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ASSESSMENT OF RESEARCH PRODUCTIVITY AMONG TEACHING FACULTY MEMBERS: A CASE STUDY OF KARNATAKA STATE AKKAMAHADEVI WOMEN'S UNIVERSITY, VIJAYAPURA

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RESEARCH ARTICLE

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Abstract

The study examines the research productivity of the faculty members at Karnataka State Akkamahadevi Women University, Vijayapura, from 2010-2023 The analysis reveals variation in the productivity by department, gender and designation. A total of 2597 articles were published and highest in 2018 (N=270, 10.40%) followed by 2017(243 -9.23%). The average relative growth rate of articles by the faculty members decreased from 0.814 in 2010 to 0.086 in 2023. While, the doubling time for publication gradually increased from 0.851 in 2010 to 8.019 in 2023 over the same period. The highest Compound annual growth rate of 16.13% recorded in 2012 and the lowest -1.72 was in 2020. Time series analyses expect over 413 publications by 2030, and more than 576 publications by 2040. Both Polynomial Model and Power models fit well for the research productivity of faculty members of KSAWUV. The article A comparative study of cluster head selection algorithms by Ramesh K received the highest number of citations(159). While, Aziz Makandar's article "Malware class recognition using image processing techniques received 83 citations. The Library and Information Science has published the highest number of articles in Conference Proceedings (296). And the Physical Education warded the highest number of PhD degrees (69). Prof. P G Tadasad from Library and Information Science awarded the highest number of PhD degrees (20). There is a strong correlation between the number of articles in journals and those in Conference Proceedings**,** **w**ith multiple authors dominating in the publications. The journals articles serve as major primary source for faculty publications. The American College of Cardiology, Heat Transfer journal and The Lancet Global Health are the most productive journals.. The Bradford law of scattering does not apply to the research productivity of the faculty members of KSAWUV. Finally, the summary of conclusion, that the faculty members of KSAWUV have to publish their research articles in high quality of journals those indexed in the major databases.

Keywords: *Research Productivity, Research Skills, Scientometrics, KSWU*

1.0 Introduction

Every university has to setup Research Policy to establish a vibrant research ecosystem providing a platform to conduct efficient and effective quality research. The earlier studies indicate that the research skills and research productivity are highly correlated and influence the research performance. World Bank has highlighted the important role of universities in research. Universities across the world are considered as a producer of new knowledge and they are act as modern entrepreneur engines and generator of knowledge through research. Most of the research productivity of academics is disseminated through publication. McCabe and McCabe (2000) revealed that academic staff members in higher education institutions, especially universities are provide the opportunity to focus on research and develop a research program and later share the outcome of the research findings with students and others to develop professional and research skills. Research provide good platform for the teaching faculty members to become competent teacher and researcher. It develop academic knowledge and reinforces the skill needed for effective knowledge transfer, it fill the gap of previous research and create an opportunities for future research. According to Rashid (2001). Research is conscious effort to collect, verify and analyze information. Research can be understood as having two broad components knowledge creation and knowledge dissemination. Ochai and Nidosa (1998) opined that the fruits of research are new knowledge and facts, which are communicated through scholarly communications

and seminars/ / Confirences. In any university setup the advancement of individual teachers depends largely on the quality and quantity of their research publications, which are communicated through different literary forms like journal articles, books, technical reports, articles in conference volumes and other types of publications(Bassey Akuegwu, Udida and others, 2008). The present study is mainly focus on the research skills and productivity of teaching faculty members of Karnataka State Akkamahadevi Women's University, Vijayapura to assess the level of research skills and competence and their research productivity.

2. Review of Literature

A literature review was conducted using the LISA, LISTA, Web of Science, and Scopus databases, identifying several key studies on the topic. Recent research highlights various personal and institutional factors that influence research productivity among university faculty members. These factors include researcher confidence, collaboration, training preferences, teaching load, research skills, research literacy, and job satisfaction. The findings underscore the complex interplay between these elements in fostering an effective research environment.. Among these factors, faculty research skills are positively associated with their research productivity. This association indicates that as the research skills of the faculty increases so does their research productivity and ultimately the faculty with more research skills are expected to be more productive compared with faculty having low research productivity. It reveals that the research productivity is influenced by the research skills through research competence. In this context different empirical studies have been conducted to demonstrate the factors which affect the research skills and production at universities, nevertheless, the findings are not consistent and more studies are required to be conducted in this area. the paper like, Mahapatra (1985) assessed the Relative Growth Rates (RGR) is a measure to study the increase in number of articles/pages per unit of articles/pages per unit of time. Sangam (2012), attempt finds out the pattern of authorship, type of collaborative research and degree of collaboration in the field of demography. Balasubramanya (2012) has made an attempt analyse the artificial intelligence research output during 1973-2011. He analysed the different types of parameters such as authorship pattern, growth, rank with global publication, institutions contribution. Further most produced journals are analysed, author has compared the profile of Indian research output with other countries with the help of Scientometrics techniques. In the study of Science & Technology of Bangladesh , Gupta has made an attempt to analyse several parameter including its growth and country publications share in various subjects in the national and global context, pattern of research communication in core domestic and international journals, geographical distribution of publications, share of international collaborative publication at the national level and as well as cross subject and characteristics of high productivity of institution, authors and cited papers. Therefore it is very much necessary to study the research skills and research productivity by integrating two constructs to see their combined as well as individual effect. The study would be help to the university authority to assess the current status of the research productivity in the university, based on the results, they can develop a research policy it would be helpful make better decision in terms of faculty research skills and research productivity. This study focuses on the assessment of important aspects of publication patterns and research trends of the faculty members of KSAWUV.

3.Objectives of the Study

1. To analyze year wise and average growth rate of the publications of faculty members during the study period.
2. To find out the Relative Growth Rate and Doubling Time of the research output at KSWUV
3. To study the Annual Growth Rate and Compound Annual Growth Rate of research output at KSWUV.
4. To examine the various growth models applicable to the research output of KSAWUV.
5. To assess the authorship pattern and level of collaborative research at KSWUV.
6. To identify the most productive Articles, Journals, Departments, Authors associated with the publications and PhD award at KSAWUV.
7. To examine the applicability of the Bradford law of scattering to the research productivity of KSAWUV.

4. Formulation of Hypotheses

1. The number of publications published by the faculty of KSAWV has increased with each passing year over the study period.
2. There is a declining trend in the Relative Growth Rate and increasing trend in Doubling Time of the of the publications by the faculty members of KSAWUV.
3. Polynomial Model and Power models fit well for the research productivity of the faculty members of KSAWUV.
4. The multiple authors dominate in the publication of KSAWU research productivity.
5. The Bradford law of scattering is not followed or fit for the research productivity of the faculty members of KSAWUV

5. Research Methodology

The present study employed a mixed method of research approach both Quantitative and Qualitative methods, to collect and analyse the required research data in two phases. In the first phase, the structure questionnaire was developed based on perceived research skills including, basics research skills, applications of research methods, use of technological tools and research report writing skills. In the second phase a quantitative method was used to collect details of research publications of the faculty members over last fifteen years (2010-2024). The research data is collected personally and supplemented with

information from the university's annual reports and official website. The researcher is also collected additional information from Scopus database from 2010-2024 and data is extracted by using the following string. ((AFFILORG(Karnataka AND state AND women's AND university) OR AFFIL(vijayapura AND women AND university) OR AFFIL(bijapur AND women AND university) OR AFFIL(akkamahadevi AND university))).

The extracted data was downloaded into excel sheet in the required format and analysed based on the various parameters such as Year wise, Average growth rate, Authorship pattern, Collaborative research, Relative growth rate and Doubling time, Institution wise distribution and country wise distribution . The collected data was analyzed using various statistical techniques and presented in tabular as well as in graphical formats. The formulated hypotheses were tested using SPSS software and Ms-Excel to determine whether formulated null hypotheses should be accepted or rejected.

6. Data analysis and interpretation

The present study focused on 60 permanent faculty members, working in 18 departments at KSAWUV; examine their research productivity from 2010 to 2023 . Data was collected from the Google scholar profiles, university website and the Scopus database and their research productivity was analyzed under different heading of scientometrics as presented in the following sections.

Table -1 : Year wise Quantification of publications of the faculty members of KSAWUV.

Sl no.	Year	No of records	Cum number of records	%	Average growth Rate	Descriptive statistics	
01	2010	66	66	2.54	-	N	14
02	2011	83	149	3.20	0.795	Min	66
03	2012	130	279	5.01	0.638	Max	270
04	2013	145	424	5.58	0.897	Average	185.5
05	2014	160	584	6.16	0.906	SD	61.24
06	2015	206	790	7.93	0.777	Range	204
07	2016	236	1026	9.09	0.873	SE	16.36
08	2017	243	1269	9.36	0.971		
09	2018	270	1539	10.40	0.900		
10	2019	237	1776	9.13	1.139		
11	2020	196	1972	7.55	1.209		
12	2021	185	2157	7.12	1.059		
13	2022	225	2382	8.66	0.822		
14	2023	215	**2597**	8.28	1.047		
	Total	**2597**		**100.00**	**Avg Growth rate =.926**		

Table- 1 presents the year wise distribution and average growth rate of articles published by the faculty members of KSAWUV from 2010 to 2023. A total of 2597 articles were published during the study period (2010-2023). The highest number of publications (N=270, 10.40%) were published in 2018 followed by 243 articles (9.23%) in 2017. While, the least number of articles were contributed in 2010 (N=66, 2.54%). Further, the average growth rate of the publications was .926, indicating gradual increase in the number of articles from 2010 with an average of 185 articles published each year and Standard Deviation of 61 articles over the 13 years.. Therefore, it can be concluded that a number of publications published by the faculty of KSAWV has steadily increased each year throughout the study period.

Table -2: Relative Growth Rate and Doubling Time of the Publications

Sl no.	Year	No of records W1	Cum of records W2	LN (W1)	LN (W2)	R(t)	Mean	D(t)	Mean
01	2010	66	66	4.19	4.19	0.000	**0.392**	0	**1.531**

02	2011	83	149	4.42	5.00	0.814		0.851	
03	2012	130	279	4.87	5.63	0.627		1.105	
04	2013	145	424	4.98	6.05	0.419		1.656	
05	2014	160	584	5.08	6.37	0.320		2.164	
06	2015	206	790	5.33	6.67	0.302		2.294	
07	2016	236	1026	5.46	6.93	0.261		2.651	
08	2107	243	1269	5.49	7.15	0.213		3.260	
09	2018	270	1539	5.60	7.34	0.193		3.592	
10	2019	237	1776	5.47	7.48	0.143		4.838	
11	2020	196	1972	5.28	7.59	0.105	**0.140**	6.620	**5.503**
12	2021	185	2157	5.22	7.68	0.090		7.728	
13	2022	225	2382	5.42	7.78	0.099		6.984	
14	2023	215	**2597**	5.37	7.86	0.086		8.019	
	Total	**2597**			**Mean**	**.262**		**3.697**	

Relative Growth Rate $R(t) = \frac{\text{Log (W2)} - \text{Log (W1)}}{(T2 - T1)}$ (1)

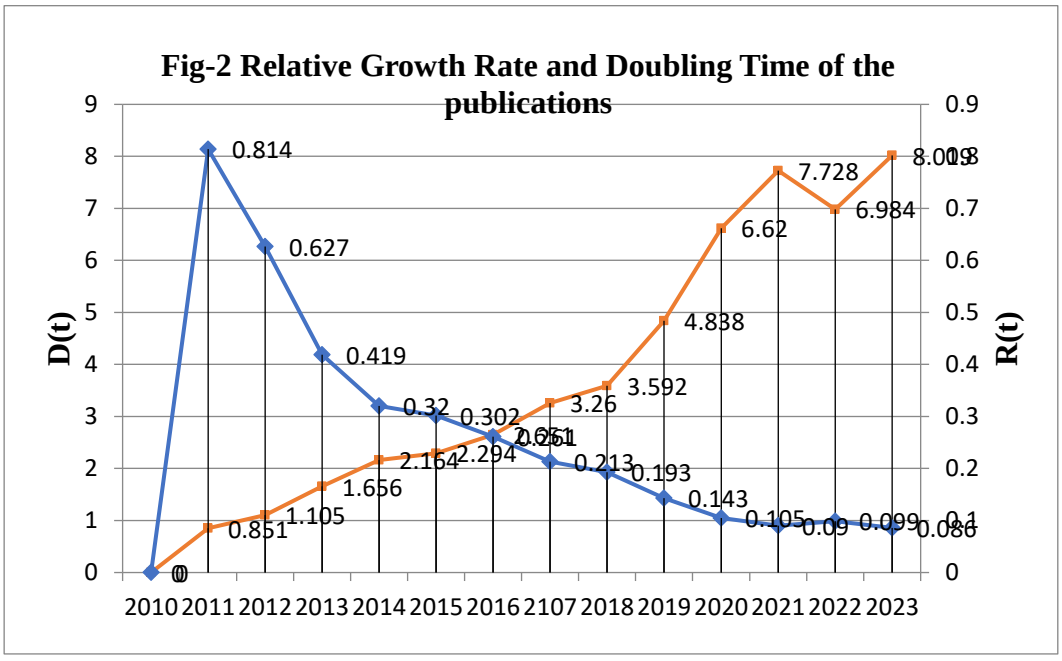
Based on the data given in the table - 2 W2 = 5.00 , W1= 4.19 and T2= 2011, T1= 2010.

Using equation (1) above $R(t) = \frac{5.00 - 4.19}{2011 - 2010} = .814$ and the

Doubling time is given by $D(t) = \frac{.693}{R(t)} = \frac{.693}{.814} = .815$

The table shows the research contribution of faculty members of KSAWUV, with a total of 2597 articles published during the study period. The average relative growth rate of articles by the faculty members decreased from 0.814 in 2010 to 0.086 in 2023 over a period of thirteen years. The mean relative growth for the first seven years (2010 to 2016) was 0.392, while, for the subsequent seven years (2017 to 2023) the growth dropped to 0.140.

At the same time, doubling time of articles publication gradually increased from 0.851 in 2010 to 8.019 in 2023 over the period of thirteen years. The value of Doubling time (Dt) increased from 0.851 in 2010 to 2.651 in 2016, in the seven years period (2010-2016), the doubling time was 1.531. While, in the second six years period (2017-2023), doubling time (Dt) increased from 3.260 in 2017 to 8.019 in 2023. The value of doubling time was 5.503. Finally, it can be concluded from the above analysis that there is a declining trend in the Relative Growth Rate and increasing trend in Doubling Time of the of the publications by the faculty members of KSAWUV.



Compound Annual Growth rate of Publications (CAGR)

The compound annual growth rate of publications "calculated by taking the nth root of the total percentage growth rate, where 'n'is the number of years in the period being considered " (Chakravarthy and Sharma 2017). This can be calculated by

$$\text{CAGR} = \left(\frac{\text{Ending value}}{\text{Intial value}}\right)^{\left(\frac{1}{\#\text{ of the years}}\right)} - 1$$

Table-3: Annual Growth Rate and (AGR) and Compound Annual Growth Rate (CAGR) of Publications of faculty members of KSAWUV.

Sl no.	Year	No of Records	Cum number of records	AGR	CAGR	% of CAGR
01	2010	66	66	0.00	0	0
02	2011	83	149	25.76	0.121417	12.14169
03	2012	130	279	56.63	0.161329	16.13285
04	2013	145	424	11.54	0.027676	2.767588
05	2014	160	584	10.34	0.019883	1.98831
06	2015	206	790	28.75	0.043017	4.301657
07	2016	236	1026	14.56	0.019612	1.961207
08	2107	243	1269	2.97	0.00366	0.366039
09	2018	270	1539	11.11	0.011776	1.177552
10	2019	237	1776	-12.22	-0.01295	-1.29516
11	2020	196	1972	-17.30	-0.01712	-1.71195
12	2021	185	2157	-5.61	-0.0048	-0.48017
13	2022	225	2382	21.62	0.015171	1.517121
14	2023	215	**2597**	-4.44	-0.00324	-0.3242
	Total	**2597**				

Table – 3 shows the annual growth rate of publications of faculty members of KSAWUV for the period of thirteen years ie. from 2010 to 2023 . The data set shows that the maximum annual growth rate was 56.3 was register in the year 2012 and the lowest annual growth rate was i.e -17.30 was registered in the year 2020. The AGR of the research output of the faculty members of KSAWUV growing trend from 25.56 in 2011to 56.63 in 2012 respectively. Again the AGR has declined 11.54 in 2013 to -17.30 in 2020, . Since there is small fluctuation in year after year as reflected in table -3 and fig 10. The reason for the fluctuation may be the out breast of Covid -2019 pandemic, which likely caused a decline in research productivity after 2019. However, the research productivity appears to be regained from 2022.

Table –3 shows the Compound annual growth rate (CAGR) of publications by the faculty members of KSAWUV over a thirteen years period, from 2010 to 2023. The CAGR value significantly varies high of 16.13% in 2012 to a low of -1.71% in 2020. The data set shows that the highest Compound annual growth rate was of 16.13% recorded in 2012 and while, lowest annual growth rate was i.e -1.72 registered 2020. Since there is fluctuation in year after year as reflected in table -9 and fig 11. The reason for the fluctuation may be the out breast of Covid -2019 pandemic, which likely caused a decline in research productivity after 2019. However, the research activity appears to be recovered from 2022.

6.1Growth Models of Literature

Growth in the number of publications can be taken as a measure or operational definition of growth of knowledge. The word 'Growth' represents an increase in actual size, implying a change of state. Hence, change in the size of literature over a specific period of time is termed as "Growth of Literature". Various growth models such as Linear Model, Exponential Model, Logistic Model, Polynomial and Power Model are applied for the present study their nature and characteristics as shown in the following section.

Table -4 Applications of Growth model on research productivity of faculty members of KSAWUV.

SL no.	Growth Models	R^2
01	Linear	.747
02	Exponential	.575
03	Logarithmic	.747
04	Polynomial	.870
05	Power Model	.825

Table -4 shows the various growth model and their corresponding R^2 value for the research publications of faculty members of KSAWUV, the nature of the curve and R^2 values are illustrated in the graph. Various growth models such as Linear Model, Exponential Model, Logistic Model, Polynomial and Power Model are applied. From the data, it is evident that the polynomial model well fits to the research productivity of faculty members of KSAWUV with an R^2 value of .87 indicating strong correlation as it is very close to 1. This followed by the Power model (R^2 =.825), the Logarithmic model (R^2=.747) and the linear model (R^2= .747). The exponential growth model has the lowest R2 value at .575. Therefore, we concluded that the **Polynomial Model and Power models fit well for the research productivity of the faculty members of KSAWUV.**

Table -5 Most Cited articles published by the Faculty Members of KSAWU as reflected in Google Scholar

Sl. No	Most cited Articles	Author name	Department	Name of the Journal	No. citations	Rank
1	A comparative study of cluster head selection algorithms in wireless sensor networks	Ramesh K	Computer science	arXiv preprint arXiv	159	1
2	Image enhancement techniques using high pass and low pass filters	Aziz Makandar	Computer science	International Journal of Computer (14), 12-15	130	2
3	Malware class recognition using image processing techniques	Aziz Makandar	Computer science	2017 International Conference on Data Management, Analytics and Innovation	120	3
4	Anti-inflammatory effect of apigenin on LPS-induced pro-inflammatory mediators and AP-1 factors in human lung epithelial cells	Babu R L	Biotechnology/bioinformatics		89	4
5	Computer aided diagnosis-medical image analysis techniques	Aziz Makandar	Computer science	Breast imaging 85 (85), 109	88	5
6	Malware analysis and classification using artificial neural network	Aziz Makandar	Computer science	2015 International conference on trends in automation, communications	87	6
7	Breast cancer image enhancement using median filter and CLAHE	Aziz Makandar	Computer science	International Journal of Scientific & Engineering Research 6	82	7
8	Synthesis and biological activities of Bis alkyl 1, 3, 4-Oxadiazole incorporated azo dye derivatives	Joy Hoskeri	Biotechnology/bioinformatics	Arabian Journal of Chemistry	75	8
9	Fourier descriptor based isolated Marathi handwritten numeral recognition	G G Rajput	Computer science	International Journal of Computer Applications	74	9

10	Intelligent Breast Abnormality Framework for Detection and Evaluation of Breast Abnormal Parameters	Sheetalrani R Kawale	Computer science	2022 International Conference on Edge Computing and Applications (ICECAA …	66	10

Table-5 shows the most productivity articles published by the faculty members of KSAWUV from 2010 to 2023. It is observed that the highest number of citations, 159 was received for the article "A comparative study of cluster head selection algorithms by Ramesh K. This is followed by the second highest number of citations, 130 received by Aziz Makandar for the article "Image enhancement techniques using high pass and low pass filters" again by Aziz Makandar for the Third article received 120 citations for the article "Malware class recognition using image processing techniques" The fourth most productivity article published by Babu R L, from the dept. of Bio- Technology has received 89 citations. Joy Hosakeri received 75 citations. G G Rajput, from the Dept. of Computer science received 74 citations for the article "Fourier descriptor based isolated Marathi handwritten numeral recognition. Following this Gavisiddappa Anandhalli from the dept. of library and information science received 33 citations for his article on "Modeling the growth of neurology literature" published in the Journal of Information Science Theory and Practice.

Table-6 Most Preferred Journals by the Faculty Members of KSAWU

Sl. No	Name of Journal	Publisher	Origin of Country	Impact Factor
2	Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy	Elsevier B.V.	Netherlands	8.4
3	Arabian Journal of Chemistry	Elsevier B V	Netherlands	5.3
4	Media and Society	Sage Publication	United Kingdom	4.5
5	International Journal on Computer Science and Engineering	ISROSET, Indore, India	India	3.8
6	IOSR Journal	International Organization of Scientific Research (IOSR)	Africa	3.7
7	International Journal of Computer Applications	Taylor and Francis Ltd	United Kingdom	3.12
8	Medicinal Chemistry Research	ACS Publication	USA	2.6
9	New Library World	Emerald insight		2.5
10	Journal of food science and technology	Springer India	India	2.3

Table-6 shows the most productivity journals in which the faculty members of KSAWUV have published their articles from 2010 to 2023 as reflected in Google scholar . It is observed that the Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy journal has the highest impact factor of 8.4 published by Elsevier B.V, Netherlands. The second most productive journal is the Arabian Journal of chemistry, which has impact factor of 5.3 also published by Elsevier B.V, Netherlands. Further, the Media and Society journal has an impact factor of 4.5 is published by Sage Publication, New Dehli. The International Journal on Computer Science and Engineering has an impact factor value of 3.8 is published by ISROSET, Indore, India and IOSR Journal has 3.7 impact factor published by International Organization of Scientific Research (IOSR.

Table-7 Department wise articles Publications in Conference and Seminar Proceedings

Sl. No	Department	No. of Paper presented in conference	%	Cum %
1	Library and Information Science	296	15.52	15.52
2	Education	274	14.37	29.89

3	Physical Education	256	13.42	43.31
4	Economics	186	9.75	53.07
5	Journalism and Mass Communication	180	9.44	62.50

Table -7 shows department wise publications of articles in conference proceedings by the faculty members under study from 2010 to 2023. Out of 17 departments, the Library and Information Science has published the highest number articles in conference proceedings with a total of 296. The department has three professors, and nearly 24 students are perusing PhD degree, who are also involved in publications of articles, they use to attend various conference and seminars, may be the reason for the more number of publications in conference proceeding. The second highest number of articles published in conference proceedings by the faculty members of the Department of Education, which has more number of regular faculty members. Similarly, the Department of Physical Education also published more than 256 articles, this department has also more number regular faculty members.

Table-8 Teachers wise Awards of Ph.D Degrees

Sl.No	**Name of Faculty**	**Department**	**No. of Ph.D awarded**
1	Prof. P G Tadasad	Library and Information Science	20 (5 Other University
2	Prof. D M Madari	Economics	16
3	Prof. Chandrappa N	Physical Education	16
4	Prof. Kamshetty	Management	14
5	Prof. Vijaya B Korishetty	Sociology	14
6	Prof. Venkoba Narayanappa	Education	13
7	Prof. Mahesh I Chintamani	Kannada	13
8	Prof. G G Rajput	Computer Science	13 (12 = Other University)
9	Prof. Rajkumar Malipatil	Physical Education	13
10	Prof. R V Gangashetty	Economics	12
11	Prof. Sakpal Hoovanna	Physical Education	12
12	Prof. P Kannan	English	11(9 = Other University)
13	Prof. Sunandamma	Women studies	11
14	Prof. Gavisiddappa Anandhalli	Library and Information Science	9
15	Prof. Onkargouda Kakade	Journalism and Mass Communication	9

Table-8 shows the teacher wise awarding of PhD degrees from 2010 to 2023. Among 48 PhD guides awarded 335 PhD degrees during the study period. In which, Prof. P G Tadasad, Department of Library and Information Science has awarded the highest number of PhD degrees with a total of 20. One of the reasons may be his long service in the university environment and early recognition as a PhD guide. The second highest number of PhD degrees was awarded by Prof. D M Madari, Department of Economics who guided 16 candidates. Prof. Chanddrappa N retired from the service from the department of Physical Education was also awarded 16 PhD degree, Prof. Kamshetty from the department of Management studies awarded 14 PhDs and Prof. Vijaya B Korishetty from the Sociology Department both awarded 14 PhD degrees. The remaining teachers also awarded the PhD degrees as shown in the above table. Finally, it can be concluded that the Prof. P G Tadasad, Prof. D M Madari and Prof. Chandrappa N, Prof. Kamshetty and Prof. Vijaya B Korishetty are the more producer of PhD.

Table-9Authorship pattern for the publications of faculty members of KSAWUV.

Authorship Pattern	**No. of publications**	**%**
Single Authors	467	17.98
Double Authors	373	14.36
Three Authors	225	8.66
Four Authors	213	8.20
Five Authors	196	7.55

Six Authors	174	6.70
Seven Authors	190	7.32
Eight Authors	161	6.20
Nine Authors	167	6.43
Ten Authors	168	6.47
>Ten authors	263	10.13
Total	**2597**	**100.00**

From the data presented in table-9, it is observed that out of 2597 publications, the majority of the publications (467-17.98%) are single authored papers, followed by double authored papers , which contributed nearly 373 articles (14.36%). The third highest numbers of articles (263-10.13%) have been written by ten and more than ten authors. However only 161 (8.10%) of the publications have been authored by eight authors. It can be concluded that single authorship dominates than the multi authored work in the research productivity of faculty members of KSAWUV. Hence, it can be concluded that "Single Authorship dominates in the publications of KSAWUV's research productivity. "

Table-10 : Citations, h- index and i-10 index of the faculty members of KSAWU as reflected in Google scholar

Sl.No	Name of the author	Department	Google scholar		No. Articles	Citations
			H - index	i10 - Index		
1	Joy Hoskeri	Bioinformatics & Biotechnology	17	33	54	870
2	Aziz Makandar	Computer Science	14	19	79	924
3	G G Rajaput	Computer Science	14	17	23	678
4	Babu L R	Bioinformatics & Biotechnology	12	15	48	410
5	Prashanth S J	Food Processing	10	13	60	336
6	P G Tadasad	Library and information science	9	6	98	272
	Gavisiddappa A	Library and information science	8	8	52	177
7	Ramesh K	Computer Science	6	5	46	334
8	Sheetalrani Kawale	Computer Science	5	4	28	193
9	Rohini Busnurmath	Camputer Science	7	3	11	117

Table-10 shows the teacher wise distribution of h-index, i10 index, number of citations and number of articles from 2010 to 2023. Among 25 teachers as listed in the above table , Joy Hoskeri , the Department of Bioinformatics has the highest h-index, who has 17 h-index in the Google scholar profile, published 54 articles and received 870 citations, appears to be top in the list followed by Aziz Makandar, the Department of Computer Science who has 14 h-index published 79 articles and received 924 citations. And then followed G G Rajput also from the Department of Computer Science who has 14 h-index published 23 articles and received 678 citations. Babu L R, the department of Bioinformatics has 12 h-index published 48 articles and received 410 citations followed by prasanth S J, dept. of Food Processing, P G Tadasad and Gavisiddappa Anandhalli from the dept. of Library and information science have 10, 9 and 8 h

Table-11: Publications of faculty members in the Journals indexed in the Scopus database

Sl.No	Name of the Journal	No. of citations	Cum Citations
1	Journal of the American College of Cardiology	157	157
2	Heat Transfer	121	278
3	The Lancet Global Health	116	394
4	Case Studies in Thermal Engineering	113	507
5	Physica Scripta	85	592
6	Inflammation	77	669
7	The Lancet	76	745
8	Computational Mathematics and Modeling	73	818
9	Nature Medicine	69	887

The faculty members of KSAWUV have published their research work in the above mentioned 94 journals indexed in the Scopus database. Out of 2135 citations received for the articles published in these journals, top 7 journals received 745 citations and are considered as Core journals. The remaining 13 journals received 683 citations (37.29%) can be considered as Nucleus Journals. Another 74 journals received 707 citations which can be considered as Allied Journals. (Table-11).

7. Applications of Bradford law of Scattering

The Bradford's law serves as a general guideline to librarians in determining the number of core journals in any given field. It states that journals in a single field can be divided into three zones each zone. Containing the same number of citations (Bibliometric laws,2012

Table – 12 Table scattering of journals and articles over Bradford law of scattering

Zones	Number of journal	Number of citations	%	Bradford multiplier
I	7	745	34.89	
II	13	683	31.99	1.857
III	74	707	33.11	5.692
Total	94	2135	100.00	3.774

For applying the mathematical explanation for the Bradford law, the 94 journals related to in which the faculty members of KSAWUV have published their research articles were grouped into three zones . Bradford's Multiplier element was calculated by dividing the number of journals in a zone second by y the number of journals in the first zone, similarly the number of journals in the three zones is divided by the number of Journals in second zone; finally we can calculate the average Bradford multiplier by taking the average of two multiplier values.

Bradford multiplier is defined as "the ratio of the number of journals titles in any group to the number of journals in any immediately preceding group. The basis for choosing the three zone was that the percentage of error in the distribution of articles among the three zones, Should be minimum. Scattering of journals and articles over Bradford zone with Bradford multiplier has been presented in table -23.in the given data set as represented in the table-23 seven journals in the nucleus has covered 745 citations , 13 journals which is in second zone has included 683 citations , and 74 journals which is in third zone has covered 707 citations , in other words, each set of journals has covered one –third of the total number of research articles.

According to S C Brodford, the determined zones will form an almost mathematical sequence 1: n : n^2 , However in the present study, it is observed that the relation within each zone is 7: 13: 74, which is not fit into the Bradford 's law of scattering.

In the present study 7 journals denotes the number of journals in the nucleus and n=3.774 is the multiplier, which is the mean value

Therefore,

Percentage of error = 7: 7x 3.774: 7x3.774^2 = 133.119

((133.119-94)/ 94) x100 = 41.615

The percentage of the error of Bradford's distribution in three zone is very high i.e 41.615% which indicates **the Bradford law of scattering is not followed or fit for the research productivity of the faculty members of KSAWUV .**

8. Findings of the Study.

1. A total of 2597 research articles were published over 13 years from 2010 to 2023 the highest numbers of articles was published in 2018 with the second highest number of articles published in 2017, while the lowest number of articles was contributed in 2010.
2. An average of 185 articles were published each year during the study period with the number of publications increasing by .926 articles each year.
3. There is a declining trend in the Relative Growth Rate and increasing trend in Doubling Time of the of the publications by the faculty members of KSAWUV.
4. The maximum annual growth rate was 56.3 was register in the year 2012 and the lowest annual growth rate of -17.30 in 2020 and the highest Compound annual growth rate was of 16.13% recorded in 2012 and the lowest rate was -1.72 registered in 2020.
5. The Polynomial Model and Power models fit well for the research productivity of the faculty members of KSAWUV.

6. The highest number of citations, 159 was received for the article "A comparative study of cluster head selection algorithms" authored by Ramesh K
7. The Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy journal, Arabian Journal of chemistry, Media and Society journal are most productive core journals preferred by the faculty members of KSAWUV.
8. The department of library and Information Science, the dept. of Education, the dept. of Physical Education and the department of Economics, all together contributed more than 50% of the total publications.
9. Prof.P G Tadasad, Prof. D M Madari and Prof. Chandrappa N, Prof. Kamshetty and Prof. Vijaya B Korishetty are the top producer of PhD degrees at KSAWV.
10. The multiple authors dominates in the publications in KSAWU research productivity
11. The journals articles are the major primary source of publications for the faculty members of KSAWUV.

9.Recommendations

Due to variations in the university name such as Karnataka State Women's University,Bijapura, Akkamahadevi Women's University, and Karnataka State Akkamahadevi women's University, Vijayapura, articles are scattered in under different names. This makes it challenging to trace all the articles published by our faculty members in the Scopus database with single search. Therefore, efforts should be made to map these names under single affiliation. Further, the university should provide institutional mail id for all the faculty members to ensure consistency in their publications. The university has to organize the Faculty Development Program on research methodology, research skills, Research Metrics and Statistical Tools and techniques on regular base for the faculty members. The Importance of journal Impact factor (IF) and the H-Index of the author should be known to the faculty members of KSAWUV particularly in the Social Science and Commerce departments, to improve the quality of their papers.

10. Conclusion

The findings of the study indicates that faculty in science discipline exhibit higher research productivity, , publishing their research work in high quality journals indexed in Scopus and Web of Science. On the other hand, Social Science faculty members need to improve their publishing skills to enhance their impact in the research community, as their quality of publications is relatively low. However they excel in publishing articles in conference proceedings and awards of PhDs. To address this, KSAWUV should have strong research policy that promote and encourage the strong research culture to publish high quality research particularly for the Social Science and Arts . The faculty members should publish their articles in high impact factor journals particularly those indexed in Scopus, Web of Science and Pub Med. Finally, it can be concluded that there is significant potential growth in their area of research. Therefore, cross disciplinary research collaboration among the faculty members of University at KSAWUV should be encouraged to enhance their impact in the research community.

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References:

1. Baby, K. and Kumaravel, J.P.S. (2012), "Relative Growth Rate and Priority Index of Journal of Clinical Microbiology during 2006-2010*", International Journal of Library and Information Studies*, Vol.2 No.2, pp.1-9.
2. Barker, D.L. (1966).Characteristics of the scientific literature cited by chemist of the Soviet Union. University of Illiois, Ph.D Thesis.
3. Bookstein, Abraham (1979). Explanations of the bibliometric laws. *Collection Management*, 3, 151-162.
4. Bradford, S. C. (1934). Sources of information of specific subjects. *Engineering*, 137, 85-86.
5. Clarke, B. L. (1964). Multiple authorship trends in scientific papers. Science, 143, 822-824. Cunningham, S. J., & Bocock, D. (1995). Obsolescence of computing literature. *Scientometrics*, 34 (2), 255-262.
6. Coles, F. J, and Eales. N. D. (1917). The history of comparative anatomy, Part I: A statistical analysis of the literature. *Science Progress*, 11 (2), 578-596.
7. De Oliveiria, S. M. (1984). Citation pattern in Veterinary Science dissertations. *Annals of Library Science and Documentation*, 31(1), 147-155.
8. Garg and Padhi (1998). Scientometrics study of Laser patent literature. *Scientometrics*, 43(3), 443-454.
9. Gross, P. L. K. and Gross, E. M. (1923). College libraries and chemical education. *Science*, 66, 385-389.
10. Gupta, B. M., and Karisiddappa, C. R. (2000),"Modelling the Growth of Literature in the Area of Theoretical Population Genetics",*Scientometrics*, Vol.49 No.2, PP.321-355.

11. Gupta, B.M., Kumar, S., Sangam, S.L., &Karisiddappa, C.R. (2002),"Modeling the growth of world social science literature",*Scientometrics*,Vol.53 No.1, pp.161-164.
12. Mahapatra, M. (1985).On the validity of the theory of exponential growth of scientific literature. In 15th IASLIC Conference Proceedings, Bangalore, IASLIC, 61–70.
13. Sangam,S.L. and Meera. (2011). Scientometric Analysis of Chemical Science Journal. International Journal of Information Research, 1(2), 1-14.
14. Subramanym, K. (1984). Research productivity and breadth of interest of computer scientists. Journal of the American Society for Information Science, 35,241-268.