition within the scientific community, as evidenced by the 22,412 citations with a citation mean of '19.01'.

• It was observed that the majority of the publications in chemical science are in the "Article" category, with a substantial count of 1,127 articles, they also actively engage in sharing their work through other publication types, including "Proceeding," "Preprint," "Edited book," and "Book Chapter."

• It was also found that the "European Journal of Medicinal Chemistry" and the "Journal of Electroanalytical Chemistry" stand out with a high average citation count i.e.,1,493 citations and 1,464 citations reflecting its significance in the field of medicinal chemistry.

• Journal of Molecular Structure" and the "International Journal of Electrochemical Science" are the leading journals in terms of publication count with 52 and 42 publications and 749 and 881 citations count respectively.

• The data reveals that the top 10 articles received significant attention on the Mendeley reference management platform, with a total of 721 citations, indicating a strong presence within the academic and research community, and are mentioned in 31 patents. The articles have also been discussed in blogs or blog posts three times in total, indicating some level of engagement within the blogging community.

• India stands out as the country with the highest number of readers engaged in tweeting, with 13 individuals, making up 31.71% of the total readers. This indicates a strong Twitter presence and significant tweeting activity in India.

9. Conclusion

The present study is designed to determine the effect of high Altmetrics Attention Scores (AAS) papers relating to Chemical Science. Concerning the first research question, it was found more AAS was collected from Mendeley than other sources such as Blogs, Facebook, Twitter, Wikipedia, and book reviews. Facebook and Twitter have a greater membership but Mendeley is used much more by academics. Perhaps the most significant finding is that the top 10 AAS papers were published in different sources, the majority published in Journal of Molecular Structure" and the "International Journal of Electrochemical Science". Further, the data indicates a research career that started modestly but has seen significant growth in terms of both the number of publications and citations, particularly in the last decade. The high citation percentages in recent years suggest that the quality and impact of the research have improved substantially. Further, the impact of chemical science publications in policy-related sources, news outlets, and blogs appears to be relatively modest. These findings provide insights into the online visibility and influence of these articles across different platforms. Since the present study is restricted in its scope, it clearly shows the value of considering AAS in designing research projects where time is of the essence in disseminating results.

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