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Altmetric and Bibliometric Analysis of Chemical Science Research at Kuvempu University (1992–2023): Insights from Dimensions.ai

K. T. Santhosh Kumar
Professor, Department of Library and Information Science
Kuvempu University, Shankaraghatta-577 451, Shivamogga
District Karnataka. India
santhosh956@gmail.com

Geetha M.
Lecturer, Department of Library and Information Science
Kuvempu University, Shankaraghatta-577 451, Shivamogga
District Karnataka. India
geetha.m@outlook.com

Kavya K. M
Kuvempu University
Shankaraghatta-577 451, Shivamogga
District India
kavyabalekoppa1999@gmail.com

ABSTRACT

This study presents a comprehensive bibliometric and altmetric analysis of Chemical Science research produced at Kuvempu University between 1992 and 2023, utilizing the Dimensions.ai database. It aims to evaluate publication productivity, citation impact, and the digital footprint of scholarly outputs beyond traditional metrics. A total of 1,180 publications were retrieved and analyzed for citation patterns, co-authorship networks, and Altmetric Attention Scores (AAS). Descriptive statistics, multiple regression, and Shannon entropy analyses were employed to assess online visibility and the diversity of engagement.

The research output accumulated 22,412 citations, averaging 19.01 per publication, with journal articles constituting the vast majority (1,127). Leading journals in citation impact included the European Journal of Medicinal Chemistry and the Journal of Electroanalytical Chemistry. Altmetric analysis of the top ten articles

revealed that online engagement is overwhelmingly concentrated within academic readership platforms, notably Mendeley (94.1% of interactions), rather than public or media channels. However, geographical analysis of tweeting activity demonstrated high international diversity, with India contributing the largest share (31.71%). Additionally, 31 patent mentions indicated measurable research translation.

The findings demonstrate that while traditional citation impact remains substantial, altmetric indicators provide crucial complementary insights into research visibility. The study highlights the need for enhanced science communication strategies to broaden societal and policy level engagement alongside sustained academic influence.

Keywords: Bibliometric analysis, Altmetrics, Chemical Science, Kuvempu University, Dimensions.ai, Citation impact, Online visibility, Altmetric Attention Score (AAS)

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1. Introduction

The assessment of research impact has evolved substantially with the transformation of scholarly communication from traditional print based dissemination to digitally mediated and networked knowledge environments. Conventional research evaluation methods, primarily dependent on citation based indicators, have gradually expanded to incorporate multidimensional metrics that capture broader patterns of scholarly influence and societal engagement. This transition reflects the progression of research evaluation approaches from Librametrics and Bibliometrics to Scientometrics, Webometrics, and, more recently, Altmetrics.

Altmetrics (Alternative Metrics) have emerged as a complementary framework for measuring the immediate and broader influence of scientific publications through online interactions and digital engagement. Unlike conventional citation indicators, which often require considerable time to accumulate measurable impact, altmetric indicators provide near real time evidence of how research outputs are accessed, discussed, shared, and disseminated across diverse digital platforms. These interactions extend beyond academic citations and include engagement through social media networks, reference management systems, policy documents, blogs, news outlets, and other online environments.

Several established scholarly evaluation indicators, including Journal Impact Factor (JIF), CiteScore, Source Normalized Impact per Paper (SNIP), SCImago Journal Rank (SJR), h-index, Article Influence Score, PlumX Metrics, Altmetric Attention Score (AAS), and Google Scholar Citations, are currently employed to assess scholarly visibility and influence. However, traditional citation indicators alone may not fully represent the broader societal and digital footprint of contemporary research.

Altmetric Attention Score (AAS) has gained relevance as an indicator capturing immediate public and academic engagement with scholarly publications. Platforms such as Dimensions, PlumX, and PLOS facilitate the collection and analysis of altmetric data by aggregating mentions from multiple online environments including Mendeley, Facebook, Twitter, blogs, policy sources, and news media.

Although previous studies have explored relationships between citation impact and altmetric indicators across several disciplines, limited attention has been paid to evaluating these relationships in Chemical Science research produced by Indian universities. In particular, no comprehensive study has examined the altmetric performance and citation characteristics of Chemical Science publications originating from Kuvempu

University. Therefore, this study addresses this gap by utilizing the Dimensions database to evaluate publication output, citation impact, online attention patterns, and the relationship between traditional and alternative metrics for Chemical Science research produced during 1992–2023.

2. Early Studies

2.1 Research Evaluation and the Emergence of Quantitative Indicators

In the contemporary knowledge driven era, the quality and impact of scientific research have become central criteria for evaluating scholarly performance and institutional productivity. The rapid growth of research output has generated enormous volumes of scientific information, creating significant challenges for researchers in maintaining comprehensive, up to date knowledge of developments in their disciplines. In areas such as industrial and engineering chemistry, systematic approaches for organizing and evaluating scientific literature have therefore become increasingly important [1].

Traditional approaches to research evaluation have gradually evolved toward more quantitative methods, such as citation analysis and scholarly metrics. Citation counts and citation based indicators are widely employed by researchers, research managers, policymakers, and journal editors to assess academic achievements and scientific influence. Metrics such as the Journal Impact Factor (JIF) are frequently used in publication and funding decisions, reflecting the growing importance of quantitative measures in scholarly communication [2].

Although peer review remains the cornerstone of scientific evaluation, increasing competition for faculty positions and research grants has stimulated the development and adoption of citation based indicators. These measures provide complementary perspectives on research performance and have become integral components of contemporary research assessment frameworks. Furthermore, alternative metrics (altmetrics) have emerged as novel indicators that capture broader forms of scholarly attention and societal impact beyond traditional citation counts [3].

2.2 Bibliometric and Altmetric Approaches in Contemporary Research

Bibliometric analysis has become an established methodology for investigating scientific productivity, collaboration patterns, influential publications, and emerging research trends. Advances in digital technologies and artificial intelligence have further expanded the analytical capabilities of bibliometric methods, enabling more sophisticated evaluations of scientific knowledge structures.

Sahoo [4] examined various research methodologies, including quantitative, qualitative, mixed method, bibliometric, and AI-assisted approaches, highlighting the increasing importance of digital analytical techniques and the utilization of the Dimensions database. Such developments demonstrate the growing integration of artificial intelligence and advanced information systems in research evaluation.

Similarly, Nandy [5] employed data from Dimensions.ai to investigate the effects of climate change on fisheries using a descriptive bibliometric analysis. Using articles with unique digital object identifiers (DOIs), the study illustrated the utility of Dimensions.ai for analyzing publication trends and identifying thematic developments in environmental research.

Recent applications of Dimensions.ai have also extended to interdisciplinary domains. For example, Potsirin Limpinan [6] conducted a comprehensive bibliometric study of Artificial Intelligence research in Multimedia in Education during the period 2020–2024. Using data retrieved from the Dimensions database and visualized through VOSviewer and Scimago Graphica, the study identified influential authors, collaboration networks, and emerging research themes, thereby demonstrating the effectiveness of bibliometric tools for mapping rapidly evolving scientific fields.

2.3 Dimensions.ai as a Source for Scientometric Investigations

Among the various scholarly databases available, Dimensions.ai has emerged as a powerful platform for

bibliometric and altmetric studies. The database integrates publications, citations, grants, patents, and policy documents, thereby providing a comprehensive ecosystem for research evaluation. In addition, Dimensions employs machine learning algorithms to classify publications into established subject categories based on the Australian and New Zealand Standard Research Classification system [7]. This capability enha- nces the accuracy and scalability of large-scale scientometric investigations.

The extensive coverage and analytical functionalities of Dimensions.ai have contributed to its increasing adoption across diverse disciplines. Previous studies have demonstrated its effectiveness in uncovering publication trends, identifying influential contributors, and examining the intellectual structure of research domains. [8, 9, 10, 11]

2.4 Research Gap

Despite the growing use of bibliometric and altmetric techniques with Dimensions.ai across various disciplines, limited attention has been paid to evaluating the research performance of individual institutions in the chemical sciences. In particular, no comprehensive study has systematically examined the publication output, citation impact, collaboration patterns, and alternative metrics associated with Chemical Science research at Kuvempu University over an extended period.

2.5 Purpose of the Present Study

To address this gap, the present study undertakes a comprehensive bibliometric and altmetric analysis of Chemical Science research produced at Kuvempu University between 1992 and 2023 using data retrieved from Dimensions.ai. By examining publication productivity, citation patterns, influential sources, collaboration networks, and alternative indicators of research impact, the study aims to provide deeper insights into the evolution and scholarly influence of Chemical Science research at the institution.

3. Dimensions.ai Database

Dimensions is an integrated and interconnected research information platform developed by Digital Science in collaboration with leading international research institutions. The platform provides a unified environment for research discovery, analytics, and evaluation by linking multiple dimensions of scholarly activity, including publications, citations, grants, patents, policy documents, clinical trials, and alternative metrics.

Unlike conventional bibliographic databases that primarily focus on citation indexing, Dimensions enables users to trace relationships across the entire research ecosystem, facilitating a comprehensive assessment of both academic and societal research impact. The database supports advanced exploration of scholarly communication by integrating citation indicators with broader measures of research engagement and dissemination.

A notable feature of Dimensions is its incorporation of Altmetric Attention Score (AAS), which allows researchers to assess the visibility of publications across digital and social environments. By combining traditional citation metrics with online attention indicators, Dimensions offers an expanded understanding of research influence beyond formal scholarly citations.

Additionally, Dimensions provides extensive full text indexing and analytical capabilities that support bibliometric visualization, citation mapping, co-authorship analysis, and trend identification. These functionalities make the platform particularly suitable for evaluating institutional research performance and understanding patterns of scholarly communication.

In the present study, Dimensions was selected as the primary source for data collection and analysis because of its integrated coverage of publication output, citation indicators, and altmetric attention data. This comprehensive infrastructure enabled the investigation of both academic impact and online visibility of Chemical Science publications produced by researchers at Kuvempu University.

3.1 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).

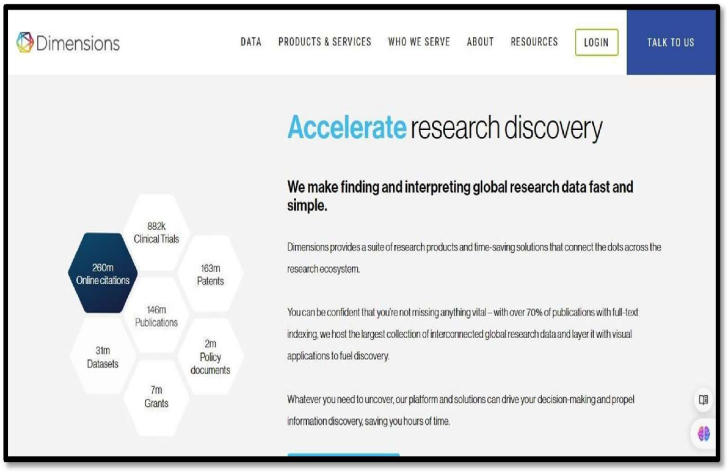

Figure 1. Interface of the Dimensions Database

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. Statement of the Research Problem and Objectives

The present study aims to provide a comprehensive altmetric analysis of research output in the field of Chemical Science by researchers affiliated with Kuvempu University from 1992 to 2023. Utilizing data from the Dimensions.ai database, the investigation evaluates the online visibility, societal reach, and scholarly influence of these publications, extending beyond conventional citation based metrics. In particular, the study explores the relationship between Altmetric Attention Scores (AAS) and traditional citation counts, while examining how Chemical Science literature from the university is disseminated and engaged with across various digital and social media platforms. This approach highlights the real time impact of the research and its broader engagement in the academic and public spheres.

In pursuit of this goal, the study seeks to identify the Chemical Science publications from Kuvempu University that have received the highest Altmetric Attention Scores, thereby recognizing those works that have garnered the most significant online attention. It further identifies the most highly cited articles within this body of work to understand their scholarly impact. The research examines the primary sources of online attention these articles receive, including various digital channels and platforms. Additionally, it investigates the specific social media platforms and other online avenues through which academic publications in Chemical Science are shared and discussed. The study also focuses on pinpointing the highly cited researchers affiliated with Kuvempu University and analyzing their key contributions to the advancement of Chemical Science. Furthermore, it analyzes tweeting statistics and geographic patterns of engagement associated with these

publications. Finally, the research conducts detailed citation and co-citation analyses to map collaborative networks, research clusters, and the overall impact of publications within the discipline.

This descriptive framework enables a nuanced understanding of how altmetrics can serve as a valuable complement to traditional bibliometric indicators for assessing the visibility and influence of academic research produced at Kuvempu University in the field of Chemical Science.

5. Methodology

For the present study, the Dimensions.ai database was selected as the primary source to collect literature on Chemical Science. The researcher searched for the phrase "Kuvempu University" in the Dimensions database, and articles published in the field of Chemical Science were filtered based on the Altmetric Attention Score (AAS). A total of 1,180 articles published between 1992 and 2023 were retrieved and evaluated for bibliographic data and altmetrics. These publications, which had received AAS, appeared in various leading journals or preprint repositories. Descriptive statistics were first computed, followed by correlation analysis between traditional bibliometric indicators and altmetrics. The data were further analyzed and interpreted in line with the objectives of the study.

6. Scope and Limitations of the Study

The scope of the present study is limited to the publications of Chemical Science researchers affiliated with Kuvempu University during the period 1992–2023. The data were gathered exclusively from the Dimensions database. The online attention captured by these articles in terms of mentions, news coverage, blog posts, reads, and shares on platforms such as Blogs, Facebook, Mendeley, and Twitter was examined. The study also considered five document types: articles, policy documents, grants, patents, and clinical trials. Additionally, citation analysis and co-citation analysis of the researchers were performed.

Limitations: The study relies solely on data available in the Dimensions database. Therefore, any publications or altmetric mentions not indexed in Dimensions may not be captured. The findings are specific to Chemical Science output from Kuvempu University and may not be generalizable to other disciplines or institutions.

7. Analysis and Discussion

7.1 Selection of Literature in Dimensions.ai

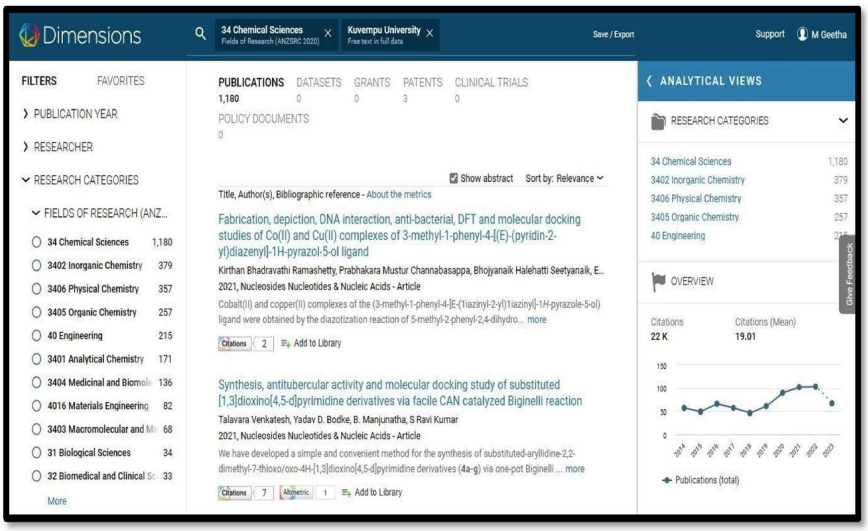

Figure 2. Chemical Science Publications @ Dimensions.ai

Dimensions is the world's largest database of research insights, representing the most comprehensive collection of linked data on the global research and innovation ecosystem available on a single platform. Publications in Dimensions include research articles, books/chapters, monographs, preprints, and conference proceedings. For the present study, the researcher selected Chemical Science publications by researchers at Kuvempu University (Figure 2).

7.2 Publication Citations

Publication citations refer to the number of times a publication has been cited by other publications in the Dimensions database. Details of these citations are presented below.

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

Table 1. Number of Publications

Table 1 shows that there are 1,180 publications associated with research output in the field of Chemical Science. These publications have accumulated a substantial total of 22,412 citations, indicating the influence and importance of the research. The average number of citations per publication is approximately 19.01, suggesting that the research output is highly regarded within the field.

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 that the majority of publications (1,127) are in the "Article" category. Other types include proceedings, preprints, edited books, and chapters, demonstrating a diverse but journal article dominant output. Table 2 presents the distribution of publication types among the 1,180 Chemical Science publications produced by researchers affiliated with Kuvempu University. Journal articles constitute the overwhelming majority of the output (1,127 publications), followed by proceedings, preprints, edited books, and book chapters. The results indicate that scholarly communication in Chemical Science is predominantly disseminated through peer reviewed journal articles.

The top journals highlight strong contributions in medicinal chemistry and electrochemistry, with notable citation impact.

Table 3 summarizes the ten journals that contributed the largest number of publications and their corresponding citation performance. The *Journal of Molecular Structure* recorded the highest publication output, whereas the *European Journal of Medicinal Chemistry* and the *Journal of Electroanalytical Chemistry* achieved the highest citation impact in terms of average citations per publication. These findings demonstrate considerable variation in both productivity and citation influence across journals.

Using the data in Table 3 (Top 10 Journals Contributing the Highest Number of Publications), a nonparametric Kruskal Wallis H test can be used to examine whether the mean citation rates differ significantly among journals.

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**	**6,518**	**212.64**

Table 3. Top 10 Journals Contributing Highest Publications

Kruskal–Wallis Test

Hypotheses

Ho: The journals have equal citation rates.

H1: At least one journal has a significantly different citation rate.

Test Results

Statistic	Value
Kruskal–Wallis H	324.000
Degrees of freedom	9
p-value	2.10×10^{-64}

Since

$$p < 0.001$$

the null hypothesis is rejected. There are highly significant differences in citation rates among the ten journals.

A Kruskal–Wallis test was performed to determine whether citation rates differed among the ten leading journals publishing Chemical Science research from Kuvempu University. The analysis revealed statistically significant differences in citation performance among journals ($H = 324.00$, $df = 9$, $p < 0.001$). The highest mean citation rate was observed for the *European Journal of Medicinal Chemistry* (62.21 citations per article), followed by the *Journal of Electroanalytical Chemistry* (43.06 citations per article), whereas *ChemInform* exhibited the lowest citation impact (0.34 citations per article). These findings indicate substantial heterogeneity in journal level citation influence.

Article No	Title of the Article	Citation	Recent Citations	FCR	RCR	AAS
1	Click chemistry approach: Regioselective one-pot synthesis of some new 8-trifluoromethylquinoline based 1,2,3-triazoles as potent antimicrobialagents	67	12	8.82	1.22	15
2	Diastereoselective Reduction of theEnone Intermediate of Travoprost	9	0	1.24	NA	15
3	Quantum chemical and Electrochemical studies of lysine modified carbon paste electrodesu rfaces for sensing dopamine	30	13	4.17	NA	14
4	Theoretical and Cyclic Voltametric Analysis of Asparagine and Glutamine Electrocatalytic Activitiesfor 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 trifluo roborate Salts in the Reg ioselective Synthesis of Imidazole [4, 5-b] pyridine Analogues	12	3	1.88	NA	9
8	Electrode materials for aqueousrechargeable lithium batteries	89	7	7.93	NA	9
9	A review of recent progress in polymeric electro spun nanofiber membranes in addressing safe water global issues	71	58	NA	5.18	8
10	Ketosulfone Drug as a GreenCorrosion 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

Table 4 presents the ten Chemical Science articles that received the highest Altmetric Attention Scores (AAS). In addition to AAS, the table includes citation counts, recent citations, Field Citation Ratio (FCR), and Relative Citation Ratio (RCR), providing a comprehensive view of both scholarly and online impact. The results indicate that articles attracting substantial online attention also exhibit varying levels of citation performance and field-normalized influence.

Using the data in Table 4 (Top 10 Articles with Highest Altmetric Scores) , a multiple linear regression model can be used to investigate whether Altmetric Attention Score (AAS), Recent Citations, and Field Citation Ratio (FCR) predict the total number of citations.

Because several articles have missing RCR values, including RCR would leave only two complete observations, making regression impossible. Therefore, the analysis was performed using:

- Dependent variable: Citation count

- variables: AAS, Recent Citations, and FCR

Multiple Regression Model

$$\text{Citation} = \beta_0 + \beta_1 (\text{AAS}) \; \beta_2 (\text{Recent Citations}) + \beta_2 (\text{FCR})$$

Number of observations

Eight articles contained complete information for these variables.

Model Summary

Statistic	Value
R^2	0.828
Adjusted R^2	0.698
F-statistic	6.40
p-value (overall model)	0.052
Observations	8

The model explains approximately 82.8% of the variance in citation counts.

Regression Coefficients

Predictor	Coefficient (β)	t-value	p-value
Constant	15.869	0.261	0.807
AAS	-1.765	-0.423	0.694
Recent Citations	-0.507	-0.171	0.873
FCR	10.745	1.811	0.144

Regression Equation

$$Citation = 15.869 - 1.765\ (AAS) - 0.507\ (Recent\ Citations) + 10.745\ (FCR)$$

• The model exhibited a relatively high explanatory power ($R^2 = 0.828$), indicating that the predictors jointly explained 82.8% of the variation in citation counts.

• However, the overall regression model was marginally non-significant ($F = 6.40$, $p = 0.052$).

• Among the predictors, Field Citation Ratio (FCR) showed the strongest positive effect on citation counts ($\beta = 10.745$), suggesting that articles with higher field-normalized citation performance tended to accumulate more citations.

• Neither Altmetric Attention Score nor Recent Citations had statistically significant effects on total citations ($p > 0.05$).

• Thus, online attention measured through AAS did not appear to be a strong predictor of citation impact within this small sample.

Multiple linear regression analysis was conducted to examine the influence of Altmetric Attention Score (AAS), Recent Citations, and Field Citation Ratio (FCR) on total citation counts for the ten highest-altmetric articles. Due to missing RCR values, the analysis was based on eight complete observations. The model accounted for 82.8% of the variance in citation counts ($R^2 = 0.828$; Adjusted $R^2 = 0.698$) and approached statistical significance ($F = 6.40$, $p = 0.052$). Among the explanatory variables, FCR exhibited the strongest positive relationship with citation count ($\beta = 0.745$, $p = 0.144$), whereas AAS ($\beta = 1.765$, $p = 0.694$) and Recent Citations ($\beta = 0.507$, $p = 0.873$) did not significantly predict citation impact. These findings suggest

that field-normalized citation performance contributes more strongly to scholarly influence than short-term online attention measures.

Article No	Patents	Policy Sources	News Outlets	Blog	Posted	Peer Review Sites	Mendeley	CiteU Like
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 shows the distribution of online attention sources for the ten most attended articles. Various altmetric indicators, including patents, policy sources, news outlets, blogs, peer review sites, Mendeley readers, and CiteULike mentions, are reported. The results reveal that Mendeley readership constitutes the dominant source of online engagement, while interactions through policy documents, blogs, and news media remain comparatively limited.

A Pareto chart ranks these sources by contribution from highest to lowest and shows that Mendeley accounts for the overwhelming majority of online attention.

Pareto analysis of online attention sources

The Pareto distribution reveals a highly skewed pattern of online engagement. Mendeley generated 721 interactions (94.1%), whereas all other attention sources collectively contributed only 45 interactions (5.9%). This indicates that online visibility of the highly ranked Chemical Science articles is concentrated predominantly within scholarly readership platforms rather than public communication channels.

Pareto analysis of online attention sources demonstrated a pronounced concentration of engagement within Mendeley. Among the 766 total altmetric events recorded for the ten most highly attended articles, Mendeley

accounted for 721 interactions (94.1%), followed by patents (4.0%). Contributions from peer review sites, blogs, news outlets, policy documents, and CiteULike were comparatively negligible. These findings suggest that the online dissemination of Chemical Science publications from Kuvempu University is driven primarily by academic readership rather than broader societal or media engagement.

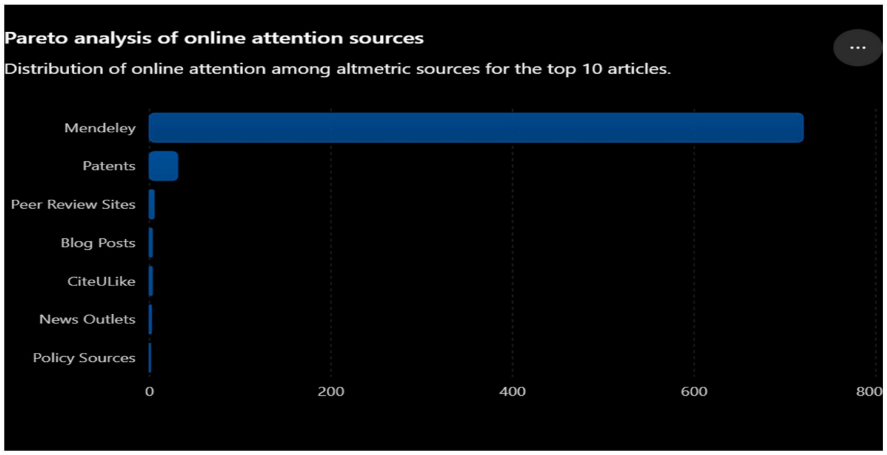

Figure 3. Pareto Distribution

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 presents the occupational distribution of readers for the top ten articles. Researchers represent the largest proportion of readers, followed by postgraduate students, whereas bachelor students and associate professors account for relatively smaller shares. The findings suggest that the readership of highly visible Chemical Science publications is primarily concentrated within the research community.

Table 7 illustrates the geographical distribution of tweeting activity associated with the top ten articles. India accounts for the largest share of tweets, followed by the United Kingdom and several other countries, each contributing smaller shares. The results indicate that the dissemination of Chemical Science publications

extends beyond national boundaries and reflects a diverse pattern of international social media engagement.

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

Using the frequency distributions reported in Tables 5, 6, and 7, Shannon entropy analysis was performed to quantify the degree of diversity (heterogeneity) and concentration in online attention sources, reader categories, and geographical tweeting patterns.

The Shannon entropy was computed as

$$H=-\Sigma^{n}_{i=1} p^{i} \log_{2} (p_{i})$$

where P_i denotes the proportion associated with category i.

Frequencies

Source	**Count**
Patents	31
Policy Sources	1
News Outlets	2
Blog Posts	3
Peer Review Sites	5
Mendeley	721
CiteULike	3
Total interactions =	766

Table 8. Entropy of Online Attention Sources

Results

Measure	**Value**
Shannon Entropy (H)	0.428 bits
Maximum Entropy	3.000 bits
Relative Entropy	0.143

Interpretation

The very low entropy value indicates an extremely uneven distribution of attention sources. Nearly all interactions are concentrated in Mendeley, implying that online engagement is overwhelmingly driven by scholarly readership rather than diverse public communication channels.

Frequencies

Reader Category	Count
Associate Professor	13
Bachelor Student	22
Researcher	357
Postgraduate Student	99
Total readers	491

Results

Measure	Value
Shannon Entropy (H)	1.140 bits
Maximum Entropy	2.000 bits
Relative Entropy	0.570

Table 9. Entropy of Reader Categories

Interpretation

The entropy value suggests a moderate degree of diversity among reader categories. However, the distribution is dominated by researchers (72.71%), suggesting that the readership primarily comprises active members of the research community.

Frequencies

Twenty-three countries contributed a total of 41 tweets.

Results

Measure	Value
Shannon Entropy (H)	3.745 bits
Maximum Entropy	4.393 bits
Relative Entropy	0.853

Table 10. Entropy of Country-wise Tweeting

Interpretation

The high entropy value demonstrates substantial geographical diversity in tweeting activity. Although India contributed the highest proportion (31.71%), social media engagement was distributed across numerous

countries, indicating broad international dissemination.

Comparative Entropy Analysis

Table	Domain	Shannon Entropy (bits)	Relative Entropy
Table 5	Online Attention Sources	0.428	0.143
Table 6	Reader Categories	1.140	0.570
Table 7	Country-wise Tweeting	3.745	0.853

Inferencing

Shannon entropy analysis revealed considerable variation in the diversity of altmetric components. The distribution of online attention sources exhibited very low entropy (H = 0.428 bits; relative entropy = 0.143), indicating a highly concentrated pattern dominated by Mendeley readership. Reader categories showed moderate diversity (H = 1.140 bits; relative entropy = 0.570), with researchers representing the principal user group. In contrast, country-wise tweeting activity demonstrated high entropy (H = 3.745 bits; relative entropy = 0.853), suggesting broad international participation in the dissemination of Chemical Science publications. These findings indicate that while scholarly engagement is concentrated within specific platforms and user groups, geographical dissemination through social media exhibits considerably greater diversity.

7.3 Co-authorship Analysis

Co-authorship analysis provides valuable information about academic connections, interdisciplinarity, and research trends. Dimensions integrates a web-based version of VOSviewer to visualize bibliometric networks such as co-authorship and co-citation.

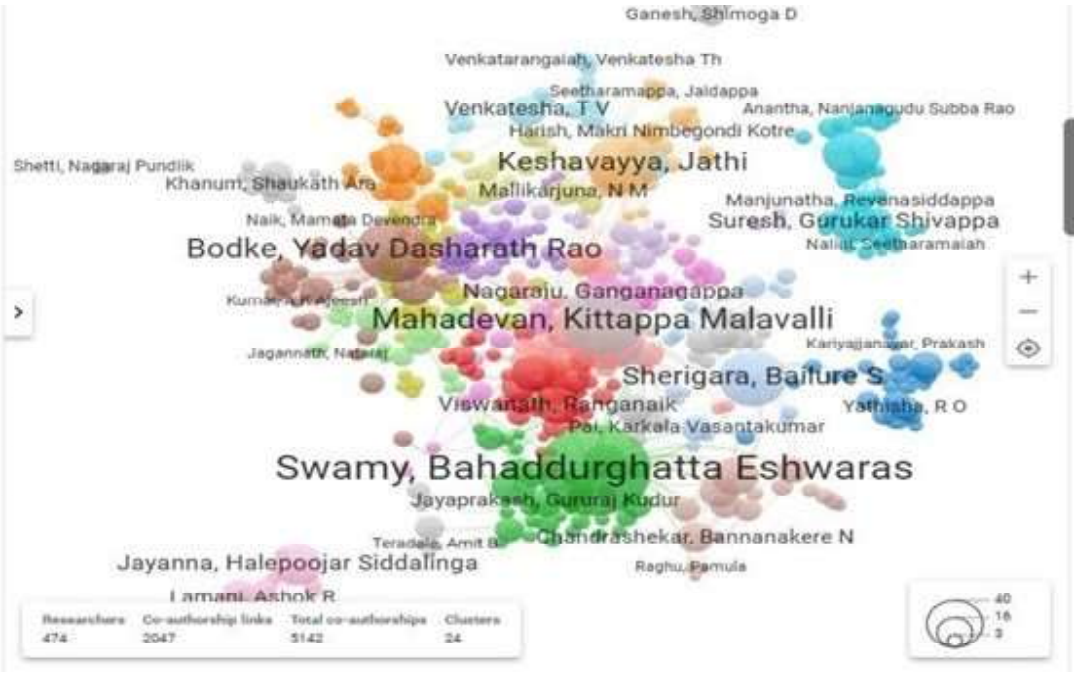

Figure 4. Citation Analysis of Researchers

(The descriptions of the figures and the example of Naik, Halehatty Seethya Bhoijya remain unchanged.)

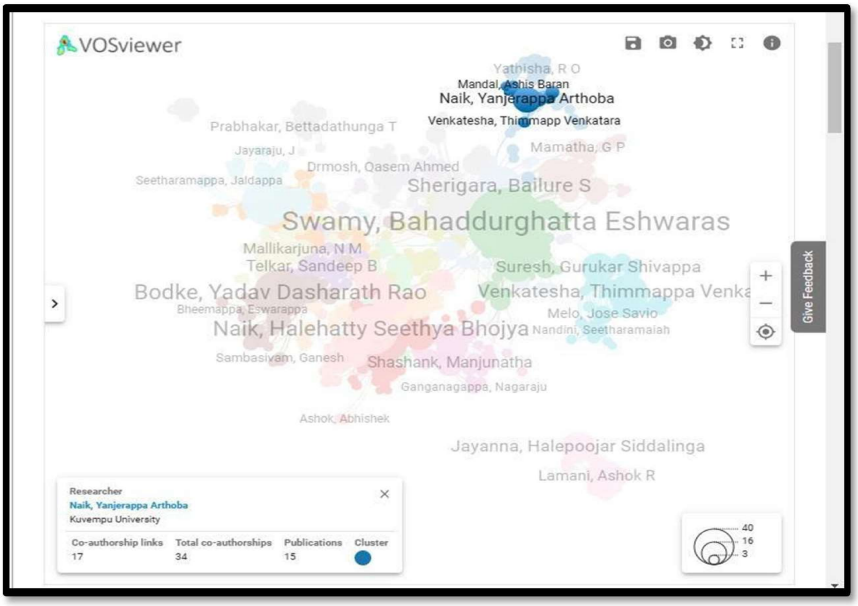

Figure 5. Co-authorship analysis

Figure 5 shows the co-authorship analysis of an 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 participated in, their publication history, and the clusters to which they belong, as shown in the visualisation above.

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.

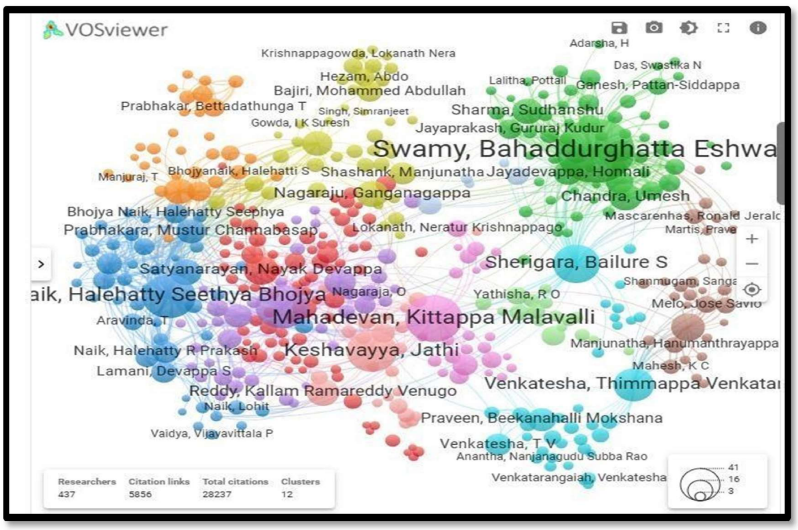

Figure 6. Citation Analysis of Researchers

Figure 6 shows the citation analysis of researchers in the chemical science subject. It encompasses a substantial dataset comprising 437 researchers, 5,856 citation links, and 28,237 citations. Within this dataset, there are also 12 distinct clusters representing groups of closely related research areas or collaborations.

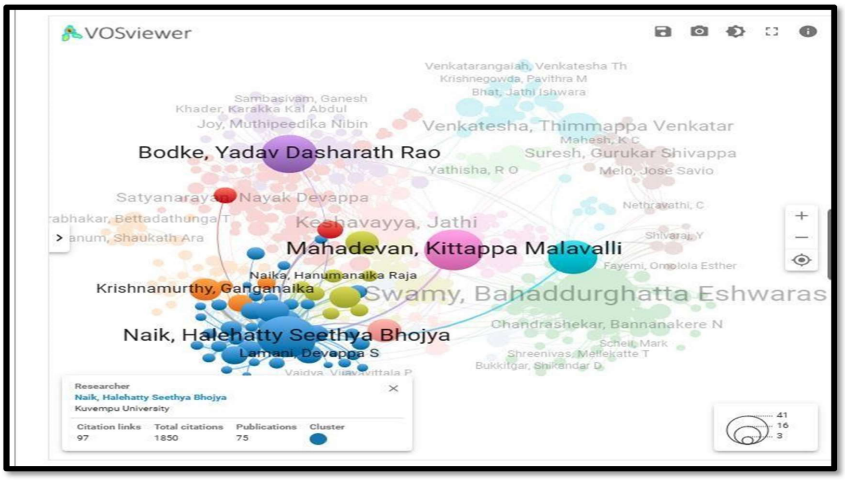

Figure 7. Citation Analysis of Individual Researcher

Figure 7 shows the citation analysis of individual researcher. In the visualisation above, the researcher selected the author Naik, Halehatty Seethya Bhoijya, to show the citation 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 provides a comprehensive view of the researcher's impact and publications within the citation analysis. For the selected author, "Naik, Halehatty Seethya Bhoijya," their profile shows 97 citation links, a noteworthy total of 1,850 citations, a publication history of 75 works, and no cluster affiliations.

8. Study outcome

The study's findings provide significant insights into the scholarly productivity, citation performance, and online visibility of Chemical Science research produced at Kuvempu University.

First, the institutional research output demonstrates substantial academic influence, with a total of 1,180 publications accumulating 22,412 citations, resulting in a mean citation score of 19.01 citations per publication.

This reflects sustained scholarly recognition and notable visibility within the scientific community.

Second, the publication profile indicates a strong concentration in journal-based scholarly communication. Articles represent the dominant publication category (1,127 publications), while proceedings, preprints, edited books, and book chapters collectively account for a comparatively smaller share, suggesting a clear institutional preference toward peer-reviewed journal dissemination.

Third, journal-level performance analysis highlights that the European Journal of Medicinal Chemistry and the Journal of Electroanalytical Chemistry achieved the highest citation influence, accumulating 1,493 and 1,464 citations, respectively. In terms of publication productivity, the Journal of Molecular Structure and the International Journal of Electrochemical Science emerged as the leading publication outlets.

Fourth, analysis of the top ten articles based on Altmetric Attention Score demonstrates that online engagement is concentrated primarily within academic discovery and readership environments rather than broad public communication channels. Among all altmetric sources, Mendeley exhibited the strongest representation, generating 721 reader interactions, indicating that scholarly readership remains the primary driver of online visibility.

Fifth, evidence of broader research translation was observed through the identification of 31 patent mentions,

indicating measurable movement of research outputs toward innovation and applied knowledge domains. In contrast, engagement through policy documents, news media, and blogs remained comparatively limited.

Finally, geographic analysis of social media engagement revealed that India accounted for the highest tweeting activity, contributing 31.71% of total reader engagement, indicating strong regional digital dissemination and scholarly interaction surrounding Chemical Science publications.

Overall, the findings suggest that while citation impact remains substantial, altmetric indicators provide complementary evidence of research visibility and engagement across academic and digital ecosystems.

9. Conclusion

This study examined the scholarly influence and online attention patterns of Chemical Science publications authored by researchers at Kuvempu University, using an integrated analysis of traditional citation indicators and Altmetric Attention Scores (AAS).

The findings demonstrate that research visibility extends beyond conventional citation accumulation and increasingly includes digital engagement captured through alternative metrics. The results indicate that Mendeley serves as the most influential altmetric source for Chemical Science publications, outperforming platforms such as blogs, Twitter, Facebook, and policy related channels. Although social networking platforms possess larger user communities, scholarly oriented environments appear to contribute more substantially to meaningful academic engagement.

The study further reveals that highly visible publications are distributed across multiple journals rather than concentrated within a single source, suggesting broad disciplinary dissemination and diversified publication strategies. The strong citation performance observed across leading journals reflects sustained academic impact and increasing institutional research maturity.

At the same time, relatively limited engagement via policy documents, news media, and blogs suggests that broader societal translation of Chemical Science outputs remains an area of growth potential. This finding highlights the continuing importance of strengthening science communication practices to enhance public and policy level reach.

Overall, the integration of citation analysis with altmetric indicators provides a more comprehensive understanding of research influence by capturing both scholarly recognition and immediate online engagement. The study supports the inclusion of alternative metrics alongside traditional indicators in research evaluation frameworks, particularly in contexts where timely assessment of visibility and dissemination is essential.

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