

Original Research Article

## Research Productivity at the All India Institute of Speech & Hearing (AIISH): A Scientometric Study of Journal Publications

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### ABSTRACT

The study analyses research publications in national and international journals by researchers during the period 2005-06 to 2014-15 in two block periods of 5 years. The recent block of five years has been most productive. 2013-14 was the most productive year with 82 articles (21.30%) published in that year. The annual growth rate during the period averaged at 33.62%. The authorship trend shows a distinct tilt towards multi-authorship. International publications have been impressive with articles by researchers at AIISH appearing in as many as 10 SCImago ranked journals. The prolificacy of authors also shows an upward trend in the recent years.

**Key words:** Journal publications, research productivity, AIISH, scientometrics.

### INTRODUCTION

The most fundamental social processes of science are the communication and exchange of research findings and results. The principal means of this communication is the publication process, which allows scientists to verify the reliability of information, to acquire a sense of the relative importance of a contribution, and to obtain critical response to work. And, in fact, publication is so central to productivity in research that the work becomes 'a work' only when it takes a conventional, physical (that is, published) form, which can be received, assessed, and acknowledged by the scientific community. Correspondingly, it is through publication that scientists receive professional recognition and esteem, as well as promotion, advancement, and funding for future

research. Such publications can be in quarterly reports, reports of laboratories and journals. <sup>[1]</sup>

An academic or scholarly journal is a peer-reviewed or referred periodical in which scholarship relating to a particular academic discipline is published. Academic journals serve as forums for the introduction and presentation for scrutiny of new research, and the critique of existing research. <sup>[2]</sup> The purpose of an academic journal, according to the first editor of the world's oldest academic journal Oldenburg, is to give researchers a venue to "impart their knowledge to one another, and contribute what they can to the grand design of improving natural knowledge and perfecting all Philosophical Arts, and Sciences". <sup>[3]</sup>

Various studies have been conducted in the past analyzing the

contribution and impact of individual organizations. Jeevan and Gupta [4-5] have analyzed the contribution and impact of Indian Institute of Technology (IIT), Kharagpur by suggesting a methodology for studying the quantitative profile of a research cum teaching institute, with a view to get idea about its performance and impact. They reported that in all, 1172 research papers were published during three years period, i.e. from 1994-95 to 1997-98, by the nine selected departments of the IIT, Kharagpur and of these, 757 were published in Science Citation Index (SCI)-covered journals. Similarly, Singh, Gupta and Kumar [6] studied the research contribution and impact of Indian Institute of Technology, Roorkee from 1993 to 2001. They concluded that that the three subjects, namely mathematics, biology and clinical medicine, although contributing smaller number of papers, secured first three ranks in terms average normalized impact per paper, also done fairly well in terms of percentage of collaborative papers, but failed badly in terms of contributing to high quality papers, with the exception of clinical medicine.

**Publication growth** (Kumbar and Gupta [7] – 14%), *research output* (Wani, Hameed, and Iqbal [8] at All India Institute of Medical Sciences), *increase in collaboration and multiple authorship* (Arora and Pawan, [9] Sharma [10] on Central Potato Research Institute) have been reported in the past. In contrast, Bandyopadhyay [11] made a comparative study of different disciplines with reference to *degree of authorship collaboration, the trend of change in multiple authorships with time*, and reported that in all the branches of Physics and Mathematics and in Psychology, the multiple authorship trends as well as the degree of authorship collaboration had increased steadily through decades. Multiple authorship indicated development of a subject and a tendency of inter institutional and inter disciplinary study.

**Degree of collaboration** has also been reported by several authors (Karisidappa, Maheswarappa and Shirol [12] - based on the data collected from 'Psychological Abstracts' - single-authorship = 39.43%, degree of collaboration in psychology = 0.60; Begum and Rajendra [13] in Zoological Sciences - multiple authors = 67.02%); Mujoo-Munshi, Vashishth and Gautam [14] in agricultural sciences - single authorship = 15.36%; Joshi and Maheswarappa [15] in different subjects of science & technology – mathematics = 94% single-authorship).

A constant increase in the number of papers being published, *collaborative authorship and multidisciplinary research* over the years has been reported by Kumar & Dora [16] at the Indian Institute of Management, Ahmadabad. Research productivity was investigated by Angadi et al. [17] (University of Madras from Web of Science database) who reported that journal was the most preferred form of the publication which accounted for more than 93% of the total publications.

Indian Scientists prefer to publish in higher ranking international journals (Nagaiah and Srimannarayana [18]). *Author productive profile* has also been investigated in the past (Kumbar et al., [19] - faculty at the University of Mysore). These authors reported that the research activity was highly skewed as only 80 authors had accounted for 72% of total publications output by the University. It was further noted by them that a majority of authors from the University showed low publication frequency and contribute very small share, nearly 29% of the total University output.

**Institutional Characteristics affecting Research Productivity** : The contextual factors that have greatest impact on the indicator that is considered to be most essential when assessing research performance: published scientific articles, according to Smeby & Try [20] include department climate, age structure, as well

as proportion of faculty members' with PhD's have significant impact on research output. Kyvik [21] reported no significant relationship between department size and scientific publishing, but noted that large differences exist between fields of learning in this respect. Dundar & Lewis, [22] however, inferred that that research productivity and faculty size have correlation, though not pronouncedly. Bland, et al. [23] mention about the need for the faculty size at or above a "critical mass" to influence the research productivity positively.

The publication growth over the years, comparison of disciplines on collaborative research, research productivity, and author productivity has been investigated in various fields. However, there is dearth of research in the field of communication sciences and disorders. Hence, this study has been taken up on All India Institute of Speech and Hearing (AIISH), a premier institute established in the year 1965, fully funded by the Ministry of Health and Family Welfare, Government of India, a unique institute in the Asian sub-continent, whose major objectives include capacity building, conducting research, rendering clinical services, and educating the public on issues related to communication disorders. The objectives of this study included investigation of (a) growth of journal publications, (b) authorship pattern of journal publications and the degree of collaboration, (c) communication pattern and the choice of journals of researchers, and (d) the prolificacy of the researchers at AIISH from 2005-06 to 2014-15.

## METHOD

**Corpus:** The information on national and international publications in journals as contained in the annual reports of the All India Institute of Speech and Hearing, Mysore, for the period 2005-06 to 2014-15 formed the basis and served as the basic data for this study.

**Procedure:** While collecting the data, the publications by the staff in the core departments of speech, language and hearing alone were reckoned and the publications by the staff in the allied departments were excluded. Publications in Symposium / Conference proceedings were excluded. For purposes of trend analysis, the data collected for the study period was segmented into two blocks of five years i.e., 2005-06 to 2009-10 (first block) and 2010-11 to 2014-15 (second block). While determining the prolificacy of the researchers, the faculty who were on full time and also who were in service during the entire block period of five years were considered.

**Analyses:** The number of national and international annual (April to March) publications was calculated. Publication growth was derived by calculating percent total output and percent annual growth rate. Percent total output and % annual growth rate were calculated by using the following formula:

% total output =  $\frac{\text{Total number of publications in a year} * 100}{\text{Total publications in 10 years.}}$

% annual growth rate =  $\frac{(N_p - N_{p1})}{N_p} * 100,$

Where,  $N_p$  is the number of publications in a given year and  $N_{p1}$  is the number of publications in the consecutive year.

Authorship pattern was calculated as the number of annual publications with a single author, two authors, 3 authors, 4 authors, and more than four authors. The degree of collaboration was calculated using the following formula:

Degree of collaboration DC =  $\frac{\text{Number of publications with } \geq 2 \text{ authors}}{\text{total number of publications.}}$

Communication pattern was determined by calculating the total percent of publications in national and international journals and its relative growth in 2005-2010 and 2011-2015.

Further, choice of journals was determined by calculating percent of

publications in each of the national and international journals. Lastly, prolificacy of researchers was determined by calculating the number and percent of faculty having no publications, < 5 publications, 5 ≤ 10 publications, 10 ≤ 20 publications, and ≥ 20 publications.

## RESULTS

Number of national and international publications: A total of 385 articles were published in the journals. Of these, 255 articles were published in

national journals and 130 in international journals. It was observed that the number publications increased over the years. The number of national publications decreased and that of international publications increased over the years though not linearly. The number of publications was lowest in 2009-10 and highest in 2013-14. Table 1 shows the year-wise national and international journal publications by researchers at AIISH from 2005-06 to 2014-15.

**Table 1: Year-wise Number of journal publications by AIISH researchers 2005-06 to 2014-15.**

| Journals      | 2005-06 | 2006-07 | 2007-08 | 2008-09 | 2009-10 | 2010-11 | 2011-12 | 2012-13 | 2013-14 | 2014-15 | Total |
|---------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|-------|
| National      | 29      | 15      | 31      | 16      | 10      | 36      | 26      | 37      | 43      | 12      | 255   |
| International | 0       | 2       | 12      | 1       | 3       | 6       | 9       | 6       | 39      | 52      | 130   |
| Total         | 29      | 17      | 43      | 17      | 13      | 42      | 35      | 43      | 82      | 64      | 385   |

**Publication growth:** Publication growth was positive though not linearly. Publication growth was highest in 2013-14 and lowest in 2009-10. Percent annual growth was highest in 2006-07, negative in 2008-09, 2009-10, 2011-12 and 2014-15. First block contributed to 30.90% of publications and second block contributed

to 69.10%. Percent growth in the second block was 39% over the first block. Table 2 shows the year-wise percent of total output and percent annual growth rate in national and international journal publications by researchers at AIISH from 2005-06 to 2014-15.

**Table 2: Year-wise percent of total output and percent annual growth rate in national and international journal publications by researchers at AIISH from 2005-06 to 2014-15.**

| Percent            | 2005-06 | 2006-07 | 2007-08 | 2008-09 | 2009-10 | 2010-11 | 2011-12 | 2012-13 | 2013-14 | 2014-15 |
|--------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Total output       | 7.53    | 4.42    | 11.17   | 4.42    | 3.38    | 10.90   | 9.09    | 11.17   | 21.30   | 16.62   |
| Annual growth rate |         | -41.38  | 152.94  | -60.46  | -23.53  | 200     | -16.67  | 22.85   | 90.70   | -21.95  |

**Authorship pattern of journal publications and degree of collaboration:** Among the national journals single authorship constituted 13.86% and the remaining 86.14% constituted multiple authorships in the first block. In the second block, single authorship constituted 3.26% and the remaining 96.74% was multiple authorships. Multiple authorships increased over the years. The percent of two authorships was the highest and > 4 authorship was the least in both blocks. The average degree of collaboration was 0.85 in the first block and 0.93 in the

second block indicating increase in collaboration over the years.

Among the international journals, single author constituted 5.55% and 2.62% in the first and the second block, respectively. Percent of two authors was the highest and > 4 authors were the lowest in both the blocks. The degree of collaboration was 0.87 and 0.99 in the first and the second blocks, respectively indicating increase in collaboration over the years. Tables 3 and 4 show the authorship pattern, and degree of collaboration across the years in national and international journals.

**Table 3: Authorship pattern and degree of collaboration (DC) in National Journals**

| Year   | Single Author | Two Authors | Three Authors | Four Authors | > Four Authors | Total  | DC   |
|--|---------------|-------------|---------------|--------------|----------------|--------|------|
| 2005-06  | 2             | 15          | 9             | 2            | 1              | 29     | 0.93 |
| 2006-07  | 2             | 7           | 5             | 1            | 0              | 15     | 0.87 |
| 2007-08  | 5             | 11          | 13            | 1            | 1              | 31     | 0.84 |
| 2008-09  | 3             | 4           | 9             | 0            | 0              | 16     | 0.81 |
| 2009-10  | 2             | 3           | 3             | 2            | 0              | 10     | 0.80 |
| Total  | 14            | 40          | 39            | 6            | 2              | 101    |      |
| Percent  | 13.86         | 39.61       | 38.61         | 5.94         | 1.98           | 100.00 |      |
| Average degree of collaboration (2005-06 to 2009-10) |               |             |               |              |                |        | 0.85 |
| 2010-11  | 0             | 17          | 12            | 4            | 3              | 36     | 1.00 |
| 2011-12  | 2             | 8           | 8             | 7            | 1              | 26     | 0.92 |
| 2012-13  | 0             | 12          | 17            | 6            | 2              | 37     | 1.00 |
| 2013-14  | 0             | 22          | 16            | 5            | 1              | 43     | 1.00 |
| 2014-15  | 3             | 5           | 4             | 0            | 0              | 12     | 0.75 |
| Total  | 5             | 64          | 56            | 22           | 7              | 154    |      |
| Percent  | 3.26          | 41.55       | 36.36         | 14.29        | 4.54           | 100.00 |      |
| Average degree of collaboration (2010-11 to 2014-15) |               |             |               |              |                |        | 0.93 |

**Table 4: Authorship pattern and degree of collaboration (DC) in international Journals**

| Year   | Single Author | Two Authors | Three Authors | Four Authors | > Four Authors | Total  | DC   |
|--|---------------|-------------|---------------|--------------|----------------|--------|------|
| 2005-06  | 0             | 0           | 0             | 0            | 0              | 0      |      |
| 2006-07  | 1             | 0           | 0             | 1            | 0              | 2      | 0.50 |
| 2007-08  | 0             | 7           | 3             | 1            | 1              | 12     | 1.00 |
| 2008-09  | 0             | 1           | 0             | 0            | 0              | 1      | 1.00 |
| 2009-10  | 0             | 2           | 0             | 1            | 0              | 3      | 1.00 |
| Total  | 1             | 10          | 3             | 3            | 1              | 18     |      |
| Percent  | 5.55          | 55.56       | 16.67         | 16.67        | 5.55           | 100.00 |      |
| Average degree of collaboration (2005-06 to 2009-10) |               |             |               |              |                |        | 0.87 |
| 2010-11  | 0             | 4           | 1             | 1            | 0              | 6      | 1.00 |
| 2011-12  | 0             | 3           | 4             | 1            | 1              | 9      | 1.00 |
| 2012-13  | 0             | 1           | 4             | 0            | 1              | 6      | 1.00 |
| 2013-14  | 1             | 19          | 11            | 4            | 4              | 39     | 0.97 |
| 2014-15  | 2             | 27          | 15            | 4            | 4              | 52     | 0.96 |
| Total  | 3             | 55          | 35            | 10           | 10             | 112    |      |
| Percent  | 2.62          | 49.10       | 31.24         | 8.52         | 8.52           | 100.00 |      |
| Average degree of collaboration (2010-11 to 2014-15) |               |             |               |              |                |        | 0.99 |

Results of Wilcoxon's matched pair test indicated significant difference between national and international publications on single authorship only ( $Z = -2.263, P < 0.05$ ).

Communication pattern and the choice of journals of researchers: The articles were published in 27 national and 55 international journals. 84.87% of

articles were published in national journals in the first block as against 57.89% in the second block. The relative growth of publications in international journals was high in the second block compared to the first block. Table 5 shows the relative growth of national and international publications during 2005-06 to 2009-10 and 2010-11 to 2014-15.

**Table 5: Relative growth of National, International Publications during 2005-06 to 2009-10 and 2010-11 to 2014-15**

| Journal       | 2005-06 to 2009-10 |        | 2010-11 to 2014-15 |        | Change |        | Relative growth |
|---------------|--------------------|--------|--------------------|--------|--------|--------|-----------------|
|               | No.                | %      | No.                | %      | No.    | %      |                 |
| National      | 101                | 84.87  | 154                | 57.89  | 53     | -26.98 | 52.47           |
| International | 18                 | 15.13  | 112                | 42.11  | 94     | 26.98  | 522.22          |
| Total         | 119                | 100.00 | 266                | 100.00 | 147    |        | 123.53          |

The top 5 national journals covered 88.21 % of publications and the top 5 international journals covered 36.45 % of publications. Table 6 shows top five most productive national and international journals 2005-06 to 2014-15.

Prolificacy of the researchers: One hundred and nineteen articles were published by 16 (of 21) faculty at a rate of 7.44 per faculty per 5 years (1.49/faculty/year) in the first block, and 266 articles by 29 faculty at a rate of 9.17 per faculty per 5 years (1.83/faculty/year)

in the second block. Maximum number of faculty had 5-10 publications in the first block, and < 5 in the second block. Five faculties did not have any publications in

the first block; in contrast all faculties had publications in the second block. Table 7 shows the prolificacy of AIISH researchers from 2005-06 to 2014-15.

**Table 6: Top 5 most productive national and international journals 2005-06 to 2014-15**

| Rank | National Publications                                |                     |       | International Publications                            |                     |      |
|------|--|---------------------|-------|---|---------------------|------|
|      | Journal Name   | No. of publications | %     | Journal Name  | No. of publications | %    |
| 1    | Journal of All India Institute of Speech and Hearing | 113                 | 44.31 | Journal of Hearing Science                            | 12                  | 9.23 |
| 2    | Journal of Indian Speech and Hearing Association     | 54                  | 21.17 | Audiology Research                                    | 9                   | 6.92 |
| 3    | Language in India                                    | 43                  | 16.86 | Speech Language Hearing (Asia Pacific)                | 8                   | 6.15 |
|      |  |                     |       | International Journal of Audiology                    | 8                   | 6.15 |
| 4.   | Indian Journal of Applied Linguistics                | 8                   | 3.13  | The Journal of Laryngology and Otology                | 6                   | 4.16 |
| 5.   | Journal of Acoustical Society of India               | 7                   | 2.74  | Journal of Child Language Acquisition and Development | 5                   | 3.84 |

**Table 7: Prolificacy of AIISH researchers from 2005-06 to 2014-15**

| No. of articles | 2005-06 to 2009-10 |        | 2010-11 to 2014-15 |        |
|-----------------|--------------------|--------|--------------------|--------|
|                 | No. of faculty     | %      | No. of faculty     | %      |
| ≥ 20            | 2                  | 12.50  | 3                  | 10.34  |
| 10 ≤ 20         | 2                  | 12.50  | 9                  | 31.03  |
| 5 ≤ 10          | 4                  | 25.00  | 5                  | 17.25  |
| <5              | 3                  | 18.75  | 12                 | 41.38  |
| Nil             | 5                  | 31.25  | 0                  | 0.00   |
| Total           | 16                 | 100.00 | 29                 | 100.00 |

## DISCUSSION

The results showed interesting points. First of all, *the number of national publications decreased and that of international publications increased over the years though not linearly.* The growth of research output of publication in journals showed an undulating pattern as reflected in the publication count. The annual growth rate was also not uniform and inconsistent with many fluctuations during the period of study.

Second, it was interesting to note that *first block contributed to 30.90% of publications and second block contributed to 69.10%. Percent growth in the second block was 39% over the first block.* The average annual growth rate of 33.76% exceeds in good measure the growth rate of 14% per annum reported by Kumbar & Gupta<sup>[7]</sup> for the Karnataka University in Science and Technology. The growth in the later period of 2010-11 to 2014-15, both in terms of the total count and the average annual growth rate perhaps is

attributable to the increase in the size of departmental staff associated with increase in the number of doctorates, increase in doctoral students enrolment in the recent years and the resultant positive research ambience leads to increase in the overall research productivity and in line with the findings of Smeby & Try,<sup>[20]</sup> Kyvik,<sup>[21]</sup> Dundar & Lewis<sup>[22]</sup> and Bland, et al.<sup>[23]</sup> The above trend could also be attributed to the overall increase in the awareness of enhanced quality standards, benchmarks being articulated by the UGC, RCI and NAAC in the recent years and the institute going in for ISO 9001:2008 certification recently could also be another reason as clear deliverables are defined for all its verticals through well defined measures of performance. Perhaps, equally significant is the shift in the hiring and promotion policies in the recent years placing emphasis and accentuation on publication productivity.

Third, *among national publications, multiple authorships increased over the years.* The percent of two authorships was the highest and > 4 authorship was the least in both blocks. The average degree of collaboration was 0.85 in the in the first block and 0.93 in the second block indicating increase in collaboration over the years. Among the international journals, single author

constituted 5.55% and 2.62% in the first and the second block, respectively. Percent of two authors was the highest and >4 authors were the lowest in both the blocks. The degree of collaboration was 0.87 and 0.99 in the first and the second blocks, respectively indicating increase in collaboration over the years. The data on authorship indicated that a highly collaborative pattern was emerging at AIISH. The collaborative pattern, including the degree of collaboration, had an upward trend in the second block of five in comparison to the first block of five years. The authorship trend showed a distinct positive tilt towards multi-authored papers. Single authored papers appeared to be declining as evident from the data, especially, in the second block of five years with no single authored publications in the years 2010-11, 2012-13 and 2013-14.

Fourth, 84.87% of articles were published in national journals in the first block as against 57.89% in the second block. The relative growth of publications in international journals was high in the second block compared to the first block. The top 5 national journals covered 88.21 % of publications and the top 5 international journals covered 36.45 % of publications. The shift in the trend of communication pattern of researchers with rapid strides in terms of the number of articles in international journals, especially, published from the west indicates that the research output is of high quality and is well connected to the mainstream research in this discipline. It is worthy to note that the publications have occurred in several interdisciplinary journals as well as in 10 of the SCImago ranked journals (SJR). The SJR journals in which the articles have appeared are given in the order of SJR ranking : Ear and Hearing (3 articles), Journal of Phonetics (1 article), International Journal of Audiology (8 articles), Journal of Voice (1 article), American Journal of Audiology (1

article), Clinical Linguistics and Phonetics (3 articles), Canadian Journal of Speech-Language Pathology and Audiology (2 articles), International Journal on Disability and Human Development (2 articles), International Tinnitus Journal (1 article) and Hearing, Balance and Communication (4 articles). The preference for publishing articles in international journals corroborates the findings of Nagaiah and Srimannarayana.<sup>[18]</sup> Further, it could be inferred that the publishing trend of the researchers also matures over the years with inkling towards publication in international journals/ journals with higher impact factor and reputation. This is not to understate the progress made in the number of articles in national journals. The research in a discipline like speech, language and hearing also needs to be locally relevant, given the fact that India is a multilingual country. The aspects relating to speech and language has close nexus to the culture, ethos and the local factors and the communication of research output in local / national journals is equally, if not more important so as to be of immediate relevance to the professionals in India. It was observed that the faculty from audiology had more number of international publications compared to those from Speech-language pathology and speech-language sciences. This may be because of the fact that speech-language included tests in various Indian languages which may be more nationally relevant and hence published in national journals.

Lastly, one hundred and nineteen articles were published by 16 (of 21) faculty at a rate of 7.44 per faculty per 5 years (1.49/faculty/year) in the first block, and 266 articles by 29 faculty at a rate of 9.17 per faculty per 5 years (1.83/faculty/year) in the second block. Five faculties did not have any publications in the first block; in contrast all faculties had publications in the second

*block*. As regards the prolificacy, while the progressive trend in the recent years in terms of the frequency of publication and the rate of publication is a matter of satisfaction, it is also to be noted that a substantial number of the faculty have low publication frequency and contribute to a very small share. The above trend was in consonance with the results reported by Kumbar et al. [19] in the case of University of Mysore.

## CONCLUSIONS

The present study was restricted to journal publications by the faculty in the core departments of AIISH from 2005 to 2015. The results of the present study have contributed to the research productivity at the All India Institute of speech & Hearing. The results indicate a growing path with an impressive annual average growth rate of research publications at AIISH. A substantial number of journal publications are multi-authored signifying the presence of a high degree of collaboration. The positive tilt towards publication in international journals and acceptance of the articles by AIISH researchers in a SCImago ranked journals is a matter of satisfaction and holds promise for the future. The prolificacy is on an upward trend, but needs to be accelerated for attaining higher levels of research productivity. Information on scientific publishing and its measurement thereof can help in research management, both at the national as well as at the institution level. An analysis of the growth rate of production of articles in journals, the authorship pattern, the communication pattern of publication, the prolificacy, etc., can help plan the right policies and strategies to motivate and incentivise the researchers, to create a conducive research environment for enhancing the research productivity. Future research on the intrinsic and extrinsic factors and the determinants such as age, rank, gender, academic origin, academic inbreeding,

years of teaching experience, etc., on research productivity as a whole including publication productivity, and publications in book chapters, books is warranted.

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