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Visibility of University of Zululand and Moi University Researchers in Web of Science and Scopus from 2003 to 2013

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Abstract

This paper reflects on the representation of the University of Zululand (UNIZULU) and Moi University (MU)'s research publications in WoS (Web of Science) and Scopus between 2003 and 2013 as an indicator of active research engagement, quality, and international visibility. Research quality, visibility and collaboration theories were interrogated to inform this study. The research questions posed in this paper were: Do the researchers' publications appear in the databases and to what extent? How has the publication trend of the universities changed from 2003 to 2013? In which subject areas/ domains did they publish? What is the citation impact of their publications? What is the subject coverage of the publications? The study employed descriptive and analytical bibliometrics through content analysis as a research method. Data for the duration of 2003 - 2013 was downloaded from the two databases by author affiliation and captured in Excel by author, rank, discipline, title of paper, and source/type of the publication, and they were analysed by using relevant quantitative techniques. The results reveal that the publications of most of the researchers (approximately 70%) were not indexed in the databases. The publication subject coverage at MU was largely in the Health Sciences/Medicine, while Physical Sciences coverage was stronger at the University of Zululand. A strong research niche area emerged in the area of Medicine at Moi University. Citations and the h-index for both universities in the databases were largely low, but some impressive impact seemed to occur in the medical and biochemical research domain. There are possibilities for research collaboration and evidence of quality research emerging from the two institutions. A niche research area and collaboration in Medicine/Health Sciences is feasible.

Introduction

In academia, research visibility and quality research have largely been seen from the vantage point of research publications, particularly academic journal articles, that appear in peer refereed journals indexed by popular/reputable international databases such as Thompson Reuters Web of Science (WoS), Scopus, and Google Scholar to some degree. The Journal Impact Factor (JIF), Author Impact Factor (AIF), and Web Impact Factor (WIF) also contribute significantly towards measuring research quality and visibility if applied with caution (Bar-Ilan, 2008; Amin and Mabe, 2000; Kumar and Fortunato, 2014; Noruzi, 2006). A recent study by Thelwall and Kousha (2015) and Onyancha (2015) confirms the strong influence and impact from academic social media such as Research Gate. Internationally, research quality and visibility have largely been determined by the number of citations a journal (journal impact factor, JIF) and an author (author impact factor, AIF) accumulates

in WoS; but increasingly, the quantity of papers indexed in Scopus also counts considerably. In a study by Onyancha and Ocholla (2009), WoS, Scopus and Google Scholar (GS) were compared by using three indicators, namely the number of publications, the number of citations and the h-index, to measure the similarity or dissimilarity between the three databases in the coverage of South Africa's library and information science (LIS) documents. It was established that GS covers more publications and citations than ISI and Scopus. However, the study notes that GS should be used cautiously when evaluating research in the developing countries.

While there are many definitions of research, it is generally understood to entail an investigation into a problem arising from natural and/or artificial phenomena by using scientific methods of inquiry that are objective, logical, systematic, reliable, and verifiable**.** Research is conducted for many reasons that have been discussed at length by various authors (e.g. Ocholla, 2011). The reasons can be categorised into three: general, personal, and institutional/ organisational. General reasons include confirming, contesting or refuting theories or hypotheses; developing scientific and professional practice; developing creative, analytical and rational thinking for informed decision making and finding solutions to challenges or problems afflicting humanity. Personal reasons include the fulfilment of learning; domestic and career needs such as promotion, tenure, and self-development; and egoistic reasons such as visibility, or to satisfy curiosity. Institutional/ organisational reasons may include mandate – mission of a university, recognition; and visibility – university rankings, justification of existence, and accountability. Visibility is listed as both a personal reason and an institutional reason as to why research is conducted. Research visibility is essential for opportunistic/pragmatic reasons such as self-promotion for recognition and reputation/ employment/appointment; for gaining competitive advantage over peers in terms of, for example, recruitment and attraction of better staff or students and outperforming others; enabling and fostering transparency and accessibility to resources and research output; gaining credibility and respect from peers or competitors and stakeholders; supporting research development or capacity building and knowledge sharing; enabling access to information for benchmarking, for example, for university rankings; supporting scholarly communication; and attracting funding/sponsors/support. Rajkumar (2006) provides seven useful tips for enhancing research visibility that are worth considering as well.

The publication of research findings in a visible and accessible publication is crucial for research visibility and impact. In this paper, bibliometric methods are used through content analysis to quantify research visibility by counting and analysing the number of research publications produced by an individual and/or an organisation that is available in the public domain (e.g. OA repository, website, search engine, publication, etc.). Increasingly, research visibility is established via quantitative measures such as citation and impact factor analysis, as alluded to at the beginning of this paper (see Bar-Ilan, 2008; Amin and Mabe, 2000; Kumar and Fortunato, 2014; Noruzi, 2006). Self-archiving is increasingly popular as well (Ocholla, 2011). Altmetrics provide additional quantitative research visibility/output and web-based impact measurement indicators/tools, thus making research impact analysis and visibility analysis more complex but also rewarding (see Galigan and Dyas-Correia, 2013; Haustein et al, 2013; McFedries, 2012; Piwowar, 2013; Thelwall and Kousha, 2013; Onyancha, 2015).

Purpose of the Study

Research visibility is increasingly becoming important in the individual researcher's bid to build his or her research reputation and gain recognition within an institution and also nationally and internationally among peers. Recognition for scientific excellence, which is normally acquired over a prolonged period, is based on the social appreciation of an individual's performance (Gruber et al, 2008; Rehrl et al, 2014). Research visibility is normally enabled by many reasons highlighted in the previous section. In this study, we argue that while research visibility is important, it is not given sufficient attention in many universities in Africa.

This paper assesses the research visibility of academics and researchers at the University of Zululand and Moi University by analysing publications indexed in WoS and Scopus between 2003 and 2013.

The research questions that guided this study were as follows:

- Do researchers' publications appear in the databases and to what extent?
- How has the publication trend of the universities changed from 2003 to 2013?
- In which subject areas/domains did they publish?
- What is the impact of their publications?

Research Methodology

This study employed descriptive and analytical bibliometrics through content analysis as the primary research method. A critical literature review was conducted on research visibility to inform the study. Data for research visibility analysis was collected from the Web of Science's (WoS) databases (i.e. Science Citation Index (SCI), Social Science Citation Index (SSCI), and Arts and Humanities Citation Index (A and HCI)) and Scopus. The databases were searched for publications from Moi University and University of Zululand academics/researchers for the period of 2003 – 2013. Searches in the databases were done by institutional affiliation (e.g. the University of Zululand) and period/duration (e.g. 2003 – 2013), and indexed research publications were captured and downloaded by using the Endnote tool (reference management software produced by Thomson Reuters (TR) for managing references and bibliography). Not all research publications in the databases are considered by the scientific community to be research output (e.g. Department of Higher Education and Training (DHET, 2015). The number of academics/researchers from each university at the time of data collection was used to determine if their research publications were indexed by the two databases for the research period of 2003 – 2013.

Both Scopus and WoS provide readily available analysis that include the total number of papers, total number of citations, average number of citations per paper, average number of citations per author, average number of papers per author, and Hirsch's h-index, to name a few, making the analysis relatively quick once research questions are known. The focus of this paper was limited to the number of papers, citations, and author h-index. Author impact was determined for each of the top 20 authors with 10 or more publications from each university and database through the number of citations and h-index. Their representations in the two databases and the influence of the researchers from the two selected universities were compared. The 20 authors' names were arranged by publication count in WoS (Table 3) followed by Scopus in the next column. We also replicated an analysis from a related study (Onyancha and Ocholla, 2009) that involved using descriptive statistics and the Pearson Correlation function in order to determine the relationship between the databases in terms of mean, median, standard deviation, sample variance, range, minimum and maximum values, and the sum total of papers and citations.

Findings of the Study

The findings of the study are presented below in sections 4.1 to 4.5.

Do the researchers' publications appear in the databases, and to what extent?

A search for the research period (2003 – 2013) revealed that 964 and 645 papers from Moi University (MU) were indexed in Scopus and WoS respectively, while 565 were indexed in WoS and 595 in Scopus for the University of Zululand. The variance between the papers indexed in Scopus and WoS at the University of Zululand was deemed to be insignificant.

A publication count of the researchers' output was conducted based on the number of known researchers in the two universities. Researchers affiliated with the two universities during the study period and indexed by the databases, including those who have since left, were included as affiliates. A researcher who published one or more papers that are indexed in the databases was included in the analysis. For the purposes of comparison with other researchers in the two universities whose publications did not appear in the databases, the authors counted academics/researchers in each university and calculated the proportion of those who published and were visible against those who were not visible. Also calculated, was the publication per capita (total number of publications divided by the number of researchers) in order to produce a weighted measure of the publication output (see Onyancha, 2013). For example, Moi University had more academics (780)

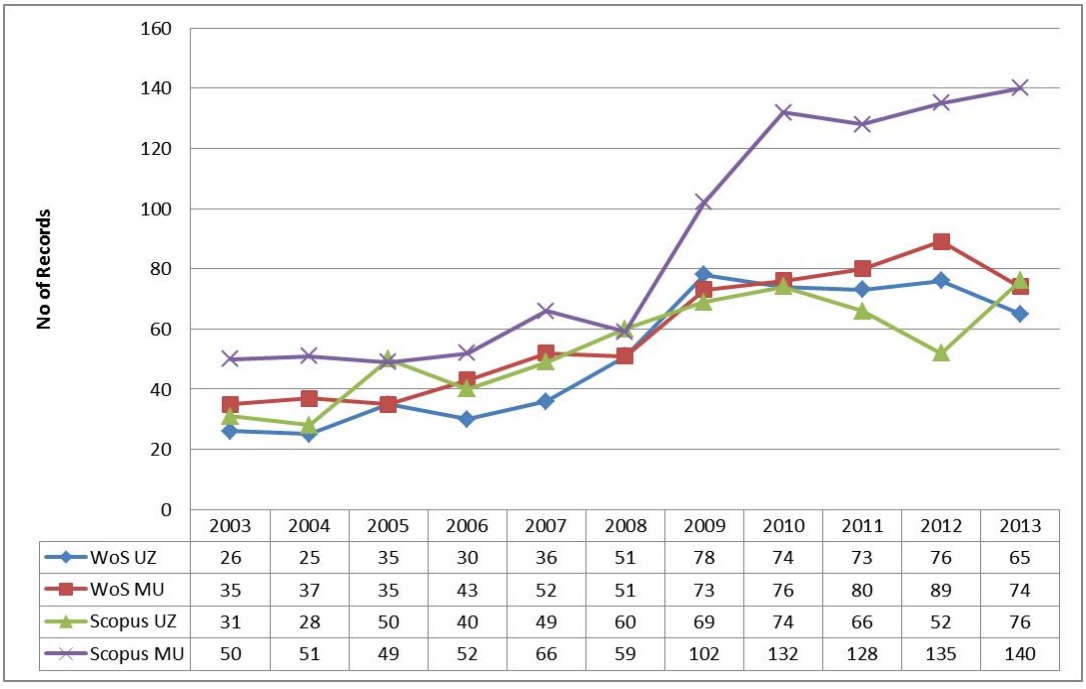
than the University of Zululand (329), and a per capita measure would normalise the disparity based on the whole count.

Of the 329 counted academics/researchers at the University of Zululand at the time of writing, 88 (26.7%) published at least one paper indexed in WoS (565) between 2003 and 2013. The number of academics whose papers were indexed in Scopus and TR-WoS (Thomson Reuter Web of Science) was similar. The per capita publication in TR-WoS for the University of Zululand was 1.7, and 1.9 in Scopus. Of the 780 academic/researchers at MU, 964 publications appeared in Scopus. The per capita publication in WoS for MU was 0.8, and 1.2 in Scopus. This implies that, on average, the University of Zululand's academics (1.7 and 1.9) had more papers indexed in the two databases than their compatriots at Moi University (0.8 and 1.2).

How has the publication trend of the universities changed from 2003 to 2013?

Growth is important for development; therefore, research visibility that increases over time is essential. The study captured publications from the two universities that are indexed in WoS and Scopus by year in Excel, and generated four graphs to show their growth over time. The authors expected more growth in Scopus than in WoS.

Figure 1 demonstrates an incremental growth of research indexed in Scopus from Moi University during the study period, with an insignificant rise and fall in 2007 – 2008, and 2010 – 2011. The growth of research indexed in WoS from Moi University was well below Scopus' growth, but continued to rise, nonetheless. The figure shows a marked margin in the comparative growth of MU publications in the two databases between 2009 and 2013. The growth of the University of Zululand's research indexed in Scopus and WoS for the period of study corresponded, as demonstrated in the two graphs. WoS indexed UNIZULU research more than Scopus in 2009, 2011 and 2012, and matched indexing in 2003, 2004 and 2010. There was an increase in the number of UNIZULU publications indexed in WoS between 2009 and 2012. Owing to the Department of Higher Education and Training's (DHET) (see *Policy and Procedures for the Measurement of Research Output of Public Higher Education Institutions, 2003)* research subsidy given to universities in South Africa, it was expected that most UNIZULU publications would be indexed in WoS rather than in Scopus as at 2015. This trend is likely to change from 2016 when DHET includes Scopus indexed journals in the subsidy list (DHET, 2015).



	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
WoS UZ	26	25	35	30	36	51	78	74	73	76	65
WoS MU	35	37	35	43	52	51	73	76	80	89	74
Scopus UZ	31	28	50	40	49	60	69	74	66	52	76
Scopus MU	50	51	49	52	66	59	102	132	128	135	140

Figure 1: Research visibility trend, 2003 – 2013

In which subject areas/domains did they publish?

A focus on subject areas aids in establishing: the research areas that most output stems from; possible areas of research collaboration; active and inactive research disciplines; and visibility for research evaluation and performance management. The most important research at Moi University from 2003 to 2013 was conducted in the field of Medicine, followed by the Environmental Sciences. The University of Zululand's research was more diversified and shared between the Natural (Chemistry, Physics, Plant Sciences) and Applied Sciences (Material Science), and the Social Sciences. Although Religion and Philosophy had more publication counts for the period of study, growth in the two areas at the University of Zululand declined in recent years; and more research at present is generated by the Departments of Psychology and Library and Information Science. Changes in research output in this case could have occurred due to staff mobility.

Table 1 shows the research visibility based on subjects/disciplines for the two universities in WoS and Table 2 in Scopus. The results reveal that visibility was greater in Scopus than WoS for both universities. However, visibility was more pronounced on the part of Moi University. The top ten visible subject areas in WoS– accounting for 69% at Moi University and 81% at the University of Zululand were almost similar in the two databases.

Table 1: Research Visibility by Top 10 Subjects/Disciplines in WoS

Moi University			**University of Zululand**		
Field: Research Areas	**Record Count**	**% of 644***	**Field: Research Areas**	**Record Count**	**% of 565***
Environmental Science Ecology	67	10.404	Chemistry	77	13.628
Public Environmental Occupational Health	63	9.783	Plant Sciences	66	11.681
Infectious Diseases	62	9.627	Physics	57	10.088
Agriculture	51	7.919	Religion	46	8.142
Immunology	44	6.832	Material Science	43	7.611
Tropical Medicine	36	5.590	Philosophy	43	7.611
General Internal Medicine	31	4.814	Information Science Library Science	35	6.195
Health Care Sciences Services	31	4.814	Psychology	34	6.018
Science Technology and other topics	30	4.658	Science Technology and other topics	31	5.487
Marine Fresh Water Biology	25	3.882	Meteorology Atmospheric Sciences	29	5.133

*Denotes number of publications indexed in WoS

Table 2: Research Visibility by Subject/Discipline in Scopus

	MU			UZ	
Subject Area	**(964)**	**%**	**Subject area**	**(595)**	**%**
Medicine	339	35.1	Agricultural and Biological Sciences	132	22.1
Agricultural and Biological Sciences	211	21.8	Social Sciences	92	15.4
Engineering	134	13.9	Chemistry	88	14.7
Social Sciences	119	12.3	Physics and Astronomy	83	13.9
Environmental Science	108	11.2	Materials Science	71	11.9
Physics and Astronomy	89	9.2	Earth and Planetary Sciences	70	11.7
Biochemistry, Genetics and Molecular Biology	88	9.1	Computer Science	66	11
Immunology and Microbiology	56	5.8	Environmental Science	61	10.2
Materials Science	49	5	Engineering	57	9.5
Computer Science	34	3.5	Biochemistry, Genetics and Molecular Biology	55	9.2
Chemistry	32	3.3	Medicine	45	7.5
Nursing	25	2.5	Psychology	29	4.8
Business, Management and Accounting	23	2.3	Pharmacology, Toxicology and Pharmaceutics	20	3.3
Earth and Planetary Sciences	22	2.2	Arts and Humanities	15	2.5
Pharmacology, Toxicology and Pharmaceutics	21	2.1	Chemical Engineering	15	2.5
Arts and Humanities	21	2.1	Immunology and Microbiology	15	2.5
Chemical Engineering	19	1.9	Mathematics	13	2.1
Health Professions	14	1.4	Health Professions	8	1.3

What are the citation and the impact of the publications?

Impact factor analysis enables the assessment of the influence, impression and effect of a journal or author that translates into the research visibility of an institution (Bar-Ilan, 2008; Amin and Mabe, 2000; Kumar and Fortunato, 2014; Noruzi, 2006). Through citation analysis, AIF (Author Impact Factor) and JIF (Journal Impact Factor) were established. Publication counts (number of papers), number of citations, and the h-index were used for this measurement/evaluation. The methods of calculating JIF and AIF are well known (see Amin and Mabe, 2000; Kumar and Fortunato, 2014).

Table 3: Author Impact Factor in WoS and Scopus for MU and UZ, 2003 to 2013

	Total Records		Times Cited		h-Index		
Author	**WoS**	**Scopus**	**WoS**	**Scopus**	**WoS**	**Scopus**	**Affiliation**
Revaprasadu, N.	64	72	458	562	13	13	UZ
Jury, M. R.	41	39	141	145	6	6	UZ
Braitstein, P.	31	38	438	544	13	14	MU
O'brien, P.	29	32	264	307	10	10	UZ
Kolawole, G. A.	28	30	312	378	11	10	UZ
Scogings P. F.	26	27	112	157	7	8	UZ
Kimaiyo, S.	26	42	531	945	11	15	MU
Wools-Kaloustian, K .	24	38	574	819	14	15	MU
Opoku, A. R.	22	21	101	27	5	2	UZ
Cyrus, D.P.	22	23	101	401	5	10	UZ
Esamai, F.	21	29	238	451	12	10	MU
Edwards, S.D.	19	20	13	164	2	7	UZ
De Wet, H.	18	15	90	134	6	7	UZ
Oyedeji, A. O.	18	16	51	79	4	6	UZ
Nyandiko, W. M.	18	32	239	514	9	15	MU
Tierney, W. M.	18	24	399	544	9	11	MU
Okalebo, J. R.	17	16	70	66	6	5	MU
Sidle, J. E.	17	35	282	986	10	15	MU
Vreeman, R. C.	16	26	146	258	7	8	MU
Were, E.	15	15	732	11	9	2	MU
Zobolo, A. M.	15	13	11	44	2	4	UZ
Beesham, A.	14	15	94	51	4	4	UZ
Khanna, K. M.	14	15	5	8	1	2	MU
Celum, C.	13	15	772	1077	10	12	MU
Lawal, O. A.	13	14	41	67	4	4	UZ
Ocholla, D. N.	13	30	41	112	4	6	UZ
Nejo, A. A.	12	13	82	110	5	6	UZ
Vivier, L.	12	14	88	151	6	8	UZ
Atwoli, L.	12	14	18	26	2	3	MU
Ayuku, D.	12	26	677	115	8	6	MU
Kiarie, J.	12	18	354	1099	9	12	MU
Othieno, C. O.	12	25	59	182	5	6	MU
Yiannoutsos, C. T.	12	18	354	476	9	11	MU
Ayaya, S.	11	30	112	246	4	6	MU
Baeten, J. M.	11	0	725	0	9	0	MU
Edwards, S.	10	38	71	25	3	4	UZ
Jerling, H. l .	10	12	63	90	4	6	UZ
Malik, M. A.	10	11	85	93	4	5	UZ
Yin, W.Y.	10	88	0	444	0	13	MU

Table 3 reveals all the authors who had a record count of over 10 publications in all or either of the two databases from the two universities. There were 20 researchers from Moi University and 19 from the University of Zululand who appeared in the Scopus database, and 18 and 20 from Moi and Zululand respectively in the WoS. More citations were recorded by Scopus than WoS across the board. The authors with the highest number of citations in Scopus from the two universities were Kiarie (1099), Celum (1077) and Sidle (986) of Moi University and Revaprasadu (562), Cyrus (401) and Kolawole (378) of the University of Zululand. The WoS database recorded less citations. The authors with the highest number of citations were Celum (772), Were (732) and Wools-Kaloustain (574) of Moi University, and Revaprasadu (458), Kolawole (312) and O'Brien (264) from the University of Zululand. In general, authors from Moi University received more citations. These findings indicate that Scopus captures more data from research publications than WoS. The highest cited research outputs from the two universities for the period of study were in the Biological and Physical Sciences and Medicine, an indication of the level of visibility of research outputs in the two fields of study.

Table 4: Correlations of Total Cited Publications and Total Records for WoS and Scopus, Moi University

		Total Cited Wos	Total Cited Scopus	Total Records WoS	Total Records Scopus
Total Cited Wos	Pearson's Correlation	1	.283	.272	-.287
	Sig. (2-tailed)	.227	.246	.220	
Total Cited Scopus	Pearson's Correlation	.283	1	.297	.284
	Sig. (2-tailed)	.227		.204	.224
Total RecordsWoS	Pearson's Correlation	.272	.297	1	-.105
	Sig. (2-tailed)	.246	.204		.658
Total RecordsScopus	Pearson's Correlation	-.287	.284	-.105	1
	Sig. (2-tailed)	.220	.224	.658	

The Pearson's correlation analysis of Moi University's output by the top twenty visible researchers, as shown in Table 4, indicates a coefficient of .283 between the total cited publications in WoS and the total cited publications in Scopus. The results further indicate a negative coefficient relationship of -.287 between the total cited publications in WoS and the total records in Scopus, and -.105 between the total records in WoS and the total records in Scopus.

Table 5: Correlations of Total Records and Total Cited Publications for WoS and Scopus, University of Zululand

		Total Cited Wos	Total Cited Scopus	Total Records WoS	Total Records Scopus
Total RecordsWoS	Pearson's Correlation	1	.726	.842	.768
	Sig. (2-tailed)	.000	.000	.000	
Total RecordsScopus	Pearson's Correlation	.726	1	.699	.604
	Sig. (2-tailed)	.000		.001	.005
Total Cited WoS	Pearson's Correlation	.842	.699	1	.845
	Sig. (2-tailed)	.000	.001		.000
Total Cited Scopus	Pearson's Correlation	.768	.604	.845	1
	Sig. (2-tailed)	.000	.005	.000	

The Pearson's correlation analysis of the University of Zululand's output by the top twenty visible researchers, as shown in Table 5, indicates a coefficient of .845 between the total cited publications in WoS and the total cited publications in Scopus. The results further indicate a coefficient relationship of .699 between the total cited publications in WoS and the total records in Scopus, and .726 between the total records in WoS and the total records in Scopus.

Table 6: Descriptive Statistics

University of Zululand			Moi University	
	Mean	Std. Deviation	Mean	Std. Deviation
TCWos	110.95	111.762	336.25	261.923
TCScopus	156.10	144.805	440.55	375.840
HIWoS	5.25	3.110	7.85	3.829
HIScopus	6.45	2.762	9.05	4.979
TRWoS	19.80	13.691	15.60	6.573
TRScopus	24.60	14.580	27.20	17.647

Descriptive analysis using Pearson's correlation analysis (see Table 6) indicates that there are some significant differences in the output of the two universities when considering the top twenty researchers with research publications that are visible. Moi University had a higher mean in the fields considered, except in the total records of WoS where the University of Zululand had a mean of 19.80 and Moi had a mean of 15.60. In the same database (WoS), the total cited publications produced a mean of 110.95 and 336.25 for the University of Zululand and Moi University respectively.

An analysis of the distribution of the h-index indicates a mean of 6.55 in WoS and 7.75 in Scopus for the study period for both universities (see Table 7). It was also observed that the range was not significant in the two databases; WoS had a maximum of 14 and Scopus had a maximum of 15 in the h-index of the forty authors in the list. The distribution of the total cited publications indicates a mean of 223.60 in WoS and 298.33 in Scopus. It was also observed that there was a significant difference in the range of the two databases in the maximum, but no difference in the minimum. The maximum was

772 in WoS and 1099 in Scopus for the period of study, while the standard deviation was 229.179 and 315.878 in WoS and Scopus respectively. A statistical analysis of the distribution of total records indicates a mean of 17.70 in WoS and 25.90 in Scopus (see Table 7). The maximum number of publications in the two databases for the research period was 64 and 88 in WoS and Scopus respectively. There was no significant difference in standard deviation in the two databases (10.811 and 16.032 in WoS and Scopus respectively), but the variance was slightly significant (116.882 and 257.015 in WoS and Scopus respectively).

Table 7: Descriptive Statistics, Moi University and the University of Zululand

	Total Recrods WoS	Total Records Scopus	h-Index WoS	h-Index Scopus	Total Cited WoS	Total Cited Scopus
Mean	17.70	25.90	6.55	7.75	223.60	298.33
Std. Error	1.709	2.535	.583	.662	36.236	49.945
Range	64	88	14	15	772	1099
Minimum	0	0	0	0	0	0
Maximum	64	88	14	15	772	1099
Std. Deviation	10.811	16.032	3.686	4.186	229.179	315.878
Skewness	2.212	2.028	.168	.287	1.138	1.298
Count	40	40	40	40	40	40
Variance	116.882	257.015	13.587	17.526	5.252	9.978

A search in Scopus and WoS for the researchers from the two institutions for the research period revealed that there was a significant difference in visibility. As shown in Table 7, the mean from all the fields was higher in Scopus, which indicates that more research output is captured by that database. The statistics further indicate a significant difference in the maximum total of records and times cited in the two databases. There was a maximum total of 88 records from the two universities in Scopus and 64 in WoS, and a maximum total of 1099 cited records in Scopus and 772 in WoS.

Conclusion

Notably, the publications of most of the researchers (approximately 70%) were not indexed in the databases for the research period, as noted in section 4.1. The approximate figure was determined by counting the number of academic staff in each university minus those who published one or more articles indexed by WoS or Scopus. For example, 88 (26.7%) of the University of Zululand's researchers/academics published at least one paper indexed in WoS (565) between 2003 and 2013.

The findings suggest the growth of research publication visibility in the databases, which is encouraging for international visibility and quality research output. At present, Moi University research is more visible in Scopus than in WoS, while the level of indexing of the University of Zululand's research publications in both WoS and Scopus is quite close. There is a strong incentive for academics from the University of Zululand and indeed in South Africa to publish in WoS indexed research outlets, as outlined by DHET (2015). But this incentive will include qualifying research publications in Scopus starting from 2016 (DHET, 2015) as well. Since most publications that are indexed in WoS are also indexed in Scopus, the duplication could have raised the number of UNIZULU indexed papers in Scopus. The publication subject coverage at MU for the period of study was largely in the Health Sciences, while Physical Sciences coverage was stronger at UNIZULU led by Chemistry. Although a strong research niche area emerged in the domain of

Medicine at MU, UNIZULU did not follow a similar pattern but produced more work in Physical Sciences. The two fields suggest areas of possible research collaboration between the two universities that could be explored.

Citations and the h-index for both universities in the databases for the research period were low, but some impressive impact seemed to occur in the Medical and Biochemical research domains. As pointed out by Bornmann and Dieter (2007), citing Anonymous, 'the h- index favours enduring performers that publish a continuous stream of papers with lasting and above average [e.g. 10 h-index] impact", suggesting that the higher the h–index, the more established a researcher would be. However, the principles of variability of impact factor must always be borne in mind as indicated in the 'bibliometrics ten commandments" outlined by Thomson Reuters (Pendlebury, 2008) that includes 'compare likes and likes'; limitations and impact factor vary from discipline to discipline, with some producing far less or more than others over time or citation 'window'.

Researchers also need to be encouraged to publish more in internationally visible research outlets/publications that are largely indexed either in Scopus or TR-WoS, or in both, in order to demonstrate and account for quality research and increase research visibility that can be used for the purposes alluded to earlier in the paper. The limited number of research publications reflected in WoS and Scopus requires further attention as the research reflected in the two databases does show quality research output. Further research could explore how academic social media such as Research Gate (see Thelwall and Kousha, 2015) is used by the two universities or among Kenyan and South African universities to replicate what Onyancha (2015) has produced on Researchgate research for South Africa. Research visibility in Google Scholar can also provide useful data for further comparison.

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