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Webometric Analysis of Open Access Digital Repositories of Agricultural Sciences in Continents of Oceania

Sanjib Ghosh
ghoshsanjiblib@gmail.com

Dr. Bijan Kumar Roy
The University of Burdwan, bijankumarroy@yahoo.co.in

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Abstract

The paper focuses on the Webometric analysis and visibility of websites of digital repositories of Agricultural sciences in Oceania and also discusses several link structures and therefore the presence of the web through different indicators like Internet access, WebPages, and link count. Throughout this study, a popular search engine like Google has been used to analyze and measure the presence on the web of those agricultural repositories. The result shows that DAFWA Research Library, Australia occupies the first place with 0.2719 % Self-Link WIF presence amongst 04 digital agricultural repositories in Oceania continents. aCQUIRe: CQUniversity's institutional repository ranks first position with 954 sites and 171 in-link sites and 0.1792% Revised or In-link WIF. DAFWA Research Library occupied the first position with 408088.45% index value followed by Queensland University of Technology ePrints Archive and Queensland Dept. of Agriculture and Fisheries e-Research Archive, Australia regarding the WISER index value of IDR websites. So from this study information professional, researchers, students can get a clear idea about the qualitative websites of open access digital repositories of agricultural sciences in Oceania which help to fulfill their information needs.

Keywords:
Digital Repository, Open Access, Agriculture, Open DOAR, Open ROAR, WISER RANK, Web IF

1. Introduction

For the advancement of human civilization around the world, Agricultural features play a great role and that considered as the science and art of cultivation of plants and livestock, and it not only provides food and staple but also employment opportunities to a considerable proportion of demography. And, therefore, the massive number of people in various countries of the world still depends upon agriculture. For this subsistence during this technological revolution era, cultivation and agriculture play a serious role which correlated with the economic development of various countries within the world. And thus, agriculture is taken as the backbone of any country's financial system. And therefore the agricultural production of the Oceania continents has no exception. Digital repository websites of agricultural sciences can be measured through webometric indicators and different web impact factors of their websites which come under a webometric study that covers research all network-based communications using Informetric or other quantitative measures. So an effort has been made to analyze the presence and impact factor of the web of selected digital repositories of agricultural sciences of Oceania continents through different Webometric indicators in this study.

2. Repositories of Agricultural Sciences in Oceania Continents

In the 21st-century, due to the inflammation of publication cost or serial crisis has brought drastic changes in the scholarly communication process and have developed open access institutional repositories significantly in different disciplines all over the world which are the collection of

scholarly literature available in online databases on the Internet that can be accessed freely available. Different developed countries like the USA, Europe, and the UK and also under developing countries have created subject and interdisciplinary repositories maintained by universities, research institutions, associations, organizations, etc. at national and international levels. Accordingly, a good number of repositories are available in the field of Agricultural Sciences. Agricultural Sciences is a broad multidisciplinary field that includes agriculture, food, and Veterinary Science, etc. which have great importance in information and knowledge management. In 1991 Dr Paul Ginsparg has developed arXiv as a first subject repository. The Registry of Open Access Repositories (ROAR) currently (December 2019) reports 4162 repositories of which 167 (4%) are from the 'Agricultural' field. Asia ranks 1st position and contributes 56 repositories, 42 in Europe, 28 from South America, 11 in North America, 20 from Africa and 2 in Oceania (ROAR, 2020). Another database, Open DOAR (Directory of Open Access Repositories) (Open DOAR, 2020) has recorded 5179 repositories and out of which 186 (3.59%) repositories are from 'Agriculture, Food and Veterinary'. Oceanian contributes 78 repositories, 46 America, 41 in Asia, 19 repositories from Africa and 04 repositories from Oceania which have identified in the following figures.

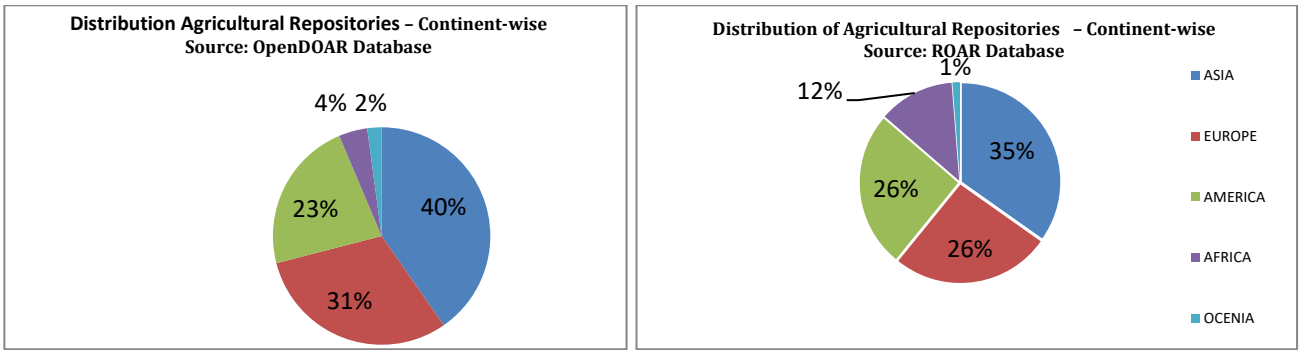

Fig. 1: Agricultural Repositories Country-wise Source: OpenDOAR & ROAR Database

3. Literature Review

Over the past many years several, studies have been done about webometric study. Ingwersen (1998)[12] analyzed seven small and medium scale national and four large web domains as well as six institutional websites and results demonstrate that Web-IFs are calculable with high confidence for national sector domains whilst institutional Web-IFs should be approached with caution. Smith (1999) compared the relative attractiveness or influence of Web spaces through explaining the WIF of Australasian universities and Australasian electronic journals. Thelwall (2000) surveyed to test the coverage of search engines to understood, whether their partial coverage is indeed an obstacle for using them to calculate WIF. The results indicate that coverage of search engines in large national domains have highly uneven that can lead to misleading calculations. Thelwall (2001)[29] explained the WIFs, the proposed web equivalent of Impact Factors for journals, can be calculated by using search engines. The author presented a bespoke web crawler designed specifically for the calculation of reliable WIFs is presented. This crawler was used to calculate WIFs for a number of UK universities,

and the results of these calculations were discussed. Smith (2002)[27] calculated the WIF of electronic journals and NZ University Websites to investigate whether the extent of metadata used by a site influences the WIF of the site. and found the most positive correlation between the substantive WIF of the electronic journal sites and the extent of Dublin Core metadata use. Kousha (2003)[19] compared Iranian newspapers' websites through analysis of WIF to find out the correlation between Web Impact Factor and non-associated ones like newspaper numbers. And revealed that there was no significant relationship among associated and no associated variables related to the newspapers but the external web impact factor had a significant relationship with some associated variables. Bjorneborn & Ingwersen (2004)[7] defined "Webometrics as the study of quantitative aspects of the construction and use of information resources, structures and technologies on the web, drawing on bibliometric and Informetric approaches". Different researchers have applied this evaluative technique to measure and evaluate the websites of different fields. Larson (1996)[21] analyzed the link structures in academic web spaces. Thelwall, Tang & Price (2003)[30] made a webometric analysis of the universities of 16 Oceanian countries to know academic interlinking and the result revealed that universities' websites mostly linked to geographically nearer countries. Thelwall and Harries (2004)[31] studied the quality and impact of academic Websites on many audiences, scholars, and Web educators, who needed to identify best practices. The result revealed that universities with higher rated scholars produced significantly more Web content with a similar average online impact. Mukhopadhyay (2004)[23] investigated different levels of domain name system and calculate WIF of ccTLDs of SAARC group of countries; sub-level domains of education and research institute, that registered under Indian ccTLD, and hosts under IIT and IIM educational system in India. Noruji (2005)[24] investigated the WIFs by calculating the number of links to Iranian universities through the AltaVista search engine and introduced a new system of measurement. Overall, Iranian university websites have fewer In-linked WIFs. Through this investigation, it has been revealed that certain features of the site can affect the WIF of an organization, but there is a significant relationship between the proportion of English language pages on an organization's site and the organization's backlink calculations. Noruji (2006)[25] analyzed the Web presence and Web Impact Factor for country code top-level and sub-level domains of education and academic institutions in Middle-Eastern countries. And found that, except for Turkey, Israel, and Iran other countries of Middle-Eastern have a low web presence due to their low in-link WIF. From it is concluded that certain features of the site can affect the WIF of a country. Jeyshankar and Ramesh Babu (2009)[18] conducted a webometric study of twenty-seven states and sixteen private university websites of Tamil Nadu. And the result revealed that although the number of web pages of some universities was much higher, the proportion of their link pages is very small, so the websites were fall behind their simple, self-linked, and external link web impact factor. In another study Ramesh Babu, Jeyshankar and Nageswara Rao (2009)[5] warned through measure the web impact

factor of 34 state agricultural universities websites in India about the analogy between citation analysis and link analysis too far. The result revealed that web impact factors can be calculated as a way of comparing the attractiveness of web sites or domains on the web. Jalal, Biswas & Mukhopadhyay (2009)[15] applied different types of webometric ranking methods for NAAC accredited universities in Southern Region and result revealed that NAAC ranking and WISER ranking of these Universities are highly correlated. Jalal, Biswas, and Mukhopadhyay (2010)[16] analyzed the link structure of 20 Asian countries based on web pages through the analysis of web pages, the number of internet users, and link counts. And for Webometric Ranking, used the WISER Ranking method by four indicators as Size, Visibility, Rich Files, and Scholar. Didegah and Goltaji (2010)[10] analyzed the link and web impact factors of top universities' of the Islamic world and the name of these top universities was collected from www.webometrics.info. The result revealed that in the ranking of these Universities the internal links or self links played a crucial role and between the Web Impact Factor and the Universities World Rank of such universities was a strong correlation. Islam (2011)[14] examined the Simple Web Impact Factor, Self-Link Web Impact Factor, and External Web Impact Factor of the website of seventy-one universities in Bangladesh by using the AltaVista search engine and ranked them by these web impact factors. And the result revealed that the number of web pages of twenty-two universities were very low, which required steps to improve their visibility on the web. Vijayakumar (2012)[35] analyzed websites of 19 universities in Sri Lanka and the result revealed that the University of Colombo, University of Sri Jayewardepura, University of Peradeniya ranked according to their highest WebPages, links, self links and based on their WISER rank the University of Colombo gets rank in the first position. Walia & Gupta (2012)[37] conducted a webometric study for Selected National Libraries' Websites and analyzed the Web Impact Factor of their and the result show that the websites of national libraries in America, Australia, and Britain were more visible and hosted the more content compare to the websites of India, Namibia, and South Africa. Sujitha and Jeyshankar (2012)[28] examined the websites of twenty-two Indian Council for Medical Research Institutions based on different link pages and webpages and calculate the web Impact Factor. Altavista search engine used to collect data. The result revealed that the In-link webpages provide more links among all other links. Madhusudhan and Prakash (2013)[22] compared the ranking of IITs using different ranking system such as WISER, WIF(In-link) and world rank that result find out the Correlation between WISER ranking and WIF. Sujitha and Jeyshankar (2013)[29] conducted a webometric analysis of websites of sixteen IITs in India. Used Boolean Operators in the Google search engine to collect data. These websites were ranking through the analysis of different web impact factors and therefore the result revealed that the performance of External links is quite than all other links of IITs altogether. Acharya & Park (2016)[2] analyzed the networking patterns and also the extent to which they're exposed internationally in cyberspace by using Webometric Analyst 2.0. Also investigated the networking behavior in the World

Wide Web through inter-linkage analysis, co-mention analysis, and link impact analyses. The result found that international organizations were interlinked, and also the non-governmental, and government organizations were strongly interlinked. Damayanti, Sukmaaji, & Suhandiah, (2017)[9] analysed Web Impact Factor to measure the average number of links of Stikom Surabaya websites for generating strategies to increase ranking webometrics. The resulting strategy there are 4 categories were needed, namely, policy, technical, content or content and supporting or supporters. Kumar (2017)[20] examined the websites of seven deemed universities in Andhra Pradesh and Telangana and ranked them based on their web impact factor. The results show that although the number of web-pages of Andhra Pradesh universities is much higher, most of the parameters of Telangana University websites have high web impact factor. Verma and Brahma (2017a)[33] analyzed the websites of National Libraries in South Asia to find out the number of web pages, link pages and also calculate the web impact factor of websites National Libraries and ranked them based on their WIF. Verma and Brahma (2017b)[34] also conducted a webometric study of 10 Central universities in North East India. And the result revealed that between the Central Universities websites in North East India, the Mizoram University holds the position in top. Jhamb & Ruhela (2017)[17] analyzed 7 public libraries websites and revealed that the website of Central Secretariat library occupies the highest simple and external web impact factor between 7 libraries, and only the website of RRRLF having internal and external links, the website of National library and Thanjavur Maharaja Serfoji's Sarasvati Mahal library also get the highest external and total links.

4. Objectives:

The main objectives of this proposed study entitled "Websites of Open Access Digital Repositories of Agricultural Sciences in Oceanian Continents: A Webometric Study" is to critically investigate the following specific objectives:

A. To analyze the selected OA digital repositories of agricultural sciences in Oceania on the basis of their websites' activity;

B. To find out various types of links, explore the web presence and calculate various web impact factors of websites of the selected agricultural repositories;

C. To use WISER (Web Indicators for Science, Technology and Innovation Research) ranking method to know the visibility and connectivity of the open access agricultural repositories on the web;

D. Compute the correlation between ranking of WISER and WIF (inlink).

5. Scope and Limitations of the Study

This analytical study is limited to open access repositories of agricultural sciences in Oceania countries registered in open DOAR (04 OARS) and open ROAR (02 OARS) databases within December 2020. For this study total, 04 unique repositories have been finally selected from open

ROAR and open DOAR after eliminating all common repositories. In open DOAR and open ROAR, The 'Agriculture' as a key subject covers different fields such as agriculture, food, and veterinary science, plant culture, forestry, animal culture, aquaculture, fisheries, angling and hunting sports.

6. Research Methodology

In this present study survey and observation method are used and in order to collect data from the websites of selected agricultural digital repositories which are registered in open ROAR (Registry of Open Access Repositories) and Open DOAR (A Global Directory of Open Access Repositories) by using Google search engine. Before using the list, we have checked the access of each agricultural repository. Total 04 OAAR repositories are selected in Oceania which registered on the Open DOAR and ROAR. And the collected data are analyzed and discussed keeping in view the objective of the study.

7.1 A methodology is followed in two parts:

Webometric study includes find out Web Impact factors, WISER rank analysis using tools and techniques. Visualization and network link analysis among the Oceania Agricultural Repository Websites.

7.2 Data Collection through Searching:

In every webometric study different search engines such as AltaVista, Yahoo, and Google, etc. play an important role to collect data but at the end of 2011 AltaVista and Yahoo have withdrawn their facilities due to their matter of company policy (Jalal, Biswas & Mukhopadhyay, 2015). So, for this present study, data have been collected using Google's search engine based on the advanced query syntax of AltaVista for the approximate number of different link pages from the websites of four selected agricultural repositories of Oceania during 15-24 November 2020. The following search statements or syntax are used to collect data for each of the 04 repository websites as:

Table2: The data collection methods extensively use of following search and search syntax.

Search Command	Explanation
site/domain:abc	*Retrieve the total number of WebPages at the website under a URL*
site:abc AND NOT linkdomain:abc	*Retrieve total number of WebPages not under a URL/website or domain name, i.e. external -link pages.*
Site:abc AND linkdomain:abc	*Retrieve total number of WebPages under a URL/website or domain name i.e. self –links pages (links from the same website).*
linkdomain: abc	*Retrieve total number of links*
site:abc NOT linkdomain:abc	*Retrieve total number of links incoming from other websites, i.e. inlink / backlink pages*
site: abc filetype:pdf/ppt/doc	*Report total number of pdf files*

7.3 Calculation of Web Impact Factors (WIF)

Most of the webometric study is based on the web impact factors (WIFs) of either simple WIF (WIFs) or revised WIF (WIFs).

7.4 The calculation of WIF is as follows

1. *Simple WIF (SWIF) = Total number of links / hyperlinks (external-link and self-link web pages)(LWP) / Total number of web pages (NWP)*

2. *Self-link WIF (SLWIF) = Total number self-link web pages / Total number of web pages (NWP)*

3. *External-link WIF (ELWIF) = Total number of external-link web pages / Total number of web pages (NWP)*

4. *InLink / Revised WIF (ILWIF / RWIF) = Total number of in-link web pages / Total number of web pages (NWP)*

Where A=Total no of WebPages of a given site; B=Total no of external back links to a given site; C=Total no of self link of a given site; D=total no of links to a given site.

7.5 Calculation of WISER INDEX Value is as follows

Multi-dimensional activities of digital repositories are reflected in their web presence, and the WISER Ranking Method used to measure these different aspects. Almind & Ingwersen first used the term "Web indicator" In 1997. The WISER Ranking value calculated through the combination of these four indicators i.e. the number of In-links or external links, the number of WebPages, the number of rich files in a web domain, and the number of publications in the Google scholar database based on the following formula where each one has a different weight:

Webometrics Rank (position) = 4*RankV + 2*RankS + 1*RankR + 1*RankSc; Where**,**

V=Visibility**; S=** Size**; R=** Rich Files and **Sc=** Google Scholar**.**

<table>
<tr><th colspan="2">Webometrics Rank</th></tr>
<tr><td rowspan="3">Visibility 50%

(inlinks or external links)</td><td>Size 20% (Webpages)</td></tr>
<tr><td>Rich Files 15%
(Adobe Acrobat (.pdf), MS Word (doc, docx), MS Powerpoint (ppt, pptx) and PostScript (.ps))</td></tr>
<tr><td>Scholars 15% (Google Scholar database)</td></tr>
</table>

Figure - 2: WISER Ranking (http://www.webometrics.info/en/Methodology)

Aguillo, et al. (2008) has given the formula for WISER ranking as:

WISER ranking = log (Visibility 50%) + log (Size 20%) + log (Rich files 15%) + log (Scholars 15%).

7. Data Analysis and Interpretation

WIF for each Agricultural digital Repository have been calculated on the basis of formula which is given in Sec.6.3 in four different ways. These are WIF (simple) a ratio of number of total link pages and number of web pages; WIF (Self link)-a ratio of number of total self link pages and number of web pages; WIF (External link)-a ratio of number of total external link pages and number of web pages; WIF (Revised link)-a ratio of number of total in-link pages and number of web pages which reflex of the degree of impact of the domain spaces on the WWW. A matrix may represent the calculation of WIF of different web spaces in different levels shown in four tables.

Table3: Simple-Link Web Impact Factor for Agricultural Repositories

SL NO.	NAME OF IDRs	NWP (A)	SLWP (B)	SIMPLE LINK IF (B/A)	Rank
1	ACQUIRE : CQUniversity's IR	954	38400	**40.2515**	1
2	DAFWA Research Library	14600	99500	**6.8150**	2
3	Queensland DepT. of Agriculture and Fisheries eResearch Archive	29100	85000	**2.9209**	3
4	Queensland Univ. of Tech. ePrints Archive	202000	113000	**0.5594**	4

Note: NWP=No. of Web Page, SLWP=Simple Link Web Page, SLWIF= Simple Link Web Impact Factor

The table3 illustrates the rank distribution of agricultural digital repositories in Oceanian according to their Simple Web Impact Factor (SWIF). Dividing the number of link pages by number of WebPages, the Simple Web Impact Factor for each Agricultural Repositories has been calculated. aCQUIRE:CQUniversity's IR occupies the first place with 40.25% SWIF. The second and third place goes to DAFWA Research Library (14600) and Queensland Dept. of Agriculture and Fisheries eResearch Archive (29100), Queensland Univ. of Tech. ePrints Archive (202000) have more no of WebPages that the above three Agricultural Repositories, but they are ranked 04th place respectively based on their SWIF.

Table4: Self- Link Web Impact Factor for Agricultural Repositories

SL NO.	NAME OF IDRs	NWP (A)	SLP (C)	SELF LINK IF (C/A)	Rank
1	DAFWA Research Library	14600	3970	**0.2719**	1
2	Queensland University of Technology ePrints Archive	202000	26700	**0.1321**	2
3	aCQUIRE : CQUniversity's Institutional Repository	954	94	**0.0985**	3
4	Queensland Department of Agriculture and Fisheries eResearch Archive	29100	2600	**0.0893**	4

Note: NWP=No. of Web Page, SLWP=Self Link Web Page, SLWIF=Self Link Web Impact Factor

The ranking of Agricultural Repositories in Oceanian is based on their Self Link Web Impact Factor as show in the table 4. DAFWA Research Library occupies the first place with 3970 Self Link Pages and 14600 WebPages with 0.2719 Self-Link WIF. Repository of Queensland University of Technology ePrints Archive and Repository of aCQUIRE: CQUniversity's are ranked 2nd and 3rd place with Self-Link WIF of 0.1321 and 0.0985 respectively. Though Repository of Queensland Department of Agriculture and Fisheries eResearch Archive (29100) have more no of WebPages compared to DAFWA Research Library (14600) and aCQUIRE : CQUniversity's Institutional Repository (954) but still it has occupies 04th position in the ranking as because it's number of Link Pages are very less compare to their number of WebPages.

Table 5: External ink Web Impact Factor for Agricultural Digital Repositories

SL NO.	NAME OF IDRs	NW (A)	ELP (D)	EXTERNAL- LINK IF (D/A)	Rank
1	DAFWA Research Library	14600	3450	**0.2363**	1
2	Queensland University of Technology ePrints Archive	202000	23900	**0.1183**	2
3	aCQUIRe : CQUniversity's institutional repository	954	95	**0.0995**	3

4	Queensland Department of Agriculture and Fisheries eResearch Archive	29100	2520	0.0865	4

Note: NWP=No. of Web Page, EWLP=External Link Web Page, ELWIF=External Link Web Impact Factor

Table5 reveals the rank distribution of Open Access Agricultural Digital Repositories in Oceanian based on their External Link Web Impact Factor (ELWIF). DAFWA Research Library again occupies the first place with 14600 WebPages, 3450 link pages and its ELWIF is 0.2363. Queensland University of Technology ePrints Archive and aCQUIRe: CQUniversity's institutional repositories have been ranked 2nd and 3rd position with the EWIF as 0.1183 and 0.0995 respectively.

Table 6: Revised-Link Web Impact Factor for Agricultural Repositories

SL NO.	NAME OF IDRs	NWP (A)	ILWP (E)	In-Link IF (E/A)	Rank
1	aCQUIRE : CQUniversity's Institutional Repository	954	171	**0.1792**	1
2	DAFWA Research Library	14600	1830	**0.1253**	2
3	Queensland University of Technology ePrints Archive	202000	23600	**0.1168**	3
4	Queensland Department of Agriculture and Fisheries eResearch Archive	29100	1810	**0.0621**	4

Note: NWP=No. of Web Page, IWLP=In-Link Web Page, RLWIF=Revised Link Web Impact Factor

Table 6 exhibits the rank distribution of the 04 Open Access Agricultural digital Repositories according to their revised web impact factor (RWIF) which has been calculated by putting the following formula i.e. Revised Web Impact Factor=E/A Where E=Internal Link Web Page and A=Number of Web Page. aCQUIRE : CQUniversity's Institutional Repository again ranked first position with 954 Web Pages and 171 in-link web pages and 0.1792 RWIF; followed by DAFWA Research Library with 14600 Web Pages and 1830 InLink Web Pages and 0.1253. Queensland Department of Agriculture and Fisheries e-Research Archive occupied 4th position with 0.0621.

8. WISER Ranking

8.1 WISER Ranking Method

According to WISER (Web Indicator for Science, Technology and Innovation Research) Ranking method, the four indicators namely Size (S), Visibility (V), Rich Files (R) and Scholar (Sc) were collected and have been given different weight to each indicator to calculate the rank. This ranking method used to know the visibility and connectivity of the open access agricultural repositories on the web. The WISER Rank is calculated by using the following formula: WISER Rank = log (Visibility 50%) + log (Size 20% +log (Rich Files 15%) +log (Scholar 15%) which recommended by the World Webometrics Group for ranking academic institutions.

Table7: Ranking of Agricultural Repositories based on WISER INDICATOR

Name of the Repositories	Web page (A) [Size]	In-link (E) [Visibility]	Total Links (B)	Rich Files [RFs]				Google Scholar	WISER Index Value	RANK
				No of Pdf	No of doc	No of Ppt	Total			
aCQUIRE : CQUniversity's Inst. Repository	954	171	38400	11300	9	11700	23009	146	3749.55	4

Queensland Dept. of Agriculture and Fisheries eResearch Archive	29100	1810	99500	57700	765	4	58469	115	15512.6	3
Queensland University of Technology ePrints Archive	202000	23600	85000	38700	135	23	38858	34000	63128.7	2
DAFWA Research Library	14600	1830	113000	2690000	44	9	2690053	4970	408088.45	1

An attempt has been made to rank the WebPages and the links of Oceania Agricultural Repositories using appropriate webometric indicators. In addition to the WISER ranking which was explained in research methodology. WISER rank by Oceania Agricultural Repositories is shown in table 7. Here Institutional repository of DAFWA Research Library occupied highest rank followed by Queensland Dept. of Agriculture and Fisheries e-Research Archive and Queensland University of Technology ePrints Archive, Australia. Table7 shows the rich files.

9. The correlation between ranking of WISER and WIF (inlink)

Table-8: **Correlation between ranking of WISER and WIF (INLINK)**

Sl No.	Name of Repository	WISER Rank (X)	WIF (Inlink) (Y)	Square (x)	Square (y)	XY	X=(X-Xbar)	Y=(Y-Ybar)	XY	Square (X)	Square (Y)
1	ACQUIRe is CQUniversity's inst. Repository	4	1	16	1	4	13.5	-11.5	-20.25	182.25	2.25
2	Queensland Department of Agriculture and Fisheries eResearch Archive	3	4	9	16	12	6.5	13.5	87.75	42.25	182.25
3	Queensland University of Technology ePrints Archive	2	3	4	9	6	1.5	6.5	9.75	2.25	42.25
4	DAFWA Research Library	1	2	1	4	2	-1.5	1.5	-2.25	2.25	2.25
Total		**10**	**10**	**30**	**30**	**24**	**20**	**20**	**75**	**229**	**229**

Hence, Mean for the variable (X & Y) can be calculated as:

$$\mathbf{Xbar = \frac{1}{N}\sum_{i=1}^{N} xi = \frac{1}{N}(x1+x2+\ldots\ldots+xN).}$$

In this case mean (X & Y) are same i.e. **Xbar = Ybar =2.5**

Standard deviation will be calculated with the help of following formula:

$$\mathbf{\sigma x = Sqrt\left[\frac{1}{N}\sum_{i=1}^{N}(Xi - Xbar)2\right]}$$

Where N=4. In such a situation, standard deviations of X (i.e. σ x) & Y (i.e. σ y) are 3.7831864 and 3.7831864 respectively.

The correlation coefficient uses to relate the strength and direction of linear relationship between two variables. The coefficient of determination represents the percent of the data that is the closest to the line of best fit. Correlation will always between -1.0 and +1.0. If the correlation is positive,

we have a positive relationship. If it is negative, the relationship is negative. The coefficient of determination (i.e. r2) is such that 0< r2 < 1, and denotes the strength of the linear association between x and y. The formula can be given as follows:

$$\textbf{Correlation(r)} = \frac{N\Sigma XY - (\Sigma X)(\Sigma Y)}{\text{Sqrt}([N\Sigma X2 - (\Sigma X)2][N\Sigma Y2 - (\Sigma Y)2])};$$

Sqrt ([NΣX2 - (ΣX) 2][NΣY2 - (ΣY) 2]) ***Or***

r2 = [COV(X, Y)/ σ x * σy] = [(1/N Σ XY - mean(X) * mean(Y))/ σ x * σy]; Where, N=4; ΣX =10; ΣY = 10; ΣXY =24; ΣX2 =30; ΣY2 =30 (For upper one Equation i.e. for **r)**

Or

Mean (X) = mean(Y) =2.5; σ x = 3.7831864 and σy = 3.7831864 (For lower one Equation i.e. for r2).

Therefore, the calculated value of r would be = -0.2 which implied that there is an inverse relation between two ranking methods Where N is the number of pairs of data and r denotes the correlation coefficient. σ x is the standard deviation of X and σ y standard deviation of Y.

10. Major Findings

Web Impact Factor, link analysis and WISER ranking and correlation of WISER and WIF (in-link) of agricultural repositories in Oceania is an unexplored area of webometric research. In this study, these webometric methods are applied to 04 agricultural repositories in Oceania. The following are the major findings of this study i.e.

- The repository websites of ACQUIRE: CQUniversity at the first rank with the Simple Web Impact Factor (SWIF) are reflected in table 3. ACQUIRE : CQUniversity occupies the first place with 40.25% SWIF. The second and third place goes to DAFWA Research Library, Queensland DepT. of Agriculture and Fisheries eResearch Archive and Queensland Univ. of Tech. ePrints Archive which shows in Table 3.
- DAFWA Research Library occupies the first place with 3970 Self Link Pages and 14600 WebPages with 0.2719% SWIF which shows in Table 4.
- DAFWA Research Library occupies the first place with 14600 WebPages, 3450 link pages, and its ELWIF is 0.2363 where as Queensland University of Technology ePrints Archive and Queensland Department of Agriculture and Fisheries eResearch Archive occupies second and fourth position with 202000 & 29100 webpages, and 23900 & 2520 link pages with 0.1183% & 0.0865% ELIF which shows in Table 5.
- aCQUIRE: CQUniversity's Institutional Repository again ranked the first position with 954 Web Pages and 171 in-link web pages and 0.1792 RWIF.
- DAFWA Research Library occupied the highest rank followed by Queensland University of Technology ePrints Archive and Queensland Dept. of Agriculture and Fisheries eResearch Archive regarding the WISER value of IDR websites which shows in Table 7.

- The calculated value of r = -0.2 which shown in table 8 has implied that there is low negative correlation between WISER and WIF (in-links) two ranking methods.

11. Conclusions

In this paper, an analytical study of four agricultural digital repository websites in Oceania was presented. The study was conducted in December 2020 using the Google search engine. Based on the collected data and its analysis, the repositories' websites were ranked based on two webometric ranking methods i.e. WIF and WISER. The results of this study have helped to reach the conclusion that this analysis provides a framework for ranking of repositories websites in Oceania based on different webometric Indicators. The library administrators can get awareness about whether their website has effectively represented itself on the internet with better performance from the ranking results. The results help to evaluate the performance of repository websites for their strengths and weaknesses accordingly. In general, the effective presence of these repository websites on the internet can be adopted on the top by having the proper number of site pages in the website, that impact their deceivability through web search tools, and to the quantity of received external links. The web plays a crucial role in circulating scholarly works of literature. Digital repositories around the world maintain their websites which are used to provide free and open access to the research outputs on a global scale and the domain of agricultural repositories in Oceania is no exception. Websites and the Internet are an essential ingredient of digital repositories across the world, even in Oceania continents. Webometrics has become an important field through which information professionals analyze websites to find the best digital repositories. To define the rank of these websites used different webometric indicators such as WIF, WISIR index values. The study sheds some light on the effective indicators used to rank websites. The results of the study can be a guide for administrators to determine their place in weak indicators and to work on their weak indicators. Thus the results of the study can be a guide for repositories to work on weak indicators to improve their rankings. Webometrics has become an essential field through which information professionals analyze websites to search for the best digital repositories. To define the rank of these websites used different webometric indicators such as WIF, WISIR index values. The study sheds some light on the effective indicators used to rank websites. The results of the study can be a guide for administrators of these repositories to determine their place in their weak indicators and to work on those weak indicators.

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