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Scientific Contributions of CCS Haryana Agriculture University, Hisar: A Scientometrics Study

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Abstract

The research in the field of science and technology significantly contribute to the growth and development of a country. Particularly the Green Revolution and the White Revolution has a significant role in the growth and development of India. To measure the quality and quantity of the scientific contributions, one can apply the technique known as Scientometrics. Scopus is the largest abstract and citation database containing both peer-reviewed research literature and quality web sources which consists more than forty six millions of records from 19000 titles of 5000 international publishers. The present study is an attempt to identify the various bibliometric aspects of the scientific contributions of the researchers and faculty of CCSHAU, Hisar published between 2003 and 2012. For this purpose the Scopus online database and search facilities are used. Most of these are research articles published in various journals. The average number of authors per contribution is 3.55. The degree of collaboration is 0.99. There is a decrease in the number of contribution during the last five years. The CCSHAU researchers and scientists had foreign research collaboration with thirty-three countries. The study clearly indicates that the sole research (authorship) trend is now over and collective research trend is in force.

Key words: Scientometrics; Bibliometrics; Research indicators; Authorship Trends.

Introduction

The research in the field of science and technology significantly contribute to the growth and development of a country. Particularly the Green Revolution and the White Revolution has a significant role in the growth and development of India. The Haryana Agricultural University was established on February 2, 1970, as a result of bifurcation of the erstwhile Punjab Agricultural University, through a Presidential Ordinance, ratified later by the Haryana and Punjab Agricultural Universities Act, 1970 (Act No 16 of 1970) passed by the Lok Sabha on 29th March, 1970. From 31st October, 1991, it has been renamed as "Chaudhary Charan Singh Haryana Agricultural University" and popularly known as HAU. It is one of Asia's biggest agricultural universities, located at Hisar of Haryana. It plays a leading role in agricultural research in India and contributed significantly to Green Revolution and White Revolution in India in the 1960s and 70s. It has a very large campus and has several research centres throughout the state. The prestigious ICAR's award was conferred in it for the Best Institute in 1997. The university has 8645 Acres land (around 7219 Acres at main campus, 1426 Acres at outstations).[1]

Constituent colleges

The University has the following constituent colleges.

1. College of Agricultural Engineering and Technology, Hisar.
2. College of Agriculture, Hisar.
3. College of Agriculture, Kaul.
4. College of Animal Sciences, Hisar.

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5. College of Basic Sciences & Humanities, Hisar.
6. Indira Chakravarty College of Home Science.
7. College of Veterinary Sciences.

Library and Information services

Nehru Library, the hub of academic and research activities of the university, is housed in a centrally located elegant building. It provides information support to its more than 5300 users and has a rich collection of about 3.12 Lakhs volumes of books and other reading material, and also subscribes 693 current Indian and foreign journals. The library opens for 15-16 hours daily throughout the year. It has 6 Reading Halls with cosy reading environment where 650 readers can sit and study at a time. Night Reading Hall, with modern facilities opens immediately after the closure of Library and keeps open up to midnight on all the days of week. Around 80 readers can sit in the Hall. Book Bank is a very popular service with the students who are entitled to borrow 4 textbooks each from its collection at nominal charges. Bookshop is a unique service of this library. The students and teachers can buy books from the Bookshop at discounts ranging from 10 to 35% against a market discount structure of 10-15%. Photocopying service is provided at very cheaper rates – 40 paise and 50 paise per exposure on ordinary and sunlit bond papers, respectively.

The library catalogue, journals' holdings, circulation operations journals' subscription, purchase of books, and other library activities are fully computerized. Online Catalogue, Circulation Database, Journals' Holdings etc. can be accessed through all the PCs linked to the Campus Network as well as through PCs having Internet facility. More than 150 CDs of Biological Abstracts, CABI, AGRICOLA, AGRIS, National Sample Survey, Indian Science Abstracts, and Encyclopaedia Britannica form the back bone of CD-ROM database. In addition, there are more than 2000 CDs of books and dissertations. Video conferencing facility, Multimedia library, Internet Lab, more than 2072 e-journals are the other feathers in the cap of library services. There is a modern health-friendly canteen in the library premises where the library user can get light refreshing eatables and drinks.

Hostel facilities

Accommodation is provided in 14 hostels of the University out of which 12 hostels (8 for Male, 3 for Female and 1 for married PG students) are situated at Hisar and two hostels, one each for male/female at Kaul campus. All the modern facilities such as gas connection, furniture, TV with cable connection, leading News Papers and Magazine and solar water heating system are provided. All the hostels have EPABX phone facilities as well as in-coming calls facilities. Two hostel wardens look after the management of each hostel. Each hostel has been provided water cooler with aqua guard for safe drinking water. The messes of hostels are running on cooperative basis.

Laboratories

The CCS Haryana Agricultural University, Hisar has well equipped laboratories in each area of learning. Modern facilities like DNA Sequencer, UV-trans illuminator, PCR, FT-IR, Gene Gun, Gene Pulser, Electron Microscope, Submarine Electrophoresis Units, Inductivity coupled Plasma Spectrometer, X-ray differaction, HPLCs, GLCs etc. are presently available. The university continued to focus its basic research efforts and therefore, in addition to required laboratory support, facilities of screen house, green house and transgenic green house are also available.

Experimental farms

The CCS Haryana Agricultural University, Hisar has a well developed experimental farm of 994 hectares at main campus, Hisar along-with ten experimental farms, one with each regional research stations covering an area of 568 hectares. Adequate number of farm machinery such as tractors, harrows, seed planters and harvesters are available for timely

completion of farm operations. The farms are under direct control of the Director Research who is assisted by farm managers, technical staff and other farm related supporting staff.

Objectives

The present study is an attempt to identify the various bibliometric aspects of the scientific contributions of the researchers and faculty of CCS HAU, Hisar. The objectives of the study are:

- To know the authorship pattern in Agriculture Science.
- To identify the proportion of single versus multi authored articles.
- To study the degree of collaboration in the field of Agriculture Science.
- To analyze the trend in the average number of authors per paper.
- To analyse year wise research productivity and growth pattern.
- To know the most preferred journals in the field of Agriculture Science.
- To know the average length of papers.

Methodologies adopted

The study is conducted by attempting an advanced search with the help of Boolean operators on the Scopus database. The search is restricted to CCS Haryana Agriculture University, Hisar and time period of 2003 to 2012. After retrieving the data, the data was saved in MS-Excel and refined to avoid the noise, and codified. To get the results in tabular form SPSS has also been used. On some aspects, the analysis facility available within Scopus has also been utilized.

Results

The results obtained on the basis of different parameters are presented in the form of tables along with description under the different subheadings.

Table 1: Showing the year wise contributions

YEAR	No. Of contributions
2012	97
2011	116
2010	123
2009	138
2008	123
2007	114
2006	131
2005	156
2004	142
2003	134

Year wise distribution and growth trend

The total number of contributions made by the scientists and researchers of CCSHAU during the last ten years is 1274. In the year 2005, highest number of contributions (156) were made and in the year 2012 lowest number of contributions (97). The average number of contributions is 127.4. It is found that around forty seven percent of contributions are made during the last five years. The growth pattern indicates a downward low, which is not a positive sign for the research in the field of agricultural science.

Authorship pattern

The authorship characteristics of the

Table 2: Showing the Authorship wise contributions

No. Of Authors	No. Of contributions	%age
Single	37	2.9
Double	278	21.8
Three	405	31.8
Four	311	24.4
Five	152	11.9
Six	39	3.1
Seven	19	1.5
Eight	16	1.3
Nine	6	0.5
Ten and More	11	0.9

Table 3: Showing Top Ten Foreign Collaborations

COUNTRY	No. Of contributors
India	1268
United States	34
Germany	25
United Kingdom	24
Canada	12
Japan	9
Australia	7
Hungary	6
Israel	4
Netherlands	4

contributions of CCSHAU reveal that the authorship pattern of single authorship is diminishing in the field of agriculture science as only 37 out of 1274 contributions are single authored which is little higher than that of the NDRI scientists.[2] The majorit of contributions (52.6%) are two and three authored. As many as 11 contributions were contributed by involving ten or more authors in each article. The average number of authors per contribution is 3.55. The increase in multiple authorship and collaboration between researchers is an indication of growing professionalism in different fields.[3]

Degree of collaboration

To measure the collaboration in research a formula designed by K Subramanyam[4] is used. The formula is as under:

C = NM/(NM+NS)

Where C is Degree of Collaboration, NM is number of multi-authored contributions and NS is number of single authored contributions. In other words it is the ratio of the number of multi-authored contributions to total contributions.

The degree of collaboration in the contribution of CCSHAU is 0.99 which supports the results of Raja Ramanna Centre for Advanced Technology contributions.[5] The researchers and scientists at CCSHAU had foreign research collaboration with as many as thirty three countries. The highest foreign research collaboration is with United States followed by Germany. While comparing the foreign collaboration of CCSHAU and NDRI, the foreign collaboration of CCSHAU is higher than that of NDRI.[2]

Table 4: Showing major subject-wise contributions

SUBJECT AREA	No. Of contributions
Agricultural and Biological Sciences	987
Veterinary	216
Biochemistry, Genetics and Molecular Biology	102
Immunology and Microbiology	99
Environmental Science	80
Earth and Planetary Sciences	51
Engineering	44
Chemistry	44
Medicine	41
Chemical Engineering	31
Business, Management and Accounting	30
Materials Science	24
Social Sciences	24
Nursing	22
Pharmacology, Toxicology and Pharmaceutics	21
Multidisciplinary	13
Arts and Humanities	10
Others	10

Table 5: Showing Type of contributions

DOCUMENT TYPE	No. Of contributions
Article	1210
Review	35
Conference Paper	16
Article in Press	6
Letter	3
Erratum	1
Note	1
Short Survey	1
Editorial	1

Subject-wise distribution of contributions

The major area of research contributions of CCSHAU is Agricultural and Biological Science which attracted 987 contributions followed by Veterinary with 216 contributions. Biochemistry, Genetics and Molecular Biology stood third with 102 contributions. The researchers and scientists of CCSHAU not only contribute in the field of science but also contribute in other fields like Social Science, Psychology, Arts and Humanities, and Business, Management and Accounting, etc.

Document type wise distribution of contributions

The analysis of type of published contributions indicates that 94.97% contributions are published in the form of research articles

As many as 35 reviews, 16 conference papers and 3 letters were also contributed by CCSHAU. There were 6 research articles which were sent for publication.

Preferred journals

The contributions from CCSHAU were published in various journals. To observe the preferred or popular journal the list of journals was analyzed. There is no single journal which has attracted more than 15% of the total contributions. It shows that the contributions of CCSHAU are very widely scattered over different journals. The highest number of contributions (169) are published in Annals of Biology and 145 in Annals of Agri Bio Research. The top ten journals are listed in the below table.

Top performers

While analyzing the individual contributions, it is found that N. Khetarpaul is on the top with 30 contributions. Others in the top ten performers are R. K. Jain (26), D. Singh (26), R. K. Behl (23), S. Jain (23), S. Singh (23), N. Narula (22), G. Prasad (22), B. Kumari (22) and S. Jood (19).

Top ten collaborating institutes

A number of institutes had collaborated with CCSHAU. The top ten are listed in the table along with number of contributions from each institute. At the top is Punjab Agricultural University with 25 contributions.

Size of contributions

Though the size of the contribution varies

Table 6: Showing Top Ten Journals

SOURCE TITLE	No. Of contributions
Annals of Biology	169
Annals of Agri Bio Research	145
Indian Journal of Animal Sciences	123
Journal of Food Science and Technology	36
Journal of Agrometeorology	35
Indian Veterinary Journal	33
Physiology and Molecular Biology of Plants	28
Indian Journal of Microbiology	28
Research on Crops	28
Archives of Agronomy and Soil Science	22

Table 7: Showing the Top Ten Collaborating Institutes

AFFILIATION	No. Of contributions
Punjab Agricultural University India	25
G B Pant University of Agriculture & Technology	15
Indian Agricultural Research Institute	14
Kurukshetra University	14
Indian Veterinary Research Institute	12
Guru Jambeshwar University of Science and Technology	10
Chaudhary Sarwan Kumar Himachal Pradesh Krishi Vishwavidyalaya	8
Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu	7
Central Soil Salinity Research Institute India	6
Indian Council of Agricultural Research	6

Table 8: Showing the size of contributions

Size (No. Of Pages)	No. Of contributions
1	1
2	78
3	200
4	283
5	183
6	145
7	81
8	72
9	62
10+	161

depending upon the type of the contribution but as more than ninety percent of the contributions are research articles. So we can analyze the size of contributions in respect of number of pages.

The size of contributions ranges from one page to more than 30 pages. The majority of contributions contained three to six pages. The average number of pages per contribution is 5.98, which is almost equal to that of Dairy Scientists.[2]

Conclusions

It is clearly reflected from the results that the sole research (authorship) trend is now over and collective research trend is in force. As emphasized by Arora and Pawan[3] increase in multiple authorship and collaboration between researchers is an indication of growing professionalism in different fields. The team research is predominant over solo research. The downward low in growth rate of publications is a sign of worry for those who have an interest in the field of Agriculture Science. Since more than ninety percent of contributions are in the form of research articles, hence the faculty, researchers and scientists at CCSHAU are of academic bent of mind. The number of foreign research collaborations is excellent. The faculty, researchers and scientists at CCSHAU are really working hard and significantly contributing towards the research in the field of Agriculture Science and allied fields.

The results of this study supports the earlier studies like: Rana and Agarwal[6] who in their article reported that the degree of collaborative research and average number of authors per article have a steady rise. Bandyopadhyay[7] also reported in his study that multiple authorship trend is increased over the years. Visakhi and Srivastava[8] also endorse the same view about authorship trends.

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