Promotion of Open Access Publications and Visibility by Institutions in South Africa

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Information Technology infrastructure, internet connectivity, platform agility and institutional governance remain significant challenges to Open Access (OA) publishing on the African continent. This study examined South African libraries and institutions' efforts to promote open-access publications. Bibliometric tools were used to analyse research outputs, trends, and citations. An informetric analysis of abstracts and titles of (n =4,808) samples from the Social Sciences and Humanities (SSH) outputs in Scopus Databases was conducted. The top 1,999 of these outputs accounted for a total citation count of (n =18, 913), representing 1,686 of the total link strengths of the outputs. This finding suggests that OA may promote the visibility and prominence of African scholarship and knowledge dissemination in the Social Sciences. Our findings present the extent of SSH contributions to Open Access Publishing (OAP) and the most prolific contributors and institutional ranking of OAP in South Africa. The descriptive statistics of the publications metric summary were max = 4,808, μ= 57.742, σ^2 = 186857.721, and σ = 432.270. The implications of these findings suggest that low OAP will significantly hinder African scholarship, knowledge dissemination and scholar's visibility. It is recommended that institutions promote more OAP to increase the visibility and prominence of South African scholars' academic output.

Keywords: Bibliometric analysis, citation trends, informetric analysis, open access publication, research output, Social Sciences and Humanities

1 Introduction and background information

The pervasive nature of IT and the introduction of online content management systems have positively impacted access to knowledge dissemination. Ahinon and Havemann (2018) note that internet penetration, platforms, and services standardisation and governance are the three significant obstacles to the visibility and accessibility of scholarly outputs. Research data management (RDM) has been a recent approach to improving visibility by making the data accessible (Kalu, Chidi-Kalu & Mafe, 2021; Marlina, 2019). At the same time, the RDM can improve the accessibility of research data to enable the reproducibility of scientific findings. The RDM is the process of documenting and describing the entire lifecycle of research processes and methods (Rath, 2022). According to the University of Pretoria (2017), RDM is the planning, organising, and preserving of relevant evidence that leads to any research conclusion.

In this study, RDM is defined as the meticulous records management of research design, research data collection, entries of scientific findings and its associated metadata in such a way that it can be accessed from different channels and media. However, the actual published data openness or OA lets many scholars access such without paying to use the scientific findings. Many outputs on the African continent have yet to achieve the visibility and prominence expected. Across the continent, OA publications have yet to be accepted for promotion, accreditation for outputs scorecards and metrics analysis for individual erudition. Ezema and Onyancha (2018) found that uncertainty surrounds the acceptance of OAP for research grants, retention of academic scholars and tenure renewal. The study also revealed that African scholars' outputs continue to suffer from poor visibility: "The greatest challenges that African researchers face include poor visibility and dissemination of their research reports" (Ezema & Onyancha, 2018: 99).

Studies have addressed OA from a broader perspective (Ezema & Onyancha, 2018; Ahinon and Vavemann, 2018), while Ojemeni and Anaehobi (2018) examined OA initiatives within a Nigerian university context. Bopape (2017) noted that the Potchefstroom Electronic Law Journal was the first legal journal in South Africa to transition to OA. Academic libraries in South Africa have been advocating for and promoting OA scholarly publishing (Ezema and Onyancha, 2018; Ajibade, 2020; Ajibade, 2022), and the South African Journal of Libraries and Information Sciences (SAJLIS) has led OAP within the continent by opting to publish OA without fees. This study investigated SSH contributions to the promotion of OA, especially

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in the South African context by analysing publication and citation patterns and the prominence and visibility of South African scholarly outputs in an OA journal within SSH.

In this work, OAP is defined as outputs that are freely accessible online, downloadable and can be used by an individual without paying for its use, even if it was made open after the authors or their affiliate institutions have paid the article process charges (APC). As Kassahun and Nsala (2017) indicated, an article might be termed OA because its publication costs have been bought by the author or their institutions. Furthermore, OA can be categorised based on the cost of publishing into gold or green OA. The gold OA model lets authors publish their research outputs in OA journals. Also, the green OA model lets the authors deposit or load their research outputs in an institutional repository for free access (Emerald Publishing 2022).

2 Literature

In recent literature that surveyed the proportion of African scholarship publications and visibility trends, it was revealed that the continent is lagging behind to make journal outputs freely available (Chilimo and Onyancha 2018: 14). Ezema and Onyancha (2017: 109) also showed that out of the top 56 OA journals, only one African journal was in 47th position. In terms of the global distribution of OAP in the Directories of Open Access Repository (DOAR), African outputs only accounted for 132 repositories (4%), of which 120 (91%) were institutional-based repositories. Still, this low percentage of total African outputs in the world's OA repositories indicated that African knowledge production and research outputs have limited access and visibility to the global audience. Furthermore, a study in the Scientometric Journal found that 93% of the 1,722 respondents in their survey affirmed that OA publication is important (Zhu, 2017). So, the importance of OA publications in making scholarly knowledge accessible cannot be overemphasised. Therefore, African scholars and libraries must do more to facilitate OA.

Nevertheless, hurdles to OA persist, including restrictions such as journal copyright. This persisting problem to OA has resulted in some scholars and authors self-archiving their outputs (Laakso & Polonioli, 2018). Initiatives launched by university libraries in South Africa over the past few years include the formation of training clusters to promote and increase awareness of OA publications through formal and informal dialogues, training, workshops, and consultations (Hare & Evanson, 2018). However, scholars, especially at higher education institutions, continue to harbour doubts as to the merits of OA. Undoubtedly, it behoves the libraries to continue and intensify their campaigns to educate both academics and students on the benefits of OAP and its potential challenges. Hartman and Wu (2018) reiterated that an intelligible strategy is required to achieve OA in South Africa.

Although one of the foremost arguments favouring OAP is the ability to challenge corporate publishers, and increase visibility, as OA also provides research outputs to a wider pool of readers (Willinsky, 2018). Still, due to the high percentages of social problems facing South African communities (Waghid, 2002), such as poverty, crime, and conflict (Rothmann & Veenhoven 2015), creating knowledge that could potentially address such problems and making it accessible is essential. The national intellectual research capacity must provide solutions to these problems, (Lin 2018), by applying innovative thinking to solve these problems (Chou 2018). However, the solution must be made openly available through OAP. The South African scholars in the SSH knowledge must be accessible to all in order to use this knowledge to mitigate prevailing challenges facing the country. However, scholars must ensure that this information is appropriately packaged in such a way that it would be usable for implementation (Kang'ethe and Ajibade 2016). For example, challenges facing South Africa besides crime and poverty also include HIV infection (Kalichman, Simbayi, Cain, Cherry, Henda & Cloete 2007).

Yet, promoting effective public healthcare systems deliveries requires scholars to make knowledge about treatments and remedies openly available (Ajibade 2018) by using efficient information management as a nexus to promote such knowledge (Ajibade & Mutula, 2018). A study showed an inability to apply relevant knowledge of psychology to societal challenges in South Africa (De la Rey & Ipser 2004). Howbeit, Kang'ethe and Ajibade (2016) argued that information must be packaged as a strong and effective tool to mitigate the effects of HIV/AIDS. So part of the proposed solution by Kang'ethe and Ajibade was the need to choose a proper channel to distribute empirical knowledge to users. Hence, this paper argued that SSH scholars must embrace OAP as an effective channel to make critical research findings that could help to mitigate societal challenges available to the wider population. The SSH research and solutions must be made widely available. The potential for wider circulation of ideas is increased, besides the obvious alluring impacts of the improved visibility of scholarly contributions of those scholars who might not be able to afford some of the journals' exorbitant processing charges.

Ezema and Onyancha, (2016) indicated that one reason for encouraging OAP hinges on academia's perceived gains of increased visibility of their research outputs and not necessarily because of any financial gains. Although, some of the publication houses allow golden access in which researchers pay Article Processing Charges (APC) to make their outputs openly available (Emerald Publishing, 2022). Although, the amount often required for such golden access is always too expensive. Hence, most authors would rather not pay the publication fees. Thus, letting the publishers charge potential users for each download of the published articles in their journal. Such practices imply that most authors who could not

afford to pay between thirty-five to eighty US dollars ($35 - $80) to download an article would rather try to access other similar scholarly topics that are readily free. Hence, the author of 'pay-to-download' articles might not necessarily suffer low visibility but a lower citation because of the inability of authors to buy their work. The aforementioned view was corroborated by Hajjem, Harnad and Gingras (2005) and Ezema and Onyancha (2017) which suggested that OAP have more citations than those articles that are not published through OA. Their arguments in support of OAP indicated a ratio of 36% to 172% improvement of OAP compared to non-open access published articles. Therefore, scholarly outputs that can increase their visibility by 172%, despite their innovative contents, might not be widely available for use if it is not published in OA. Thus, this might serve as a disservice to African knowledge utilisation if their knowledge production is limited due to publication charges, thus hindering their ability to foster, and spread innovation through freely accessible OA materials.

It is important for authors to collaborate, and OA allows authors to share innovation freely, but if the fees are too expensive, this may have a negative impact. One reason why OAP is difficult to achieve is the cost of production. As indicated by Ling, Abdul-Aziz and Nording (2018), research outputs that are free to use might not necessarily be free as the authors are required to cover the cost of keeping the article online. Nevertheless, publication in most of the DOAR might increase the volume of scholarly knowledge online as the expensive cost of hosting the articles and online preservation (archiving) of outputs are covered by the publishers. Furthermore, the cost of indexing or classification of OA articles and database maintenance might prompt some journal publishing companies to insist on APC. Still, the fact that African outputs in the directory of open access journals (DOAJ) accounted for merely 4% of the total global outputs speaks a volume as the same findings indicated that only 20 African countries are visibly present in the Registry of Open Access Repositories (ROAR) and DOAJ (Ezema & Onyancha 2017).

De Beer (2005) posited that a problem existed in South Africa about knowledge diffusion based on the difficulty of generating knowledge and the inability to coordinate OA in the country. Although the statement by De Beer (2005) was true, ten years later, findings still indicated that while the Organization for Economic Co-operation and Development (OECD) countries spend 2.4% of their total Gross Domestic Product (GDP) on research and development, the percentage of GDP in Africa and other developing nations is 1% (Czerniewicz & Goodier, 2014). Hence, since the mandate of libraries is to promote open knowledge, even in the face of budgetary constraints will still benefit from OA for knowledge dissemination and solving national socio-economic problems. An earlier study by Fullard (2007) suggested that South African libraries might face financial constraints in building robust collections due to charges associated with publication. Thus, this study aimed to analyse the outputs of South African scholar's promotion of OAP in the SSH domain, and the results were presented based on these goals.

3 Objectives

The aim of this paper was to study the promotion of OA publications and visibility by institutions in South Africa. To accomplish this aim, specific objectives were developed. The scholar's outputs from journal sources can reveal whether an output was published using OA, and the citation analysis is important to measure visibility. The collaboration trends and authorship can help understand visibility patterns, while the total link strength is important for visibility analysis. The study's objectives were to dissect the outputs of the SSH scholars' contributions to the OA publications and to understand the trajectories of knowledge production and visibility of the SSH scholars by examining:

- Scholars' outputs performances trends by journal sources and citations analysis.
- Journal sources and subject area, the authorship patterns and collaboration trends.
- Outputs by South African scholars and the total link strength of their OA outputs prominence and visibility.
- Co-citation analysis of South African SSH scholars and growth of knowledge production.
- Co-occurrence mapping of key terms and research focus.

4 Methodology

This study adopted a quantitative approach. This approach was suitable for this analysis as it relies on numerical analysis of aggregated research outputs. The study used bibliometric tools to map research areas in the SSH and the data was extracted. However, the search returns were limited to journal articles as most published conference proceedings include abstracts but not necessarily the full papers. Including conference papers whose abstracts may have been published in conference proceedings might mislead and create analysis bias. The researcher used advanced search criteria, and subject areas were restricted to "all social sciences" covered in the Scopus database. Hence, the OA classification of this database was bronze OA, meaning the articles are freely accessible on the publisher's website without a license.

The journal search strings, and combinations of search terms were: SubjectArea (soci) AND affilcountry (South AND Africa) AND (limit to (doctype, "ar") OR limit to (doctype, "cp") AND (limit- to (subject area, "SOCI") OR limit-to (Subject

Area, "ARTS") OR limit-to (Subject Area (humanity) AND (limit-to (Access type, Open Access (OA). Only data published in journals that support open accessibility were included for analysis. The data were reordered based on the top-cited article, and the top 2000th articles were synthesised for analysis of bibliometric visualisation using a bibliometric computational tool. The visualisation includes the co-citations trends by author, co-authorship by country and co-occurrence of the terms in the OA based on the data retrieved from Scopus published by SSH scholars in South Africa. The clustering technique and co-authorship followed the recommendations of Van Eck and Waltman (2009; 2014; 2016) and similar recent publications (Ajibade & Mutula, 2018; 2020a; 2020b) affirming the approach as a robust method to validate knowledge production in a given field.

5 Findings and discussions

The clustering techniques adopted for this paper data are denoted as follows: ci represents assigned nodes, δ(ci, cj), function = 1 if ci = Cj and 0 other, and γ denotes the resolution parameter that determines the details of the clustering, meaning that the value of γ, determines the level of clustering details; hence, the model is expressed as (Van Eck & Waltman (2014):

$$V\,c(\,i,...,cn) = \sum_{i<j} \delta(ci, cj)(\,sij - \gamma)$$

Co-authorship trends were analysed, and the authors' countries of origin were used as the unit of analysis, whereby the full counting methods were used. The minimum number of outputs in the co-authorship was set at three; out of 125 countries, only 74 had co-authored at least three articles with scholars in South Africa in OA publications within SSH disciplines. The co-authorship visualisation was calculated based on the following equation:

$$u_{ij} = \sum_{k=1}^{M} a_{ik}a_{jk},\ n_k = \sum_{i=1}^{N} a_{ik}$$

Co-authorship trends

Using this equation, the co-authorship of the outputs was generated, and its visualisation is presented in Figure 1 to show the collaboration patterns. The collaboration trends were depicted in the colour-coded clusters. In the order of outputs ranking after South Africa, the second-ranked collaborating country was the United States, followed by scholars from the United Kingdom in the third place. Scholars in The Netherlands had the fourth-highest outputs with South African scholars in SSH fields, followed by Australia in fifth place and Canada in sixth place based on overall collaboration contributions.

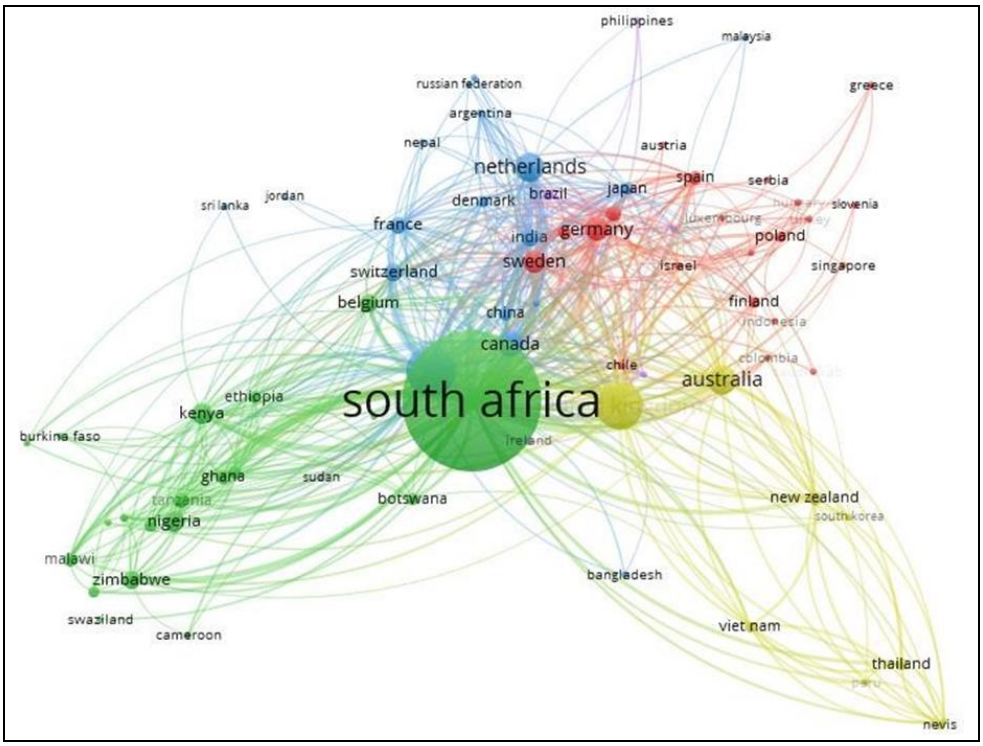

Figure 1: Co-authorship trends of countries collaboration based on co-authorship in Social Sciences

The findings in Table 1 indicate the outputs counts, the citation distributions, and the total link strength (TLS) of the SSHs' visibility based on their outputs. The total link strengths are useful to determine the size and prominence of a network (collaboration) (Zhao, Zhang & Tan 2014), showing the strength of a particular node over the rest of the node (Liao et al 2018). Other studies, such as Sarkodie and Strezov (2018), have reported TLS and its implications. However, this analysis showed that 260 outputs were co-authored by scholars from South Africa and the United States (n=260), with 4, 759 citations and total link strength (TLS=767). This demonstrates South African SSH scholars' visibility to United States scholars. This level of prominence in OAP seems stronger than in many other African countries. South African SSH scholars have established more extensive collaboration with scholars worldwide. The five countries with the highest collaboration networks are the United States, the United Kingdom, the Netherlands, Australia, and Canada. These trends contrast with collaboration networks on the African continent. No African countries appeared in the top ten in the SSH collaboration network (see Table 1) based on their prominence in terms of research and articles published.

Table 1: Output trends based on collaborations by scholars from other countries

Country	Doc	%(*n=3,209)*	Citations	%(*n=40,895)*	TLS(6,226)	%(*n=6,226)*
South Africa	1999	62.3	18913	46.2	1686	27.1
United States	260	8.1	4759	11.6	767	12.3
United Kingdom	238	7.4	4190	10.2	705	11.3
Netherlands	94	2.9	2315	5.7	262	4.2
Australia	91	2.8	1385	3.4	352	5.7
Canada	76	2.4	1273	3.1	294	4.7
Germany	61	1.9	983	2.4	271	4.4
Sweden	56	1.7	951	2.3	250	4.0
France	31	1.0	756	1.8	179	2.9
Switzerland	35	1.1	746	1.8	175	2.8
Belgium	33	1.0	671	1.6	154	2.5
India	30	0.9	583	1.4	175	2.8
Italy	27	0.8	545	1.3	161	2.6
Kenya	45	1.4	534	1.3	158	2.5
Denmark	13	0.4	456	1.1	74	1.2
Norway	19	0.6	453	1.1	98	1.6
Spain	23	0.7	398	1.0	122	2.0
Nigeria	45	1.4	369	0.9	103	1.7
Japan	18	0.6	308	0.8	145	2.3
Brazil	15	0.5	307	0.8	95	1.5
Total	**3,209**	**100.0**	**40,895**	**100.0**	**6,226**	**100.0**

5.1 Co-Citation Analysis

The co-citation analysis was performed based on journal sources, and fractional counting was used. The analysis threshold was limited to articles with at least four citations by source, limiting the analysis unit to n=2,976. Based on the total strength of the co-citation links with other sources, the sources with the highest link strength were selected, and the top 500 strongest co-citation links were used (see Figure 1). This analysis presented the prominence and visibility of the journals where Social Sciences outputs were published. This information is useful for researchers in deciding on the best journals to which to submit their work. It may also be useful for librarians for subscriptions and knowledge sharing, especially when informing academics during their training in order to achieve their OA research publications. See the visibility and strength of co-citation links in (Figure 2) and (Table 2), respectively, for a detailed breakdown of the top 20 most visible and most cited OA journals in SSH based on research outputs by South African scholars. The findings show that the South African Journal of Education had the highest visibility due to the highest citation weight among all the sources. The Journal of Education

had the second-highest co-citation metric behind the Lancet Journal in the first place (see Figure 2). This means that the Journal of Education's articles were the most prominent sources of OAP that produced the highest number of OA articles by SSH scholars. This journal was the most visible among scholars and the most cited OA journal by implication. Each node colour indicates the journal that is related to each research niche area, and network links between the nodes suggest transdisciplinary use of the outputs from different research areas.

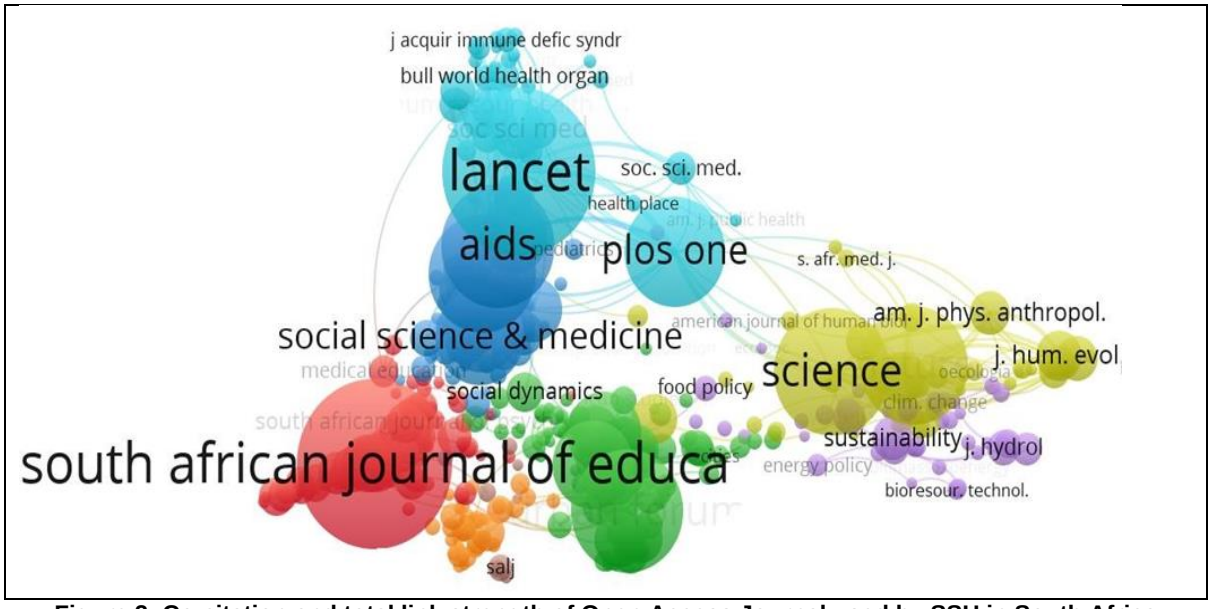

Figure 2: Co-citation and total link strength of Open Access Journal used by SSH in South Africa

The outputs breakdown by sources are presented in Table 2, showing the journals' weight of TLS based on the visualisation in Figure 2.

Table 2: Co-citation and total link strength of open access journal used by SSH in South Africa

Journal Sources	Citations	%(n=3601	Total Link Strength	%(n=3063
Lancet	391	10.9	317.91	10.4
South African Journal of Education	395	11	296.7	9.7
Aids	268	7.4	232.42	7.6
Aids Care	253	7	221.73	7.2
Urban Forum	266	7.4	215.72	7
Plos one	232	6.4	201.64	6.6
Social Science & Medicine	198	5.5	168.85	5.5
Development Southern Africa	179	5	162.56	5.3
Social Science and Medicine	164	4.6	146.33	4.8
BMC Public Health	141	3.9	132.95	4.3
World Development	159	4.4	132.89	4.3
The Lancet	122	3.4	107.63	3.5
American Journal of Public Health	112	3.1	102.82	3.4
South African Medical Journal	113	3.1	100.3	3.3
Perspectives in Education	104	2.9	94.72	3.1
Social Science and Medicine	109	3	92.63	3
South African Journal of Higher ?? Is this complete?	107	3	89.44	2.9
EducationTourism Management	101	2.8	85.04	2.8
Journal of Southern African	94	2.6	82.11	2.7
Studies Urban Studies	93	2.6	78.96	2.6
Total	3,601	100	3063.35	100

5.2 Output by year

The most productive years in the Social Sciences for the past 20 years were between 2013 and 2014. However, this period also saw sudden and sharp increases and decreases in the number of research outputs (see Figure 3). This was due to the peer-review practices of the Mediterranean Journal of Social Sciences (MJSS) (Smillie, 2014; MJSS), in which an author might have had up to four (4) articles in a single volume (MJSS, 2022). Therefore, for this practice, the South African Department of Higher Education and Training removed the journal accreditation. When the Department of Higher Education and Training removed this journal in 2015 from its list of accredited journals, the number of outputs became relatively normalised (Figure 3). These findings might suggest that some researchers chose MJSS based on the ease of publication rather than upholding ethical standards (Smillie, 2014). The publications trend in SSH research outputs from 2016-2018 is slightly higher than that from 2010-2012, and there has been an annual increase in SSH research uptake (see Figure 3).

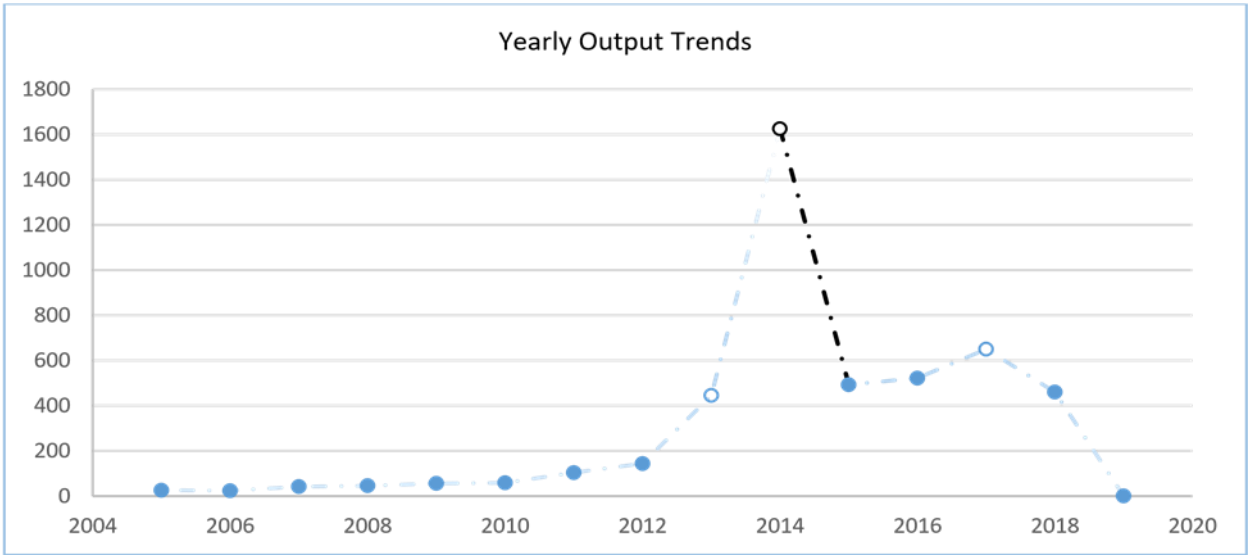

Figure 3: Output by Journal Sources

5.3 Output by Journal Sources

Articles production by journal sources is a valid indicator to examine a variety of variables. It points to the growth of knowledge, and the intensity of contributions to OAP by fields of studies as sources are related to a specific subject area or field of studies. Togia and Tsigilis (2006) used the number of articles published from different sources to calculate, measure and analyse journal impact factors. The number of articles published from a journal source and the citation received are important indicators for measuring a journal's impact (factor?). It could also be used by librarians to campaign for OAP and inform scholars about journals in their fields that promote OA publications. Hesford, Lee, Van der Stede and Young (2006) used journal sources for a bibliographic study of the growth of knowledge in management accounting. Figure 6 shows journal sources with their ranked number of OA outputs. The MJSS has the most significant outputs (1,450), followed by the Potchefstroom Electronic Law Journal, with over three hundred outputs (301)

These were among the leading journals promoting South African scholars' OAP in the domain of SSH.

Still, higher OA figures should also show that articles with longer years of publications than recently established journals might have higher visibility. The remaining distribution of OA contributions is displayed in Figure 4. It shows that OAP in many other subject areas within SSH was low. This low figure has two implications; the first being that South African scholars' have low overall output in these top journals. The second factor could be that most of their outputs were not published in OA sources.

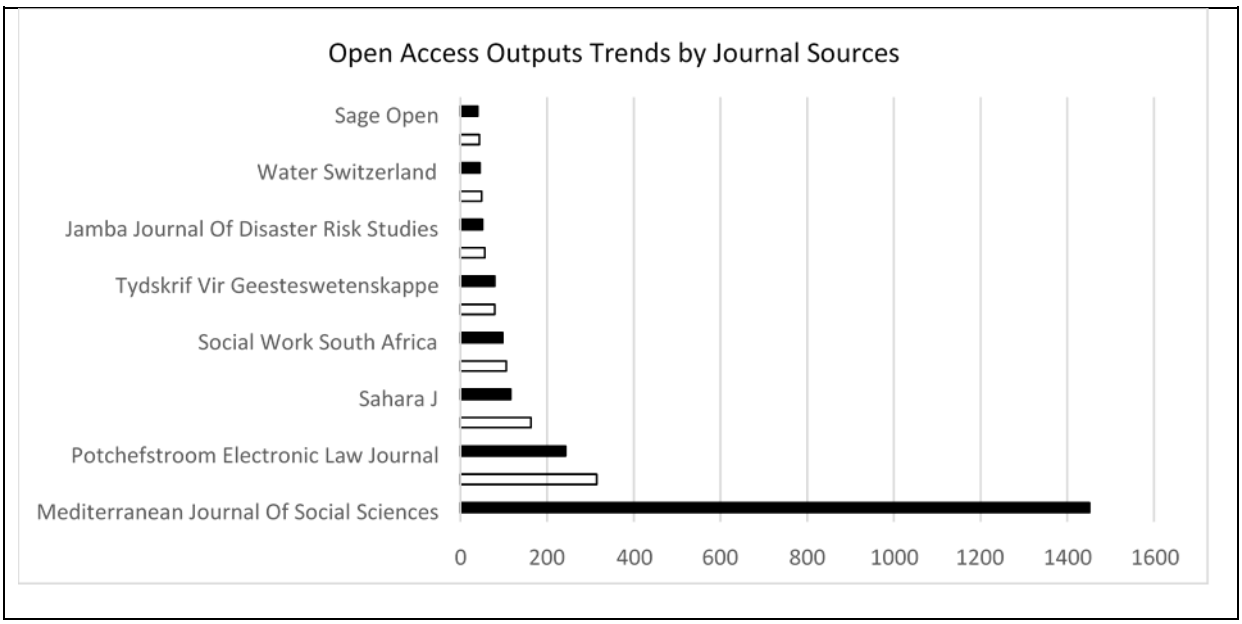

Figure 4: Open Access Outputs by Top 15 contributing Journals (n=4,808)

The number of outputs in an OA publication is central to Library and Information Science (LIS) campaigns to make scholarly contributions available to promote knowledge dissemination through access to research outputs. The authorship trends in OA among South African scholars in SSH showed the top ten authors with the highest visibility. Although these authors contributed the highest number of publications individually (see Figure 5), their total OA outputs only accounted for 6.156% of the total 4,808. This finding shows that the outputs per author are widely spread. Odeku K.O. and Ukpere W.I.'s contributions accounted for 39 (0.812%) each of the total output, which is statistically significant in light of the total contributions from SSH within higher education institutions in South Africa. Fatoki O. accounted for 27 (0.562%), while Dhurup M. (0.396%), Moloi K.C., Rogerson C.M., and Surujlal J. accounted for (0.374%) each of the total OAP outputs from South African SSH scholars (see Figure 5). However, the total contribution of the top eight most prolific contributors (as depicted in Figure 5) accounted for less than six and a half per cent (6.157%) of the total OAP in South African SSH.

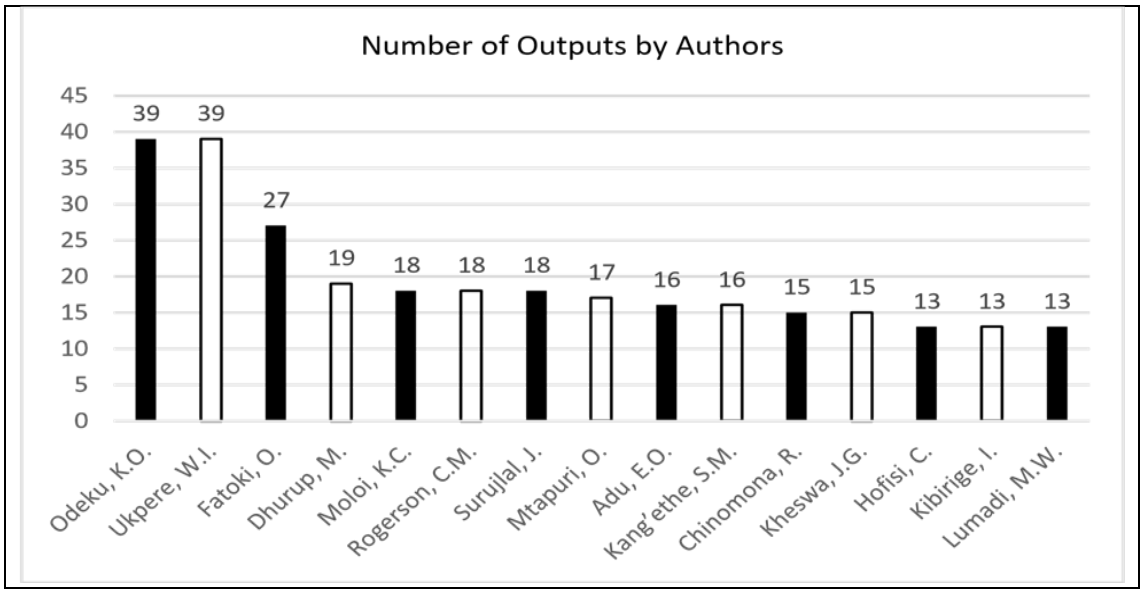

Figure 5: Top SSH Authors promoting Open Access to scholarly publishing (n=4,808)

5.4 Output by institution

In the top five ranking of institutions that contributed the most to OAP, the outputs were close, and there is no substantial statistically significant dominance among the top five institutions. While there is a statistically significant difference between the top six institutions' contributions and those in the middle and the bottom three institutions, it must be emphasised that some journals charge substantial publication fees before a journal is made OA. Therefore, there is a need to classify what

journals were classified as open within the LIS professional ontology to indicate whether a journal with publication charges deserves to be called OA. Van Leeuwen and Tatum (2018) also noted complications arising from copyright restrictions and what should be regarded as an OA output. The mean of the total OA outputs (4,347) by scholars within South African institutions was 276.14 based on their output visibility (μ=276.14) and standard deviation of (= 121.67). The distribution of output by institution indicates that North-West University accounted for 10.11% or 10 (11%) of Scopus's total OA research outputs in the Social Sciences across research niche areas. The University of the Witwatersrand's outputs accounts for (8.32%) same as above of (n=4,808) of total knowledge production in the Scopus OA in the Social Sciences.

Institutions	**Outputs Count**	**% of output(n=4,808)**
North-West University	486	10.11%
University of Witwatersrand	400	8.32%
Universiteit van Pretoria	387	8.05%
University of KwaZulu-Natal	386	8.03%
University of Cape Town	361	7.51%
University of Johannesburg	332	6.91%
Universiteit Stellenbosch	302	6.28%
University of Fort Hare	288	5.99%
University of Limpopo	262	5.45%
University of the Free State	190	3.95%
University of the Western Cape	164	3.41%
Vaal University of Technology	138	2.89%
South African Medical Research Council	88	1.83%
Cape Peninsula University of Technology	82	1.71%
Top 15 total Outputs Accounted for:	4347	90.43%

5.5 South Africa Social Sciences Outputs in Scopus Open access Journals

Outputs by South African SSH scholars were compared with selected countries, and the results suggest that most scholars in South Africa preferred OAP. Thus, this was reflected in the total number of articles compared with SSH scholars' outputs in other countries. Most (4,808) outputs in the Scopus database were from South Africa. Hence, South Africa's promotion of access to knowledge yields positive results, and campaigns by South African libraries or institutions might bear fruit. Institutions in other African countries could learn from this example. Based on the distributions in Figure 4, South African scholars in Social Science disciplines might prefer OA journals. South African institutions' 4,808 outputs accounted for 78.83%, which is more than the other nine countries combined. The United States stood at 5.20%, with the United Kingdom at 4.77%, The Netherlands at 2.13% and Australia at 1.85%. These results indicate that intensive campaigns and outreach by the Library and Information Association of South Africa (LIASA) to encourage and promote OAP might work. Furthermore, internal campaigns by university librarians to promote OA could have contributed to a significant uptake in OAP. This is vital to increase the visibility of South African and African scholarship

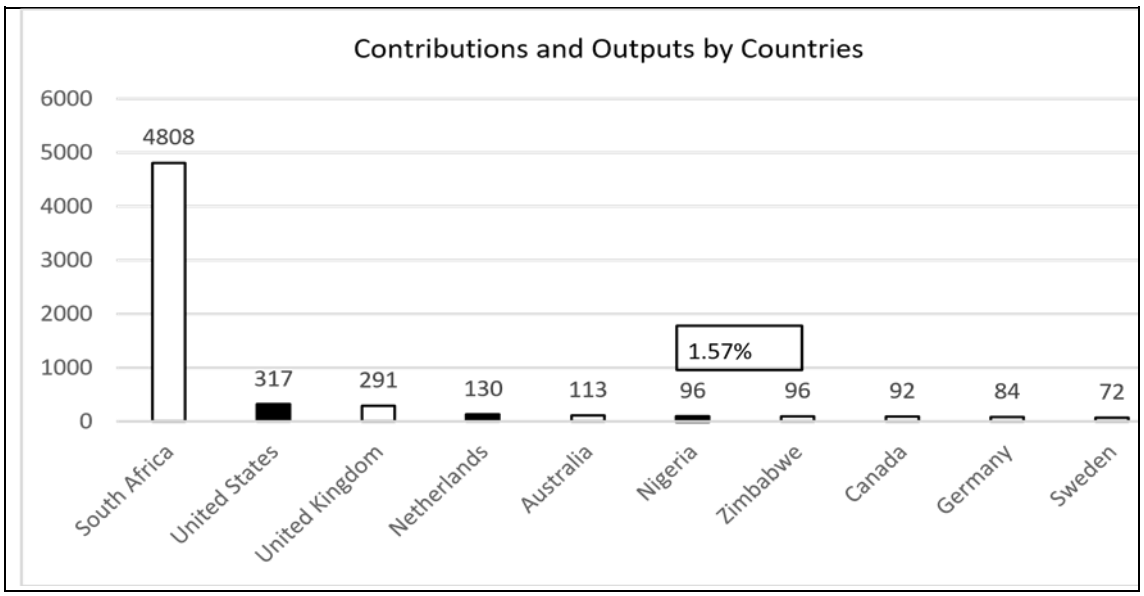

Figure 6: (n=4,808) compare the document count for up to 15 countries)

5.6 Output by subject area

The output distribution based on the contributions by different subject areas is presented in Figure 7. Social Sciences accounted for 4,383 (46%) of the total outputs in the Scopus open sources databases. Outputs by the Arts and Humanities accounted for almost 20% (19.8%). However, SSH subject areas accounted for 66.1% of the total outputs in the OA journals in the Scopus database (see Figure 7). Thus, this implies that the outputs and knowledge produced on South African society's social and economic challenges could be freely accessed. Other OA outputs by SSH scholars were in economics and economic management (14.8%), medicine (4.7%), and environment studies (3.8%) as displayed in the Figure 7.

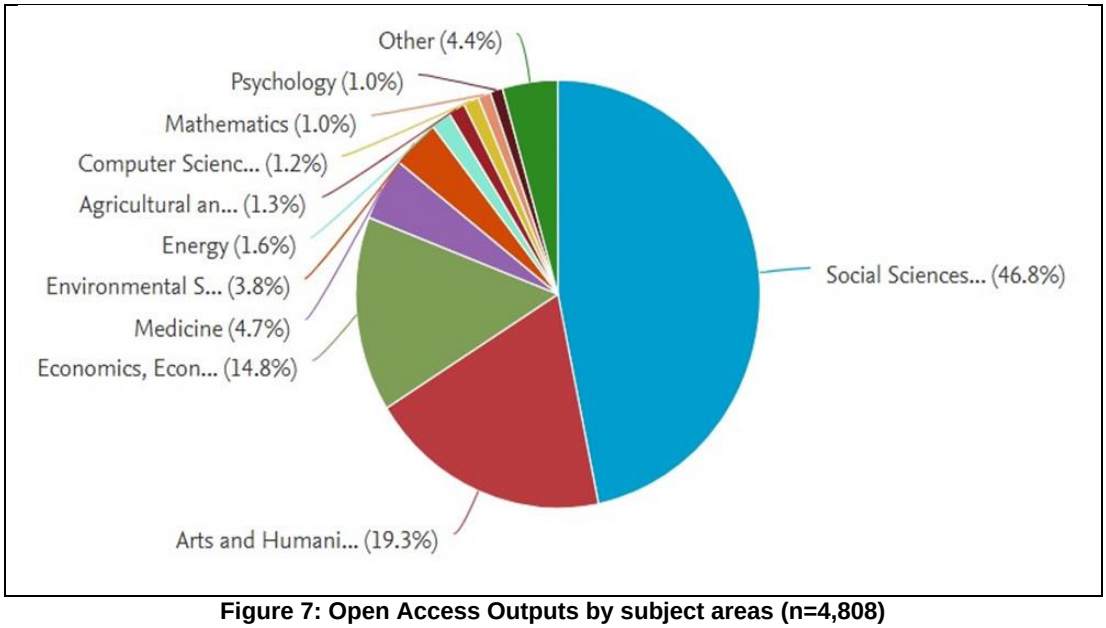

Figure 7: Open Access Outputs by subject areas (n=4,808)

5.7 Terms Co-occurrence based on Titles and Abstracts

Terms co-occurrence is useful in evaluating the focus of research and the predominant niche area in the Social Sciences. The green cluster contains research outputs on information communication technology (ICT) and skills, while the blue cluster is devoted to research methods, research design and the adoption of theories and is directly linked to the lemon cluster, where the research design and research approaches are connected with the theories. The red cluster on e-government is the most predominant focus area. However, subjects such as social work and social challenges were scarcely covered based on the analysed texts. The results show that ICT and ICT adoption were the most common topics in SSH with the highest prominence and visibility. The second research focus that was covered extensively is e-government while e-government adoption and e-government acceptance was the third most prominent subject (see Figure 8). It seems that the Technology Acceptance Model (TAM) (see Figure 8) was the predominant theoretical underpinning in most technology-

related studies as indicated in the top of this visualisation below. Literature suggested that scholars use this model because it is simple and not because of suitability (Ajibade, 2018).

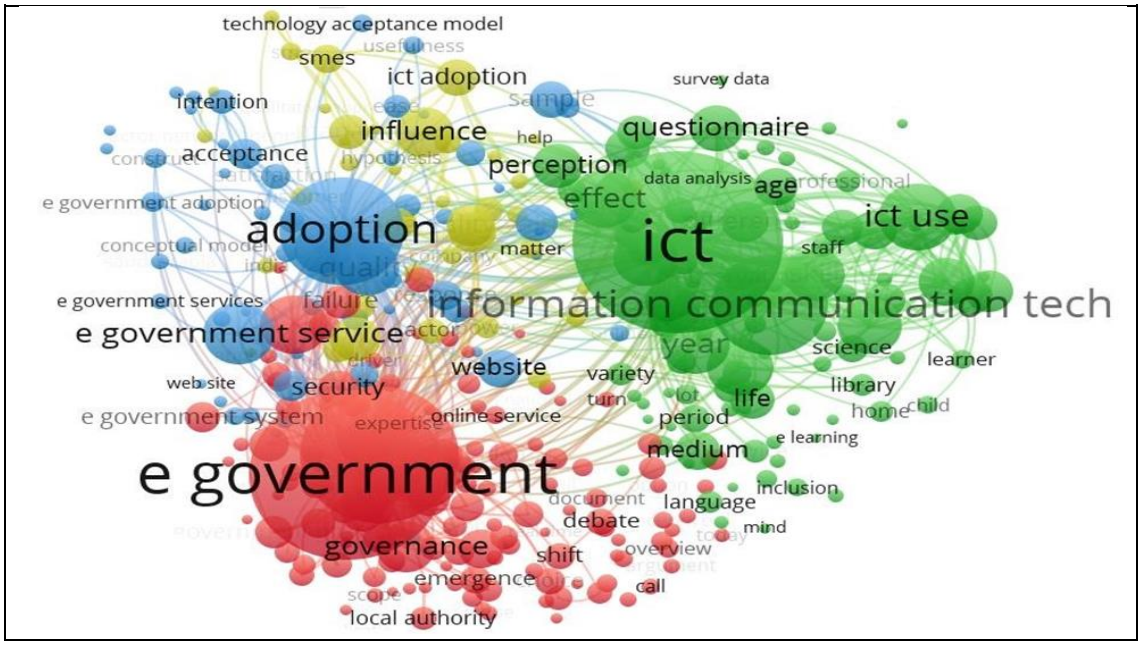

Figure 8: Co-occurrence based on title and abstract: the colours indicate the different research focus and niche areas

6 Implications of the findings

One implication of these findings is that without a large increase in the number of outputs in OA publications, the visibility of these scholars would be negligible. Although this study did not cover all outputs by SSH scholars, as it mainly focused on OA outputs, there may be a need to compare their total output with OAP. The findings point to the possibility of significant citations of outputs in OA publications compared with those in closed or pay per use ones. Our study suggested this trend when the ratio of total publications to total citations was compared. On average, one output received five times the citations because it was accessible. So the findings suggest that scholars who publish in OA journals might increase their prominence and visibility compared to outputs requiring payment to download or use. Increased adoption of an OAP route to distribute scholarly findings might be a strong tool to promote African scholarship and knowledge dissemination to wider audiences and users who might not be able to pay for scholarly articles. The cost of accessing some of the South African scholars' outputs could explain why some of their outputs have received very low citation counts, and some have not been cited even once. Despite the uptake in OAP outputs in SSH, there seems to be a wider margin in outputs from the most prolific contributors and the rest of the scholars in the SSHsocial sciences and humanities field.

7 Conclusion and recommendations

This study was a bibliometric analysis of research trends and visibility of scholars in the SSH domain in South African universities based on their contributions in the OAP. The findings showed that SSH scholars in South Africa have an extensive co-authorship record with scholars globally. The findings also revealed that the United States, United Kingdom, Netherlands, Australia, and Canada were the top collaborators with the South African scholars. However, none of the African country was in the top ten of the collaboration ranking with South Africa. The co-citation analysis indicated that South African Journal of Education had the highest visibility. The study also found out that there was a sharp increase in output in 2013-2014, and significant number were published in the MJSS. In terms of output performance, North-West University outputs accounted for 10%, while University of the Witwatersrand accounted for 8.2% of the total outputs. Based on the SSH scholars' subject area of outputs, Social Sciences accounted for almost half (46.8%) while Art and Humanities accounted for 19.3%, and Economics subject area was 14.8%.

The study revealed that ICT and e-government were the top research topics and focus areas within SSH. The TAM and the Unified Theory of Acceptance and Use of Technology (UTAUT) were the predominant theoretical underpinning used by SSH scholars. The findings showed that the top eight most visible authors' contributions were less than 6.2% of the total OAP outputs in SSH in South Africa. This is statistically significant, pointing to huge gaps between the most prolific authors in SSH and the rest of academic scholars. The number of contributions to scholarly outputs suggests that South African SSH scholars have established collaborations with those in other countries. The findings further established that

SSH scholars in South African Higher Education Institutions showed interest in promoting OA publications. It would thus seem that campaigns by LIASA and university libraries to promote OAP have resulted in the increased appreciation of OAP.

Therefore, it is recommended that SSH scholars who are not using journals that support OAP should make their outputs more widely accessible and increasing their visibility and prominence among their global academic peers. The study recommend that stakeholders should thus launch intensive campaigns to support OA articles to increase the visibility and prominence of scholars within SSH in South Africa.

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Appendix

The assumption by Ezema and Onyancha (2017) that open access publications receives higher citations impact was tested. We made comparison with the top cited articles in all categories from 2006 – 2019. By comparing the total citation of the top ten outputs from the total published articles not freely accessible (*n*=40,919) and the OAP (*n*=3,383). The search rriteria used were: Subject area (soci) AND affilliate country (South Africa). The specific subject focus were limited to social sciences and humanities with each separated by a Boolean operator; (arts) EA (arts OR busi OR deci OR econ OR psyc OR soci). Also, the publication years were further clustered into 2, from 2006-2017, because outputs in these years were limited, AND LIMITTO (PUBYEAR , 2006- 2017) OR LIMIT-TO (PUBYEAR, 2018) (LIMIT-TO (PUBYEAR, 2019)). The overall h-index for the 40,919 outputs were compared with the OAP outputs. Surprisingly, the OAP (h-index= 11, while the restricted access (h-index -10). Thus, the findings supports the assumption that outputs in the OAP will performed better in terms of citation impact. However, the author visibility and prominence might be enhanced.= 10 (Of the 10 documents considered for the h-index, 10 have been cited at least 10 times.). Even though the number of restricted outputs (*n*=40,919) were six times more than the OA outputs (*n*=6,386), by percentage,

OA article are more likely to get more visibility (15%) because it is freely accessible and usable.

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Comparison of Open Access and Restricted Access based on Citation Impact

Restricted Access (*n*=40,919)		<2015	2015	2016	2017	2018	2019	subtotal	total
Publication Year	Authors								
2013	Poloczanska et al	59	105	97	105	134	98	539	598
2012	Lang et al	84	74	94	129	185	84	566	650
2011	Borras et al	105	46	47	66	60	32	251	356
2011	Robinson J.	117	52	88	66	69	33	308	426
2010	Lund et al	117	43	42	49	69	31	234	351
2009	Bryan et al	98	52	43	48	64	45	252	350
2009	Deressa et al	110	54	58	70	103	54	339	449
2007	Schmitt et al	218	37	47	62	62	37	245	463
2006	Richardson et al	397	36	44	51	56	38	225	622
2006	McIntyre et al	200	32	25	45	42	23	167	367
Cumulative Total		**1505**	**531**	**585**	**691**	**844**	**475**	**3126**	**4632**

1. ábra:Paid-to-use Publication Articles Citation Ranking

Open Access (*n*=6,383)		<2015	2015	2016	2017	2018	2019	subtotal	total
Publication Year	Authors	508	257	334	550	690	404	2235	2743
<2015	Diaz et al	1	23	75	136	177	97	508	509
2015	White et al	74	59	50	64	69	44	286	360
2012	Callaghan et al	157	46	38	47	48	22	201	358
2010	Wise et al	13	25	64	72	84	60	305	318
2014	Pascual et al	0	0	0	31	112	79	222	222
2017	Van de Schoot et al	8	17	21	38	56	30	162	170
2014	Lehmann et al	89	27	11	21	16	1	76	165
2009	Maes et al	0	0	14	47	64	38	163	163
2016	Nutt et al	5	33	35	37	35	15	155	160
2014	Adato et al	91	14	14	22	13	6	69	160
2009	Goldberg et al	70	13	12	35	16	11	87	157
Cumulative Total		**508**	**257**	**334**	**550**	**690**	**404**	**2235**	**2743**

2. ábra: Open Access Articles Citation Ranking