Analysis of e-visibility status of faculties in Africa: Google Scholar Citation index as a yardstick.

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Abstract

Visibility ultimately increases citation counts as well as improving the research productivity of researchers. Analyzing the e-visibility status of faculties in Africa using Google Scholar Citation index as a yardstick is the objective of the study. Comparative causal- effect Ex Post Facto research design was employed in to achieving the desired objectives. With an estimate of eight hundred and forty-three thousand, five hundred (843, 500) academic staff in various African Universities as the population of the study; One thousand, six hundred and sixty-seven (1,667) academic staff was sampled from ten (10) universities. Two universities from each region of West Africa, Southern Africa, East Africa, North Africa and Central Africa that have GSC accounts formed the bases of the sample. Purposive quota sampling technique was used to select faculties who have account with google scholar that provides individual statistics of citation counts. Data was collected strictly using google scholar database. Google scholar database provided information on paper citation counts. Data was analyzed as follows: the research questions were analyzed using mean and standard deviation while One-way Analysis of variance (ANOVA) was used to analyze the hypotheses. Among the findings were that University of Cape Town, University of Pretoria, Cairo University and University of Nairobi are most e-visible universities, also citation indexes of faculties among African universities are statistically significant. *The study also established the importance of GSC as an open access source that can be utilized to evaluate and improve productivity and visibility of African faculties so recommended same researchers in Africa to take advantage of.*

Key Words: E-visibility, Citation, Citation Index, Google Scholar, Research, Research Productivity

Introduction

Research is one of the cardinal functions of a faculty in the university. It is a catalyst to a tangible and meaningful development in the society. Countries that want to develop or are developing rely on the research outcomes from the universities; therefore, there is a conscious effort to provide funding in the form of grants to the universities to sponsor research activities.

Research involves the creation of new ideas and ways of finding out and explaining systems. It is a strict and precise way of evaluating previous knowledge and applying the experience to clarify and describe social and professional needs. Kpolovie (2016; and 2010) looked at the concept of research as the "logical, systematic and objective collection, analysis, synthesis, evaluation and recording of accurate and controlled observations to aid informed generalizations, establishment of principles and theories that foster description, explanation, prediction and control of natural occurrence to meet man's needs". Knowledge gained through research is always objective and scientific. Research based knowledge is always logical, rational and experience based. According to Rashid (2001, p.69), research is a deliberate effort to gather, scrutinize and analyze information. Research is a well-coordinated effort to solve the complex and teasing problems. According to (Bako, 2005), research is a methodical effort to search and investigate and to find solutions to puzzles or uncertainties that fosters knowledge.

Since research is all about advancing knowledge through the discovery of new ideas and the modification of existing ones, there is need for the dissemination of this ideas. Research works are basically disseminated through research publications in professional journals and in conference proceedings, writing of books or chapters of a book. The presentation of research works in the form of publications in professional journals and in conference proceedings, writing of books or chapters of a book is referred to as research productivity.

Research productivity: According to Okanedo, Popoola, Emmanuel & Bamigboye, (2015) "research productivity is the quality, and often the quantity of research published as textbooks, or chapters in books, journal articles, conference/workshop proceedings, occasional papers, monographs, edited books, bibliographies, abstracts, and indexes published". Print and Hattie (1997) stated that the amount publications is a signal of a faculties' research productivity. To them, these include: "articles in refereed journals, commercially published peer reviewed books, major refereed conference presentations, papers in refereed conference proceedings, articles weighed by journal citation impact, competitive peer reviewed grants postgraduate research degrees supervised to completion, and editor/editorial board of recognized journals".

E-visibility: The advent of the internet as broadened the horizon of researchers. Researchers now have opportunity to reach out to the world in presenting their profile and also access scholarly works, increase collaboration and even monitor their progress in terms of how, when and who cited their works thereby making them more visible.

A research work that is unavailable and is not retrievable online simply lacks visibility and accessibility, implying that it is invisible (Lawrence, 2001). Research works need to be more visible for other researchers to utilize them in their research publications. (Lawrence 2001: 521) states that a research work that is available online is likely to be cited four to five times more than printed (offline) research work.

E-visibility entails a research work been present online, discoverable and accessible. With the availability of scholarly resources online and social networking tools, researchers are increasingly embracing online research practices and becoming part of online research communities, Adriaanse and Rensleigh (2017). E-

visibility allows researchers to create, track, trace, and monitor research footprints in a digital platform (Sapula and Pretorius, 2016).

Visibility of a research work in this time and season cannot be over looked. Research productivity of a researcher begins with the visibility, accessibility and discoverability of that faculty as it translates into published output of a researcher who is easy to find and searchable on online platforms and tools on the web. Norman (2012: 4) states that research should be visible in a suitable format to all possible audiences of online platforms.

The determination of the e-visibility of a researcher is a function of a researcher's utilization of digital platforms such as the internet. research is accessible via online repositories which host output for dissemination and archival purposes (Repanovici 2011: 116, Norman 2012: 4) and is retrievable and downloadable for perusal and citation by other researchers (Czerniewicz & Wiens 2013: 39). Norman, (2012) asserted that for an article to be cited, it has to be both visible in an electronic environment and perceptively relevant to the key audience. A paper has greater chance of becoming highly cited when its visibility increases (Egghe et al., 2013). Since free available articles have a greater research impact than articles which are not open-access to the users, most authors are motivated to publish in open-access journals to increase their visibility and citation advantage (Jayaprakash et al., 2013).

Prioritizing e-visibility by a researcher increases the online presence of the researcher through the researcher's research e-profiles, and enhancing the accessibility of the research output for maximum retrieval possibilities by other researchers (Sapula and Pretorius, 2016). According to Sapula and Pretorius, (2016), "e-visibility empowers researchers to be visible across various online platforms on the internet to enhance their discoverability and accessibility".

Online scholarly search engines such as: Google scholar, Academic Info, iSeek, Virtual LRC, Refseek, Microsoft Academic Search etc. provides opportunity for scholars and researchers to access variety of scholarly works thereby advertising the visibility of researchers. While all of these provides useful links and resources for academic benefits, google scholar went a step further to introduce the google scholar citation database in November, 2012 to liberalize the monopoly of other bibliometric databases.

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).

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. Google scholar is a free access web search engine that indexes the full text or metadata of scholarly literature across an array of publishing formats and disciplines. Google Scholar is an online search engine that makes available data relating to researchers' publication output and citations and is proclaimed by scholars to be an alternative tool for measuring the

research performance of authors (Onyancha & Ocholla, 2009, Harzing, 2007; Pauly & Stergiou, 2005:34; Noruzi, 2005).

Creating a Google Scholar Account: 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 faculty can add 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.

The following steps will guide a faculty to create a google scholar account.
Step 1: Using your g-mail if absent, create a new g-mail account, then Log on to http://scholar.google.com with the G-mail account.
Step 2: Set up Google Profile: Click the "My Citations" link at the top of the page
Step 3: Add your photo and provide keywords to your profile about your research
Step 4: Click on Add publications
Step 5: Verify if all articles are your publications
Step 6: Make it public If your profile is private, it won't appear on search results.

Citations: Citation count as a means of measuring scientific works was first used by Gross and Gross in in 1927 (Bornmann & Daniel, 2008). "Since then, citation analysis been useful in conducting assessments of national scientific policies and disciplinary development" (Oppenheim, Lewison, Tijssen et al. in Bornmann & Daniel, 2008).
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". A citation is simply giving credence to a published or unpublished source whose ideas or information has been made use of in a current work. 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 evaluates the focus earned by articles written by different researchers.
Citations serves the purposes of maintaining intellectual integrity acknowledging and giving credence to works and ideas to the rightful owners, to allow readers to determine independently whether the referenced sources supports the author's argument in the claimed way, and to guide the reader, measure the strength and concreteness of the material been used by the author. (Wikipaedia.com)
According to the argument of Roark and Emerson (2015), citations is connected to the way an author perceive the substance of a work, position in the academic system, and the moral equivalency of the author's place, substance, and words.
Citation increases the prestige of the author whose work is been cited and as well boosts the relevance level of an institution. Having to know that your work is in public domain and citations are received from all

over the world is a source of motivation for the author to do more in quality and content. Citation counts in most cases is a function of the quality of the content of the scientific work. As argued by Fooladi et al., (2013) "Citations are applied to measure the importance of information contained in an article". In their argument, Bornmann & Daniel, (2008) states that the use of citation counts is a measure of research impact only when the citing author used that document and the citation of the document reflects the quality, significance, and impact of that document; and citations are made to the best possible works.

Citation index is the total number of citations from all publications a researcher gets from other researchers. That is, summing all citations from the first publications to the last. Visibility ultimately increases citation counts as well as improving the research productivity of researchers. Therefore, it is useless if a well-structured logically organized research work cannot be accessed by large research audience. It will not only reduce the productivity level of the; but it is also a wasteful effort. There are a lot of open access repositories for researchers to showcase their work particularly researchers from Africa, but how often has these opportunities been taken to their advantage? World university ranking bodies have consistently ranked African universities behind other universities from other regions in the world even though African faculties have not relented in their quest for knowledge and have not stopped publishing. For instance, only one university in Africa made into the first 200 universities in the world (Time Higher Education (THE), 2018). University of Ibadan which is the best university in Nigeria is only ranked 991 in the world according to the Centre for World University Ranking (CWUR). All this bodies have research output, quality of publications and citation counts among other things as indicators for choosing universities for ranking and they do not go to universities for data rather they rely on the above mentioned bibliometric data bases for documented statistics of researchers which is used to rank universities, countries and continents in terms of research and productivity. Most universities in the world now have google scholar profile as an institution from where the h-index and citation index are determined through her faculties who are already registered members. The question is; is it the same with African universities? Maybe few. The researcher will also x-ray the level of compliance. Therefore, it is pertinent to find out where and how African faculties and indeed Africa is lagging in the world university ranking. That is why the researcher is considering the citation counts as a measure of e-visibility and research productivity of faculties in Africa.

Google scholar citation data base provides summary of bibliometric statistics, (i.e, citation counts, h-index and i10-index) for faculties who have account with it and also mops up scholarly works even from those who do not have account with google scholar. The question is: how many persons have account with google scholar, or how many persons have their works uploaded in the internet for google scholar to capture? The researcher is interested to answering these questions; hence the researcher is compelled to investigate into the e-visibility status of faculties in Africa using Google Scholar Citation index as a yardstick.

Aims and Objectives of the Study

Investigating and comparing the e-visibility status through citation index of faculty's research productivity in Africa is the general purpose of this study. Specifically, the study is intended at determining the:

1. citation index of faculties in Africa.
2. difference in citation index of faculties among African universities.

3. difference in citation index of faculties among African countries
4. difference in citation index of faculties among African region.

Research Questions

Four (4) research questions were answered in this study

What is:

1. the citation index of faculties in Africa?
2. the citation index of faculties among African Universities?
3. the citation index of faculties among African countries?
4. the citation index of faculties among African region?

Null hypothesis

Three null hypotheses were tested at 0.05 significant level in this study

1. citation index of faculties among African universities are not statistically significant
2. citation index of faculties among African countries are not statistically significant
3. citation index of faculties among African region are not statistically significant

Methodology

Comparative causal- effect Ex Post Facto research design was adopted in this study. 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. One thousand, six hundred and sixty-seven (1,667) academic staff sampled from ten (10) universities forms the sample size. Two universities from each region of West Africa, Southern Africa, East Africa, North Africa and Central Africa. In selecting the sample, purposive quota sampling was used to select faculties who have account with google scholar that provides individual statistics of citation counts which was used in this study in the various regions.

data was collected strictly with use of google scholar database. Google scholar database provided information on paper citation counts. Data was analyzed as follows: the research questions were analyzed using mean and standard deviation while Analysis of variance (ANOVA) was used to analyze the hypotheses.

Table 1: Number of Countries and Universities per region of Africa

S/NO	REGION	NUMBER OF COUNTIRES	NUMBER OF UNIVERSITIES
1.	WEST AFRICA	16	314
2.	EAST AFRICA	15	573
3.	Central Africa	8	91
4.	Southern Africa	9	214
5.	North Africa	6	316
	Total	54	1508

Table 2: Sample size of faculties, universities, countries and regions.

S/NO	UNIVERSITY	COUNTRY	REGION	SAMPLE
1.	University of Cape Town	South Africa	Southern Africa	200
2.	University of Pretoria	South Africa	Southern Africa	200
3.	University of Nairobi	Kenya	East Africa	200
4.	Cairo University	Egypt	North Africa	200
5.	Al Akhawayn University	Morocco	North Africa	31
6.	Makerere University	Uganda	East Africa	200
7.	University of Zambia	Zambia	Central Africa	200
8.	University Buea	Cameroon	Central Africa	36
9.	University of Ibadan	Nigeria	West Africa	200
10.	Kwame Nkurumah University of Science and Technology	Ghana	West Africa	200
	TOTAL			1, 667

Results

Research question One

What the citation index of faculties in Africa?

Table 1: Mean and Standard deviation of citation index of faculties in Africa

	N	Minimum	Maximum	Mean	Std. Deviation
FACULITIES IN AFRICA	1667	1.00	91134.00	1669.6215	4793.94547

Table one shows the mean and standard deviations of citation index of faculties in Africa as 1669.6215 and 4793.94547. Minimum and maximum citation indexes are 1.00 and 91134.00

Research Question Two

What is the citation index of faculties among African Universities?

Table 2: mean and standard deviations of citation index of faculties among African Universities

	N	Minimum	Maximum	Mean	Std. Deviation
UC T	200	105.00	67769.00	5749.8300	7958.93844
U. P	200	19.00	38257.00	3026.6650	4639.94332
C U	200	834.00	91134.00	3047.3700	8492.63968
Al A U	31	1.00	946.00	160.5484	233.35321
U. N	200	399.00	6298.00	1041.3350	922.57134
MU	200	9.00	27902.00	477.4900	2054.84995
U. Z	200	1.00	4073.00	156.8650	382.67339

Buea	36	1.00	3519.00	365.6111	793.22298
U. I	200	12.00	4565.00	155.9450	369.26584
KNUST	200	11.00	2814.00	288.0000	437.35597

Table 2 shows the mean and standard deviations of citation index of faculties among African universities sampled in the study. University of Cape Town has mean and standard deviation as 5749.8300 and 7958.93844; the minimum and maximum citations by faculties are 105.00 and 67769.00. Mean and standard deviation of University of Pretoria is 3026.6650 and 4639.94332, the minimum and maximum citations are 19.00 and 38257.00. Cairo University has mean and standard deviation as 3047.3700 and 8492.63969, also, the minimum and maximum citations as 834.00 and 91134.00. Al Akhawayn University has mean and standard deviation as 160.5484 and 382.67339 while the minimum and maximum citations are 1.00 and 946.00. the mean and standard deviation of University of Nairobi is 1041.3350 and 922.57134 and the minimum and maximum citations as 399.00 and 6298.00. the mean and standard deviation of Makerere University is 477.4900 and 2054.84995; minimum and maximum citations as 9.00 and 27902.00. University of Zambia has mean and standard deviation as 156.8650 and 382.67339 and minimum and maximum citation as 1.00 and 4073.00. University of Buea Cameroon has Mean citation and standard deviation as 365.6111 and 793.22298 while the minimum and maximum citations are 1.00 and 3519.00. Mean citation and standard deviation of University of Ibadan is 155.9450 and 369.26584 and minimum and maximum citation are given as 12.00 and 4565.00 and lastly the mean citation and standard deviation of Kwame Nkurumah University of Science and Technology is 288.0000 and 437.35597 and the minimum and maximum citations are 11.00 and 2814.00.

Research Question Three

What is the citation index of faculties among African countries?

Table 3: mean and standard deviation of citation index of faculties among African countries

	N	Minimum	Maximum	Mean	Std. Deviation
South Africa	400	19.00	67769.00	4388.2475	6647.48695
Egypt	200	834.00	91134.00	3047.3700	8492.63968
Morocco	31	1.00	946.00	160.5484	233.35321
Kenya	200	399.00	6298.00	1041.3350	922.57134
Uganda	200	9.00	27902.00	477.4900	2054.84995
Zambia	200	1.00	4073.00	156.8650	382.67339
Cameroon	36	1.00	3519.00	365.6111	793.22298
Nigeria	200	12.00	4565.00	155.9450	369.26584
Ghana	200	11.00	2814.00	288.0000	437.35597

Table three presents the mean citations and standard deviations as well as the minimum and maximum citations of faculties according to their countries. South Africa (mean= 438888.2475, std=66747.48695), Egypt (mean = 3047.3700, std = 8492.63968), Morocco (mean = 160.5484 and std = 233.35321) and Kenya

(mean = 1041.3350 and std = 922.57134). others are: Uganda (mean = 477.4900 and std = 2054.84995), Zambia (mean = 156.8650 and std = 382.67339), Cameroon (mean = 365.6111 and std = 793.22298), Nigeria (mean = 155.9450 and std = 369.26584) and Ghana (mean = 288.000 and std = 437.35597).

Research Question Four

What is the citation index of faculties among African region?

Table 4: mean and standard deviation of citation index of faculties among African region

	N	Minimum	Maximum	Mean	Std. Deviation
Southern Africa	400	19.00	67769.00	4388.2475	6647.48695
North Africa	231	1.00	91134.00	2659.9610	7961.36610
East Africa	400	9.00	27902.00	759.4125	1615.57877
Central Africa	236	1.00	4073.00	188.7076	472.62438
West Africa	400	11.00	4565.00	221.9725	409.60802

Presented in table four are the mean and standard deviations of citation index of faculties among African region. Also, in the table are minimum and maximum citation counts. Southern Africa (mean = 4388.2475 and std = 6647.48695), North Africa (mean = 2659.9610 and std = 7961.36610), East Africa (mean = 759.4125 and std = 1615.57877). Central Africa (mean = 188.7076 and std = 472.62438) and West Africa (mean = 221.9725 and std = 409.60802).

Null Hypotheses

Hypothesis One

citation index of faculties among African universities are not statistically significant

Table 5: One-Way ANOVA of citation index of faculties among African Universities

VAR00001

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5869940276.313	9	652215586.257	33.386	.000
Within Groups	32370374683.913	1657	19535530.890		
Total	38240314960.226	1666			

In table five, the one-way ANOVA gives the following: between groups sum of square is 5869940276.313, mean square as 652215586.257 and degree of freedom (df) as 9 and the within groups sum square as 32370374683.913, mean square as 19535530.890 and degree of freedom (df) as 1657. The total sum of square is 38240314960.226 with degree of freedom (df) (1666). F-value = 33.386 and P (0.000) at 0.05 level of significance. Since P (0.000) < 0.05 alpha level, the null hypothesis is rejected. That is, citation indexes of faculties among African universities are statistically significant.

Table 6: Multiple Comparisons

Dependent Variable: VAR00001

Scheffe

(I) VAR00002	(J) VAR00002	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
UCT	UP	2723.16500*	441.99017	.000	902.4191	4543.9109
	UN	2702.46000*	441.99017	.000	881.7141	4523.2059
	CU	5589.28161*	853.14481	.000	2074.8146	9103.7487
	AL A.U	4708.49500*	441.99017	.000	2887.7491	6529.2409
	M. U.	5272.34000*	441.99017	.000	3451.5941	7093.0859
	U. Z	5592.96500*	441.99017	.000	3772.2191	7413.7109
	U. BUEA	5384.21889*	800.20703	.000	2087.8251	8680.6126
	U.I.	5593.88500*	441.99017	.000	3773.1391	7414.6309
	KNUST	5461.83000*	441.99017	.000	3641.0841	7282.5759
UP	UCT	-2723.16500*	441.99017	.000	-4543.9109	-902.4191
	UN	-20.70500	441.99017	1.000	-1841.4509	1800.0409
	CU	2866.11661	853.14481	.258	-648.3504	6380.5837
	AL A.U	1985.33000*	441.99017	.017	164.5841	3806.0759
	M. U.	2549.17500*	441.99017	.000	728.4291	4369.9209
	U. Z	2869.80000*	441.99017	.000	1049.0541	4690.5459
	U. BUEA	2661.05389	800.20703	.273	-635.3399	5957.4476
	U.I.	2870.72000*	441.99017	.000	1049.9741	4691.4659
	KNUST	2738.66500*	441.99017	.000	917.9191	4559.4109
UN	UCT	-2702.46000*	441.99017	.000	-4523.2059	-881.7141
	UP	20.70500	441.99017	1.000	-1800.0409	1841.4509
	CU	2886.82161	853.14481	.247	-627.6454	6401.2887
	AL A.U	2006.03500*	441.99017	.015	185.2891	3826.7809
	M. U.	2569.88000*	441.99017	.000	749.1341	4390.6259
	U. Z	2890.50500*	441.99017	.000	1069.7591	4711.2509
	U. BUEA	2681.75889	800.20703	.261	-614.6349	5978.1526
	U,I	2891.42500*	441.99017	.000	1070.6791	4712.1709
	KNUST	2759.37000*	441.99017	.000	938.6241	4580.1159
CU	UCT	-5589.28161*	853.14481	.000	-9103.7487	-2074.8146
	UP	-2866.11661	853.14481	.258	-6380.5837	648.3504
	UN	-2886.82161	853.14481	.247	-6401.2887	627.6454
	AL A.U	-880.78661	853.14481	.999	-4395.2537	2633.6804

	M. U.	-316.94161	853.14481	1.000	-3831.4087	3197.5254
	U. Z	3.68339	853.14481	1.000	-3510.7837	3518.1504
	U. BUEA	-205.06272	1082.97371	1.000	-4666.2929	4256.1675
	U.I	4.60339	853.14481	1.000	-3509.8637	3519.0704
	KNUST	-127.45161	853.14481	1.000	-3641.9187	3387.0154
AL A.U	UCT	-4708.49500*	441.99017	.000	-6529.2409	-2887.7491
	UP	-1985.33000*	441.99017	.017	-3806.0759	-164.5841
	UN	-2006.03500*	441.99017	.015	-3826.7809	-185.2891
	CU	880.78661	853.14481	.999	-2633.6804	4395.2537
	M. U	563.84500	441.99017	.996	-1256.9009	2384.5909
	U. Z	884.47000	441.99017	.911	-936.2759	2705.2159
	U. BUEA	675.72389	800.20703	1.000	-2620.6699	3972.1176
	U.I	885.39000	441.99017	.910	-935.3559	2706.1359
	KNUST	753.33500	441.99017	.968	-1067.4109	2574.0809
M. U	UCT	-5272.34000*	441.99017	.000	-7093.0859	-3451.5941
	UP	-2549.17500*	441.99017	.000	-4369.9209	-728.4291
	UN	-2569.88000*	441.99017	.000	-4390.6259	-749.1341
	CU	316.94161	853.14481	1.000	-3197.5254	3831.4087
	AL A.U	-563.84500	441.99017	.996	-2384.5909	1256.9009
	U. Z	320.62500	441.99017	1.000	-1500.1209	2141.3709
	U. BUEA	111.87889	800.20703	1.000	-3184.5149	3408.2726
	U.I	321.54500	441.99017	1.000	-1499.2009	2142.2909
	KNUST	189.49000	441.99017	1.000	-1631.2559	2010.2359
U. Z	UCT	-5592.96500*	441.99017	.000	-7413.7109	-3772.2191
	UP	-2869.80000*	441.99017	.000	-4690.5459	-1049.0541
	UN	-2890.50500*	441.99017	.000	-4711.2509	-1069.7591
	CU	-3.68339	853.14481	1.000	-3518.1504	3510.7837
	AL A.U	-884.47000	441.99017	.911	-2705.2159	936.2759
	M. U	-320.62500	441.99017	1.000	-2141.3709	1500.1209
	U. BUEA	-208.74611	800.20703	1.000	-3505.1399	3087.6476
	U.I	.92000	441.99017	1.000	-1819.8259	1821.6659
	KNUST	-131.13500	441.99017	1.000	-1951.8809	1689.6109
U. BUEA	UCT	-5384.21889*	800.20703	.000	-8680.6126	-2087.8251
	UP	-2661.05389	800.20703	.273	-5957.4476	635.3399
	UN	-2681.75889	800.20703	.261	-5978.1526	614.6349
	CU	205.06272	1082.97371	1.000	-4256.1675	4666.2929
	AL A.U	-675.72389	800.20703	1.000	-3972.1176	2620.6699

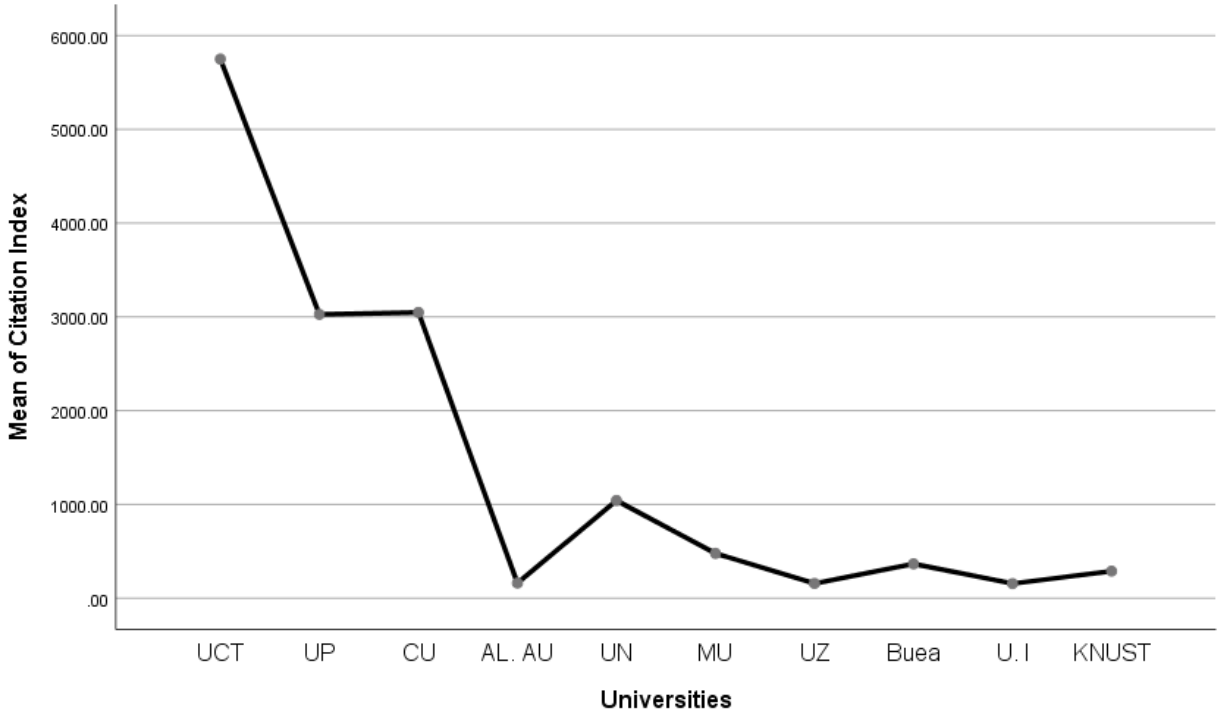
	M. U	-111.87889	800.20703	1.000	-3408.2726	3184.5149
	U. Z	208.74611	800.20703	1.000	-3087.6476	3505.1399
	U.I	209.66611	800.20703	1.000	-3086.7276	3506.0599
	KNUST	77.61111	800.20703	1.000	-3218.7826	3374.0049
U.I	UCT	-5593.88500*	441.99017	.000	-7414.6309	-3773.1391
	UP	-2870.72000*	441.99017	.000	-4691.4659	-1049.9741
	UN	-2891.42500*	441.99017	.000	-4712.1709	-1070.6791
	CU	-4.60339	853.14481	1.000	-3519.0704	3509.8637
	AL A.U	-885.39000	441.99017	.910	-2706.1359	935.3559
	M. U	-321.54500	441.99017	1.000	-2142.2909	1499.2009
	U. Z	-.92000	441.99017	1.000	-1821.6659	1819.8259
	U. BUEA	-209.66611	800.20703	1.000	-3506.0599	3086.7276
	KNUST	-132.05500	441.99017	1.000	-1952.8009	1688.6909
KNUST	UCT	-5461.83000*	441.99017	.000	-7282.5759	-3641.0841
	UP	-2738.66500*	441.99017	.000	-4559.4109	-917.9191
	UN	-2759.37000*	441.99017	.000	-4580.1159	-938.6241
	CU	127.45161	853.14481	1.000	-3387.0154	3641.9187
	AL. A.U	-753.33500	441.99017	.968	-2574.0809	1067.4109
	M. U	-189.49000	441.99017	1.000	-2010.2359	1631.2559
	U. Z	131.13500	441.99017	1.000	-1689.6109	1951.8809
	U. BUEA	-77.61111	800.20703	1.000	-3374.0049	3218.7826
	U.I	132.05500	441.99017	1.000	-1688.6909	1952.8009

*. The mean difference is significant at the 0.05 level.

In the ANOVA as shown in table five there was significant difference in the citation index of faculties among the universities, but did not outline where the difference lies. That is why the researcher went further to ascertain where the difference lies between the faculties as represented in the various institutions. University of Cape Town shows statistical significance to all universities sampled. There is no statistical significance between University of Pretoria and University of Nairobi, Cairo University, and University of Buea, but shows statistical significance with University of Cape Town, AL AU, Makerere University, University of Zambia, University of Ibadan and KNUST. University of Nairobi shows no statistical significance with University of Pretoria as well as Cairo university and U. BUEA, but statistically significant with UCT, ALAU, MU, UZ, UI and KNUST, CU is not significant with UP, UN, ALAU, MU, UZ, UBUEA, UI AND KNUST, but significant with UCT. ALAU shows significance with UCT, UP, UN, but not significant with CU, MU, UZ, UBUEA, UI and KNUST. MU shows significance with UCT, UP, UN, but not significant with CU, ALAU, UZ, UBUEA, UI and KNUST. UZ is significant with UCT, UP, and UN, but not significant with CU, ALAU, MU, UBUEA, UI and KNUST. U. BUEA is only significant

with UCT. U. I is sonly significant with UCT, UP and UN and KNUST are only statistically significant with UCT, UP and UN.

Figure 1: Mean of plot of citation index of faculties in African Universities



Hypothesis Two

Citation index of faculties among African countries are not statistically significant

Table 7: ANOVA of citation index of faculties among African countries

VAR00001

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5128377514.590	8	641047189.324	32.099	.000
Within Groups	33111937445.635	1658	19971011.728		
Total	38240314960.226	1666			

Table seven gives the ANOVA analysis of citation index of faculties among African countries. Between groups sum of square is 5128377514.590, mean square is 641047189.324 and degree of freedom (df) is 8; within groups sum of square is 33111937445.635, mean square is 19971011.728 and degree of freedom is 1658. Total sum of square and degree of freedom are 38240314960.226 and 1666. F value is 32.099 and P (0.000) at 0.05 level of significance. Since P (0.000) < 0.05 alpha level, the null hypothesis is rejected. That is, Citation index of faculties among African countries are statistically significant

Table 8: Multiple Comparisons

Dependent Variable: VAR00001

Scheffe

(I) VAR00002	(J) VAR00002	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
South Africa	Egypt	1340.87750	387.01756	.152	-185.3572	2867.1122
	Morocco	4227.69911*	833.15888	.001	942.0703	7513.3279
	Kenya	3346.91250*	387.01756	.000	1820.6778	4873.1472
	Uganda	3910.75750*	387.01756	.000	2384.5228	5436.9922
	Zambia	4231.38250*	387.01756	.000	2705.1478	5757.6172
	Cameroon	4022.63639*	777.61035	.001	956.0676	7089.2051
	Nigeria	4232.30250*	387.01756	.000	2706.0678	5758.5372
	Ghana	4100.24750*	387.01756	.000	2574.0128	5626.4822
Egypt	South Africa	-1340.87750	387.01756	.152	-2867.1122	185.3572
	Morocco	2886.82161	862.60144	.192	-514.9163	6288.5595
	Kenya	2006.03500*	446.88938	.010	243.6909	3768.3791
	Uganda	2569.88000*	446.88938	.000	807.5359	4332.2241
	Zambia	2890.50500*	446.88938	.000	1128.1609	4652.8491
	Cameroon	2681.75889	809.07687	.203	-508.9006	5872.4184
	Nigeria	2891.42500*	446.88938	.000	1129.0809	4653.7691
	Ghana	2759.37000*	446.88938	.000	997.0259	4521.7141
Morocco	South Africa	-4227.69911*	833.15888	.001	-7513.3279	-942.0703
	Egypt	-2886.82161	862.60144	.192	-6288.5595	514.9163
	Kenya	-880.78661	862.60144	.998	-4282.5245	2520.9513
	Uganda	-316.94161	862.60144	1.000	-3718.6795	3084.7963
	Zambia	3.68339	862.60144	1.000	-3398.0545	3405.4213
	Cameroon	-205.06272	1094.97786	1.000	-4523.1957	4113.0702
	Nigeria	4.60339	862.60144	1.000	-3397.1345	3406.3413
	Ghana	-127.45161	862.60144	1.000	-3529.1895	3274.2863
Kenya	South Africa	-3346.91250*	387.01756	.000	-4873.1472	-1820.6778
	Egypt	-2006.03500*	446.88938	.010	-3768.3791	-243.6909
	Morocco	880.78661	862.60144	.998	-2520.9513	4282.5245
	Uganda	563.84500	446.88938	.991	-1198.4991	2326.1891
	Zambia	884.47000	446.88938	.864	-877.8741	2646.8141
	Cameroon	675.72389	809.07687	1.000	-2514.9356	3866.3834
	Nigeria	885.39000	446.88938	.864	-876.9541	2647.7341

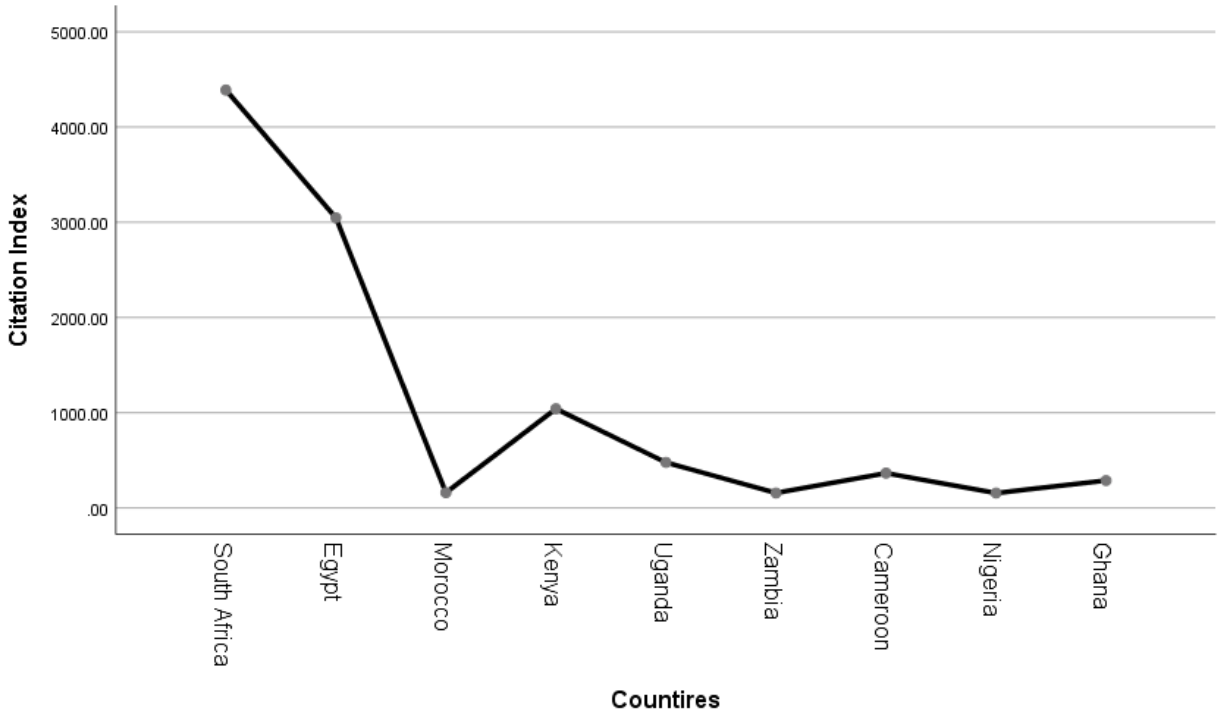
	Ghana	753.33500	446.88938	.944	-1009.0091	2515.6791
Uganda	South Africa	-3910.75750*	387.01756	.000	-5436.9922	-2384.5228
	Egypt	-2569.88000*	446.88938	.000	-4332.2241	-807.5359
	Morocco	316.94161	862.60144	1.000	-3084.7963	3718.6795
	Kenya	-563.84500	446.88938	.991	-2326.1891	1198.4991
	Zambia	320.62500	446.88938	1.000	-1441.7191	2082.9691
	Cameroon	111.87889	809.07687	1.000	-3078.7806	3302.5384
	Nigeria	321.54500	446.88938	1.000	-1440.7991	2083.8891
	Ghana	189.49000	446.88938	1.000	-1572.8541	1951.8341
Zambia	South Africa	-4231.38250*	387.01756	.000	-5757.6172	-2705.1478
	Egypt	-2890.50500*	446.88938	.000	-4652.8491	-1128.1609
	Morocco	-3.68339	862.60144	1.000	-3405.4213	3398.0545
	Kenya	-884.47000	446.88938	.864	-2646.8141	877.8741
	Uganda	-320.62500	446.88938	1.000	-2082.9691	1441.7191
	Cameroon	-208.74611	809.07687	1.000	-3399.4056	2981.9134
	Nigeria	.92000	446.88938	1.000	-1761.4241	1763.2641
	Ghana	-131.13500	446.88938	1.000	-1893.4791	1631.2091
Cameroon	South Africa	-4022.63639*	777.61035	.001	-7089.2051	-956.0676
	Egypt	-2681.75889	809.07687	.203	-5872.4184	508.9006
	Morocco	205.06272	1094.97786	1.000	-4113.0702	4523.1957
	Kenya	-675.72389	809.07687	1.000	-3866.3834	2514.9356
	Uganda	-111.87889	809.07687	1.000	-3302.5384	3078.7806
	Zambia	208.74611	809.07687	1.000	-2981.9134	3399.4056
	Nigeria	209.66611	809.07687	1.000	-2980.9934	3400.3256
	Ghana	77.61111	809.07687	1.000	-3113.0484	3268.2706
Nigeria	South Africa	-4232.30250*	387.01756	.000	-5758.5372	-2706.0678
	Egypt	-2891.42500*	446.88938	.000	-4653.7691	-1129.0809
	Morocco	-4.60339	862.60144	1.000	-3406.3413	3397.1345
	Kenya	-885.39000	446.88938	.864	-2647.7341	876.9541
	Uganda	-321.54500	446.88938	1.000	-2083.8891	1440.7991
	Zambia	-.92000	446.88938	1.000	-1763.2641	1761.4241
	Cameroon	-209.66611	809.07687	1.000	-3400.3256	2980.9934
	Ghana	-132.05500	446.88938	1.000	-1894.3991	1630.2891
Ghana	South Africa	-4100.24750*	387.01756	.000	-5626.4822	-2574.0128
	Egypt	-2759.37000*	446.88938	.000	-4521.7141	-997.0259
	Morocco	127.45161	862.60144	1.000	-3274.2863	3529.1895
	Kenya	-753.33500	446.88938	.944	-2515.6791	1009.0091

	Uganda	-189.49000	446.88938	1.000	-1951.8341	1572.8541
	Zambia	131.13500	446.88938	1.000	-1631.2091	1893.4791
	Cameroon	-77.61111	809.07687	1.000	-3268.2706	3113.0484
	Nigeria	132.05500	446.88938	1.000	-1630.2891	1894.3991

*. The mean difference is significant at the 0.05 level.

In furtherance to ascertain where the difference lies from the ANOVA presented in table 7, the Scheffe's post-hoc multiple comparison was performed. Table 8 presents the multiple comparison of the faculties' citation counts. South Africa is statistically significant with all the countries except Egypt. Egypt also showed statistical significance with all the countries except South Africa, Morocco and Cameroon. Morocco showed statistical significance with South Africa alone. Kenya is only statistically significant with South Africa and Egypt. Also, Zambia is statistically significant with South Africa and Egypt alone. While Cameroon is only statistically significant with South Africa, Nigeria is statistically significant wit South Africa and Egypt.

Figure 2: Mean Plot of citation index of faculties among African countries



Hypothesis Three

Citation index of faculties among African region are not statistically significant

Table 9: ANOVA of Citation index of faculties among African region

VAR00001

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4869836026.617	4	1217459006.654	60.635	.000
Within Groups	33370478933.608	1662	20078507.180		
Total	38240314960.226	1666			

In table 9, the one-way ANOVA **of** Citation index of faculties among African region presented, the between groups sum of squares is 4869836026.617, degree of freedom, 4 and mean square value is 1217459006.654. the within groups sum of square value is 33370478933.608, degree of freedom, 1662 and mean square value is 20078507.180, while the total sum of square and degree of freedom are; 38240314960.226and 1666. The F-value is 60.635 at P (0.000). since P (0.000) < 0.05 alpha level, the null hypothesis is rejected and the alternative hypothesis is upheld. That is, Citation index of faculties among African region are statistically significant.

Table 10: Multiple Comparisons

Dependent Variable: VAR00001

Scheffe

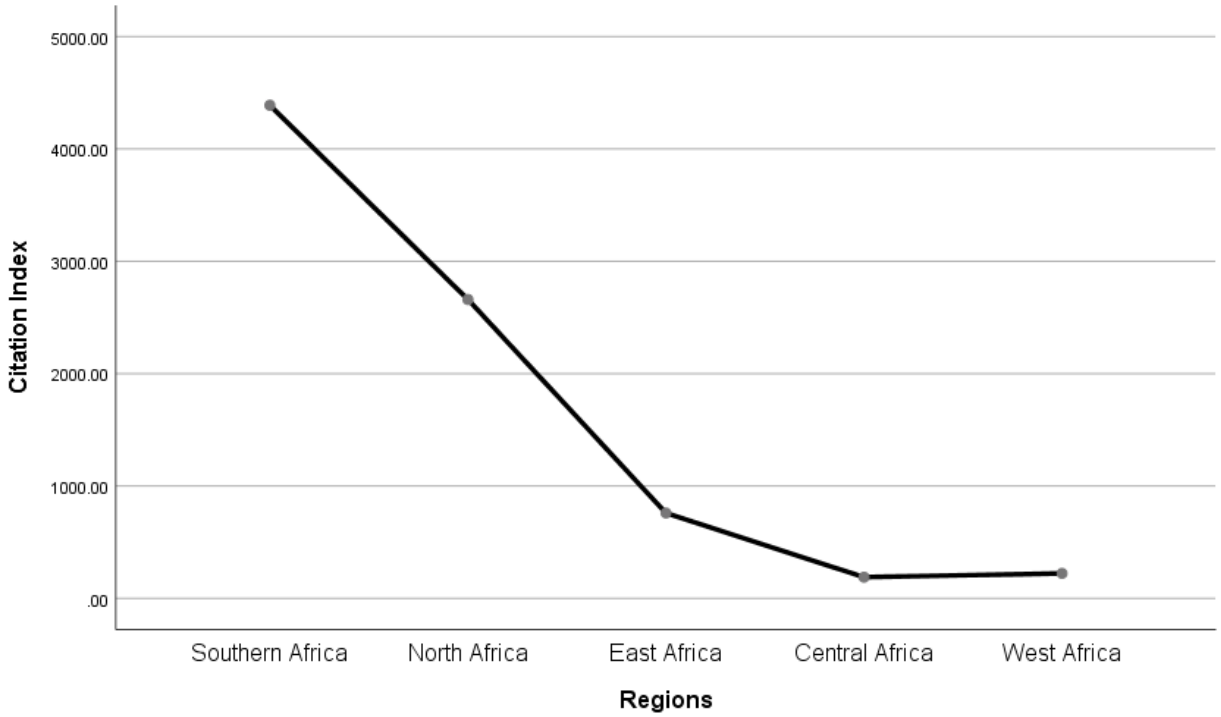
(I) VAR00002	(J) VAR00002	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	Upper Bound
Southern Africa	North Africa	1728.28646*	370.29206	.000	586.4215	2870.1514
	East Africa	3628.83500*	316.84781	.000	2651.7754	4605.8946
	Central Africa	4199.53987*	367.79707	.000	3065.3687	5333.7111
	West Africa	4166.27500*	316.84781	.000	3189.2154	5143.3346
North Africa	Southern Africa	-1728.28646*	370.29206	.000	-2870.1514	-586.4215
	East Africa	1900.54854*	370.29206	.000	758.6836	3042.4135
	Central Africa	2471.25341*	414.72686	.000	1192.3654	3750.1414
	West Africa	2437.98854*	370.29206	.000	1296.1236	3579.8535
East Africa	Southern Africa	-3628.83500*	316.84781	.000	-4605.8946	-2651.7754
	North Africa	-1900.54854*	370.29206	.000	-3042.4135	-758.6836
	Central Africa	570.70487	367.79707	.661	-563.4663	1704.8761
	West Africa	537.44000	316.84781	.579	-439.6196	1514.4996
Central Africa	Southern Africa	-4199.53987*	367.79707	.000	-5333.7111	-3065.3687
	North Africa	-2471.25341*	414.72686	.000	-3750.1414	-1192.3654
	East Africa	-570.70487	367.79707	.661	-1704.8761	563.4663

	West Africa	-33.26487	367.79707	1.000	-1167.4361	1100.9063
West Africa	Southern Africa	-4166.27500*	316.84781	.000	-5143.3346	-3189.2154
	North Africa	-2437.98854*	370.29206	.000	-3579.8535	-1296.1236
	East Africa	-537.44000	316.84781	.579	-1514.4996	439.6196
	Central Africa	33.26487	367.79707	1.000	-1100.9063	1167.4361

*. The mean difference is significant at the 0.05 level.

Multiple comparison of Citation index of faculties among African region is presented as follows: Southern Africa showed statistical significance with other regions; North Africa is also statistically significant with all other regions. East Africa is statistically significant with Southern Africa and North Africa, but not statistically significant with Central Africa and West Africa. Similarly, Central Africa is statistically significant with Southern and North Africa, but not statistically significant with East and West Africa respectively, while West Africa is also statistically significant with Southern and North Africa, but not statistically significant with East and Central Africa.

Figure 3: Means Plots of Citation index of faculties among African region



Discussion

Citation index of faculties among African universities

Findings from the analysis of research questions and hypothesis revealed that Citation index of faculties among African universities is statistically significant. The multiple comparison analysis of table six gave a clear picture of where the differences lies that are statically significant. University of Cape Town for instance has citation mean of 5749.8300 which is statistically different from the rest university and an

indication that the university commands a high e-visibility in terms of research output (citation) in Africa. University of Pretoria and Cairo University closely follows the Cape Town University with citation mean of 3026.6650 and 3047.3700 in terms of e-visibility as a measure of research productivity. University of Nairobi is placed fourth with citation mean of 1041.3350 based on the findings as one of the universities that has high e-visibility based on faculties research outputs (citations) in these universities.

The findings give the interpretation of the variation of how faculties and universities in Africa advertise their research output and the desire to reach out and make impact in the global stage of research. Google scholar Citation database is one of such channels through research e-visibility can be attained; which brings to mind that University of Cape Town, University of Pretoria, Cairo University and University of Nairobi in this study have advantage over other universities in terms GSC utilization. The findings showed a poor performance of research output (citation) as a measure of e-visibility by Al Akhawayn University, Makerere University, University of Zambia, University of Ibadan and Kwame Nkurumah University of Science and Technology. While they have made considerable effort to showcase their works to the world more is still needed if they want to catch up with rest of the world.

Citation index of faculties among African countries

Table three presented the mean and standard deviation of citation index of faculties among African countries and table seven and eight provided results to the analysis of the hypothesis. The mean and standard deviations are as follows: South Africa (mean= 438888.2475, std=66747.48695), Egypt (mean = 3047.3700, std = 8492.63968), Morocco (mean = 160.5484 and std = 233.35321) and Kenya (mean = 1041.3350 and std = 922.57134). others are: Uganda (mean = 477.4900 and std = 2054.84995), Zambia (mean = 156.8650 and std = 382.67339), Cameroon (mean = 365.6111 and std = 793.22298), Nigeria (mean = 155.9450 and std = 369.26584) and Ghana (mean = 288.000 and std = 437.35597). the test of hypothesis revealed that Citation index of faculties among African countries are statistically significant. In furtherance to ascertain where the difference lies from the ANOVA presented in table 7, the Scheffe's post-hoc multiple comparison was performed and a clarity was made that South Africa is statistically significant with all the countries except Egypt; Egypt also showed statistical significance with all the countries except South Africa, Morocco and Cameroon. Morocco showed statistical significance with South Africa alone; Kenya is only statistically significant with South Africa and Egypt. Also, Zambia is statistically significant with South Africa and Egypt alone. While Cameroon is only statistically significant with South Africa, Nigeria is statistically significant wit South Africa and Egypt. South Africa, Egypt and Kenya are countries with the highest mean citation index signifying high visibility compared to the rest countries. It is also an indication that faculties in these countries have high usability of GSC. In their study Lateef et al, (2016) discovered that Across the regions, South Africa, Egypt, Kenya and Nigeria are leading countries in terms research visibility and productivity. Though Nigeria did not show good outing in this study based on the findings, it is a leading block in the West African region.

Citation index of faculties among African region

Presented in table four are the mean and standard deviations of citation index of faculties among African region that provided answers to research question four. Southern Africa (mean = 4388.2475 and std = 6647.48695), North Africa (mean = 2659.9610 and std = 7961.36610), East Africa (mean = 759.4125 and std = 1615.57877). Central Africa (mean = 188.7076 and std = 472.62438) and West Africa (mean = 221.9725 and std = 409.60802). Also, table nine and ten provided answers to the hypothesis postulated that Citation index of faculties among African region is statistically significant at chosen alpha level. The multiple comparison also provided insight to where the difference lies between the regions of Africa. The multiple comparison of Citation index of faculties among African region as presented shows Southern Africa is statistical significance with other regions; North Africa is also statistically significant with all other regions. East Africa is statistically significant with Southern Africa and North Africa, but not statistically significant with Central Africa and West Africa. Similarly, Central Africa is statistically significant with Southern and North Africa, but not statistically significant with East and West Africa respectively, while West Africa is also statistically significant with Southern and North Africa, but not statistically significant with East and Central Africa.

Southern Africa, North Africa and East Africa are the leading regions with highest mean citations there by making faculties in these regions more visible in research output. This is not unconnected with the massive utilization of GSC by faculties from this region particularly faculties from South Africa and also utilizing opportunities available in open access journals. If a researcher wants to be more visible then he/she needs to publish more in open access repositories. The findings clearly show that Southern Africa region is the most e-visible region in terms of research output and impact. No doubt this is reflected in the ranking of South African universities by World Universities bodies ahead of other universities in Africa. The rule of thumb in this scenario simply applies that, if a faculty has produced good citation metrics, i.e. if his or her work is well-cited, it is very likely that he or she has made a significant impact in the world stage of research or better in his/her chosen field. Also, if a faculty shows weak citation metrics, this implies that the work lacks impact.

Conclusion

Analyzing the e-visibility status of faculties in Africa using Google Scholar Citation index as a yardstick is the objective of the study. Among the findings were that University of Cape Town, University of Pretoria, Cairo University and University of Nairobi are most e-visible universities, also South Africa, Egypt and Kenya are countries that have high mean citation thereby becoming most visible. The regions with highest level of visibility are Southern Africa, North Africa and East Africa. The study also established that citation indexes of faculties among African universities are statistically significant; Citation index of faculties among African countries are statistically significant and Citation index of faculties among African region are statistically significant. The study also established the importance of GSC as an open access source that can be utilized to evaluate and improve productivity and visibility of African faculties.

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