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Research Contribution of Kalasalingam Academy of Research and Education, Tamil Nadu, India: A Scientometric Evaluation

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Abstract

The study aims to evaluate the research performance of Kalasalingam Academy of Research and Education (KARE), Tamil Nadu, India. The 1933 research publications produced by KARE during the year 2001-2018 were retrieved from Scopus database and taken up for the study. Ms-Excel and IBM SPSS Statistics software were used to analyze the data and bibliometric indicators were applied for evaluation. The publication production found increased year by year but the growth rate is not on par with the quantity growth. 98.2% of the total publications were multi-authored and 98.4% of the publications were produced by research collaborations with the organizations in India and abroad. 24.52% of the publications received financial support. Engineering, computer science, materials science, mathematics, chemistry and physics are found as most productive subjects. Increasing the research projects, getting funding supports and identifying the weakest research areas would be helpful in increasing the research production.

***Keywords*:** Bibliometric, Scientometric, Co-Authorship, Collaborative Co-efficient, Collaborative Index.

1. Introduction

The research performance and development of science and technology of the countries need to be evaluated quantitatively and qualitatively using scientific measures for identifying socio-economic status, strength and its weakness. Bibliometric applications can be used to measure the written communication quantitatively (Pritchard 1969)[1], growth and the patterns of science, technology communications can be evaluated using scientometircs (Wilson 2001)[2] and the rating systems based on scientometric indicators may be employed for assessing the research publications to find the strength and weakness of the universities (Spivakovsky et al. 2018[3]; Zhu et al. 2014[4]). There are various sources of data for evaluating the research performance of the institutions.

2. Prior Studies

It is very important to study the overall research performance of any institution and identity the gap on which research could be conducted in future (Li, Wang and Ho 2011)[5]. Various studies conducted globally to examine the research performance of the individuals, institutions and R&D sector. Jacobs (2001)[6] found research production has direct relationship with the position of scientists in South African universities; faculty members at professor level had high productivity (Niasar and Ghaffari 2017)[7] whereas Prathap (2014)[8] found that high performers in production have low growth at quality point of view. Erfanmanesh, Geraei and Jahromi (2016)[9] evaluated the scientific production of Iranian universities and R&D institutions. Malih et al. (2016)[10] found the productivity was in increasing trend in Shahid Beheshti University of Medical Sciences; research productivity was increasing but quality based on citation per paper, immediacy index, and impact factor witnessed low in Iranian Fisheries Research Institute (Yousefi, Touraji and Zare 2019)[11]. Erfanmanesh (2017)[12] assessed the scientific production of Tehran University of Medical Sciences to find the International Research Collaboration and Banadkouki (2019)[13] carried out the quantitative and qualitative study of the research output of 50 Iranian medical universities. The higher educational institutions in India play big role in research and produce more output. Prathap (2014)[8] found KARE was in 7th position with 493.93 exergy indicator value among 138 institutions based on SCImago Institutions Rankings World Reports during 2009-13.

Many studies conducted globally for evaluating the research performance of the institutions and found no study evaluated the overall research performance of KARE. Hence, the author has carried out the same by employing scientometric indicators to the research literature of KARE indexed in the Scopus database.

2. Kalasalingam Academy of Research and Education (KARE): An Overview

Arulmigu Kalasalingam College of Engineering (AKCE)[14], established in Krishnankoil, Tamil Nadu in the year 1984, was affiliated to Madurai Kamaraj University and later affiliated to Anna University, Chennai. University Grants Commission (UGC) of India granted Deemed to be University status to AKCE and after that the name was changed as Kalasalingam Academy of Research and Education (KARE). It offers UG, PG, M.Phil and Ph.D programmes in engineering, agriculture, science, humanities and management. The institution is providing research fellowships to all the scholars pursuing Ph.D. in full-time mode.

Research initiatives

- *TIFAC-CORE in Network Engineering* – established in 2002
- *National Centre for Advanced Research in Discrete Mathematics* – established in 2007 with the financial support by DST, Govt. of India.
- *International Research Centre (IRC)* – established in 2014 with high end instruments such as Scanning Electron Microscope EVO18, Energy Dispersive X-ray-Spectrometer Quantax 200 with X Flash® 6130, X – ray diffractometer D8 Advance ECO, Fourier Transform Infrared Spectrophotometer IR Tracer 100, Atomic Absorption Spectrophotometer AA 7000 etc. It has six laboratories such as Multifunction Materials Research Laboratory, Nanomaterials Laboratory, Composite Materials Laboratory, Biocomposite Materials Laboratory, Supramolecular Research Laboratory and Quantum Mechanics Laboratory.
- The other centers of excellence in IRC are *Centre for Excellence in Material Science*, *Centre for Excellence in Energy Research* and *Centre for Research in Computing*.

3. Objective

The main objectives of this study are

- To identify the growth trend of publications;
- To find out the research collaboration in terms of author, country and organisation;
- To find the research quality based on the citations obtained;
- To identify the funding agencies leading extending support for pursuing research;
- To identify the impactful subject areas and highly cited publications.

4. Materials and Methods

The data for the study was retrieved on 6th February 2020 from Scopus, an indexing and bibliographic database. The term 'Kalasalingam Academy of Research and Education' was used in 'Affiliation' search and fetched 2501 documents during the year 1996-2020. The first article appeared in the year 1996 and the second appeared 2001. After that, the papers published in all subsequent years. The literatures published in the years 2019 and 2020 were omitted for attaining the accuracy. Due to the delay in the release of journal issues, all the articles published in the year 2019 may not have appeared in Scopus. Hence, the literature for the study were limited to the years 2001-2018 and there were a total of 1933 publications present during this period. The Bibliometric measures such as relative growth rate, doubling time, compound annual growth rate, authorship patter, co-authorship index, degree of collaboration, collaborative index, collaborative co-efficient, relative quality index, h-index, g-index, hg-index, p-index, r-index etc were employed.

4. Results and Discussion

Growth of Publication

The prevailing trend in the growth of research in KARE is shown in the Table 1. Annual growth rate (AGR), relative growth rate (RGR), doubling time (T_d) (Mahapatra 1985)[15] and compound annual growth rate (CAGR) (Choi, Lee, and Sung 2011)[16] were applied to find the publication growth per unit of time. Doubling time is the time required for a quantity to double in size and directly related to RGR. The publication production increased from 1 in the year 2001 to 145 in the year 2012 and after that, it was in declining for another two years. During the year 2017-2018 there was a jump in the production. The AGR and RGR were high during 2001-2009. The T_d value during 2001-2009 was lesser than 2 and it was more than 2 during 2010-2018. CAGR was calculated based on the

publications count of initial and final years. All these measures indicate the growth rate in the second half was lesser than the first half.

Table 1 Growth Trend of Literature

Year	TP	TP%	Cum Pub	Cum%	AGR	CAGR	RGR	T_d
2001	1	0.05	1	0.05		0.42	0.00	0.00
2002	3	0.16	4	0.21	2.00	0.35	1.39	0.50
2003	4	0.21	8	0.41	0.33	0.35	0.69	1.00
2004	15	0.78	23	1.19	2.75	0.26	1.06	0.66
2005	16	0.83	39	2.02	0.07	0.27	0.53	1.31
2006	17	0.88	56	2.90	0.06	0.29	0.36	1.92
2007	42	2.17	98	5.07	1.47	0.22	0.56	1.24
2008	66	3.41	164	8.48	0.57	0.19	0.51	1.35
2009	90	4.66	254	13.14	0.36	0.17	0.44	1.58
2010	103	5.33	357	18.47	0.14	0.18	0.34	2.04
2011	123	6.36	480	24.83	0.19	0.17	0.30	2.34
2012	145	7.50	625	32.33	0.18	0.17	0.26	2.63
2013	132	6.83	757	39.16	-0.09	0.23	0.19	3.62
2014	136	7.04	893	46.20	0.03	0.29	0.17	4.19
2015	190	9.83	1083	56.03	0.40	0.26	0.19	3.59
2016	189	9.78	1272	65.80	-0.01	0.41	0.16	4.31
2017	285	14.74	1557	80.55	0.51	0.32	0.20	3.43
2018	376	19.45	1933	100.00	0.32	0.00	0.22	3.20

Average CAGR = 0.27, Average AGR = 0.55, Average RGR=0.44

Co-Authorship Index and Author Collaboration

Table 2 provides details about Co-Authorship Index (Schubert and Braun (1986)[17] and Author Collaboration.

$$\mathrm{CAI} = \frac{N_{ij}/N_{io}}{N_{oj}/N_{\infty}} x100$$

N_{ij} - total publications having j authors in block i
N_{io} - total publications in block i
N_{oj} - total publications having j authors in all blocks
N_{∞} - total publications collectively in all blocks

In a particular type of authorship, CAI=100 indicates the world average. Two and three authored publications were high during 2001-2015 and after the publications with more than three authors increased. The result is similar to the findings of Chang (2012)[18] in his study on the scientometric research in Taiwan institutions.

Collaborative index (Lawani 1980)[19] was calculated by dividing the total number of authors for all publications in the unit by the total number of publications. It ranges from 2.00 to 3.75 and the average value is 3.18. Degree of collaboration (Subramanian 1983)[20] was calculated by dividing the total multiple authored papers by total papers in the unit. The DC should be between 0 and 1, where 0 denotes single authored publication and 1 denotes highly collaborated publication. The collaboration was found high with the average value of 0.95. Collaborative Co-efficient (Ajiferuke, Burell and Tague 1988)[21] was calculated using the following formula where 'fj' is number of j authored publications; 'A' is the greatest number of authored publications and 'N' is total publications. Two and

three authored publications are found high and hence the CC values (0.47-0.69) are lesser than the DC values (0.73-1.00). The average CC value is 0.62. These values indicate that the collaboration is increasing in trend with the slender ups and downs in the recent years.

$$CI = \frac{\sum_{j=1}^{A} jf_j}{N} \qquad DC = \frac{N_m}{N_m + N_s} \qquad CC = 1 - \frac{\sum_{j=1}^{A} (1/j)f_j}{N}$$

Table 2 Measures of Authorship Pattern and Collaboration

Year	No. of Authors and Co-Authorship Index												CAI	TP	CI	DC	CC
	1	CAI	2	CAI	3	CAI	4	CAI	5	CAI	> 5						
2001	0	0.0	1	385.1	0	0.0	0	0.0	0	0.0	0	0.0	1	2.00	1.00	0.50	
2002	0	0.0	1	128.4	1	120.9	1	163.1	0	0.0	0	0.0	3	3.00	1.00	0.64	
2003	1	1342.4	0	0.0	2	181.3	1	122.3	0	0.0	0	0.0	4	2.75	0.75	0.52	
2004	4	1431.9	4	102.7	3	72.5	4	130.5	0	0.0	0	0.0	15	2.47	0.73	0.47	
2005	3	1006.8	5	120.3	3	68.0	3	91.8	1	49.9	1	53.7	16	2.81	0.81	0.52	
2006	0	0.0	6	135.9	6	128.0	5	143.9	0	0.0	0	0.0	17	2.94	1.00	0.63	
2007	1	127.8	16	146.7	15	129.5	6	69.9	4	76.1	0	0.0	42	2.90	0.98	0.61	
2008	2	162.7	25	145.9	18	98.9	10	74.1	7	84.7	4	52.1	66	3.11	0.97	0.62	
2009	1	59.7	24	102.7	26	104.8	16	87.0	8	71.0	15	143.2	90	3.57	0.99	0.67	
2010	0	0.0	30	112.2	18	63.4	20	95.0	18	139.6	17	141.8	103	3.75	1.00	0.69	
2011	0	0.0	40	125.2	30	88.5	23	91.5	10	64.9	20	139.7	123	3.51	1.00	0.67	
2012	2	74.1	34	90.3	49	122.6	32	108.0	18	99.2	10	59.2	145	3.41	0.99	0.66	
2013	1	40.7	39	113.8	41	112.6	32	118.6	15	90.8	4	26.0	132	3.25	0.99	0.65	
2014	2	79.0	46	130.2	38	101.3	26	93.6	15	88.1	9	56.9	136	3.24	0.99	0.64	
2015	4	113.0	57	115.5	55	105.0	40	103.0	20	84.1	14	63.3	190	3.30	0.98	0.65	
2016	3	85.2	37	75.4	56	107.5	42	108.7	30	126.8	21	95.5	189	3.65	0.98	0.68	
2017	5	94.2	57	77.0	73	92.9	63	108.2	44	123.3	43	129.6	285	3.75	0.98	0.69	
2018	7	100.0	80	81.9	99	95.5	71	92.4	52	110.5	67	153.1	376	3.75	0.98	0.68	
Total	36	100.0	502	100.0	533	100.0	395	100.0	242	100.0	225	100.0	1933				

Average (CI-3.18, DC-0.95 & CC-0.62)

Measures of Organizational and Country Collaborations

Table 3 shows organizational and country collaboration of KARE in research. 1902 (98.4%) publications produced in collaboration with 153 organisations from 57 countries including India and it is similar to the findings of Chang (2012)[18] who found more than half of the articles produced in Taiwan universities by inter-institutional collaboration. Anna University (107, 5.54%), Annamalai University and Thiagaarajar College of Engineering (51, 2.64%) occupy top three positions. University of Newcastle, Australia and Liverpool Hope University with 34 (1.76%) papers each were among the top 10 collaborative institutions. 656 (33.93%) papers were produced with foreign collaboration and Malaysia (83, 4.29%), South Korea (75, 3.88%) and USA (63, 3.26%) occupy the top three positions.

Table 3 Measures of Organizational and Country Collaborations

S. No.	Organization	TP	%	S. No.	Country	TP	%
1	Anna University	107	5.54	1	Malaysia	83	4.29
2	Annamalai University	51	2.64	2	South Korea	75	3.88
3	Thiagarajar College of Engineering	51	2.64	3	United States	63	3.26
4	Madurai Kamaraj University	49	2.53	4	Australia	45	2.33
5	Ramco Institute of Technology	38	1.97	5	United Kingdom	45	2.33
6	Bharathiar University	36	1.86	6	Saudi Arabia	37	1.91
7	Shanmugha Arts, Science, Technology & Research Academy (SASTRA)	34	1.76	7	Pakistan	25	1.29
8	University of Newcastle, Australia	34	1.76	8	China	23	1.19
9	Indian Institute of Chemical Technology	34	1.76	9	Japan	22	1.14
10	Liverpool Hope University	34	1.76	10	Brazil	21	1.09
11	Other Institutions	1434	74.19	11	Other Countries	214	11.07
12	KARE (Non-Collaboration)	31	1.60		Total	653	33.78
	Total	1933	100.00				

Citation Studies

The indicators such as AGR, CAGR, citation per paper (CPP), relative quality index (RQI) were appliled for the publications and the Table 4 shows the same. 1453 publications together gained 19974 citations with an average of 13.75 citations per paper. AGR is in negative for some years but the CAGR is more than the average (0.14) for the years except 2004-05 and 2008-13. RQI was employed to the citation data to measures the incidence of high quality publications.

$$\text{RQI} = \frac{\#\text{ of citations of the Year}/\#\text{ of cited publications of the year}}{\text{Total Citations for all years}/\text{Total cited publications for all years}}$$

The value RQI=1 is the world average. RQI>1 is found for the years 2002-2005 & 2007-2011 and RQI<1 is found for the remaining years. AGR, CAGR, CPP and RQI values show the direct relationship between the publications production and the citations in terms of quantity (Torkaman and Khorram 2017)[22] but there is no significant relationship in terms of quantity growth and the quality (Yousefi, Touraji and Zare 2019)[19].

Table 4 Citation Measures

Year	Total Pub.	Cited Pub.	Total Cit.	Cit. AGR	Cit. CAGR	CPP	RQI
2001	1	1	2		0.49	2.00	0.15
2002	3	2	91	44.50	0.20	45.50	3.31
2003	4	3	54	-0.41	0.26	18.00	1.31
2004	15	14	382	6.07	0.11	27.29	1.98
2005	16	15	465	0.22	0.10	31.00	2.26
2006	17	15	135	-0.71	0.23	9.00	0.65
2007	42	30	412	2.05	0.14	13.73	1.00
2008	66	55	1741	3.23	0.00	31.65	2.30
2009	90	77	2724	0.56	-0.05	35.38	2.57
2010	103	90	3006	0.10	-0.07	33.40	2.43
2011	123	102	2134	-0.29	-0.03	20.92	1.52
2012	145	124	1513	-0.29	0.02	12.20	0.89
2013	132	102	1145	-0.24	0.08	11.23	0.82
2014	136	108	928	-0.19	0.16	8.59	0.63
2015	190	131	1061	0.14	0.17	8.10	0.59
2016	189	144	1281	0.21	0.15	8.90	0.65
2017	285	199	1219	-0.05	0.38	6.13	0.45
2018	376	241	1681	0.38	0.00	6.98	0.51
Total	1933	1453	19974		Avg=0.14		

Other indices were applied and the values are shown in Table 5. Hirsch (2005)[23] introduced an h-index which gets good appreciation from research community but it is weakly sensitive to high citations received by single publication. Egghe (2006)[24] finds a solution to this by introducing g-index. Alonso et al. (2010)[25] developed hg-index ($hg = \sqrt{hg}$) that fuses both 'h' and 'g' indices. Jin et al. (2007)[26] introduced r-index by making a square root of total citations in Hirsch core. Sidiropoulos, Katsaros and Manolopoulos (2007)[27] suggested the normalized h-index (h_{nom}) dividing h-index by number of cited publications. Zhang (2009)[28] suggested e-index for evaluating performance of researchers having highly cited publications. Prathap (2011)[29] introduced p-index, to give best balance between quality and quantity of research productions. In the following formula, C denotes citation and P denotes total cited publications.

$$e = \sqrt{\sum cit_j - h^2} \qquad p = \sqrt[3]{\frac{C^2}{P}}$$

Table 5 Other Scientometric Indices

No. of cited pub.	No. of citations	h-index	g-index	hg-index	a-index	r-index	Normalised "h" index - h_{nom}	e-index	p-index
1453	19974	61	101	78.49	327.44	141.33	0.04	127.49	65.00

Measures of Financial Support

138 funding sponsors around the globe sponsored for 474 (24.52%) publications which is lesser than the India's performance during 2009-14 (DST-NSTMIS, 2015)[30]. Table 6 shows the list of 13 funding agencies which have sponsored for more than 5 publications. Department of Science and Technology (DST), India has sponsored for 78 (4.04%) publications which is the highest among all agencies followed by Council of Scientific and Industrial Research (CSIR) with 42 (2.17%) publications.

Table 6 Funding Sponsors

S. No.	Funding Agency	TP	%
1	Department of Science and Technology, Ministry of Science and Technology	78	4.04
2	Council of Scientific and Industrial Research	42	2.17
3	Department of Science and Technology, Government of Kerala	31	1.60
4	University Grants Commission	26	1.35
5	Department of Mechanical Engineering, College of Engineering, Michigan State University	11	0.57
6	National Research Foundation of Korea	9	0.47
7	Bangladesh Council of Scientific and Industrial Research	7	0.36
8	Department of Atomic Energy, Government of India	7	0.36
9	Department of Biotechnology, Government of West Bengal	7	0.36
10	Department of Science and Technology, Government of Rajasthan	7	0.36
11	Indian Council of Medical Research	7	0.36
12	National Natural Science Foundation of China	7	0.36
13	Universiti Putra Malaysia	6	0.31
14	Other Agencies	229	11.85
	Total	474	24.52

Measures of Subject wise distribution of Publications

The publications were further classified based on their subject category and the same is shown in Table 7. The publications produced in 24 different subject categories and most productive subjects such as engineering (776), computer science (648) and materials science (441), mathematics (352), chemistry (306) and physics and astronomy (293) contributed more than 15% individually. It reflects the most impactful research areas in India's during 2009-14 (DST-NSTMIS 2016)[31] and G20 countries in the year 2015 (Lin, Hu and Hou 2018)[32].

Table 7 Subject Wise Distribution of Publications

S. No.	Subject Area	TP	%	S. No.	Subject Area	TP	%
1	Engineering	776	40.14	13	Decision Sciences	44	2.28
2	Computer Science	648	33.52	14	Business, Management and Accounting	37	1.91
3	Materials Science	441	22.81	15	Social Sciences	29	1.50
4	Mathematics	352	18.21	16	Agricultural and Biological Sciences	27	1.40
5	Chemistry	306	15.83	17	Immunology and Microbiology	27	1.40
6	Physics and Astronomy	293	15.16	18	Earth and Planetary Sciences	26	1.35
7	Chemical Engineering	179	9.26	19	Multidisciplinary	24	1.24
8	Biochemistry, Genetics and Molecular Biology	141	7.29	20	Economics, Econometrics and Finance	10	0.52
9	Energy	109	5.64	21	Neuroscience	8	0.41
10	Environmental Science	93	4.81	22	Nursing	5	0.26
11	Medicine	49	2.53	23	Health Professions	4	0.21
12	Pharmacology, Toxicology and Pharmaceutics	49	2.53	24	Psychology	2	0.10

Highly Cited Publications

Table 8 shows the details about the top 10 highly cited publications. The department of biotechnology (7) has emerged as leading department followed by Chemistry (2) and mechanical engineering (1). Five publications have received financial support from the funding sponsors. Sangiliyandi Gurunathan from the department of biotechnology with 49 publications got 9th place in the top 10 most productive authors but has 7 publications in the top ten highly cited publications.

Table 8 Highly Cited Publications

S. No.	Publication Details	TC	Avg. Cit. Per year	Department
1	Kalimuthu K., Suresh Babu R., Venkataraman D., Bilal Mohd., Gurunathan S. (2018). Biosynthesis of silver nanocrystals by Bacillus licheniformis. Colloids and Surfaces B: Biointerfaces, 65(1)*	518	47.09	Biotech
2	Gurunathan S., Kalishwaralal K., Vaidyanathan R., Venkataraman D., Pandian S.R.K., Muniyandi J., Hariharan N., Eom S.H. (2009). Biosynthesis, purification and characterization of silver nanoparticles using Escherichia coli. Colloids and Surfaces B: Biointerfaces, 74(1)*.	381	38.10	Biotech
3	Kalishwaralal K., BarathManiKanth S., Pandian S.R.K., Deepak V., Gurunathan S. (2010). Silver nanoparticles impede the biofilm formation by Pseudomonas aeruginosa and Staphylococcus epidermidis. Colloids and Surfaces B: Biointerfaces, 79(2).	308	34.22	Biotech
4	Sriram M.I., Kanth S.B.M., Kalishwaralal K., Gurunathan S. (2010). Antitumor activity of silver nanoparticles in Dalton's lymphoma ascites tumor model. International Journal of Nanomedicine, 5(1).	295	32.77	Biotech
5	Deepa B., Abraham E., Cherian B.M., Bismarck A., Blaker J.J., Pothan L.A., Leao A.L., de Souza S.F., Kottaisamy M. (2011). Structure, morphology and thermal characteristics of banana nano fibers obtained by steam explosion. Bioresource Technology, 102(2).	280	35.00	Chemistry
6	Cherian B.M., LeÃ£o A.L., de Souza S.F., Thomas S., Pothan L.A., Kottaisamy M. (2010). Isolation of nanocellulose from pineapple leaf fibres by steam explosion. Carbohydrate Polymers, 81(3).	278	30.88	Chemistry
7	Gurunathan S., Lee K.-J., Kalishwaralal K., Sheikpranbabu S., Vaidyanathan R., Eom S.H. (2009). Antiangiogenic properties of silver nanoparticles. Biomaterials, 30(31)*.	262	26.20	Biotech
8	Kalishwaralal K., Deepak V., Ram Kumar Pandian S., Kottaisamy M., BarathManiKanth S., Kartikeyan B., Gurunathan S. (2010). Biosynthesis of silver and gold nanoparticles using Brevibacterium casei. Colloids and Surfaces B: Biointerfaces, 77(2)*.	254	28.22	Biotech
9	Kalishwaralal K., Deepak V., Ramkumarpandian S., Nellaiah H., Sangiliyandi G. (2008). Extracellular biosynthesis of silver nanoparticles by the culture supernatant of Bacillus licheniformis. Materials Letters, 62(29)*.	213	19.36	Biotech
10	Venkateshwaran N., ElayaPerumal A., Alavudeen A., Thiruchitrambalam M. (2011). Mechanical and water absorption behaviour of banana/sisal reinforced hybrid composites. Materials and Design, 32(7).	200	25.00	Mechanical

* Received financial support from funding agencies

5. Conclusion

It was found from the study that publication growth increased over the years but growth rate was not in linear trend. Engineering, computer science, materials science, mathematics, chemistry and physics are found as most productive subjects. The collaborative studies are found high. 24.52% of the publications received financial support from the agencies. Eventhough the publication growth and citations increased over the years, KARE has to put more concentration for improving the research performance in weakest subject domains. The interested faculty members may be allowed to register as research supervisor which would increase the number of research scholars and research can be carried out in all possible domains. A comparative evaluation of research performance of similar institutions will be helpful to identify the weakness and strength in various aspects of research and the miles to go. Analyzing the publications indexed in other multidisciplinary databases such as Web of Science, Google Scholar etc would be fruitful to get more clarity about the research performance of the KARE.

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