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Comparison of h-index; citation index of African Researchers and world h-index; citation index

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Abstract: **The study was aimed comparing the h-index; citation index of African researchers and the world average h-index and citation index. This was achieved through logical procedure of (h-index and citation index) collection using the Google Scholar citation data base. of researchers. Four research questions in line with the purpose of study were all answered, while the four null hypotheses were tested with using single sample t-test at 0.05 alpha level. Given their P (0.000) < 0.05 alpha level (significant; all the null hypotheses were rejected and the alternative hypotheses upheld. The study used a sample size of three thousand, (3, 000) faculties in Africa cutting across fifteen universities. Purposive sampling was used to select faculties who have account with google scholar and summary of individual statistics of citation index and h-index. Google scholar citation data base has been judged as one of the most dependable, accurate and e-visible data bases for measuring research productivity of faculties therefore has very high reliability and validity. At the end of the study findings were made, implications were drawn and recommendations were made among others that institutions make it compulsory for faculties members to open google scholar citation account. The limitations of the study were highlighted with suggestions for further study.**

Keywords: **Research, productivity, Research productivity, Citation index, h-index, google scholar.**

1. INTRODUCTION

University is a system which has input, process and output including research and teaching (Tafreshi, Imani, & Ghashlag, (2013)). Universities are considered as producers of new knowledge that is why the role of university academicians is not limited to teaching only. Research is becoming vital and necessary part of modern university education. Universities are considered as modern entrepreneur engine and generator of knowledge through research. Research publications enable academicians to earn better salary package and get better tenure. University teachers considers that research and teaching are interlinked. Involvement in research activities always supports teachings and participation in research polishes their thinking and creative abilities.

Writing of research papers enables university teachers to quickly understand the originality and quality of the research work. According to Cresswell in Tafreshi et al, (2013), teaching and research are equally important for university teachers; they must give equal attention to research and teaching as a part of their duty, because participation in research directly improves the quality of teaching. Research is required for the improvement of general knowledge, research enable the academicians to understand their own selves, to analyze their own abilities. Research also enable the academicians to fully understand their discipline, which is imperative for effective teaching. Investigation of factors which bang the research productivity of the university faculty members is of greater interest to the academicians trying to preserve their academic status and to the University management to provide a smooth and progressive climate to the academicians.

A new way of measuring research productivity emerged with the advent of internet which has opened up new lines of opportunities for researchers to reach out to the wider world in presenting their profiles and making their works more visible (Lateef, Ogunkugunle & Adigun, 2016,). According to them “this is the genesis of e-visibility”.

The launching of Google Scholar (GS) in November, 2008 provided the opportunity for scholars to access variety of academic information freely on the web breaking the monopoly of other sites charging subscription for information. With the initial success of GS in making multidisciplinary academic information available, the google scholar citation (GSC) was launched in April 2012 (Jacso in Lateef et-al, 2016). This afforded scholar the opportunity to create editable personal profile which liberalized the process of evaluation of citation metrics.

Citations

According to Maier (2015), a citation is when one paper explicitly refers to another paper, and in that paper full reference or cited paper is given in the bibliography. Also, Wikipedia, gives a citation as an "abbreviated alphanumeric expression embedded in the body of an intellectual work that denotes an entry in the bibliographic references section of a work for the purpose of acknowledging the relevance of the works of others in the topic of discussion at the spot where the citation appears". Citation is generally the combination of both in-body citation and the bibliographic entry. According to Dhamdhere (2018), Citations are important for the following reasons:

a). Citation is the way authors give proper credit to the work and ideas of others.

b) People count citations of a paper as an indication of how important or influential the paper has been.

c) For the avoidance of plagiarism, it is compulsory to give credit to the original author by citing his/her sources in references.

d) Apart from plagiarism, citations enable anyone to find out more about the ideas and where they came from in a work.

e) Citing sources shows the amount of research one has done and it strengthens one's work by lending outside support to the ideas.

Google scholar

"Google Scholar searches for all scholarly publications from all disciplines and sources like articles, abstracts, books, court opinions from academic publishers, professional societies, online repositories, universities and institutions websites, patents, etc at one place and helps to find relevant work across the world of scholarly research" (Dhamdhere, 2018). Using Google Scholar, a faculty can explore related works, citations, authors and publications, locate complete document through the library or from the web, keep up with recent developments in any area of research, including patents or citations options, keep tract of citations, get graph citations over time, check who is citing a publication and can create a public author profile free of charge. Google Scholar also compute several citation metrics like h-index, i10-index and also ranks the documents the way researchers do, provide details of each documents, where it was published, how often and how recently it has been cited in other scholarly literature (Dhamdhere, 2018).

Google Scholar profile of individual Faculty

Individual faculty or researcher can create a Google Scholar account using his/her G-mail. To make it authentic and public, he or she will need to add authentic institutional email id and verify it. After adding personal details and profile picture, a research scholar is able to add his or her authored publications directly from the list that appears or manually. A researcher can select and input multiple groups if he or she has written articles under different names, with different groups of colleagues, or in different journals. All the publications available online appears in the listed groups.

Creating Google Scholar account of an institution

According to Dhamdhere, (2018), to create Google Scholar account of an institution, the institution needs the following steps:

1. the need to appoint a staff to handle the responsibility, preferably someone with a research background.

2. Add information about an institution together with its affiliation and logo.

3. Add articles of staff members online or manually.

Benefits of Google Scholar

There are many benefits of creating Google Scholar profile of Institutions which gives cumulative research index like number of citations, h-index, and i10-index of all researchers. It helps in institutional growth and future planning, to get and apply for funded research and grant, for students' placement, collaborative research, industry collaboration and International recognition, also, Google Scholar profile of an academic institution is useful. This profile is easily accessible to all faculties and public, but regular update is necessary.

The h-index

Jorge Hirsch, a physicist in August, 2005, at the University of California, San Diego, USA introduced a new indicator for measuring the research output of researchers (Bornmann & Daniel, 2007a; Hirsch, 2005). The h-index was aimed as an alternative to other bibliometric indicators such as the number of publications, the number of citations, total number of citations and the age average of an article (Hirsch, 2007).

A scholar has index h if h of his/her n papers have at least h citations each and the remaining (n-h) papers have at most h citations each (Hirsch, 2005, p.16569). This index measures the scientific productivity and impact of a scholar's research. The h-index of a journal expresses the number of its articles (h) that have received at least h citations. It quantifies the journal's scientific productivity and scientific impact. An h index of 7 means that a faculty has published seven papers and each of these seven papers have been cited at least seven times. According to Bornmann & Daniel, (2007) someone who has an h index of 0 does not indicate that the faculty is inactive, it simply means he or she might have already published a number of papers, but none have been cited at least once.

Statement of the Problem

A new measure of research productivity is in vogue; the h-index and citation index which is been calculated by some renown citation data bases like Scopus, Web of Science and Google Scholar. Universities and researchers all over the world take advantage of this current trend and it is currently the in thing for measuring research productivity of researchers, faculties, institutions, countries and even nations. While researchers pay subscription to register with other citation data bases, google scholar is free. Researchers just need to open a google scholar account and all citations from such a person is mopped up and the h-index and citation index as well as i10 index is summarily calculated. The question is; how many African researchers have google scholar account? How many institutions have google scholar account? Theses are the questions the researcher intends to answer in this study.

Aims and Objectives of the Study

Generally, the study intends to compare the h-index; citation index of African researchers and the world h-index; citation index. Specifically, the study is poised to:

1. Determine the difference in h-index of researchers in each African university and with the world average h-index.
2. Determine the difference in h-index of researchers in each African country with the world average h-index.
3. Determine the difference in citation index of researchers in each African university and the citation index with the world average.
4. Determine the difference in citation index of researchers in each African country with that of the average world citation index.

Research Questions

The following research questions will guide the study

1. What is the difference in h-index of researchers in each African university and the average world h-index?
2. What is the difference in h-index of researchers in each African country and the average world h-index?
3. What is the difference in citation index of researchers in each African university and with the average world citation index?
4. what is the difference in citation index of each African country and with the average world citation index?

Hypotheses

The following null hypotheses are tested at 0.05 alpha level.

1. There is no significant difference in h-index of researchers in each African university and the average world h-index.
2. There is no significant difference in h-index of researchers in each African country and the average world h-index.
3. There is no significant difference in citation index of researchers in each African university and the average world citation index.
4. There is no significant difference in citation index of researchers in each African country and the average world citation index.

2. METHODOLOGY

The design for this study is basically comparative causal- effect Ex Post Facto research design. The population of this study covers the one thousand Five Hundred and Eight (1508) degree awarding universities that have full accreditation from the regulatory bodies of their countries. An estimate of eight hundred and forty-three thousand, five hundred (843, 500) academic staff in these universities makes up the population of this study. The sample size is Three thousand (3, 000) faculties sampled from fifteen (15) universities. Three universities from each region of West Africa, Southern Africa, East Africa, North Africa and Central Africa. Taro yamen's formula was used to determine the sample of each stratum from the population and each stratum added together to give the total sample size of 3,000. Purposive quota sampling was used to select faculties who have account with google scholar and summary of individual statistics of citation index and h-index that are readily provided for the used in this study in the various regions.

The instrument for data collection is strictly google scholar data base. Google scholar database provides information on paper citation counts and h-indexes of scholars. The researcher enters the name of each university into Google Search Engine at www.scholar.google.com. A list of faculties/users from respective institutions and or countries of google scholar will appear with a summary of total number of citations, h-index and i10-index of that faculty in each university. The h-index and citation index which are the two dependable variables in this study are recorded in Microsoft excel for all the subjects. The results were collated for each faculty, university and country for the investigation.

Data was analyzed using SPSS version 25 statistical software application through which the research questions were analyzed using mean and standard deviation while one sample t-test was used to analyze the hypotheses. World average h-index of 17.5 (Hirsch, 2007) and world average citation index of 971 (Thomson Reuters essential science indicators citation threshold, Wikipedia.com) were the bases for comparison in the analysis.

3. RESULTS

Table 1: Comparison of mean h-index of researchers in Africa Universities and world average h-index

Universities	N	Mean	World h-index	Std. Deviation
University of Cape Town	200	32.80	17.5	15.66
University of Pretoria	200	23.69	17.5	12.20
University of Zimbabwe	200	4.28	17.5	6.21
Cairo University	200	21.16	17.5	11.83
Al Akhawayn University	200	9.59	17.5	8.94
UTE,TUNISIA	200	16.76	17.5	12.60
University of Nairobi	200	14.78	17.5	5.92
Makerere University	200	7.61	17.5	7.76
A. A. U, Ethiopia	200	7.58	17.5	8.19
University of Zambia	200	4.50	17.5	4.60

University of BUEA	200	7.04	17.5	4.47
UAN Angola	200	4.32	17.5	5.49
University of Ibadan	200	16.76	17.5	8.44
KNUST	200	9.35	17.5	5.67
UNIPORT	200	8.71	17.5	8.03

Table one compares the mean h-index of researchers in the sampled Africa Universities and world average h-index. University of Cape Town, University of Pretoria and Cairo University have mean h-index of 32.80, 23.69 and 21.16 which is higher than the world average h-index of 17.5. all other universities have mean h-index below the 17.5 world average h-index.

Table 2: Comparison of mean h-index of each African country and the average world h-index

Countries	N	Mean	World h-index	Std. Deviation
South Africa	400	28.25	17.5	14.74
Zimbabwe	200	4.28	17.5	6.21
Egypt	200	21.16	17.5	11.83
Morocco	200	9.59	17.5	8.94
Tunisia	200	16.76	17.5	12.60
Kenya	200	14.78	17.5	5.92
Uganda	200	7.61	17.5	7.76
Ethiopia	200	7.58	17.5	8.19
Zambia	200	4.50	17.5	?4.60
Cameroon	200	7.04	17.5	4.47
Angola	200	4.32	17.5	5.49
Nigeria	400	12.73	17.5	9.16
Ghana	200	9.35	17.5	5.67

Table two compares the mean h-index of each African country and the average world h-index. South Africa and Egypt with h-index of 28.25 and 21.28 are higher than the world h-index of 17.5. the rest; Zimbabwe 4.28, Morocco 9.59, Tunisia 16.76, Kenya 14.78 Uganda 7.61 and Ethiopia 7.58 all have less h-index compared to the world h-index of 17.5. Also, Zambia 4.50, Cameroon 7.04 Angola 4.32 Nigeria, 12.73 and Ghana, 9.35 are all less than the world h-index of 17.5.

Table 3: comparison of mean citation index of faculties among African universities and with the average world citation index

Universities	N	Mean	World citation index	Std. Deviation
University of Cape Town	200	5749.83	971	7958.94
University of Pretoria	200	3026.67	971	4639.94
University of Zimbabwe	200	299.10	971	1823.05
Cairo University	200	3047.37	971	8492.64
Al Akhawayn University	200	38.97	971	106.06
UTE,TUNISIA	200	2017.67	971	7809.72
University of Nairobi	200	1041.34	971	922.57

Makerere University	200	477.49	971	2054.85
A. A. U, Ethiopia	200	478.67	971	1559.21
University of Zambia	200	156.87	971	382.67
University of BUEA	200	91.77	971	357.03
UAN Angola	200	210.06	971	752.40
University of Ibadan	200	155.95	971	369.27
KNUST	200	288.00	971	437.36
UNIPORT	200	165.08	971	369.03

Table 3 compares the mean citation index of each African university with the world citation index. Cape Town University (5749.83 > 971), University of Pretoria (3026.67 > 971), University of Zimbabwe (299.10 < 971), Cairo University (3047.37 > 971). Others are: Al Akhawayn University (38.97 < 971), UTE, Tunisia (2017.67 > 971), University of Nairobi (1041.34 > 971), Makerere University (477.49 < 971), A, A, U, Ethiopia (478.67 < 971), University of Zambia (156.87 < 971), University of Buea (91.77 < 971), UAN, Angola (210.06 < 971), while University of Ibadan (155.95 < 971), Kwame Nkurumah University of Science and Technology (288.00 < 971) and University of Port-Harcourt (165.05 < 971). University of Cape Town, University of Pretoria, Cairo University UTE, Tunisia and University of Nairobi are countries whose citation index is higher than the world average citation index.

Table 4: Comparison of citation index of each African country and with the average world citation index

Countries	N	Mean	World citation index	Std. Deviation
South Africa	400	4388.25	971	6647.49
Zimbabwe	200	299.10	971	1823.05
Egypt	200	3047.37	971	8492.64
Morocco	200	38.97	971	106.06
Tunisia	200	2017.67	971	7809.72
Kenya	200	1041.34	971	922.57
Uganda	200	477.49	971	2054.85
Ethiopia	200	478.67	971	1559.21
Zambia	200	156.87	971	382.67
Cameroon	200	91.77	971	357.03
Angola	200	210.06	971	752.40
Nigeria	200	155.95	971	369.27
Ghana	400	226.54	971	408.79

Table 4 presents the comparison of citation index of each African country and with the average world citation index. South Africa (4388.25>971), Zimbabwe (299.10 < 971), Egypt (3047.37 > 971), Morocco (38.97 < 971), Tunisia (2017.67 > 971), Kenya (1041.34 > 971), Uganda (477.49 < 971). Others are: Ethiopia (478.67 < 971), Zambia (156.87 < 971), Cameroon (91.77 < 971), Angola (210.06 < 971), and Nigeria (155.95 < 971) and Ghana (226.54 < 971). South Africa, Egypt, Tunisia and Kenya have citation index greater than the world citation index.

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Table 5: One-Sample Test of h-index of researchers in each African university and the average world h-index

	Test Value = 17.5					
					95% Confidence Interval of the Difference	
Universities	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
UC T	-22.343	2999	.000	-4.90700	-5.3376	-4.4764
U. P	7.175	199	.000	6.19000	4.4888	7.8912
UNIZIM	-30.110	199	.000	-13.22500	-14.0911	-12.3589
C U	4.374	199	.000	3.66000	2.0101	5.3099
Al A U	-12.523	199	.000	-7.91500	-9.1613	-6.6687
U T E , Tunisia	-.836	199	.404	-.74500	-2.5015	1.0115
U. N	-6.515	199	.000	-2.72500	-3.5498	-1.9002
MU	-18.016	199	.000	-9.89000	-10.9725	-8.8075
A. A. U, E	-17.132	199	.000	-9.92000	-11.0619	-8.7781
U.Z	-39.999	199	.000	-13.00000	-13.6409	-12.3591
Buea	-33.098	199	.000	-10.46500	-11.0885	-9.8415
UAN, Angola	-33.978	199	.000	-13.18500	-13.9502	-12.4198
U. I.	-1.248	199	.214	-.74500	-1.9224	.4324
KNUST	-20.325	199	.000	-8.15000	-8.9407	-7.3593
UNIPORT	-15.472	199	.000	-8.79000	-9.9103	-7.6697

Table 5 presents the one sample t-test of researchers in each African university and the average world h-index of 17.5. university of Cape Town has t value -22.343, degree of freedom 199, P (0.000) < 0.05 alpha level (significant). University of Pretoria (t t = 7.175; df = 199; P (0.000) < 0.05 alpha level), significant, University of Zimbabwe (t = -30.110; df = 199; P (0.000) < 0.05 alpha level) significant, Cairo University (t = 4.374; df = 199; P (0.000) < 0.05 alpha level) significant, Al Akhawayn University (t = -12.523; df = 199; P (0.000) < 0.05 alpha level) significant University of Tunis El Manar, Tunisia (t = -.836; df = 199; P (.404) > 0.05 alpha level) not significant. University of Nairobi (t = -6.515; df = 199; P (0.000) < 0.05 alpha level) significant. Makerere University (t = -18.016; df = 199; P (0.000) < 0.05 alpha level) significant. Addis Ababa University, Ethiopia (t = -17.132; df = 199; P (0.000) < 0.05 alpha level) significant. University of Zambia (t = -39.999; df = 199; P (0.000) < 0.05 alpha level) significant. University of Buea, Cameroon (t = -33.098; df = 199; P (0.000) < 0.05 alpha level) significant. Universidade Agostinho Neto, Angola (t = -33.978; df = 199; P (0.000) < 0.05 alpha level) significant. University of Ibadan (t = -1.248; df =199; P (0.214) > 0.05 alpha level) not significant. Kwame Nkurumah University of Science and Technology (t = -20.325; df = 199; P (0.000) < 0.05 alpha level) significant and lastly University of Port-Harcourt (t = -15.472; df = 199; P (0.000) < 0.05 alpha level) significant.

Table 6: One-Sample Test for h-index of researchers in each African country and the average world h-index

	Test Value = 17.5					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
South Africa	14.575	399	.000	10.74500	9.2957	12.1943
Zimbabwe	-30.110	199	.000	-13.22500	-14.0911	-12.3589

Egypt	4.374	199	.000	3.66000	2.0101	5.3099
Morocco	-12.523	199	.000	-7.91500	-9.1613	-6.6687
Tunisia	-.836	199	.404	-.74500	-2.5015	1.0115
Kenya	-6.515	199	.000	-2.72500	-3.5498	-1.9002
Uganda	-18.016	199	.000	-9.89000	-10.9725	-8.8075
Ethiopia	-17.132	199	.000	-9.92000	-11.0619	-8.7781
Zambia	-39.999	199	.000	-13.00000	-13.6409	-12.3591
Cameroon	-35.514	198	.000	-10.57538	-11.1626	-9.9882
Angola	-33.978	199	.000	-13.18500	-13.9502	-12.4198
Nigeria	-10.405	399	.000	-4.76750	-5.6683	-3.8667
Ghana	-20.325	199	.000	-8.15000	-8.9407	-7.3593

Table 6 presents the one sample t-test of researchers in each African country and the average world h-index of 17.5. South Africa (t = 14.575; df = 399; P (0.000) < 0.05 alpha level) is significant. Zimbabwe (t = -30.110; df = 199; P (0.000) < 0.05 alpha level) is significant. Egypt (t = 4.374; df = 199; P (0.000) < 0.05 alpha level) is significant. Morocco (t = -12.523; df = 199; P (0.000) < 0.05 alpha level) is significant. Tunisia (t = -.836; df = 199; P (,0404) > 0.05 alpha level) no significant. Kenya (t =-6.515; df = 199; P (0.000) < 0.05 alpha level) is significant. Uganda (t = -18.016; df = 199; P (0.000) < 0.05 alpha level) is significant. Ethiopia (t = -17.132; df = 199; P (0.000) < 0.05 alpha level) is significant. Zambia (t = -39.999; df = 199; P (0.000) < 0.05 alpha level) is significant. Cameroon (t = -35.514; df = 199; P (0.000) < 0.05 alpha level) is significant. Angola (t = -33.978; df = 199; P (0.000) < 0.05 alpha level) is significant, while Nigeria (t -10.405; df = 399; P (0.000) < 0.05 alpha level) is significant and Ghana (t =-20.325; df = 199; P (0.000) < 0.05 alpha level) is significant.

Table 7: One-Sample Test of citation index of researchers in each African university and the average world citation index

	Test Value = 971					
					95% Confidence Interval of the Difference	
Universities	T	df	Sig. tailed)	(2-Mean Difference	Lower	Upper
UC T	8.491	199	.000	4778.83000	3669.0485	5888.6115
U. P	6.265	199	.000	2055.66500	1408.6788	2702.6512
UNIZIM	-5.212	199	.000	-671.90000	-926.1032	-417.6968
C U	3.458	199	.001	2076.37000	892.1700	3260.5700
Al A U	-124.276	199	.000	-932.03500	-946.8241	-917.2459
U T E , Tunisia	1.895	199	.059	1046.67000	-42.3042	2135.6442
U. N	1.078	199	.282	70.33500	-58.3069	198.9769
MU	-3.396	199	.001	-493.51000	-780.0350	-206.9850
A. A. U, E	-4.465	199	.000	-492.33000	-709.7443	-274.9157
U.Z	-30.087	199	.000	-814.13500	-867.4944	-760.7756
Buea	-34.827	199	.000	-879.23500	-929.0184	-829.4516
UAN, Angola	-14.303	199	.000	-760.94500	-865.8587	-656.0313
U.I	-31.215	199	.000	-815.05500	-866.5448	-763.5652
KNUST	-22.085	199	.000	-683.00000	-743.9842	-622.0158
UNIPORT	-30.885	199	.000	-805.92500	-857.3816	-754.4684

Table 7 presents the one sample t-test of researchers in each African university and the average world citation index of 971. university of Cape Town has t value 8.491, degree of freedom 199, P (0.000) < 0.05 alpha level (significant). University of Pretoria (t = 6.265; df = 199; P (0.000) < 0.05 alpha level), significant, University of Zimbabwe (t = -5.212; df = 199; P (0.000) < 0.05 alpha level) significant, Cairo University (t = 3.458; df = 199; P (0.001) < 0.05 alpha level) significant, Al Akhawayn University (t = -124.276; df = 199; P (0.000) < 0.05 alpha level) significant University of Tunis El Manar, Tunisia (t = 1.895; df = 199; P (.059) > 0.05 alpha level) not significant. University of Nairobi (t = 1.078; df = 199; P (0.282) > 0.05 alpha level) not significant. Makerere University (t = -3.396; df = 199; P (0.001) < 0.05 alpha level) significant. Addis Ababa University, Ethiopia (t = -4.465; df = 199; P (0.000) < 0.05 alpha level) significant. University of Zambia (t = -30.087; df = 199; P (0.000) < 0.05 alpha level) significant. University of Buea, Cameroon (t = -34.827; df = 199; P (0.000) < 0.05 alpha level) significant. Universidade Agostinho Neto, Angola (t = -14.303; df = 199; P (0.000) < 0.05 alpha level) significant. University of Ibadan (t = -31.215; df =199; P (0.214) > 0.05 alpha level) not significant. Kwame Nkurumah University of Science and Technology (t = -22.085; df = 199; P (0.000) < 0.05 alpha level) significant and lastly University of Port-Harcourt (t = -30.885; df = 199; P (0.000) < 0.05 alpha level) significant.

Table 8: One-Sample Test for citation index of researchers in each African country and the average world citation index.

	Test Value = 971					
					95% Confidence Interval of the Difference	
Countries	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
South Africa	10.281	399	.000	3417.24750	2763.8237	4070.6713
Zimbabwe	-5.212	199	.000	-671.90000	-926.1032	-417.6968
Egypt	3.458	199	.001	2076.37000	892.1700	3260.5700
Morocco	-124.276	199	.000	-932.03500	-946.8241	-917.2459
Tunisia	1.895	199	.059	1046.67000	-42.3042	2135.6442
Kenya	1.078	199	.282	70.33500	-58.3069	198.9769
Uganda	-3.396	199	.001	-493.51000	-780.0350	-206.9850
Ethiopia	-4.465	199	.000	-492.33000	-709.7443	-274.9157
Zambia	-53.606	199	.000	-843.96465	-875.0128	-812.9165
Cameroon	-34.827	199	.000	-879.23500	-929.0184	-829.4516
Angola	-14.303	199	.000	-760.94500	-865.8587	-656.0313
Ghana	-31.215	199	.000	-815.05500	-866.5448	-763.5652
Nigeria	-36.423	399	.000	-744.46250	-784.6449	-704.2801

Table 8 presents the one sample t-test of researchers citation index in each African country and the average world citation index of 971. South Africa (t = 10.281; df = 399; P (0.000) < 0.05 alpha level) is significant. Zimbabwe (t = -5.212; df = 199; P (0.000) < 0.05 alpha level) is significant. Egypt (t = 3.458; df = 199; P (0.001) < 0.05 alpha level) is significant. Morocco (t = -124.276; df = 199; P (0.000) < 0.05 alpha level) is significant. Tunisia (t = 1.895; df = 199; P (,059) > 0.05 alpha level) not significant. Kenya (t = 1.078; df = 199; P (0.282) > 0.05 alpha level) not significant. Uganda (t = -3.396; df = 199; P (0.001) < 0.05 alpha level) is significant. Ethiopia (t = -4.465; df = 199; P (0.000) < 0.05 alpha level) is significant. Zambia (t = -53.606; df = 199; P (0.000) < 0.05 alpha level) is significant. Cameroon (t = -35.51-34.827; df = 199; P (0.000) < 0.05 alpha level) is significant. Angola (t = -14.303; df = 199; P (0.000) < 0.05 alpha level) is significant, while Nigeria (t = -36.423; df = 399; P (0.000) < 0.05 alpha level) is significant and Ghana (t -31.215; df = 199; P (0.000) < 0.05 alpha level) is significant.

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4. DISCUSSION OF RESULTS

H-index of researchers **in each African university and the average world h-index**

The results of the one sample t-test of researchers in each African university and the average world h-index of 17.5 shows that University of Cape Town, University of Pretoria, University of Zimbabwe, Cairo University are statistically significant, Al Akhawayn University, University of Nairobi (t = -6.515; df = 199; P (0.000) < 0.05 alpha level) significant. Makerere University, Addis Ababa University, Ethiopia, University of Zambia, University of Buea, Cameroon, Universidade Agostinho Neto, Angola, Kwame Nkurumah University of Science and Technology, and University of Port-Harcourt are all significant. While the University of Tunis El Manar, Tunisia (t = -.836; df = 199; P (.404) > 0.05 alpha level) and has the University of Ibadan (t = -1.248; df =199; P (0.214) > 0.05 alpha level) are not significant. The performance of African universities in terms of citation and h-index has been exposed in this hypothesis testing. University of Cape Town, University of Pretoria and Cairo university that have h-index higher the world average h-index and are statistically significant with the world h-index.

According to Onyancha and Maluleka (2011), South African universities published 52,000 articles from 1995 to 2008 three times more than other African countries. South African universities also have more international collaboration in terms of research than other African countries. This no doubt has increased the h-index of University of Cape Town and Pretoria University been the leading universities in the ranking by Times Higher Education (THE) in Africa.

H-index of researchers **in each African country and the average world h-index**

the one sample t-test of researchers in each African country and the average world h-index of 17.5 of hypothesis two shows that South Africa has (t = 14.575; df = 399; P (0.000) < 0.05 alpha level) is significant. Zimbabwe (t = -30.110; df = 199; P (0.000) < 0.05 alpha level) is significant. Egypt (t = 4.374; df = 199; P (0.000) < 0.05 alpha level) is significant. Morocco (t = -12.523; df = 199; P (0.000) < 0.05 alpha level) is significant. Tunisia (t = -.836; df = 199; P (,0404) > 0.05 alpha level) no significant. Kenya (t =-6.515; df = 199; P (0.000) < 0.05 alpha level) is significant. Uganda (t = -18.016; df = 199; P (0.000) < 0.05 alpha level) is significant. Ethiopia (t = -17.132; df = 199; P (0.000) < 0.05 alpha level) is significant. Zambia (t = -39.999; df = 199; P (0.000) < 0.05 alpha level) is significant. Cameroon (t = -35.514; df = 199; P (0.000) < 0.05 alpha level) is significant. Angola (t = -33.978; df = 199; P (0.000) < 0.05 alpha level) is significant, while Nigeria (t -10.405; df = 399; P (0.000) < 0.05 alpha level) is significant and Ghana (t =-20.325; df = 199; P (0.000) < 0.05 alpha level) is significant. This finding is corroborated by Lateef et al (2016). Who showed in their study that South Africa and Egypt ranked the first and second among the countries in terms of all indices considered. According to Lateef et al (2016), The top-rated researchers who had h-index of 92, 75 and 65 were found to be associated with South Africa, Egypt and Tunisia respectively.

Citation index of researchers **in each African university and with the average world citation index**

The result of the one sample t-test of researchers in each African university and the average world citation index of 971 shows that university of Cape Town, University of Pretoria, University of Zimbabwe, Cairo University, Al Akhawayn University, Makerere University. Addis Ababa University, Ethiopia are significant. University of Zambia, University of Buea, Cameroon, Universidade Agostinho Neto, Angola. Kwame Nkurumah University of Science and Technology and University of Port-Harcourt are significant. While University of Tunis El Manar, Tunisia, University of Nairobi. And University of Ibadan are not significant.

Conspicuously, University of Cape Town, and University of Pretoria from South Africa together with Cairo university Egypt, UTE, Tunisia and University of Nairobi had their mean citation indexes higher than the 971-world average citation index. While the mean difference between university of Cape Town, university of Pretoria and Cairo university statistically significant, the mean difference of UTE, Tunisia and university of Nairobi are statistically significant. The statistically significance outcome from the one sample t-test of the other universities showed their means were not only smaller than the test mean, but also deviated sharply from it. This explains why most African universities could not make the first 500 universities in the world ranking except those from South Africa and few from Egypt. The findings of the study are in line with THE ranking of Africa universities.

The Times Higher Education (THE) held her inaugural Africa summit in Johannesburg, South Africa and came up the ranking of first thirty universities in Africa. "South Africa dominated a snapshot of what a new ranking for African universities could look like, making up two-fifths of the institutions in the list.

Egypt is the second most-represented country, with six universities in the top 30 table, which was drawn up by *Times Higher Education* and measures research impact. Morocco and Tunisia both have three institutions making the running". University of Port-Harcourt, the only university from Nigeria is number six in the list.

Citation index of each African country and with the average world citation index

Findings in the one sample t-test of researchers' citation index in each African country and the average world citation index of 971 shows that South Africa, Zimbabwe, Egypt, Uganda, Ethiopia, and Zambia are significant, Also Cameroon, Angola, Nigeria and Ghana are significant. While Tunisia and Kenya showed no significance. Only South Africa and Egypt that had their citation mean greater than the test value. The rest countries were lesser than the test mean. South Africa and Egypt have dominated the Africa in terms of research productivity probably because of their over whelming presence in high profile bibliometric indexes like google scholar citation database, Scopus, Web of Science etc. this outlook of Africa in terms of research productivity was confirmed by Ajifureke (2011) who used Web of Science database to analyze the contributions of researchers in Africa to the informetrics literature but with a wider coverage; the time frame used was 1960 to September 2010 (i.e. the time that the data was collected). Also, instead of looking at the contributions by year, he examined the contributions by each of the countries in Africa. The study used Scopus, the result shows that only 12 out of the 54 countries in Africa have contributed informetrics articles in journals indexed by either Web of Science or Scopus but only South Africa and Nigeria seemed to have made significant contributions. Pouris and Pouris (2009), in their analysis of the state of science and technology in Africa between 2000 and 2004, report that Africa produced 68 945 publications in this time frame, representing 1.8% of the World's publications. 23 335 of these 68 945 publications were publications from the North African countries (Egypt, Morocco and Tunisia), 20 762 were from South Africa and the rest from other African countries. This analysis further shows that Sub-Saharan countries are not contributing significantly to the world's publications, with the exception of South Africa. It should be noted that 40 South African journals are indexed in Thomson Scientific's Citation indexes (Mouton & Gevers, 2009). "It is worrisome to note that 47 countries in the Sub-Saharan African region are only contributing 1.8% to global science". This speaks volumes of the quality of journals (including research) of this region. Africans need have more journals indexed by ISI as this will ensure an international presence. Moreover, African researchers should be publishing in international high impact journals Pouris and Pouris (2009). The findings of Pouris and Pouris (2009) corroborates the findings of the study. The analysis shows that African countries are not contributing significantly to the world's publications, with the exception of South Africa.

5. CONCLUSION

After collecting, analyzing, presenting and interpreting the generated data, the following conclusions were drawn.

1. University of Cape Town, University of Pretoria and Cairo University have mean h-index of higher than the world average h-index of 17.5. all other universities have mean h-index below the 17.5 world average h-index.

2. Only South Africa and Egypt have h-indexes higher than the world h-index of 17.5.

3. University of Cape Town, University of Pretoria, Cairo University UTE, Tunisia and University of Nairobi are countries whose citation index is higher than the world average citation index.

4. South Africa, Egypt, Tunisia and Kenya have citation index greater than the world citation index.

5. The sampled universities h-indexes are significant with world average h-index except the University of Ibadan and UTE, Tunisia that are not statistically significant.

6. The h-index of the African countries sampled were all statistically significant with the world h-index except Tunisia

7. The universities' citation indexes are statistically significant with world average citation index except UTE, Tunisia and University of Nairobi.

8. The citation index of all African countries sampled are statistically significant with the world average citation index except Tunisia and Kenya.

9. African countries have not contributed significantly to the world's publications, with the exception of South Africa.

10. Most African researchers are not registered account holders of google scholar one of the free citation data bases that can easily measure citation count and impact of research output of faculties.

6. RECOMMENDATION

Based on the findings, the following recommendations are made.

1. Registration in Google Scholar citation data base is free, no subscription for access and it has a very wide coverage, the researcher recommends that faculties utilize this opportunity and be a registered member of google scholar. Summary of research statistics as it regards total citation, h-index and i10 index of faculties are readily computed with registered members with google scholar.

2. The researcher also recommend that institutions make it compulsory for faculties members to open google scholar citation account. The research productivity of an institution to some extend measured by the research impact of her faculty members and google scholar that can be done with almost zero cost.

3. The researcher also recommend that African researchers should be publishing in international high impact journals.

4. The researcher recommends that African indigenous bibliometric indicators be created to measure research visibility and impact of African faculties.

5. The number of African journals indexed by ISI's Web of Science is low compared to the total number of journals published in Africa. According to Kpolovie & Onoshagbegbe (2017) there are publications that are in some non-visible media so such publications cannot count to positively affect research productivity of faculties in this present era of ICT and Internet. According to them such works should be upgraded and republished in or migrated to online journals with high visibility. To them the process may also translate such academics from digital non-natives to digital natives by immigration. Such digital immigration can boost the research productivity of academics and probably uplift the ranking of universities not only in Africa but globally (Ololube, Kpolovie, Amaele, Amanchukwu & Briggs, 2013). It is recommended that African faculties should strive to publish in journals indexed by ISI's web of science and other journals with high impact factor.

6. Collaboration efforts will also broaden the horizon of African faculties. The researcher seriously recommends African faculties to collaborate with faculties in other regions of the world to share knowledge in the area of research. faculties outside Africa who has wider understanding of research visibility and productivity and who has easy access to high citation impact journals might open up windows of opportunities to African collaborators.

7. The language used in scientific publications plays a key role in the inclusion or exclusion of a publication. There is empirical evidence that most of the journals indexed by ISI WoS are English (Bakuwa, 2014). "Obviously, there are some journals of high quality and importance that are not covered by ISI's Web of Science simply because they are not written in English. For instance, a significant number of journals in Germany, France, Spain, Switzerland and even Africa are not indexed on the basis of their language. Since these journals are not indexed, this affects the impact factor scores of individual researchers, institutions and countries (Bakuwa, 2014). Based on this fact, the researcher recommends that faculties in Africa used English language for scientific publications to stay relevant in the business of journal publishing.

REFERENCES

[1] Aina, L. A. (2016). The visibility of researchers: measuring the impact of journals in a scholarly community. Paper Delivered at the Redeemer's University Research Seminar, held at the University Auditorium, Redeemer's University, Ede, Osun State, Nigeria. retrieved: 15/9/2018

[2] Ajiferuke, I. (2011). How to overcome some of the challenges that African scholars are facing in conducting informetrics research. SA Jnl Libs & Info Sci 77(2)

[3] Altbach, P. G. (2015). What counts for academic productivity in research universities? International Higher Education. Number 79: p6-7

[4] Altmann, J', Abbas, A., & Hwang, J., (2009). Evaluating the productivity of researchers and their communities: The RP-Index and the CP-Index. International Journal of Computer Science Application, volume 6. No. 2 pp 104-118.

[5] Athey, S. & Plotnicki, J. (2000). An evaluation of research productivity in academic IT. Communications of the Association for information systems. 3, article 7, 2-19. Available at: http://www.pitt.edu/~ckemerer/Athey%20and%20Plotnicki%202000.pd

[6] Bakuwa, J. (2014). The significance of citation impact indicators of research performance in the developing countries of sub-Saharan Africa. The Journal for Transdisciplinary Research in Southern Africa, 10(1), pp. 112-122.

[7] Bar-Ilan, J. (2008). Which h-index? – A comparison of WoS, Scopus and Google Scholar. Scientometrics, 74(2): 257-271

[8] Bar-Ilan, J., Levene, M., & Lin, A. (2007). Some measures for comparing citation databases. Journal of Informetrics, 1:26-34

[9] Bassey, U., Akuegwu, B., Udida, L. & Udey, F. U. (2007). Academic staff research productivity: a study of universities in South-South zone of Nigeria. Educational Research and Review volume 2(5), pp 103-108.

[10] Beiler, A., Zimmerman, L. M., Doerr, A. J., & Clark, M. A. (2014). An evaluation of research productivity among I-O Psychology Doctoral programs. The industrial organizational psychologist. Volume 51, issue 3, pp 40-52.

[11] Bornmann, L. & Daniel, H. D. (2009). The state of h index research: is the h-index the ideal way to measure research performance? Embor report. Vol. 10 No 1

[12] Bornmann, L. & Daniel, H. D. (2007a). What do we know about the h-index? J Am Soc Inf Sci Tec 58: 1381-1385.

[13] Bornmann, L., Wallon, G., & Ledin A. (2008b). Is the h-index related to (standard) bibliometric measures and to the assessments by peers? An investigation of the h index by using molecular life sciences data. Research Evaluation 17: 149-156

[14] Dhamdhere, S. N. (2018). Cumulative citations index, h-index and i10-index (research metrics) of an educational institute: A case study. International Journal of Library and Information Science. Vol. 10(1), pp. 1-9. DOI: 10.5897/IJLIS2017.0797

[15] Google Scholar (2018). Google Scholar metrics. https://scholar.google.com/intl/en/scholar/metrics.html

[16] Hirsch, J. E. (2005). An index to quantify an individual's scientific research output. Proceedings of the National Academy of Sciences (PNAS). 102(46), 16569-16572. Retrieved from http://www.pnas.org/content/102/46/16569.full.pdf

[17] Hirsch, J. E. (2007). Does the h index have predictive power? Proceedings of the National Academy of Sciences (PNAS). USA 104: 191930-19198. http://www.pnas.org/content/104/191930.full.pdf.

[18] Harzing, A-W. (2007). Google Scholar – a new data source for citation analysis. http://www.harzing.com/resources. htm#/pop_gs.htm

[19] Huggins-Hoyt, K. Y., Holosko, M. J., Brigs, H. & Barner, J. R. (2014). Citation impact scores of top African American scholars in social work Schools: The story behind the data. Research on Social Work Practice 1-7. DOI: 10.1177/1049731514530004.

[20] Jacso, P. (2008). Testing the calculation of a realistic h index in Google Scholar, Scopus and Web of Science for F. W. Lancaster. Library Trends 56: 784-815.

[21] Jacs, P. (2008). The pros and cons of computing the h-index using Google Scholar. Online Information Review, 32(3): 437-452.

[22] Kpolovie, P., J. (2010). Advanced research methods. New Owerri, Imo State, Nigeria. Springfield publishers ltd.

[23] Kpolovie, P., J. (2011). Statistical techniques for advanced research. New Owerri, Imo State, Nigeria.Springfield publishers ltd.

[24] Kpolovie, P., J. & Onoshagbegbe, E., S. (2017). Research productivity: h-index and i10-index of academics in Nigerian universities. International journal of quantitative and qualitative research methods. Vol. No. 2. pp62-123.

[25] Kpolovie, P. J. (2018). Multiple Prediction of Research Productivity: H-Index. Advances in Social Sciences Research Journal, 5(11)110-135. DoI:10.14738/assrj.511.5518.

[26] Kousha, K. & Thelwall, M. (2008). Sources of Google Scholar citations outside the Science Citation Index: a comparison between four science disciplines. Scientometrics, 74(2): 273-294.

[27] Kulkami, A.V., Aziz, B., Shama, I. & Busse, J.W. (2009). Comparisons of citations in Web of Science, Scopus, and Google Scholar for articles published in general medical journals. Journal of the American Medical Association, 302(10): 1092-1096.

[28] Lateef, A., Ogunkunle, A. T. J., and Adigun, G. O (2016). Google scholar citation in retrospect: Visibility and contributions of African scholars. COLLNET Journal of Scientometrics and Information Management. Vol.10(2), pp. 219-236, DOI: 10.1080/09737766.2016.1213966. http://www.tandfonline.com/action/journalInformation?journalCode=tsim20

[29] Lertputtarak, S. (2008). An investigation of factor s related to research productivity in a Public University in Thailand: A case study. Retrieved from http://vuir.vu.edu.au/1459/

[30] Marsh, H., W. & Hattie, J. (2002). The relation between research productivity and teaching effectiveness: complimentary, antagonistic, or independent constructs. The Journal of higher education. Vol. 73, no. 5, pp634-641.

[31] Mayr, P. & Walter, A.K. (2007). An exploratory study of Google Scholar. Online Information Review, 31(6): 814-830.

[32] McGill, M. M., & Settle, A. (2012). Identifying effects of institutional resources and support on computing research productivity, tenure and promotion. International Journal of doctoral studies. Vol. 7 pp167-198.

[33] Meyers M., A. & Quan, H. (2017). The use of the h-index to evaluate and rank academic departments. Journal of materials research and technology. 6(4):304–311

[34] Mingers, J. & Lipitakis, E. (2010). Counting the citations: a comparison of Web of Science and Google Scholar in the field of business and management. Scientometrics, 85(2): 613-625.

[35] Moed, H. F. (2005). Citation analysis in research evaluation. Doedrecht, The Netherlands: Springer.

[36] Noruzi, A. (2005). Google Scholar: The New Generation of Citation Indexes. LIBRI, 55(4) 170-180.

[37] Nwagwu, W.E. (2005) Deficits in the Visibility of Aftican Scientists: Implications for Developing Information and Communication Technology (ICT) Capacity. World Review of Science, Technology and Sustainable Development, 2(3/4):244-260.

[38] Nwagwu, W.E. (2007). Creating Science and Technology Information Databases for Developing and Sustaining Sub-Saharan Africa's Indigenous knowledge. Journal of Information Science, 33: 737-751.

[39] Olalude, F.O. (2007). Utilization of Internet Sources for Research by Information Professionals in Sub-Saharan Africa. African Journal of Library, Archives and Information Science, 17(1) 53-58.

[40] Onyancha, O. B. (2009). A Citation Analysis of Sub-Saharan African Library and Information Science Journals using Google Scholar. Afr. J. Lib, Arch. & Inf. Sc. Vol. 19, No. 2. 101 – 116.

[41] Onyancha, O. B. (2007). LIS Research in Africa: How much is it Worth? A Citation Analysis of the Literature, 1986-2006. South African Journal of Libraries and Information Science, 73(2) 95-108.

[42] Onyancha, O., B. & Ocholla, D., N. (2008). Assessing researchers' performance in developing countries: is Google Scholar an alternative? In P. A. van Brakel (ed). Proceedings of 'the 10"" Annual Conference on World Wide Web Applications, 3-5.

[43] Okiki, O., C. (2013). Research productivity of teaching faculty members in Nigerian federal universities:An investigative study. Chinese librarianship: An international electronic Journal. 36.pp99-117.

[44] Okiki, O., C., & Iyabo, M. (2013). Impact of information literacy skills on academic staff research productivity in Nigerian federal universities. Information and knowledge management, 3 (2), pp9-18

[45] Okenedo, S., Popoola, S. O., Emmanuel, S. O. & Bamigboye, O. B. (2015). Correlational analysis of demographic factors, self-concept and research productivity of librarians in public universities in South-West, Nigeria. International Journal of library science, 4(3): 43-52.

[46] Paasi, A. (2005). Globalization, academic capitalism, and the uneven geographies of international journal publishing spaces. Environment and Planning, volume 37, pages 769-789. DOI:10.1068/a3769

[47] Schubert, A. (2007). Successive h-indices. Scientometrics, 70(1), pp 201-205.

[48] Tafreshi, G. H., Imani, M. N. & Ghashlag, P. M. (2013). Designing a model for research productivity evaluation of faculty of district 2 of Islamic Azard university of Iran. World applied science Journal 21 (12): 1708-1720.

[49] Thomson Reuters essential science indicators citation threshold.

[50] Yusuf, A. K (2012). An appraisal of research in Nigeria's university sector. J Res Natl Dev, researchgate.net.