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RESEARCH PRODUCTIVITY OF GURU JAMBHESHWAR UNIVERSITY OF SCIENCE & TECHNOLOGY, HISAR DURING 2010-2019

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Abstract

The study presents the research productivity of academic community of GJUS&T, Hisar during a decade 2010-19. The study shows that a total of 1916 papers were produced by university during the period, which received 18056 citations with ACPP of 9.42, maximum publications appeared in articles (79.65%) and highly productive year was 2019 with 14.67% publications. The most preferred source for publications was 'AIP conference proceeding' with 24.12% of papers, top collaborating country was South Korea with 49 papers (33.56%). Nearly half of the publication (47.65%) received up to 10 citations.

Keywords: Research Productivity, GJUS&T, Research Output, Bibliometrics, Citation

INTRODUCTION

Guru Jambheshwar University of Science & Technology, Hisar (GJUS&T) a State University was established on October 20, 1995 by an Act of the Legislature of the State of Haryana to facilitate and promote the studies and research in emerging areas of higher education with focus on new frontiers of technology, pharmacy, environmental studies, non- conventional sources energy and management studies and also to achieve excellence in these and connected fields. It was formally inaugurated on November 1, 1995. It is named after Guru Jambheshwar Ji Maharaj, a saint environmentalist of 15th century. It is very prestigious university in the field of science and technology of region.

As per report published by the National Institutional Ranking Framework (NIRF-2019), Ministry of Human Resource Development, Government of India, GJUS&T has achieved 35th ranking among all the pharmacy category institution in India [8]. Research productivity is one of the major aspects that have usually been used by the different rating agencies globally to know the status of higher learning. One of the most important objectives of this study is to know the research productivity of this university as proof by the number of research papers published from 2010-2019 and this study also analyze the growth pattern, different types of papers published, authorship productivity, etc. from the published data.

OBJECTIVES

The main objective of this study is to examine the research performance of GJUS&T during 2010 to 2019. In particular, the study is carried out with following objectives:

- To examine the type of publications output of GJUS&T between 2010-2019;
- To study the growth of publications and citations of GJUS&T during 2010-2019;
- To identify the most productive authors of GJUS&T;
- To analyze the most preferred sources for publication by GJUS&T academic community;
- To study the national and international research collaborations of GJUS&T publications;
- To identify the highly cited publications of GJUS&T;
- To explore the Citation profile of GJUS&T.

METHODOLOGY

The present study is restricted to GJUS&T one of the three Hisar based universities. The data was extracted from Scopus database which is a popular largest abstracting and citation database of peer-reviewed scientific literature. The data was extracted in Jan 2020. Using the string AF-ID ("Guru Jambheshwar University of Science and Technology" 60001406), the data was obtained from the Scopus database and then the data was limited to the time period 2010 to 2019. The ten-year period is a good period to understand the research productivity of any institutions. The extracted data was then exported to MS-excel sheet and then analyzed to draw findings.

Limitations of the study

This paper scrutinizes entirely 1916 different types of papers published by GJUS&T that have been indexed in SCOPUS database from the period of 2010-2019. Thus, the different publications of GJUS&T indexed in other databases and have not been indexed in SCOPUS are not covered in present study.

REVIEW OF RELATED LITERATURE

Bebi and Kumar [1] in their scientometric analysis on contributions by women faculties of Physics from 2011-2015 at Delhi observed that the multi authored papers were more published, Ratnamala Chatterjee, IIT Delhi was most productive author, and Journal of Applied Physics was also the most preferred journal during the period. The most leading academic institution with publishing of journals articles was CSIR- National Laboratory and majority of the women authors were preferred second author while writing papers in collaboration. Kumar [2] in his bibliometric analysis of the research output of Guru Jambheshwar University of Science and Technology during 1999-2018 found that annual growth rate of publication was 31.72% with ACPP 13.67. Preferred subjects were Pharmacology, Toxicology and Pharmaceutics (11.31 %), maximum collaboration with with Maharshi Dayanand University, Rohtak and Ashish Agarwal from Applied Physics department was identified as the most productive author. Kumar, Partap and Kumar [3] studied the pattern of publications, using bibliometric analysis, of Journal of Documentation for the period of 2005 to 2018 and found that a total of 687 articles were published in the 14 years period from 2005 to 2018, with 71 (10.3%) articles being published the highest total in the year 2018. The study confirmed that the maximum number of articles i.e. 304 (43.9%), were published by single authors, out of which, a large number were on research articles. Nagarkar and Kumbhar [4] studied the bibliometric analysis of papers published by faculty of Life Science departments of Savitribai Phule Pune University during 1999-2013 and revealed that almost all the faculties of the university published their article with the collaboration of international researchers and extended their research work interdisciplinary. Single authorship papers were published in less number and multiple authorship publications received more citations in comparison to single author publications. Patel [5] in his Scientometric analysis of publications of NIT, Kurukshetra using Web of Science during 2012-2016 found that conference proceedings (68.18%) were published more than other literature, IIT, Roorkee was top collaborating academic institution with NITK while Malaysia, USA and Japan were the most favored countries for collaboration. Two authorship patterns were most preferred in 59.09% publications. Singh and others [6] studied the bibliometric analysis of 3218 documents published in 'Scientometrics Journal' from 2010 to 2019 and they have discovered various parameters of Bibliometrics such as total publications, totally cited publications year wise share of publications top productive authors, top countries in terms of research output, and top cited articles of the journal, the most productive year was 2018 with 398 (12.36%) publications and China produced the highest research output (22.37%) was on top and Bornmann, L. from Germany was the most productive author with 73 publications. KU Leuven was a top institution and produced 114 publications. Singh [7] after conducting his study on chemistry discipline of Panjab University, Chandigarh during 2008-15 found that PU's total publications in chemistry were increased at an average growth rate of 17.04 percent while ACPP was 6.38. Out of total publications, 22.33 percent publications were not cited by anyone. Siwach and Kumar [8] after investigating research contributions of Maharishi Dayanand University, Rohtak for period 2000-2013 indicated that the ACPP of MDU papers was 5.58 and marked highest (13.20) in 2001. Top collaboration was with Guru Jambheshwar University, Hisar with 66 papers while South Korea were in lead-Korea Institute of Energy Research (39 papers) had top collaboration on international level. Siwach and Parmar [9] after investigating research output of CCSHAU, Hisar during 2001-2015 found a total of 2649 paper were published from 2001-2015 which scored 15282 citation. Almost half of university publications (47%) were published in ten journals. The highest number of publications was published in the year 2014 and maximum collaboration of 141 publications with College of Veterinary Science on national level while top international collaboration with USA with 64 publications.

DATA ANALYSIS

Type of Publications

Table 1 shows the research output of GJUS&T appeared in different kind of publications. It is apparent from the table that highest research output of GJUS&T appeared in articles (79.65%) whereas only 11.22 percent publications appeared in conference papers and 6.00 percent as reviews. Research output of GJUS&T appeared in other kind of publications was in a very meager form.

Table 1: Types of documents

Document	Number of Papers	%
Article	1526	79.65
Conference Paper	215	11.22
Review	115	6.00
Book Chapter	39	2.04
Letter	6	0.31
Note	4	0.21
Editorial	2	0.10
Erratum	2	0.10
Short Survey	2	0.10
Undefined	5	0.26
Total	1916	100.00

Year wise Distribution of Publications and Citations during 2010-2019

Yearly distribution of papers of GJUS&T during a period of ten years is reflected through table 2. It is apparent that highest number of publications were published during the year 2019 (14.67%) followed by the preceding year 2018 (12.27%). A very a smaller number of publications were published in the year 2010 (6.26%). In terms of citations, 2012 accounted for highest number of citations (16.54%) followed by its preceding year 2011 (15.97%). ACPP was also highest (17.06) in the year 2011. It is noticeable that average growth rate of publications of GJUS&T during the period has been 10.75 however it was highest in 2010-11 followed by 2019.

Table 2: Year wise distribution of publications and citations

Year	TP	%	CO	% of GR	TC	%	ACPP
2010	120	6.26	-		1920	10.63	16
2011	169	8.82	289	40.83	2883	15.97	17.06
2012	182	9.50	471	7.69	2986	16.54	16.41
2013	184	9.60	655	1.10	2058	11.40	11.18
2014	165	8.61	820	-10.33	2028	11.23	12.29
2015	169	8.82	989	2.42	1735	9.61	10.27
2016	202	10.54	1191	19.53	1420	7.86	7.03
2017	209	10.91	1400	3.47	1638	9.07	7.84
2018	235	12.27	1635	12.44	1163	6.44	4.95
2019	281	14.67	1916	19.57	225	1.25	0.80
	1916	100.00		10.75	18056	100.00	9.42

(TP= Total Publications, TC= Total Citations, ACPP= Average Citations Per Paper , GR=Growth Rate, CO=Cumulative Output)

Most Productive Authors

Table 3 lists the top ten highly productive authors of GJUS&T. These top ten authors collectively contributed 43.16 % of total publications. Agarwal, A. published highest number of research papers (16.93%) while author at 10th position Chaudhary, A. published 6.53% of total papers published by top ten productive authors. In terms of citations, Kumar, S received highest citations (22.17%) followed by Kumar, A. (13.73%). ACPP of Kumar, A. (37.00) was found highest among ten productive authors. H index of Garg V.K. is visibly highest among the top authors.

Table 3: Authors with highest research profile

Author		TP	%	TC	%	ACPP	h-index
Agarwal, A.	Applied Physics	140	16.93	1680	10.39	12	27
Kumar, S.	Bio & Nano Technology	110	13.30	3586	22.17	32.6	29
Sanghi, S.	Physics	101	12.21	1302	8.05	12.89	26
Dilbaghi, N.	Department of Bio & Nano Technology	98	11.85	1872	11.57	19.10	27
Garg, V.K.	Environmental Science & Engineering	79	9.55	1721	10.64	21.78	45

Khatkar, B.S.	Food Technology	73	8.83	1170	7.23	16.03	23
Kumar, A.	Department of Pharmaceutical Sciences	60	7.26	2220	13.73	37.00	30
Ahuja, M.	Pharmaceutical Sciences	57	6.89	1045	6.46	18.33	21
Bishnoi, N.R.	Environmental Science & Engineering	55	6.65	1000	6.18	18.18	27
Chaudhary, A.	Department of Bio & Nano Technology	54	6.53	577	3.57	10.69	16
Total 160 authors		827 (43.16%)	16.93	1680	100.00	12	--

Top 15 Sources Preferred for Publications

A total of 1916 publications of GJUS&T appeared in 60 sources. The top 15 sources in which academicians of GJUS&T preferred publishing their research output is listed in table 4. These top sources collectively published about one fourth of total publications (25.10%). It is visible from the table that the most preferred source for publications for GJU scholars has been 'AIP conference proceeding' during 2010-2019 as in this source 24.12 percent of papers of GJUS&T appeared. Other preferred sources were 'Annals of Agri Bio Research published 9.77% of total publications, Annals of Biology published 9.77% and International Journal of Biological Macromolecules published 8.32% papers. Source at 15th top place published 3.12 percent of total papers published in 15 preferred top sources.

Table 4: Sources preferred for publications

Source Title	Publisher/Country	No. of papers	%	TR-IF	SJR	SJR H index
AIP Conference Proceedings	--	116	24.12	-	0.182	-
Annals of Agri Bio Research	Agri Bio Research Publishers, India	47	9.77	-	0.113	5
Annals of Biology	Agri Bio Research Publishers, India	47	9.77	-	0.103	5
International Journal of Biological Macromolecules	Elsevier BV, Netherland	40	8.32	3.909	0.962	101
Der Pharmacia Lettre	Scholars Research Library, USA	32	6.65	-	0.129	24
Journal of Food Science and Technology	Blackwell Publishing Inc., UK	29	6.03	1.797	0.786	82
Journal of Alloys and Compounds	Elsevier BV, Netherlands	23	4.78	3.79	1.065	145
Medicinal Chemistry Research	Birkhauser Boston, USA	23	4.78	1.607	0.366	38
Asian Journal of Chemistry	Chemic Publishing Co., India	22	4.57	-	0.142	31
Carbohydrate Polymers	Elsevier Ltd, UK	19	3.95	5.158	1.377	172
Der Pharma Chemica	Scholars Research Library, USA	19	3.95	-	0.136	26
Ceramics International	Elsevier Ltd.,UK	17	3.53	3.057	0.888	89
Acta Poloniae Pharmaceutica	Polskie Towarzystwo Farmaceutyczne/Polish Pharmaceutical Society, Poland	16	3.33	0.531	0.209	35
International Journal of Pharmacy and Pharmaceutical Sciences	International Journal of Pharmacy and Pharmaceutical Sciences, India	16	3.33	-	0.232	37
Bioresource Technology	Elsevier BV	15	3.12	5.807	2.157	251
		481	100.00			

(TR-IF=Thomson Reuter Impact Factor; SJR=Scimago Journal Ranking)

Top Institutional Collaboration with GJUS&T

GJUS&T collaborated with different institutions in term of publications. The top 10 institutions GJUS&T collaborated with are listed in table 5. Out of these 10 institutions majority are from Haryana State, India while one collaborative institute from Seoul, South Korea. GJUS&T has maximum collaboration with Maharishi Dayanand University as a little less than one fourth of publications (21.32%) of GJUS&T are collaborated with this university. The second highest collaboration of GJUS&T was with Panjab University (14.38%) while third highest collaboration was with Kurukshetra University (12.13%). Among different collaborative institutions of GJU, h-index of Hanyang university of South Korea (27) was found highest followed by University of Delhi, India and Panjab University, Chandigarh (16).

Table 5: Top collaborative institutes at International and national level

Collaborative Institute	State	Country	No. of Papers	%	h index (2019)
Maharishi Dayanand University	Haryana	India	123	21.32	12
Panjab University	Panjab	India	83	14.38	16
Kurukshetra University	Haryana	India	70	12.13	6
Deenbandhu Chhotu Ram University of Science and Technology	Haryana	India	64	11.09	7
Chaudhary Devi Lal University	Haryana	India	54	9.36	5
Hanyang University	Seoul	South Korea	44	7.63	27
Central University of Punjab	Panjab	India	38	6.59	8
University of Delhi	New Delhi	India	34	5.89	16
Maharishi Markandeshwar University, Mullana	Haryana	India	34	5.89	6
National Institute of Technology Kurukshetra	Haryana	India	33	5.72	13
			577	100.00	-

Top Country Collaboration of GJUS&T during 2010-19

GJUS&T published many publications in collaboration of different countries out of which top 10 collaborating countries are listed in table 6. These top countries collectively produced 146 papers with GJUS&T which is 7.62 percent share of total publication output of GJUS&T during a decade. Out of these 10 top countries South Korea was on the top with collaboration of 49 papers (33.56%) followed by USA collaborated 30 papers (20.55%). Three countries viz China, Malaysia and Mauritius had ten publications each with GJUS&T.

Table 6: Top collaborative Countries

Collaborative Country	No. of Papers	%
South Korea	49	33.56
United States	30	20.55
China	10	6.85
Malaysia	10	6.85
Mauritius	10	6.85
Saudi Arabia	9	6.16
Germany	8	5.48
Sweden	8	5.48
Belgium	6	4.11
Trinidad and Tobago	6	4.11
Total	146	100.00

Most Cited Papers and Citation Profile of GJUS&T during 2010-2019

The highly cited research papers published by GJUS&T's academic community are listed in table 7. The paper 'Chitosan nanoparticles: A promising system in novel drug delivery' authored by Nagpal K., Singh S.K., Mishra D.N. in 2010 received highest number of citations (286) while paper at 10th position 'A review on biological activities and chemical synthesis of hydrazide derivatives' authored by Narang R., Narasimhan B., Sharma S. in

2012 received 122 citations out of total citations. It is also noticeable that paper ‘Solar energy: Potential and future prospects’ at second position received highest citation in minimum period of time. All ten highly cited papers had collaborative authorship. It is also apparent from table 8 that nearly half of the publication (47.18%) received upto 10 citations while 50 to 100 citations were received to only 2.14 percent papers. It is also noticeable that more than one fourth publications (7.61%) received no citations.

Table 7. Highly cited papers of GJUS&TS&T

Document Title	Pub. Year	Authorship	Journal Title	Citations	Duration
Chitosan nanoparticles: A promising system in novel drug delivery	2010	Nagpal K., Singh S.K., Mishra D.N.	Chemical and Pharmaceutical Bulletin	286	10
Solar energy: Potential and future prospects	2018	Kabir E., Kumar P., Kumar S., Adelodun A.A., Kim K.-H.	Renewable and Sustainable Energy Reviews	222	2
Guar gum: Processing, properties and food applications-A Review	2014	Mudgil D., Barak S., Khatkar B.S.	Journal of Food Science and Technology	187	6
Biosensors as innovative tools for the detection of food borne pathogens	2011	Arora P., Sindhu A., Dilbaghi N., Chaudhury A.	Biosensors and Bioelectronics	175	9
Graphene, carbon nanotubes, zinc oxide and gold as elite nanomaterials for fabrication of biosensors for healthcare	2015	Kumar S., Ahlawat W., Kumar R., Dilbaghi N.	Biosensors and Bioelectronics	160	5
Carbon nanotubes: A novel material for multifaceted applications in human healthcare	2017	Kumar S., Rani R., Dilbaghi N., Tankeshwar K., Kim K.-H.	Chemical Society Reviews	128	3
Niosomes: A controlled and novel drug delivery system	2011	Rajera R., Nagpal K., Singh S.K., Mishra D.N.	Biological and Pharmaceutical Bulletin	127	9
Adsorption of hexavalent chromium from aqueous medium onto carbonaceous adsorbents prepared from waste biomass	2010	Jain M., Garg V.K., Kadirvelu K.	Journal of Environmental Management	122	10
X-ray diffraction, IR spectroscopy and thermal characterization of partially hydrolyzed guar gum	2012	Mudgil D., Barak S., Khatkar B.S.	International Journal of Biological Macromolecules	119	8
A review on biological activities and chemical synthesis of hydrazide derivatives	2012	Narang R., Narasimhan B., Sharma S.	Current Medicinal Chemistry	116	8
				(8.87%)	

CONCLUSION

The present paper explores the research output of academic community of GJUS&TS&T, Hisar. The 10-year research publications output of GJUS&T point out that a total of 1916 papers were published from 2010-2019 which received 180566 citations with ACPP of 9.42. The highest research output of GJUS&T appeared in articles (79.65%). Highest numbers of publications were contributed during the year 2019(14.67%). Top ten authors collectively contributed 43.16 percent of total publications. The most preferred source for publications is ‘AIP conference proceeding’ in which 24.12 percent of papers of GJUS&T academic community appeared. South Korea was on the top with collaboration of 49 papers (33.56%) with GJUS&T. Nearly half of the publication (47.18%) received up-to 10 citations while more than one fourth publications (27.61%) received no citations.

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