

## MAPPING OF RESEARCH PRODUCTIVITY OF FACULTIES IN ENGINEERING INSTITUTE – A CASE STUDY

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**Abstract:** - *The present study examines research publications in the field of Engineering. The analysis included research growth, author productivity, authorship pattern, form wise distribution of research publications, department wise distribution of research publication, designation wise distribution of research publication, gender wise distribution of research publications etc. The study reveals, that most of the faculties preferred to publish their research in International level Conference as well as Journals; as such 34% papers published in International conferences and 32.74% papers published in International Journals. It is also seen that multi authorship is dominant than single authorship. The result shows that there is a significant growth of research productivity in the field of engineering.*

**Keywords :** Bibliometric study, Scientometric study, Research productivity, Authorship pattern, Research collaboration, SGGS IE & T.

### Introduction :

Higher education is the major source which contributes input to technological capability and change, besides higher rates of growth. The function of a engineering institute is not merely to impart skills and techniques required for running industries, business and government and non government departments, but to impart the young minds certain ethics and values.

Bibliometric study is an approach which is based on quantitative characteristics, attributes or objects of documentary flows. It is primarily based on the analysis of the bibliographic data on publications. A principal assumption underlying the use of bibliometric indicators is that scholars publish their research results in the publicly available literature and that one may obtain picture of scholarly activities from a

quantitative analysis of scholarly documents (Garfield, 1979 )

### **Brief profile of SGGS IE & T :**

Shri Guru Gobind Singhji Institute of Engineering & Technology is established in the year 1981 at Nanded. It has grown to the level of being recognized as a leader in the area of technical education and research. It now offers 10 undergraduate, 10 postgraduate and offers Ph. D. program under its affiliating university. In less than 25 years of its inception, the institute has made a mark in technical education and quality research which got endorsed by the third party survey conducted in 2004. The institute got identified as an institute which can be raised to the level of Center of Excellence. The institute has state of the art equipment and machinery for teaching as well as for research / consultancy services. The institute has a very progressive and pragmatic approach in providing its services to all its stakeholders. The research culture of the institute has been proven through publications in thousands of research contributions with good citation record in peer reviewed prestigious national / international journals and reputed international conferences. Most of the faculty are reviewers for international journal. A number of books have also been published by the faculty. Patenting is becoming a promising feature of the institute basically because students projects are also getting converted into patents. Establishment of Innovation laboratory and

participation of roughly 15% of the student strength in various innovation projects is a key feature of the institution.

### **Source, Scope, Methodology and Limitations :**

SGGSIE & T is an government funded autonomous institute. The main source used for the collection of data is website of the institute. The details of the faculties is collected from the Cvs available on the institute website as well as publication details from the department. Scope of the study is limited to the bibliometric analysis of research publications of permanent working faculties of the institute, personal discussions with the target audience also opted administrative help. The data for the present study is collected through CVs of the faculties available on institute website. The data collected for the study was fed into MS-excel with variables such as name, designation, gender, publication level, department, year, author 1, 2, 3, 4, more than 4, author position, no of authors, title, publication, venue, remark etc. The collected data were analysed, tabulated and represented by tables using MS-Excel 2007. The secondary data were collected from the books, encyclopaedias, printed / online journals and particular institute website.

### **Review of Literature :**

A number of quantitative studies based on Bibliometric and Scientometric techniques have been reported to evaluate the research productivity of individuals, institutions, countries,

etc. Studies are also available to verify the fitness of classic laws of bibliometrics, factors of productivity and impact of research conducted in various countries.

**Thanuskodi S (2011)** analysed the journal titled “Library Herald” for the period between 2006 and 2010. The analysis covered mainly the number of articles, authorship pattern, subject wise distribution of articles, average number of references per articles, forms of documents cited, year wise distribution of cited journals etc. it was found that all the studies pointed out the merits and weakness of the journal which will be helpful for its further development. The result showed that out of 138 articles single author contributed 72 (52.17%) articles while the rest 66(47.83%) articles were contributed by joint authors. The study revealed that most of the contributions are from India with 89.85 % and the rest 10.15 % only from foreign sources.

**Pillai Sudhier & Priyalakashmi (2013)** analysed the Bibliographic details of 1076 research articles of Central Tuber Crops Research Institute (CTCRI). It was found that the highest number of 169 papers was published in the year 2006 and average number of publications per year was 97.82. Most of the contributions were multi authored (87.68%). The degree of collaboration of scientist of CTCRI was 0.87 and most of the articles published by the scientists were in the foreign journals (51.89%).

**Sharma R. (2009)** studied a total of 2603 research articles published by the scientist of

Central Potato Research Institute (CPRI) during 1991 to 2007. The Data collected by scanning of Annual reports of CPRI and Journal of the Indian Potato Association. Analysis show that majority of the scientists preferred to publish research papers in joint authorship (82.67%) having 0.82 degree of collaboration.

**Aswathy & Gopikuttan (2013)** analysed the publication pattern of faculty members of three universities in Kerala viz., University of Kerala, Mahatma Gandhi University and University of Calicut during 2005 to 2009. Authorship pattern, Degree of Collaboration, Year-wise and Designation wise distributions has been studied. In UoK there are 966 journal article contributions, while in MGU and UoC there are 635 and 734 journal articles.

### **Objectives :**

The main objectives of the study are as follows

- a. To study the research productivity in various forms of Shri Guru Gobind Singhji Institute of Engineering & Technology Nanded.
- b. To find department wise research productivity of the Institute.
- c. To know the authorship pattenon of research publications of the faculties.
- d. To find out gender wise analysis of research productivity.
- e. To find out designation wise analysis of research productivity.

### Data Analysis & Results :

Shri Guru Gobind Singhji Institute of Engineering & Technology Nanded's faculty members research publication details collected, analysed and evaluated as per given below.

### Form wise Distribution of Research Output :

Table No 1 shows form wise distributions of total number of 2303 research publications. Where, seven different forms were considered to separate the research outputs. Conference/Seminar proceedings and Journal articles found most popular form which is preferred by the faculties to publish their research work.

Table No 1 : Form wise Distribution of Research Output

Sr. No.	Publication	Total Publication	Percentage	Cumulative Total Publications	Cumulative Percentage
1	Patent	23	0.99%	23	0.99%
2	Book Chapter	36	1.56%	59	2.55%
3	Book	47	2.05%	106	4.60%
4	National Journal	181	7.86%	287	12.46 %
5	National Conference	479	20.80%	766	33.26 %
6	International Journal	754	32.74%	1520	66%
7	International Conference	783	34%	2303	100%
	<b>Total</b>	<b>2303</b>	<b>100 %</b>		

Table No. 1 reveals that out of 2303 research publications maximum number with 783 (34%) papers are published in the International Conference proceedings, followed by 754

(32.74%) are published in the International Journal articles and National Conference with 479 (20.80%) followed by National Journal with 181 (7.86%), Book with 47 (2.05%), Book Chapters 36 (1.56%) and Patents 23 (0.99%). The study shows that majority of faculty members likes to publish their work in the International Conference/Seminar proceedings followed by International Journals; it includes reviewed or peer-reviewed publications. This is because Conference and seminars at National & International level gives platform to the professionals to share their ideas on National as well as International level which help to update their knowledge. It is also found that publication of book or Book chapter is less by faculty members.

### Authorship Pattern and Research Output

It is seen from Table No 2 that out of 2303 research publications, highest number of publications are by two collaborative authors. It means that more faculty members keep interest in research collaboratively rather than single.

Table No 2 : Authorship Pattern of Research Output

Sr. No.	Publications	Total Publication	Percentage	Cumulative Total Publications	Cumulative Percentage
1	Single Author	121	5.25%	121	5.25%
2	Two Author	1246	54.10 %	1367	59.36%
3	Three Author	702	30.48 %	2069	89.84%
4	Four Author	192	8.34%	2261	98.18%
5	More Than Four Author	42	1.83%	2303	100%
	<b>Total</b>	<b>2303</b>	<b>100 %</b>	<b>-</b>	<b>-</b>

It is seen from *Table No 2* that out of 2303 research publications during 1987 to 2016, there were 121 (5.25%) articles written by single authors, 1246 (54.10%) belonged to two-authored, 702 (30.48%) articles are by three authors, 192 (8.34%) articles are by four authors and very less i.e. only 42 (1.83%) articles were written by more than four authors. While, only 121 (5.25%) publications written by single author. It reveals that collaborative researches were highly preferred by the faculties.

**Department wise Distribution of Research Output :**

In Shri Guru Gobind Singhji Institute of Engineering and Technology in all 12 Departments of different branches are available.

The publication output of these departments is given in table no 3.

**Table No 3 : Department wise Research Output**

Sr. No.	Department	Total No of Publication	Percentage	Cumulative Total No of Publication	Cumulative Percentage
1	Chemical	19	0.82%	19	0.82%
2	Civil	178	7.72%	197	8.55%
3	Computer	190	8.25%	387	16.80%
4	Electrical	0	0%	387	16.80%
5	Electronic & Tele. Comm.	643	27.95%	1030	44.72%
6	Information Technology	46	1.99%	1076	46.72%
7	Instrumentation	696	30.22%	1772	76.94%
8	Mathematics	5	0.21%	1777	77.16%
9	Mechanical	0	0%	1777	77.16%
10	Physics	0	0%	1777	77.16%
11	Production	386	16.77%	2163	93.92%
12	Textile	140	6.07%	2303	100%
	<b>Total</b>	<b>2303</b>	<b>100%</b>		

It is seen from *Table No. 3* that out of 2303 research publications the Department of Instrumentation Engineering is top with 696 publications which is 30.22% of the total contributions. The second rank is to the department Electronics and Telecommunication Engineering with 643 publications i.e. 27.95%. This is followed by Production Engineering with 386 i.e. 16.77% and Computer

Science Engineering with 190 i.e. 8.25%. While Electrical, Mechanical and Physics departments are not having single output of research publication by faculty member, however the reason behind this is that there is less number of working faculties in these departments. It can be revealed from this table that the recent topics like Instrumentation, Electronics, and Telecommunication are gaining importance in this era, since this has shown relatively good productivity.

**Designation wise Research Collaboration:**

Table No 4 shows Designation-wise collaboration of research contributions in twelve departments for the study period. At the higher institute level, the most important requirement for promotion is research publications. Therefore, it is necessary to know the research contributions of the faculties over the years.

**Table No 4 : Designation wise Research Output**

Sr. No.	Designation	No of Faculties	Percentage	Total Publication	Percentage	Cumulative Total Publication	Percentage
1	Assistant Professor	21	30%	113	4.90 %	113	4.90 %
2	Associate Professor	33	47.14%	702	30.49%	815	35.38%
3	Professor	16	22.86%	1488	64.61%	2303	100 %
	<b>Total</b>	<b>70</b>	<b>100</b>	<b>2303</b>	<b>100 %</b>		

It is observed from *Table No. 4* that out of 2303 research publications majority of the contributions was made by Professors with 1488 (64.16%) followed by Associate Professors with 702 (30.49%) contributions and Assistant Professors with 113 (4.90%) contributions. It seems to be that senior faculties are more. Simply it can be concluded that length of service matters more.

**Gender wise analysis of Faculties:**

Table No 5 shows the gender wise analysis research output of faculties from the twelve different departments and further the gender wise total number of research publications has been analysed.

**Table No 5 : Gender wise Research Output**

Sr. No.	Gender	Total Faculty	Percentage	Total Publication	Percentage
1	Male	58	82.86	2190	95.1
2	Female	12	17.14	113	4.9
	<b>Total</b>	<b>70</b>	<b>100</b>	<b>2303</b>	<b>100</b>

*Table No. 5* shows that out of 70 core faculty members 58 are male faculties and 12 are female, of which 58 male faculties published 2190 research papers with (95.10%) and 12 female faculties published 113 research papers with (4.90%). On an average 38 papers are published per male author, whereas only 9 papers are published per female author.

**Department and Gender wise Research Publications :**

Table No 6 shows the Gender wise analysis of faculties and their research contributions. It seems that majority professionals are male as compared to female professionals.

**Table No 6 : Department & Gender wise Research Output**

Department	Males		Females		Total	
	No. of faculties	Publication	No. of faculties	Publication	No. of faculties	Publication
Chemical	3	19	0	0	3	19
	4.28%	0.83%	0.00%	0.00%	4.28%	0.83%
Civil	7	178	0	0	7	178
	10.00%	7.73%	0.00%	0.00%	10.00%	7.73%
Computer	10	161	4	29	14	190
	14.29%	6.99%	5.71%	1.26%	20.00%	8.25%
Electrical	0	0	0	0	0	0
	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Electronic & Tele. Comm.	13	616	3	27	16	643
	18.57%	26.75%	4.29%	1.17%	22.86%	27.92%
Information Technology	5	33	2	13	7	46
	7.14%	1.43%	2.86%	0.56%	10.00%	1.99%
Instrumentation	6	652	2	44	8	696
	8.57%	28.31%	2.86%	1.91%	11.43%	30.22%
Mathematics	2	5	0	0	2	5
	2.86%	0.22%	0.00%	0.00%	2.86%	0.22%
Mechanical	0	0	0	0	0	0
	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Physics	0	0	1	0	1	0
	0.00%	0.00%	1.43%	0.00%	1.43%	0.00%
Production	7	386	0	0	7	386
	10.00%	16.76%	0.00%	0.00%	10.00%	16.76%
Textile	5	140	0	0	5	140
	7.14%	6.08%	0.00%	0.00%	7.14%	6.08%
<b>Total</b>	<b>58</b>	<b>2190</b>	<b>12</b>	<b>113</b>	<b>70</b>	<b>2303</b>
	<b>82.85%</b>	<b>95.10%</b>	<b>17.15%</b>	<b>4.90%</b>	<b>100.00%</b>	<b>100.00%</b>

It is observed from *Table No. 6* that out of 70 faculties majority of the research outputs are from Department of Instrumentation Engineering which contributed to total 696 (30.22%) outputs, wherein 6 male faculties contributed 652 (28.31%) publications and 2 female faculties contributed 44 (1.44%) publications. This is followed by Department of Electronics & Telecommunication Engineering contributed total 643 (27.92%) outputs, whereas 13 male faculties contributed 616 (26.75%) publications and 3 female faculties contributed 27 (1.17%) publications and Department of Production Engineering contributed 386 (16.76%) outputs, whereas only 7 male faculties contributed 386 (16.76%) publications. Department of Computer Science Engineering contributed 190 (8.25%) outputs, whereas 10 male faculties contributed 161 (6.99%) publications and 4 female faculties having 29 (1.26%) publications on their credit followed by

Department of Civil Engineering contributed 178 (7.73%) outputs by only 7 male faculties. While, Department of Electrical, Mechanical & Physics contributed zero research outputs on credit.

### Conclusion :

The present study tried to provide a comprehensive evaluation of the data obtained from SGGGS IE & T. It is found that at the early stage the coverage of publications from faculties was less but it is increasing gradually. In all there were 12 departments and 71 core faculty members in the institute. International Conference as well as International Journal is the most popular channel of research publication preferred by the faculties with highest 34% and 32.75%, followed by national conference papers with 20.80%, national journals with 7.86%. Publication of Books with 2.05%, Book Chapters with 1.56%. The most important patents registered with 0.99%. The reason behind this may be Conferences at international level or national level gives platform to the professionals to share their good ideas and also update their knowledge in their field.

- It is observed that out of 2303 research publications, there were only 121 (5.25%) articles written by single author and 2182 (94.75%) articles were written by multi authors. It reveals that collaborative researches were highly preferred by the faculties.
- It is seen that out of 2303 research publications the Department of Instrumentation Engineering is top with 696

publications which is 30.22% of the total contributions.

- Professors Research publications is more than associate professor and assistant professors.
- Male faculty research publications is more than the female faculty members.

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