

# **MAPPING THE RESEARCH PRODUCTIVITY OF THREE ENGINEERING & TECHNOLOGY JOURNALS PUBLISHED FROM PAKISTANI UNIVERSITIES: A COMPARITIVE BIBLIOMETRIC ANALYSIS 2006-2017**

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## **ABSTRACT**

*The aim of this study was to compare the growth of research productivity specifically in engineering sciences and technology of three research journals of; Mehran University of Engineering & Technology (MUET) Jamshoro, Pakistan Journal of Engineering & Applied Sciences (PJEAS), Lahore and Quaid-e-Awam University of Engineering, Science & Technology (QUEST) Nawabshah, during the period of 2006 – 2017. The data of articles download and collected during the December 2017 to January 2018 for numerical analysis from the websites of e-journals of MUETRJ, PJEAS & QUETRJ. Total 802; 12.9% articles published in 62 issues with the contribution of 2477 authors with average of 3 authors per article (502; 62.5, 192; 24 and 108; 13.4) were published in MUETRJ, PJEAS & QUETRJ during the years 2006 – 2017. The participation of multi authors 773; 96.3% (493; 93.2%, 179; 93.2% and 101; 93.5%) were found in majority as compare single or solo authors. A gender wise contribution of males was higher 2242; 90.5% than the females 229; 9.2%. One hundred thirteen national and international (80; 73.4% National and 30; 26.5% International) Institutes, Organizations and Universities contributed their research in publishing. With contribution of 254; 31.6% Mehran University of Engineering & Technology takes major share in producing research in the field of engineering and technologies.*

*Researching in engineering science is complex. The number of articles in each journal shows the collaboration and effectiveness of authors in publications, a system of publishing, and participation of female authors in organizational research. The bibliometric findings of this study are helpful to journal publishers to formulate appropriate policies to help in the development of research culture among the community of engineering and technology academia's.*

**Key words:** Bibliometric, MUETRI, PJEAS and QUETRJ

## **INTRODUCTION**

Engineering science is a methodology to solve complex problems of civil, electrical, mechanical, chemical and other technological sciences in practical and cost-effective manners. Engineering science is a combination of skills and the competencies which involve in inventions of new tools and gadgets to facilitate professionals in structural designs of buildings or machines. Engineering science deals with the conditions of matter, liquid and air to convert into energy resources. Writing scholarly research is highly appreciated by academia and intellectuals of the subject specific. Among institutes, the publications are the foremost factor to measure the rank of the institute in the same type of discipline. Bibliometric study is helpful to analyze the research productivity of a single journal. It provides the description of an article to measure the contribution of an author, gender specification, and affiliation with the institute. Bibliometric study specifies the productivity, quality, and maturity of the journal in one field.

### **Aim and Objectives.**

This is retrospective study; the aim of this study is to compare the research productivity of three electronic journals related to engineering and technologies published by the public sector universities in Pakistan. The objectives were set to analysis:

- 1) To identify the contributions in the studied electronic journals during the 2006 to 2017.
- 2) To calculate and compare the year and issues-wise distribution of

publications.

- 3) To evaluate the involvement of authors in publications with gender wise distribution of the first author;
  - i) to categorize the pattern of authorship; and
  - ii) to identify the geographic affiliation of first author.

## **LITERATURE REVIEW:**

A brief answer submitted by Franceschini et. al (2014) of a question, can editors monitor the performance of journals through bibliometric indicators? A quantitative study was carried out on the Google Scholar, Web of Science, and Scopus databases to gauge IEEE scientific journals. This study found 250,000 authors which published their research in 110 IEEE journals and limited by assumptions about the value of citations, the reliability of search engine statistics, and the homogeneity of IEEE journal citation practices. This study also provides a new methodological tool for monitoring a large number of scientific journals.

Merigo et. al. (2017) with the inspiration of its 40th anniversary in 2016, a bibliometric analysis conducted on the leading international journal in the field of industrial engineering named Computers & Industrial Engineering (CIE) from 1976 and 2015. Web of Science Core Collection database used to analyze the data. This study reflects the participation of prominent countries in publishing their scientific research. The United States of America was most productive but the People Republic of China publishing more than yearly in CIE. The University of Central Florida and Ashikaga Institute of Technology, Japan are the most productive institution.

A bibliometric study was published by Gundes, S., & Aydogan in the year 2016 on growing interest in international construction published in the Scopus database from 2003 to 2013. The main objectives were to know the patterns of development, active institutes, and research communities to discover critical themes with collaboration in international construction. Only 87 articles were published in six journals in the field on international construction from 2003 to 2013. The National University of Singapore, the Hong Kong Polytechnic University, and Middle East Technical University, Turkey got the lead in publications. Risk management, measuring performance, competencies and foreign market were the rising trends in the construction industry to encounter the challenges.

Nan Li (2018) conducted bibliometric investigations based on the literature published in Web of Science and its sub-databases; Science Citation Index (SCI), Social Sciences Citation Index (SSCI), Conference Proceedings Citation Index- Science (CPCI-S) and Conference Proceedings Citation Index- Social Science & Humanities (CPCI-SSH) comprising terms of solid waste reuse and recycling during the period of 1992 to 2016. Study finds 6289 articles met the selection criteria were published in 1402 journals. The developing countries are in a relatively advanced stage and contributed to significant growth. People Republic China has surpassed the United States of America as the most productive country since 2007–2011.

In 2015, a bibliometric study was conducted by Fiala, D & Tutoky, G (2017) in the department of computer science and engineering, University of Bohemia, Czech Republic. Study chooses the topic of computer science as the main field with other sub-fields of computer science published and available on Web of Science (WoS) during the period of 1945 to 2014 which were published in 2017. This study reveals that 1,922,652 (1.9 million) computer science papers published from 1945 to 2014 and indexed in Web of Science. Sub-field “Artificial Intelligence” followed by “Interdisciplinary Applications”, “Hardware & Architecture” with “Software Engineering” find as most productive sub-fields of computer science all-around the world.

With the collaborative efforts, a comparative study was carried out by Baladi and Satti (2018) on two heart journals one from Pakistan and other from Saudi Arabia. Research revealed that 393 articles were published in Pakistan Heart Journal (PHJ) and Journal of Saudi Heart Association (JSHJ) during the year 2012 – 2016. Five years published data of 20 issues of each journal were compared, 207 articles published in PHJ and 186 in Journal of Saudi Heart Association (JSHA). Total 1840 researchers contributed, 980 in PHJ and 850 in JSHA, an average of authors per article found 4.73 in PHJ and 4.56 in JSHA. Male authors were seen to dominated (n=1656; 89.6%), 93.3%.

## **RESEARCH METHODOLOGY:**

The data for research was collect & downloaded for statistical analysis from the websites of e-journals of MUETRJ <http://publications.muuet.edu.pk/index.php/muetrj>, PJEAS [http://uet.edu.pk/research/researchinfo/index.html?RID=research\\_journal](http://uet.edu.pk/research/researchinfo/index.html?RID=research_journal) and QUETRJ <http://www.quest.edu.pk/>

[rjournals/cissueRJ.php](http://rjournals/cissueRJ.php) in MS Office (Excel 2010) in the library of College of Applied Medical Sciences, King Saud bin Abdulaziz University for Health Sciences Riyadh, Kingdom of Saudi Arabia throughout the period of December 2017 to February 2018.

## Results

Sixty two issues were found to collect and download to analysis from the websites of respective electronic journals of Mehran University of Engineering & Technology (MUET) Jamshoro, Pakistan Journal of Engineering & Applied Sciences (PJEAS), Lahore and Quaid-e-Awam University of Engineering, Science & Technology (QUEST) Nawabshah, during the period of 2006 – 2017. Figure 1 and table 1 reveals that 802 articles were published with the contribution of 2477 authors in the 62 issues of (28 MUETRJ, 19 PJEAS & 15 QUETRJ) with an average of 12.9% articles per issue (n=502; 17.9, n=192; 10.1 and n=108; 7.2) during the years 2006 – 2017. Total pages 7602 (9.47 per page) were used with 15967; 19.9% references per article.

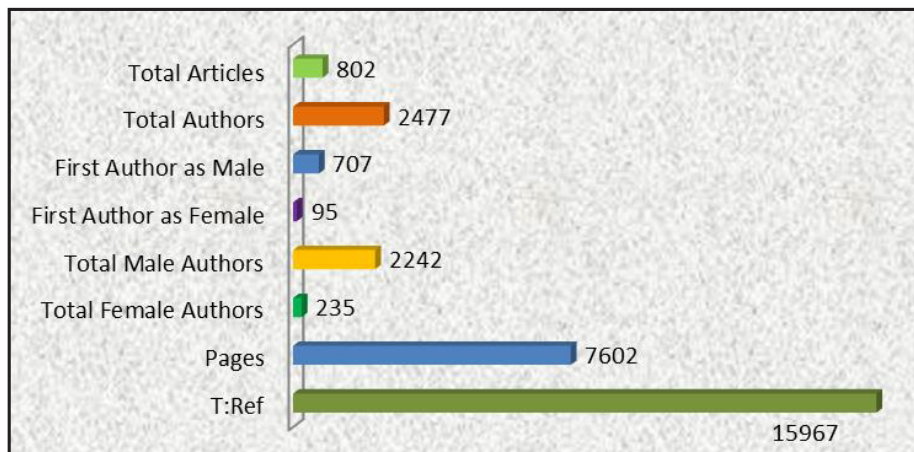


Figure. Research articles published.

Table 1 shows further breakdown of articles published in the MUETRJ, PJEAS & QUETRJ with contribution of authors, gender ship of author, consumption of pages and utilization of references during

the period of 2006 – 2017. The issue-wise participation of MUETRJ n=28; 45.1%, PJEAS n=19; 30.6% and QUETRJ n=15; 24.1% were in 62 issues. The MUETRJ n=502; 62.5%, PJEAS n=192; 24% and QUETRJ n=108; 13.4% contributed in publishing research.

**Table 1. Research articles published in the MUETRJ,PJEAS & QUETRJ (2006-2017)**

Name of Journals	Total Articles	Total Authors	First Author as Male	First Author as Female	Total Male Authors	Total Female Authors	Pages	Total Ref:
MUETRJ Year 2011 – 2017 Total Issues = 28	502 (62.5%)	1502 (60.6%)	430 (60.8%)	72 (75.7%)	1322 (59%)	180 (76.6%)	4919 (64.7%)	10321 (64.6%)
PJEAS Year 2007 - 2016 Total Issues = 19	192 (24%)	613 (24.7%)	183 (25.8%)	9 (9.4%)	585 (26%)	28 (12%)	1944 (25.5%)	3605 (22.5%)
QUETRJ Year 2006 – 2016 Total Issues = 15	108 (13.4%)	362 (14.6%)	94 (13.3%)	14 (14.7%)	335 (15%)	27 (11.4%)	739 (9.7%)	2041 (12.7%)
Total Articles published during the period of 2006 - 2017	802	2477 (3.08 authors per article)	707 (28.54%)	95 (11.85%)	2242 (90.51%)	235 (9.49%)	7602 (9.47 pages per article)	15967 (19.9 References per article)

**Table 2. Authorship pattern of publication articles in MUETRJ,PJEAS & QUETRJ (2006-2017)**

Authorship Pattern	MUETRJ Year 2011 – 2017 Total Issues = 28	PJEAS Year 2007 - 2016; Total Issues = 19	QUETRJ Year 2006 – 2016 Total Issues = 15	Total
Single Author	9	13	7	29 (3.62%)
Two Authors	58	47	12	117 (14.5%)
Three Authors	385	62	48	495 (61.7%)
Four Authors	27	41	18	86 (10.7%)
Five or More Authors	23	29	23	75 (9.35%)
Total Articles	502 (62.5%)	192 (23.9%)	108 (13.4%)	802

**Table 3. The geographic affiliation of authors the MUETRJ, PJEAS & QUETRJ (2006-2017)**

	Affiliation	Articles
1	Mehran University of Engineering & Technology, Jamshoro Pakistan	254 (31.6%)
2	University of Engineering & Technology, Lahore. Pakistan	177 (22%)
3	Quaid-e-Awam University of Engineering, Science & Technology, Nawabshah. Pakistan	80 (9.9%)
4	University of Engineering & Technology, Taxila Pakistan	42 (5.24%)
5	National University of Sciences and Technology, Islamabad, Pakistan	28 (3.49%)
6	University of Sindh, Jamshoro. Pakistan	20 (2.49%)
7	NED University of Engineering & Technology, Karachi. Pakistan	12 (1.5%)
8	Federal Urdu University of Arts, Science & Technology, Karachi and ShaheedZulfiqar Ali Bhutto Institute of Science & Technology, Karachi Pakistan. <b>(Total 02 Institutes produced)</b>	7 (0.87%) each
9	Beijing Institute of Technology, Beijing 100081, P.R China	6 (0.75%)
10	Centre for Advanced Studies in Engineering, Islamabad; MUET, SZAB Campus, Khairpur Mir's, Pakistan; Sir Syed University of Engineering & Technology, Karachi; University of Karachi, Karachi. Pakistan. <b>(Total 04 Institutes produced)</b>	5 (0.62%) each
11	Bahauddin Zakariya University, Multan; Dawood University of Engineering & Technology, Karachi; International Islamic University, Islamabad; The Islamia University of Bahawalpur, Bahawalpur; University of Central Punjab, Lahore, Pakistan. <b>(Total 05 Institutes produced)</b> .	4 (0.5%) each
12	Hamdard University, Karachi Pakistan, Hazara University, Mansehra, KPK Pakistan, Institute of Business Administration, Sukkur Pakistan, Iqra University Karachi, Pakistan, National Agricultural Research Center, Islamabad. Pakistan, Pakistan Atomic Energy Commission, Islamabad Pakistan, Royal Melbourne Institute of Technology RMIT, Melbourne, Australia, Sindh Agricultural University, TandoJam, Hyderabad, Sindh Pakistan, and University Teknologi Malaysia, Skudai Johor, Malaysia. <b>(Total 09 Institutes produced)</b>	3 (0.37%) each



Rank	Affiliation	Articles
13	Allama Iqbal Open University, Islamabad; Bahria University Islamabad; Balochistan University of Engineering & Technology, Khuzdar; Capital Development Authority (CDA), Islamabad; COMSATS Institute of Information Technology, Abbottabad; Government College University, Lahore; Institute of Business Administration, Karachi; International Islamic University Islamabad; Isra University, Hyderabad; Jamshoro Power Company Limited, Jamshoro; National University of Computer & Emerging Sciences, Karachi; Pakistan Institute of Nuclear Science and Technology, Islamabad; Quaid-e-Azam University, Islamabad; Sukkur Institute of Business Administration, Sindh; University of Manchester, M13 9PL, UK; University of Oldenburg, Germany; and University Technology Malaysia. <b>(Total 17 Institutes produced)</b> .	2 (0.25%) each
14	Ahmadu Bello University, Zaria; Air University, E-9 PAF Complex, Islamabad; Associated Consulting Engineers (ACE), Lahore; Bahria University, Karachi; C&W Dept., Govt. of the Punjab, Lahore; Chinese Academi of Science, Shenzhen China; DISAT, Politecnico di Torino, Italy; Engineering College, Larkana; Florida International University, Miami, FL, USA; G.C. University, Faisalabad, Punjab; Ghulam Ishaque Khan Institute of Science & Technology, Topi, Peshwar; Gomal University Dera Ismail Khan, KPK; Government Degree College Gambat District Khairpur, Sindh; Government Girls College, Qasimabad, Hyderabad; Hacettepe University, Beytepe, Ankara Turkey; Institute of Communication Technologies (ICT), Islamabad; Institute of Nanoelectronic Engineering (INEE) Malaysia; International Islamic University, Malaysia; International Water Management Institute, Lahore; IQRA National University, Phase-II, Hayatabad, Peshawar, Khyber Pakhtunkhawa; Irrigation Department, Government of Sindh, Hyderabad; Isra University, Islamabad; Italian National Research Council, Cosenza 87036, Italy; Jeju National University, Jeju City 690-756, South Korea; Kampala International University, Uganda; King Faisal University, Al-Ahsa, Kingdom of Saudi Arabia; Kinnaird College, Lahore; KTH Royal Institute of Technology, Stockholm, Sweden; Lahore College for Women University, Lahore;  Nanjing University, Nanjing 210093, China; National Engineering Services of Pakistan NESPAK, Lahore; National Institute of Technology, Kurukshetra India; National University of Computer and Emerging Sciences, Faisal Town, Lahore; NESPAK; NFC Institute of Engineering and Fertilizer Research, Faisalabad; NUST School of Civil Engineering, Risalpur; NWFP, University of Engineering & Technology, Peshawar; Pakistan Institute of Engineering and Applied Sciences (PIEAS), Nilore, Islamabad; Pakistan Telecommunication Company Limited, Hyderabad; Perston University, Islamabad; Planning and Development Department, Government of the Punjab, Lahore; Prince Sultan University, Kingdom of Saudi Arabia; Shah Abdul Latif University, Khairpur Mirs; Sindh Irrigation and Drainage Authority, Hyderabad; South Eastern University, Sri Lanka; Tashkent Institute of Textile & Light Industry, Uzbekistan; Traffic Engineering & Transport Planning Agency, Lahore Development Authority, Lahore; Tsinghua University, Beijing, China; University of Agriculture, Faisalabad; University of Agriculture, Peshawar; University of Azad Jammu & Kashmir, Muzaffarabad; University of Balochistan, Quetta; University of Benin, Benin City, Nigeria; University of Electronic Science & Technology, China; University of Engineering and Technology, Peshawar; University of Hawaii, USA; University of Lagos, Nigeria; University of Lahore; University of Leeds, Leeds, UK; University of Malakand, Chakdara Dir Lower; University of Management and Technology Lahore; University of Punjab, Lahore; University of Sargodha; University of Sindh, Khairpur Mirs Campus; University of SriLanka, SriLanka; University of the Punjab, Lahore; University of Tsukuba, Japan; and Urdu University of Arts, Science & Technology, Karachi, Pakistan <b>(Total 68 Institutes produced)</b> .	1(0.12%) each



Table 2 explains the breakdown of authorship pattern in the MUETRJ, PJEAS & QUETRJ. The 773; 96.3% (493; 98.2%, 179; 93.2% and 101; 93.5%) articles were written by multi authors only 29; 3.62% (9; 1.7%, 13; 6.7% and 7; 6.4%) articles written by solo or single authors.

Table 3 reveals that 113 national and international (80; 73.4% National and 30; 26.5% International) Institutes, Organizations and Universities participated in publishing their research in respective electronic journals of MUETRJ, PJEAS and QUETRJ. Mehran University of Engineering & Technology, Jamshoro take top position with the contribution of 254; 31.6% publications followed by University of Engineering & Technology, Lahore 177; 22%, Quaid-e-Awam University of Engineering, Science & Technology, Nawabshah 80; 9.9%, University of Engineering & Technology, Taxila Pakistan 42; 5.24% and National University of Sciences and Technology, Islamabad (n=28; 3.49%). Sixty eight Institutes present only one paper, 17 Institute present 02, 9 Institutes 03, 5 Institutes 04 and 04 Institute contributed 05 articles out of 802 articles.

## **DISCUSSION & CONCLUSION**

This research covered 802; 12.9% articles written by 2477; 3% authors in the 62 issues of e-journals published by (28 issues of MUETRJ published in 2011 – 2017, 19 issues of PJEAS 2007- 2016 and 15 Issues of QUETRJ) during the period of 2006 – 2017. The 802; 12.9% articles were written in per issue. Mehran University of Engineering & Technology Research Journal (MUETRJ) grab the major share (n=502; 62.5%) followed by Pakistan Journal of Engineering and Applied Sciences (n=192; 23.9%) and Quaid-e-Awam University of Engineering, Science & Technology Research Journal (n=108; 13.4%). The length of pages (n=7602; 9.47%) were used for 802 articles. The contribution of females as first author 95; 11.8% (72; 14.3% in MUETRJ, 9; 4.69% in PJEAS and 14; 12.9% in QUETRJ) were found in publishing. Engineering science is an art to solve the complex world of civil, mechanical, electrical and chemical engineering knowledge. The bibliometric findings of this study are helpful to journal publishers to formulate appropriate policies to help in the development of research culture among the community of engineering and technology academia's

**Disclaimer:** This study presents only numbers and not inclined or declined growth of any organization, city, country and standards.

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## **APPENDIX**

### *Abbreviations*

MUETRJ: Research Journal	Mehran University of Engineering & Technology
PJEAS: Sciences.	Pakistan Journal of Engineering & Applied
QUETRJ: & Technology	Quaid-e-Awam University of Engineering, Science Research Journal