

Authorship Characteristics of The Journal of The Nigerian Association of Mathematical Physics (JNAMP)

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Abstract

Bibliometric techniques were used to study the authorship characteristics of the Journal of the Nigerian Association of Mathematical Physics (JNAMP). Relevant data was obtained through an examination of volume 10 of the Journal. Author productivity, average productivity per author, authorship collaboration, most productive researchers, gender distribution of authors, productivity by institution, and geographical spread of affiliate institutions are reported.

Volume 10 of JNAMP 2006 contains 89 research papers produced by 124 scholars from the fields of Mathematics, Physics and Computer Science. Considering co- and multiple authorship, these scholars made a total of 169 contributions. The study found that authorship was both single (40.45%) and collaborative (59.55%) and productivity was approximately 0.53 per contributor. Authorship was heavily skewed in favour of males. It was found that the most productive researcher was also the most collaborative. 13 out of 33 institutions were most productive and 3 out of the 6 geopolitical zones in Nigeria dominated productivity.

Introduction

The National Association of Mathematical Physics (NAMP) was formally inaugurated in 1979 at the first National Colloquium on Mathematical Physics held at the Department of Physics, University of Ibadan, from 12 to 15 December. During the colloquium it was observed that only very few scientists in Nigeria at the time could be called “Mathematical Physicists”. It was therefore decided that the term should be broadened to mean “any scientist who applies fairly rigorous mathematics to physics, chemistry, engineering or other sciences and also any mathematician whose results have direct applicability in physics, chemistry, engineering...”[1]. It was also decided at the same forum that there ought to be a “vibrant national forum for a critical discussion of research results and a proper documentation of accepted works that have been duly “refereed” (emphasis ours). The proper documentation of accepted and duly refereed works resulted in the birth of the Journal of the Nigerian Association of Mathematical Physics (JNAMP), the focus of this study.

The Journal became moribund after the first volume in 1979 and was not resuscitated until 1998 when Volume 2 was produced under a new editorial team. The journal is now well respected with full national coverage and even international contributions. The Association produced one volume of the journal a year from 1998 until 2008 when it increased production to two volumes a year, one in May and one in November. Currently the journal has a very powerful editorial board made up of more than 10 senior, professionally active and internationally recognized Professors and Professors emeriti in mathematics and physics in Nigeria. The important role this journal is playing in the physical and mathematical sciences necessitated this study. The study investigates the nature of the authorship of the articles in the journal.

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Literature Review

Research publication is a very significant indicator of academic staff productivity. Publishing research results provide current information in the field of specialization which is necessary for development and pushing forward the frontiers of knowledge. According to Olorunfoba and Ajayi [2], an academic staff's attainment in research is determined by the number of published articles in refereed journals or conference proceedings of repute that he/she has to his/her name. Attainment in research increases the social prestige and visibility of both the academic doing the research and the institution he or she represents. Articles published in reputable journals provide an avenue of recognition for the researcher, since a published journal article is the first formal presentation to the scientific community of an innovation or a discovery [3].

Hjorland [4], defines bibliometrics as "book measurement" used for all types of documents but mostly journal articles, to arrive at statistical patterns of variables such as authorship, sources, subjects, geographical origin and citations. Bibliometrics is a generic term used to describe a series of techniques that seek to quantify the process of written communication [5]. Bibliometrics has been used to resolve three main issues in written communication. These are: to identify the most productive authors identifying concepts in science; identifying the fusion and fission of scientific knowledge; and lastly to supplement but not substitute, subjective judgements.

Sengupta [6], states that bibliometric techniques can be used to research many areas, some of which are listed below:

- Identifying authorship and its trends in documents.
- Forecasting past, present and future publishing trends.
- Identifying core periodicals.
- Formulating an accurate need-based acquisition policy within limited budgeting provision.
- Adopting an accurate weeding and stacking policy.
- Studying and the dispersion of scientific literature.
- Predicting the productivity of individual authors, organization, etc.

This research paper dwells mostly on authorship characteristics and patterns in the JNAMP which is descriptive bibliometrics. This process will be used to examine authors' productivity, collaboration, institutional affiliation and gender distribution, most productive authors and geographical spread of authorship.

Collaboration

Glanzel [7] observed that among scientists, a lot of collaboration tend to exist within a department, research group or institution. He lists Beaver's 18 reasons why authors collaborate. These are as follows:

- (1) Access to skills and expertise;
- (2) Access to equipment and resources;
- (3) Improved access to funds;
- (4) Acquisition of respect, admiration and recognition for professional advancement;
- (5) Efficiency;
- (6) To make more rapid progress;
- (7) To be able to tackle bigger problems;
- (8) To increase productivity;
- (9) To create networks (like an invisible college);
- (10) To retool and learn new skills or techniques;
- (11) To satisfy intellectual interest;
- (12) To share the excitement of being on the same page as more notable authors;
- (13) To find weaknesses or mistakes more easily;
- (14) To keep one focused, because others are counting on one to do one's best;
- (15) To reduce aloofness and recharge one's energy and excitement;
- (16) To educate oneself and others;
- (17) To advance knowledge and learning; and
- (18) To have fun and pleasure in collaboration.

Reporting details of authorship characteristics of the Journal of College and Research Libraries (CRL) from 1939-1979, Cline [8] examined the total number of articles, the average number of references per article, journal self citations, topics discussed, authors productivity, the gender of authors, the number of productive authors, the most highly contributing affiliated institutions, types of institutions, co-authorship productivity and the most cited authors in the journal.

Bibliometric analysis can be used to highlight changes or developments in the literature of a profession. Terry [9] updating authorship studies of the CRL from 1989 to 1994, investigated the variables of gender, institutional affiliation

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and extent of collaboration. The study found a lot of changes between it and earlier authorship studies. For example there had been a sharp drop in male predominance from around 65% -87% in the period between 1930-1979 to 50% by the period of this study, that is 1989-1994.

A profile of contributing authors at the conference of the Association of College and Research Libraries (ACRL) in the 27 years of existence between 1978 and 2005 was reported by Fennewald [10]. The authorship profiles were presented for geographical distribution, author productivity collaboration, gender, and institutional affiliation.

Purpose of the Study

This study focuses on the authorship characteristics observed in JNAMP volume 10. This is a pilot study to investigate the authorship pattern in the journal. This has never been done since the inauguration of the journal. Findings will be compared with those of related studies. It is expected that the information learned from this research will be of benefit to physicists and mathematicians in Nigerian Universities and the editorial board of the journal, given its very prominent place in the development of the two disciplines of physics and mathematics in Nigerian Universities.

Research Questions

1. How much do Nigeria mathematical physicists in Nigeria publish in JNAMP?
2. What are the authorship characteristics and pattern in the JNAMP?
3. What is the gender distribution of contributors in the JNAMP?
4. Who are the most prolific contributors in the JNAMP?
5. What is the average contribution per author in the JNAMP?
6. What are the institutional affiliations of the contributors in the JNAMP?
7. What is the geographical distribution of the contributors affiliate institutions?
8. What is the level of collaboration among mathematical physicists in Nigeria.?

Methodology

Most of the data was collected through an examination of JNAMP volume 10 consisting of 89 research articles. However, since gender was not reflected in the biodata on each research paper, the assistance of some of the editors of the journal was solicited in identifying the gender of contributors where there was doubt. Data about authorship productivity, collaboration, gender distribution, geographical distribution of authors affiliate institutions, and productivity by institution were all gathered from the volume. The above data and the data on gender of authors was stored in an Excel file for statistical analysis. Frequency counts were done for each entry, one each was done in the fields of author name and institution, in other words, if four authors from four different institutions collaborated to produce one article, each contributor and each institution were counted separately. This process was used by Park [11] in her article.

Data Analyses

Author Productivity

JNAMP Volume 10 of 2006 has a total of 89 research papers produced by 124 scientists contributing 169 times in the disciplines of physics, mathematics and computer science. This gives a ratio of one contribution to 0.53 (approx) of a paper. Among the 169 contributors, 96 (56.80%) made a single contribution the remaining 73 (43.20%) made joint contributions. The breakdown of the contributions of this latter group is as follows. 19 researchers produced two papers each; while one researcher each produced the remaining papers in the range of 4; 5; and 8. Table I shows a detailed description of authors and frequency distribution of their productivity.

Table I: Frequency Distribution of Author Productivity

S/N	No. of Contributions	Frequency	No. of Authors	Percentage of Author Population
1	1	96	96	56.80
2	2	19	38	22.49
3	3	6	18	10.65
4	4	1	4	2.37
5	5	1	5	2.96
6	8	1	8	4.73

Source: JNAMP Vol. 10

It is worthy to note that most of the 96 scientists with single authorship were also contributors to papers by multiple authors.

Author Collaboration

Out of the 89 articles in volume 10 of JNAMP, 36 were produced by single authors which mean that 40.45% of the papers were produced by 21.30% of the total population of 169 contributions. This productivity by single authors is high as collaborative work especially in the sciences is greatly valued. Co- and multiple authorship has been on a steady rise since the 1970’s [12 – 13]. While Al-Ghamdi et al [12] observed that collaborative authorship in the Journal of the American Society for Information Science (JASIS) for the period 1970-1996 was 38%, Liu [13] reported that collaborative authorship had risen to 58% during the period 2001-2002 for the Journal of the American Society for information Science and Technology (JASIST).

Although 133 collaborating researchers produced the remaining 53 articles in volume 10 of JNAMP, representing 59.55%, the sheer number of individual authors in this volume is daunting. Table 2 shows the analysis.

Table 2: Author Collaboration

Authorship	Frequency	% of Total	No. of Authors	Productivity %
Single Authors	36	40.45	36	21.30
Co-Authors	36	40.45	72	42.60
Multiple Authors (3)	9	10.11	27	15.97
Multiple Authors (4)	6	6.74	24	14.21
Multiple Authors (5)	2	2.25	10	5.95
Total	89	100.00	169	100.00

Source: JNAMP Vol.10

It is interesting to note that the same number of articles (36) were produced by 72 co-authors who make up 42.6% of the 169 contributors in this cohort. Multiple authorship by three researchers each, produced 9 articles (that is 27 contributors together wrote 9 articles), while groups of four researchers each produced six articles and groups of five researchers each produced two articles.

Most Productive Researchers

While from Table I, many researchers are seen to be making only one contribution, there are some researchers who are quite prolific for even a single volume of this journal. Table 3 shows the ranking by productivity of individual researchers.

Table 3. Ranking by productivity of individual Researchers

S/N	No. of Contributions	Author’s Name	Affiliate Institution
1	8	Ayeni, R. O.	LAUTECH, Ogbomosho
2	5	Umana, R. A.	FUT, Owerri
3	4	Ette, A. M.	FUT, Owerri
4	3	Adebile, E. A.	FUT, Akure
5	3	Fenuga, O. J.	OOU, Ago-Iwoye
6	3	Njah, A. A.	UNIAGRIC, Abeokuta
7	3	Okedoye, A. M.	LAUTECH, Ogbomosho
8	3	Omolehin, J. O.	UNILORIN, Ilorin

Source : JNAMP Vol. 10

The power and importance of collaboration to productivity is borne out clearly in reviewing the contributions of these authors. All of the 8 contributions by the most prolific researcher are all collaborated researches. However, the researcher contributing five times did four of the researches alone. The researcher with four contributions also worked alone. All the researchers contributing three papers each collaborated at some point. It would seem then that the researchers who collaborate most also have the highest productivity. The study by Oyeniyi and Bozimo [14], on the relationship between collaboration and productivity showed that authors who topped the rank in productivity also topped the rank in collaboration.

Gender Distribution

It is an established fact in the research literature of the physical sciences and mathematics that males predominate in academic productivity hence all the various programmes aimed at improving female participation in science subjects. It is therefore not surprising that female contribution in this cohort is negligible. Infact, Mischo [15], made the observation that the high ratio of males authors is not surprising because digital library research tends to be conducted by scholars from computing disciplines. Physics and mathematics are also computing disciplines. Table 4 shows the gender distribution of contributors and their productivity.

Table 4: Gender Distribution

S/N	Gender	No. of Contributors	%	Productivity
1	Male	164	97.04	86.92 (approx)
2	Female	5	2.96	2.65 (approx)
	Total	169	100.00	89.57 (89)

Source: JNAMP Vol. 10

With 169 contributors producing 89 papers the average productivity per author is approximately 0.53. this ratio is abysmally low, compared with the 2.24 publication per author observed by Oyeniyi & Bozimo [14]. However, the male predominance observed in this study is in keeping with the study by Mischo [15].

Institutional Affiliation

Altogether there were 89 research articles contributed by researcher’s from 33 institutions to volume 10 of JNAMP. One article came from the University of Botswana, Gaborone; while the remaining 88 articles were from scientists in 32 higher institutions in Nigeria. These institutions consist of 26 Universities, 3 Polytechnics, 2 Institutes and 1 College of Education. Scientists from the three polytechnics made only four contributions, scientists from the two institutes made three contributions and there was a lone contribution from the 1 College of Education. The remaining 160 contributions came from scientists in the 26 universities. This resonates with the study of Park [11] that authors affiliated with universities are leading the digital library field, this study also shows that authors from universities are leading in the field of mathematical physics. Details of contributions from the most productive institutions are as follows:

- University of Benin (UNIBEN), Benin City (39)
- Ladoko Akintola University of Technology (LAUTECH), Ogbomoso (25)
- University of Ilorin (UNILORIN,) Ilorin (19)
- Federal University of Technology (FUT), Owerri (14)
- Federal University of Technology (FUT), Akure (12)
- Olabisi Onabanjo University (OOU), Ago-Iwoye (10)
- University of Agriculture (UNIAGRIC), Abeokuta (5)
- Federal University of Technology, (FUT) Minna (4)
- University of Ibadan, (UI) Ibadan (3)
- University of Ado Ekiti (UNIADO), Ado Ekiti (3)
- Delta State University (DELSU), Abraka (3)
- Bayero University (BAYERO), Kano (3)
- University of Uyo (UNIUYO), Uyo (3)

Five universities had two contributions each and seven universities made one contribution each. This analysis shows that 119 contributions (70.4%) came from only five (19.23%) of the 26 affiliate universities. It is worthy of note that two of these universities, LAUTECH, Ogbomoso and OOU, Ago-Iwoye and Delsu, Abraka are state universities while the others are federal universities.

Geographical Spread

The JNAMP has a good geographical spread through five geopolitical zones of Nigeria. The analysis is based on location of researchers’ institution. A few authors were counted for more than one geographical location due to change of institution of employment. A large propotion of affiliate institutions are spread over three geopolitical zones, viz, South-South, South West, and North Central. There were no contributors from institutions in the Federal Capital Territory (FCT) and the North East zone. The south West zone topped the productivity list with 63 (37.5%) contributions, followed by the South-South zone with 54 (32.14%) contributions, and then the North Central with 29 (17.26%) contributions. The South East zone though represented by only two institutions made 16 (9.52%) contributions, while the North West zone contributed 6 (3.57%) from three institutions.

Conclusion

It is very important to understand the nature of authorship in any particular discipline, hence this study. Of the 169 contributions by scientists from 33 institutions of higher learning in Nigeria and Botswana, 56.8% (96) of these researchers had a frequency count of one while 43.2% (73) made two or more contributions to volume 10 of JNAMP. The most prolific authors, numbering only 8 made 35 contributions representing 47.9% of all co-and multiple authored papers. Given the many benefits of collaboration [7], it is important to note that more and more scientists are collaborating in the production of academic papers. Collaboration engenders increased productivity [14] and this study is in agreement with that observation. The most prolific author is also the most collaborative.

Gender analysis of productivity shows that there are still extremely few females in the so called “hard sciences”. Of the 169 contributions, only 5 (2.96%) came from females with a total productivity of approximately 2.65. There is need to encourage females to go into these areas and publish. A study such as this, highlights this huge gap existing between female and male productivity and therefore draws attention to the problem of the persisting gender disparity in the sciences.

It is not clear from this study what role institutional affiliation has to play in productivity, since Federal and State universities are represented in the 13 affiliate institutions with high productivity. It is worthy of note however that of the so called 1st generation universities in Nigeria, only UNIBEN and UI “the premier university” made the list. It was also observed that none of the private universities made the list, infact the only two that made contribution were Igbinedion University, Okada, (1) and Mkar University, Gboko (2).

Bibliometric studies of journals are a well established research genre [11]. This perspective assists the researcher in demonstrating the scholarly trends and communications in the area of mathematical physics in Nigeria. This bibliometric study will inform the community of mathematical physicists of their research productivity, the most active researchers in their fields, the paucity of female researchers in the field as well as, the affiliate institutions of the most productive scholars.

References

- [1] Ayeni, R. O. (2006) Forward. JNAMP Vol. 10.
- [2] Oloruntoba, A & Ajayi, M. T. (2006). Gender and research attainment in Nigerian agricultural universities. *JHEA/RESA: Council for the Development of Social Science Research in Africa*, 4 (2), 83-98.
- [3] Radha, K. R; Connors, J; Elliot, J; & Verma, S. (2001). From early beginning to sound sustained future. *J. Inter. Agric. Ext. Educ.* 8 (3), 31-40.
- [4] Hjørland, B. (2007). Bibliometrics. <http://www.bd.dk/bh/core%20concepts%20in%20lis/articles%20a=/bibliometrics.htm>.
- [5] Ikapaahindi, L. (1985). An overview of bibliometrics: Its measurements, laws and their applications. *Libris* 35 (2), 163-190.
- [6] Sengupta, I. N. (1992). Bibliometrics, informatics, scientometrics and librametrics: An overview. *Libri* 42 (2), 75-98.
- [7] Glanzel, W. (2003). Bibliometrics as a research field: A course on theory and application of bibliometric indicators. http://www.norslis.net/2004/Bib_module_kul.pdf
- [8] Cline, G. S. (1982). *College & Research Libraries: Its first forty years.* *College & Research Libraries* 43 (5), 208-232.
- [9] Terry, J. L. (1996). Authorship in College & research Libraries revisited: Gender, Institutional affiliation, collaboration. *College & research Libraries*, 57 (7), 377-383.
- [10] Fennewald, J. (2007). The ACRL conferences: A profile of its presenters. *College research libraries* 68 (2), 107-118.
- [11] Park, T.K. (2010), *D-Lib magazine: Its first 13 years.* <http://www.dlib.org/dlib/january10/park/01park.print.html>
- [12] Al-Ghamdi, A., Al-Harbi, M., Beacon, N. A. B., Dedolph, J., Deignan, M., Elftmann, C., et al. (1998). Authorship in JASIS: A quantitative analysis. (Online). *Katharine Sharp Review*, 6 (Online) <http://mirrored.ukoln.ac.uk/lis-journal/review/review/6/al-ghamdi-hml>.
- [13] Liu, J. (2003). A bibliometric study: Author productivity and co-authorship features of JASIST 2001-2002. *Mississippi Libraries*, 67 (4), 110-112.
- [14] Oyeniyi, J. O. & Bozimo, D. O. (2004). The relationship between author collaboration and productivity: A study of Sorghum Literature in Nigeria. *Afr. J. Lib. Arch. & Inf. Sc.* 14 (1), 29-36
- [15] Mischo, W. H. (2005). Digital libraries: Challenges and influential work. *D-Lib magazine*, 11 (7/8). Doi:10.1045/july2005-mischo.