Web Analysis of 4ICU and Webometrics Based on University Ranking using Web Impact Factor

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ABSTRACT

The university ranking is currently used as a measurement standard for the development of universities in the world or referred to as World Class University (WCU). Many universities in Indonesia use ranking websites as their credible ranking benchmark. This research tries to compare two flagship ranking websites, Webometric and 4ICU which are frequently used as the main ranking standards in Indonesia. The Webometrics itself has four types of parameters for the measurement, namely Size (20%), Visibility (50%), Rich Files (15%), and Scholar (15%), while 4ICU uses two parameters: Google Page Rank and Alexa Traffic Rank. The results of the Web Impact Factor analysis show that Universitas Alma Ata has the lowest web page ranking with a total score of 144. The results are obtained by combining internal and external links in the web domain: almaata.ac.id. The Google links connected to the Universitas Alma Ata website have 25 backlinks taken from the web crawlers. The web impact factor value obtained from the web impact factor (WIF) formula is 0.005. The WIF values obtained from twenty universities have the same significant results or accepts H_o because the probability value for 2 = 1.03 F c is 0.5975, where the probability has higher value than a = 0.05. There should be a number of websites that can support existing backlinks on university websites.

1. Introduction

The university ranking in the world today is often a measure of the percentage of the development of universities in the world or often referred to as the World Class University (WCU). In this case, the topics on the importance of WCU status and the strategies that can be used to achieve WCU have caught the attention of practitioners and policymakers in the educational sectors. In this regard, there are some issues in the efforts to achieve the WCU status, one of which is that there are still many differences in the World Class University criteria. This is in line with the research by Altbach (2004) stating that the assessment of the level of a university in the world is very subjective. However, it has been commonly agreed that a university can be categorized as a WCU if it has received recognition from an institution that has an international reputation. This shows that the WCU achievement strategies can be based on the fulfillment of the WCU criteria of an institution or on efforts to encourage the use of new criteria that give more weight to the excellence of a university. The criteria used to rank, and measure university performance are very complex and tend to be not absolute. One of several university assessment criteria is the quality of the university website. This is in line with the use of the World Wide Web and its supporting technology that is currently developing rapidly. This approach assumes that a university website reflects the whole academic activities. Thus, the high quality of a university means the high quality of its website. This opinion is based on Internet World Stats data which shows that the number of internet users today is nearly 360 million with the average user growth of 528.1% from 2001 to 2011. The penetration of the use of the Internet is assumed to also occur in the academic world of educational institutions. In response,

several quantitative studies have been conducted to create some website quality measurement methods, such as those conducted by Webometrics (Spain) and 4ICU (Australia).

The weakness of Webometrics ranking lies in the use of the methods used in the ranking process and the use of tools for the data collection. As we all know, the indicators of the Webometrics assessment include the size with the quota of 20 percent, visibility with a weight of 50 percent, rich file15 percent, and scholar with the quota of 15 percent. It can be concluded that the indicators used in Webometrics are only appropriate when they are applied at the universities that have a strong commitment to the number of web publications. On the other hand, there might be a good university but having a low score on its web publication quality. Meanwhile, 4ICU uses three independent web metrics, namely traffic rank (Alexa), inbound links, and PageRank (Google).

The main weakness of the 4ICU ranking is that the assessment is only based on the popularity and use of the website, and it does not look at the contents of the website. We need an improvement in the quality assessment methods of the university's website in order to identify the WCU ranking more clearly. In this research, two web assessments are taken as the samples; Webometrics & 4ICU, because these two university ranking websites are often used as references by many universities in Indonesia. Mapping each variable to find out what types of assessments are used is an important point in this research. Using the Web Impact Factor will make it easier to determine which variables that firstly impact significantly on the universities' sites.

2. Literature Review

2.1. Webometrics

In 1997—two years after the web-based metrics were introduced—a new metric method was discovered and called Webometrics. This method is described as a study of all communication based on computer networks (including the World Wide Web) with the help of informetrics method. According to Bjorneborn and Ingwersen (2001), Webometrics is "the study of the quantitative aspects of the construction and use of information resources, structures and technologies on the Web drawing on Bibliometrics and Informetrics approaches". Another theory states that Webometrics is a part of Infometrics. In carrying out the research on Webometrics, this study is conducted by analyzing links and websites, evaluating search engines, and studying the descriptions of the web.

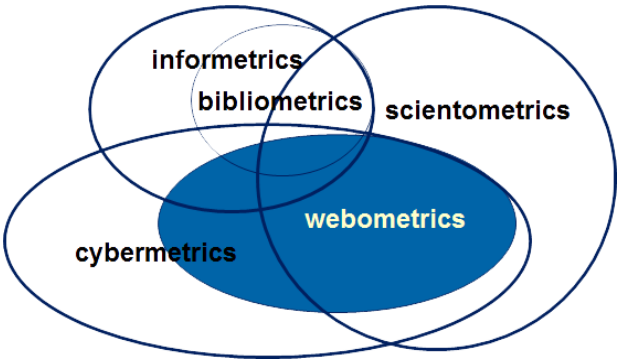

Figure 1. Webometrics Diagram

Therefore, Webometrics covers four fields:

1. *Scientometrics*, which is a science used to measure and analyze the science. In practice, scientometrics is often done using bibliometrics which is a measurement of (scientific) impact of publications.
2. *Cybermetrics*, which is similar to Webometrics, but broadens the definition to include electronic resources; the data comes from information sources, structures and technologies on the Internet, study group discussions, e-mail communication, etc.
3. *Informetrics* is the study of quantitative aspects of information. This includes the production, publication and use of all forms of information, regardless of its form or origin. It can be concluded that the focus of informetrics is on the flow of information in the network and shows on the basis of mathematical and statistical methods

4. *Bibliometrics* studies the quantitative aspects of information recorded. This method is used to analyze books, articles, and other publications. The bibliometric method is often used in the fields of library and information science. The sub-field of bibliometrics that deals with the analysis of scientific publications are called scientometrics

2.2. 4ICU

4ICU is a search engine or directory that evaluates a university's popularity in terms of its official university website. 4ICU uses algorithms from five web metrics, namely Google Page Rank, Alexa Traffic Rank, Majestic Seo Referring Domains, Majestic Seo Citation Flow, and Majestic Seo Trust Flow. More than 11,300 higher education institutions from 200 countries around the world have been assessed by 4ICU.

There are three main criteria that a higher education institution can be included in the 4ICU assessment. First, it has been accredited by a national or regional accreditation agency, for example in Indonesia is by the Ministry of Research, Technology and Higher Education. Meanwhile, the institutions that have not been yet accredited cannot be included in the 4ICU assessment criteria. Second, the universities must have provided undergraduate and/or postgraduate educational levels, both Master (S2) and Doctoral (S3) level. Thus, the institutions that only provide vocational education, military-based education, seminar classes, and others are not involved in the 4ICU assessment. Finally, the assessed universities have implemented a face-to-face teaching method, or better known as the traditional system (a format of education in a class that brings the lecturers and students together). It means the learning process is done offline within the buildings as the meeting places.

The ranking methodology is carried out using UniRank, University Ranking which has been registered as a Global University Ranking by the IREG Observatory on Academic Ranking and Excellence. The algorithmic system is based on five neutral and independent extracted websites, namely Moz Domain Authority, Alexa Global Rank, SimilarWeb Global Rank, Majestic Referring Domains, and Majestic Trust Flow. The data used for the ranking process are taken from the same week to minimize existing fluctuations and maximize comparisons. Next, filtering is performed before entering the computational process to detect the presence of outliers in the raw data. For the universities that adopt sub domain as their official website home page, there will be further investigations and reviews of Alexa Global Rank and SimilarWeb Global Rank.

When the outliers are detected and sub domain data have been reviewed and adjusted, the web matrix data are normalized to a scale from 0-100 taking into account the logarithmic nature used by some of the assessment websites used. The values that appear on the scale are then collected based on the average algorithm that generates the final score and website ranking of a university. Therefore, it can be stated simply that the assessment conducted by 4ICU makes the website of a university or institute as its main assessment material. Thus, the universities that have met the three previous criteria will not be able to be assessed anymore if they do not have an institutional website, the website has expired, or the website uses free domains such as Blogspot, WordPress, and so on.

2.3. Webometric Ranking and Web 4ICU

Currently, there are some websites that calculate the ranking of the universities, namely Webometrics and 4ICU, and both websites have different parameters in measuring the ranking.

2.3.1. Webometrics

Webometrics is a multi-dimensional university ranking method, and this is reflected in the web presence. Therefore, the best way to build the ranking is to combine a group of indicators that measure some different aspects. Almind and Ingwersen (1997) have proposed one of the first Web indicators, Web Impact Factor (WIF), which is based on link analysis that combines the number of external inlinks and the number of website pages, and 1:1 ratio between Visibility and Size. This ratio is used for the ranking but adds two new indicators to the size component: number of documents, which is measured from the number of Rich Files owned by a web domain, and the number of publications collected by the Google Scholar database. The four indicators obtained from quantitative results are provided by the major search engines as follows:

Size (S); number of pages found from four engines: Google, Yahoo, Bing and Exalead. For the search results of each engine, the results are log- normalized to 1 for the highest value. Then, for each domain, maximum and minimum results are not included, and each institution is given a ranking according to the combined number.

Visibility (V); the total number of unique external links received (in-links) by a site obtained from Yahoo Search. The results are log- normalized to 1 for the highest value and then combined to generate a ranking figure.

Rich Files (R); after evaluating their relevance for academic and publication activities and considering the volumes of different file formats, the following format are finally chosen: Adobe Acrobat (.pdf), Adobe PostScript (.ps), Microsoft Word (.doc) and Microsoft PowerPoint (.ppt). The data are retrieved using Google and combines the results for each file type after log-normalization in the same way as previously described.

Google Scholar provides the number of posts and citations for each academic domain. The results from the Scholar database describe papers, reports and other academic items.

The Webometrics Web itself uses four types of parameters for the measurement:

1. Size (20%), the number of website pages captured by the search engines (Google, Live Search/Bing)
2. Visibility (50%), which is the number of unique external links or backlinks received by college web domains (inlinks) that are captured by two search engines (Google)
3. Rich files (15%), which is the number of document files (Adobe Acrobat (.pdf), Adobe PostScript (.ps), Microsoft Word (.doc) and Microsoft PowerPoint (.ppt), and does not include .xls or latex or text which is online under the domain website of the university caught by Google search engines
4. Scholar (15%), which is the number of papers, literature, theses, and abstractions captured on Google Scholar (http://scholar.google.com) for each college website domain

2.3.2. 4ICU

The 4ICU which addresses in www.4ICU.org uses two parameters:

1. Google Page Rank, which is a website ranking provided by Google. The basic concept is the same as the popularity link, but it doesn't only take into account the "number" of inbound and outbound links. The approach is that a page will be considered important if another page has a link to it. A page will also become increasingly important if other pages that have a high rank (page rank) refer to that page.
2. Alexa Traffic Rank, which is the value of a website given by Alexa (www.alexa.com) where the more visitors of the website, the Alexa value will decrease. It combines the estimated data on the number of website visitors and how many pages a website visitor visits.

2.4. Web Impact Factor (WIF)

The University websites have been widely evaluated using link analysis in order to measure the Web Impact Factor. WIF is an impact factor of the web version. WIF was firstly introduced by Ingwersen (1998). Basically, the calculation is the same as the principles adopted from the Journal of Impact Factor (JIF). WIF measures the websites by describing the number of web pages in a website that receive links from other websites, divided by the number of web page publications in a crawler-accessed website. WIF is part of the Webometrics methodology, which is a relative measurement of the extent to which the sites are linked by others and is analogous to counting citations. There are three types of WIF calculations, namely WIF-simple, WIF-revised and WIF-overall. A series of WIF measurements with other are:

1. Self-link web impact factor: the measurement of the intensity of links with web pages on a site or domain
2. External web impact factor: the measurement of the intensity of links from other sites or domains

3. Overall web impact factor: the measurement of the intensity of all links of a site or domain

The formulation and indicators used in the Web Impact Factor are as follows:

WIF Simple = D/A WIF Revised = B/A WIF self-link = C/A

A = Total number of web pages

B = Number of external link (backlinks)

C = Number of self-links

D = Total number of links towards the web

The website evaluation using WIF self-link better reflects the logical structure to manage the web pages on a local server, or in other words, the percentage of self-links describes navigation and easy access to the available web pages. WIF self-link analysis is less meaningful than WIF in-link (external), because the majority of self-links in a website can be made for navigation purposes, rather than supporting the contents of the intended page (Thelwal, 2000).

There are some purposes of the use of WIF method proposed by Noruzi (2006):

1. The WIF analysis method presents a methodology for evaluating "International Visibility" and the impact of institutional and academic websites, and competitive links to other websites. The WIF can be considered as a useful tool for measuring the relative visibility of a company, organization, or country on the Web.
2. WIF provides a way to evaluate the relative importance of a website, especially when we compare it to the same field or country domain. Therefore, to compare a website, we must stick to certain categories.
3. The WIF for national, sector, and larger web segments or the highest domain can be calculated accurately.
4. WIF provides quantitative indicators of the website that have a long-term effect.
5. The WIF in turn provides new insights into the re-assembling process on the web. For example, the website clusters can be detected by the way co-occurrence links works. In addition, the WIF can be considered as a tool to measure the accuracy of search engine performance and website organization, linking, and page layout.

From the existing research data, the web impact factor can be reformulated as follows:

H1: The comparison of WIF obtained from the results with the ranking of the academic webs in Indonesia obtained from the Webometrics has significantly different results.

H2: The comparison of academic websites ranking between Webometrics searches through the search engines and the ranking from Webometrics website has the same significant results.

H3: The comparison of academic website ranking between Webometrics searches through the search engines and the ranking from Webometrics website has significantly different results.

H4: The academic websites in Indonesia have more link targets to the academic websites than the link targets to non-academic websites.

H5: The academic websites in Indonesia have more link targets to non-academic websites than the link targets to the academic websites.

3. Method

$$WIF = \frac{\text{The total number of pages linking to the web site}}{\text{The number of pages at the web site}} \quad \textbf{(1)}$$

The calculation for determining the Impact Factor web used two variables:

1. *Total number of page link to the website* (total links that were linked to the website); the way to retrieve the data to obtain the variables by using the website webcrawler.com. The backlinks that exist on the university web could be further identified.
2. *The number of pages at the website* (Total University Web Page) of the total pages could be identified from internal and external links, and the total number of the two links became the variable *The Number of Page at the website.*

$$(EX + IL) = \textit{The number of pages at the website}$$

The Web Impact Factor obtained from the two variables was then divided and generated a WIF value

WIF resulted in the average impacts of measurement per page, for example for a university website being measured, or all websites across the country. It could be analogous that the measurement impacted some factors, including journal citations.

WIF was useful for clarifying the importance of in-link (or total link) frequency. It was important to clarify from the number of measurements that support large websites rather than the small ones, or well-known websites from lesser-known ones, and old websites with new ones, in a case where a website had a large literature link on the web chart compared to the number of links on the new one (An and Qiu, 2004).

All things were considered equal; the greater the number of previously published web pages, the more frequent the website would be linked. Therefore, the higher the number of links linking the pages to the website, the higher the WIF. The symbolic role played by the links which represented the website contents was a broad dimension of information retrieval.

The researcher had set the impacts of WIF (not including independent links) for the website that was being evaluated. Self-links often represent an important percentage of links on the web pages. The independent links reflected the logical structure used to manage the web pages on the local server. The WIF analysis for self-links was less meaningful than the external ones, because most independent links on a website could be made for navigation purposes rather than to support the contents of the target page. The larger the website, the greater the number of independent link pages.

External links showed more effort to redirect to the target page and contained more valuable information. However, it was not always easy to separate the independent links from the external ones. For this reason, the WIF calculation model was then revised as follows:

A = total links on the website (all in-links and self-link pages).

B = inlinks on the website.

C = the same self-links and navigational links on the website.

D = number of pages on the web that are indexed by search engines.

R-WIF= revised WIF (B / D)

The Yahoo search engine could be used to count the number of links and web pages in the Webometric research because it had sophisticated searching facilities. This search engine continuously recorded the links that are represented by the web pages from many popular world websites.

Each method had its own advantages and disadvantages, including WIF. The main advantages and utilities of WIF were:

1. The WIF analysis method presented a way for evaluating "international visibility" and the impacts of institutional and academic websites, as well as its competitiveness relationship to other websites. The WIF could be classified as a useful tool for measuring the visibility

of companies, organizations, or countries on the Web. Note that WIF was not the only indicator of website usage, visibility, and popularity.

2. The WIF provided a way to evaluate the relative importance of a website, especially when we compare it with others on the same field or domain of a country. Therefore, to compare the websites, we must stick to certain categories. We did not compare the websites in different fields of studies. So, the WIF measured the success and relative influence of the similar websites
3. The WIF from national, sector and larger web segments or top-level domains are calculated from a comparison that must be carried out carefully, should be done in the same snapshot, and the comparison should also be limited to other comparable units.
4. The WIF provided more quantitative indicators of the website's long-term impacts. In the final analysis, the impacts only reflected the ability of the website and webmaster to attract its users and cybercitizens, and consequently there would be backlinks. However, we had warned the users who indiscriminately used the WIF data.
5. The WIF in turn was able to provide new insights into the retrieval process on the Web. For example, the website clusters could be detected from the co-occurrence of the page links. In addition, the WIF could also act as a tool to measure the accuracy of web search engine performance and organizational websites, linking, and page layout.

4. Results and Discussion

The results of the Web Impact Factor analysis in Table 1 shows that Universitas Alma Ata has the lowest number of web pages with the total of 144. This is obtained by combining internal and external links in the almaata.ac.id web domain. The Google link that redirects to Universitas Alma Ata website has 25 backlinks taken from the web crawlers. The web impact factor value obtained from the WIF formula is 0.005.

In Figure 2, there is a comparison of four university websites in Indonesia, with the highest number of pages from the www.unsri.ac.id website compared to the website from www.binus.ac.id which has the lowest number of web pages. However, the number of links on www.uii.ac.id in Figure 3 has the highest number of links compared to the other four websites. Meanwhile, www.binus.ac.id has the lowest number of links to websites compared to other four websites.

However, the high number of website pages of a website does not necessarily have a significant effect if the number of links to the website is low. This is shown from the results of the impact of WIF measurement in Figure 4. The highest WIF value is from www.binus.ac.id, which when compared to the number of other website pages, www.binus.ac.id has the lowest number of web pages, but the number of pages with the link to the website is balanced with the number of pages of the website. On the other hand, www.unsri.ac.id has the lowest WIF value compared to the other four websites. This shows that the impact of measurement by the WIF method will not be any longer meaningful if the number of web pages is not comparable with the number of pages with links to the website.

Table 1. Web Impact Factor

No.	University	Web pages	Google link to website	WIF
1	www.almaata.ac.id	144	25	0,005
2	www.unikom.ac.id	285	29	0.1
3	www.umy.ac.id	1,700	99	0.06
4	www.unair.ac.id	4,910	250	0.05
5	www.mercubuana.ac.id	5,490	158	0.03
6	www.um.ac.id	4,210	115	0.03
7	www.uajy.ac.id	1,560	32	0.02
8	www.undip.ac.id	14,800	335	0.02
9	www.usu.ac.id	11,100	210	0.02
10	www.gunadarma.ac.id	19,700	206	0.01
11	www.ugm.ac.id	34,900	420	0.01
12	www.ui.ac.id	33,400	494	0.01
13	www.its.ac.id	45,300	319	0.007
14	www.uii.ac.id	41,500	277	0.007
15	www.unand.ac.id	24,100	150	0.006
16	www.binus.ac.id.	1,620	50	0.03
17	www.umm.ac.id	152,000	255	0.002
18	www.ums.ac.id	50,600	84	0.002
19	www.itb.ac.id	428,000	534	0.001
20	www.unsri.ac.id	189,000	91	0.0005

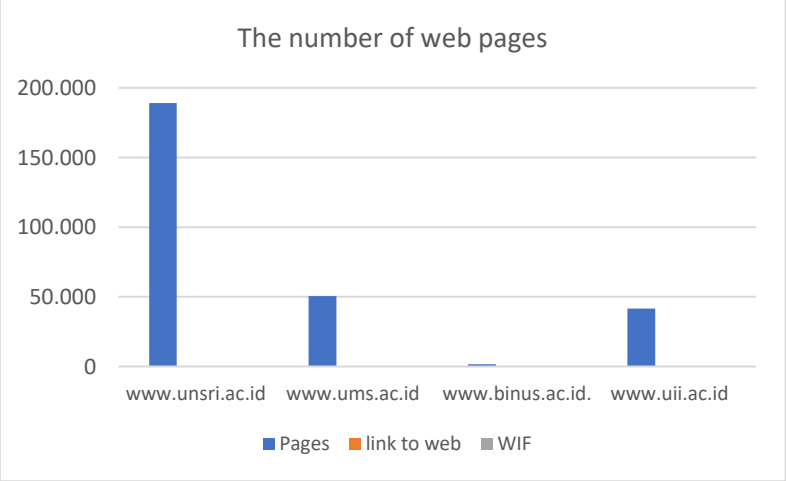

Figure 2. Graph of comparisons of page number

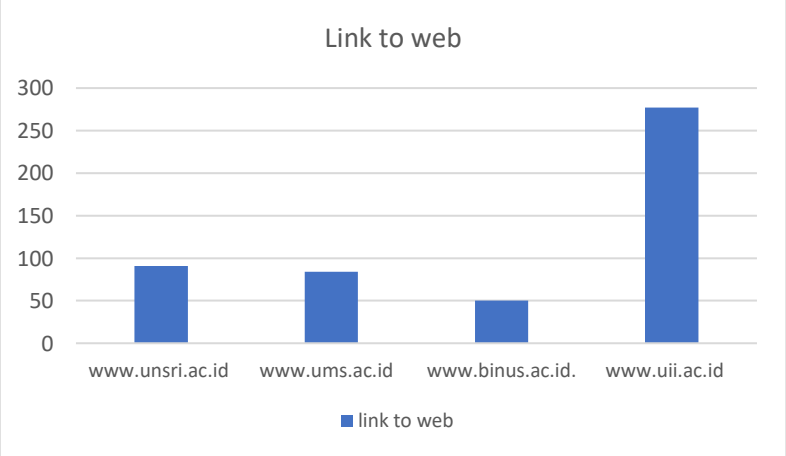

Figure 3. Graph of comparison of WIF values

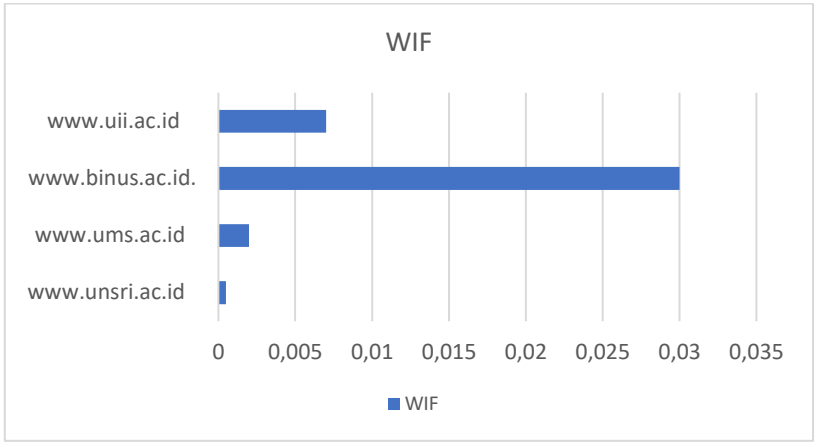

Figure 4. Graph of comparison of WIF values

In terms of the number of pages, www.almaata.ac.id needs to increase the number of internal pages, because the growth of the number of page links to the website is greatly influenced by the number of web pages themselves.

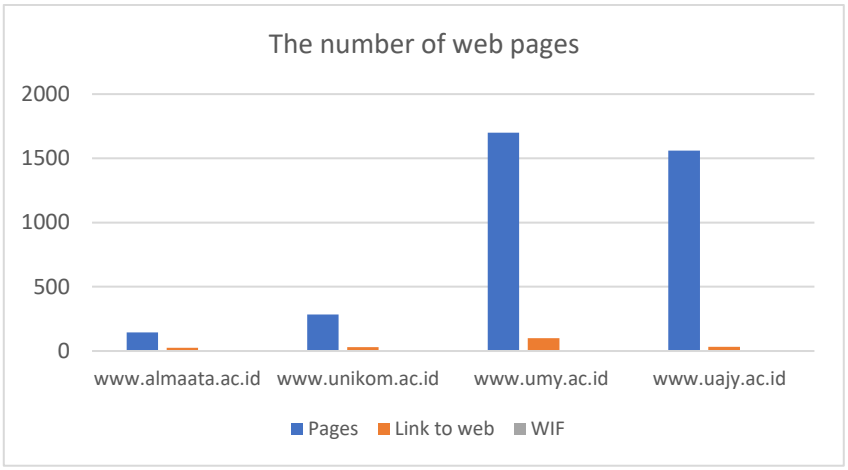

Figure 5. Graph of comparison of page number on almaata.ac.id web

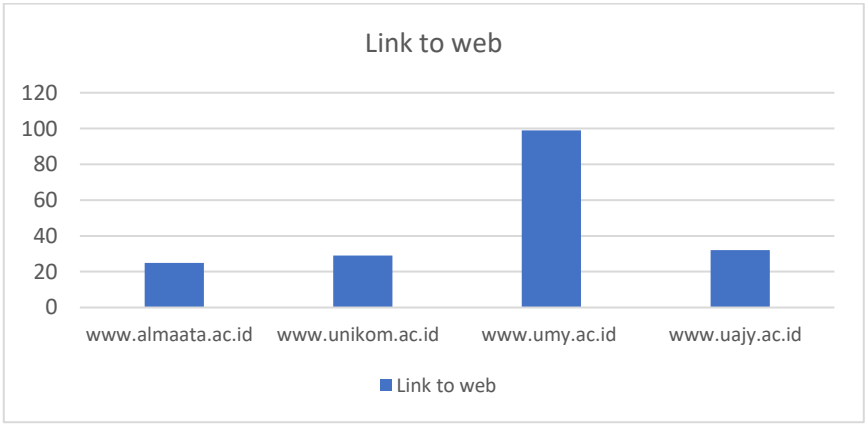

Figure 6. Graph of comparison of number of links to almaata.ac.id website

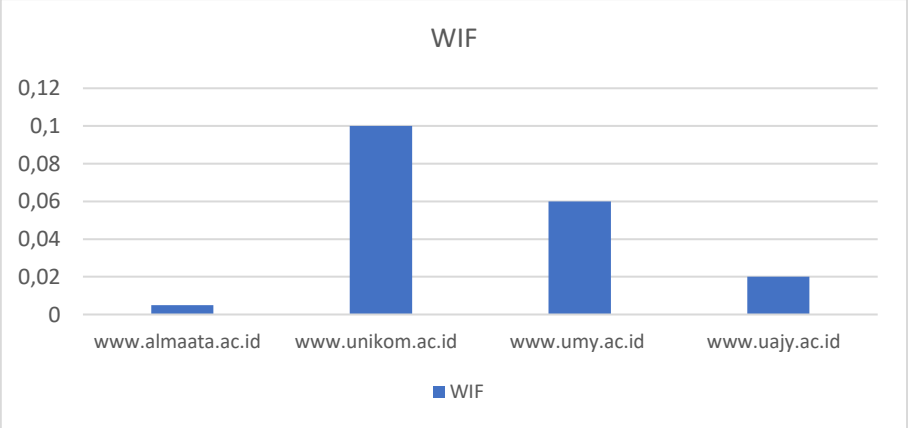

Figure 7. Graph of comparison of WIF values on almaata.ac.id web

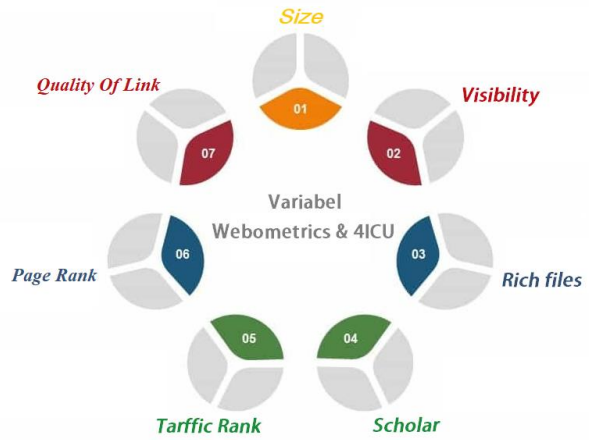

Figure 8. Variables of Webometric & 4ICU

The variable analysis of the combination of the two ranking websites between Webometric and 4ICU is used for the measurement of WIF for each university website. More detail explanations and tools used to obtain the data to measure for the university ranking are described in Table 2.

Table 2. Analysis of Webometric & 4ICU

Variable	Definition	Tools
Size	Number of web pages in a domain	Google
Visibility	External links that connect to the domain	SEO Quake
Rich files	Number of files of pdf, doc + docx, ppt + ppts and ps + eps in a domain	Google
Scholar	Number of papers in Google Scholar	Google *Scholar*
Traffic rank	Amount of data sent and received from visitors from a website / domain	Alexa
Page rank	Score of a ranking will show how important a domain is	Google Pagerank
Quality of link	This is a ranking factor mainly measuring link quality especially from domain authority and page authority	SeoMoz

4.1. Webometric Analysis

To improve the ranking on the Webometrics, it is necessary to collaborate and cooperate with various parties in the university, such as web admin and library section. The development of library

should be done to support the ranking in the Webometrics. The developmental activities that can be implemented by the library section are:

4.1.1. Development of Digital Collection

The development of communication and information technology has given a significant impact in increasing the types of collections within the library, namely through the digital collection. The utilization of the Internet network and computers demand faster information retrieval in the digital collection, and the information must be available at any time.

The digital collection can be described as

> "an electronic Internet based collection of information that is normally found in hard copy but converted to a computer compatible format. Digital books seemed somewhat slow to gain popularity, possible because of the quality of many computer screens and the relatively short 'life' of the Internet. This seemingly slow start to the use of eBooks should be seen in the context of the hundreds, if not thousands of years it took to move from the verbal to the written - initially on rock, clay tablets, animal skins, papyrus scrolls and finally, to modern paper" (African Digital Library, 2002).

From the statement, the digital collection is a collection of information in the form of internet-based electronics that are generally contained in printed ones, which can be accessed widely using computers and the like. The digital collections here may vary, such as electronic books, electronic journals, online databases, electronic statistics, and so on.

The digital collection may consist of several types of documents (file types), where each different program will produce different types of documents according to the program used, and the difference can be seen from the document icons/images, or the three letters that are listed after the dot in the document title. For example, "title.doc" indicates that the document is created using the Microsoft Word program, and "title.xls" shows the document is created using the Microsoft Excel program.

4.1.2. Development of Electronic Literature Sources

The library should no longer only provide printed collections but is expected to enrich itself with the electronic forms installed online. The library users have been familiar with the internet and use it to access information on an online library.

A library, on its efforts to provide electronic materials to meet the needs of its users, can apply the three methods in the process of building a digital collection, namely:

1. Digitalization, converting paper and other media in existing collections to digital form; a common way to build a digital collection is to change the printed materials into the digital ones. Digitalization is the process of transferring media from printed or analogue into digital or electronic media through the process of scanning, digital photographs, or other techniques.
2. Acquisition of original digital works created by publisher and scholars; building the digital collections can also be done by procuring the materials through the digital collection providers or digital databases, either by buying or subscribing them. Therefore, the library will be able to provide adequate digital collections to meet the needs of the users. "Ebscohost and Proquest" are two examples of the databases that are currently quite "in demand" and are excellent for the college libraries that want to provide more complete digital collections such as UGM, UNY, UI, UB, UNAIR, USU and many more. "The procurement of the digital collections using this method still relatively costs much. For example, the Ebsco database for annual subscriptions requires around IDR 100 million". So, not all libraries have enough funds for developing the digital collections through the subscription or purchasing method.
3. Access to external materials; besides the library, there are also many individuals and institutions that build a site that provides a certain set of information that is costless, so this method does not spend much money because it utilizes resources that are available for free. This method can be done by opening a link or network to a server provided by partners, publishers, or other institutions that may have an agreement with the library before, providing links to the important sources of information based the needs of the users.
4. Development of e-books

Electronic books (e-books) are electronic versions of books. If a book generally consists of a collection of papers that can contain texts or pictures, an electronic book contains digital information which can also be in the same form. Today, the electronic books are highly in demand due to their small size compared to conventional ones, and also generally have a search feature, so we can find certain words quickly. There are various popular electronic book formats, including plain text, pdf, jpeg, lit and html.

5. Development of Electronic Article (e-article)
   The electronic articles (e-article) are the articles that are packaged within an electronic format. The electronic articles can be found in electronic journals or freelance articles.
6. Development of electronic journals (e-journal)
   The electronic journals are a collection of articles from various sources, and they are usually scientific journals, magazines, and newspapers that are collected in a database and can be accessed online and generally must be subscribed to. The contents are in the form of abstracts and full texts.
   The reasons for subscribing the e-journal are:
   a) New paradigm of the library
   b) Users' demand
   c) Space limits
   d) Electronic files benefits

   E-journal is a serial of publications in printed but electronic forms, and usually consists of three formats, namely text, text and graphics, and full image (in pdf format).
7. Development of e-gray literature or development of e-local contents; gray literature is a collection of works that is not widely published which may consist of final projects, theses, dissertations, and research reports. If the university library has digitalized its library collection, it has huge potential to increase its Webometric ranking.
8. Uploading news and information
   Publishing every announcement, news, and information related to the library in various file forms, for example the publication of all library activities in the form of videos uploaded on YouTube
9. Publishing PowerPoints of workshops/ talk shows online
   Publishing every activity paper (in the form of .ppt) online created by the library and library corner conducted in a public space
10. Book Review
    Promoting the book review for all library staffs in general, and specifically for the librarians, where each month there should be at least five books that can be reviewed. Then, the reviews are uploaded on the website in .doc or .pdf file format. There are also some suggestions from Webometrics.info (2019) so that the university website can get higher ranking on the Webometrics:
    a) URL Naming
       Each institution must choose a unique institutional domain that can be used by all of the institutions' websites. It is important not to change the domain of the institution because it will create confusion and impact on the loss of its visibility. Creating an alternative domain or mirror is not allowed. Use well-known abbreviations and institutional descriptions, such as the name of the city for the domain name.

    b) Contents Creation
       The existence of a high-quality website can only occur if it is supported by a large group of writers. The best way to do is to allow a large proportion of staff, researchers, and students who have graduated from their expertise fields to become potential writers.

       The writing distribution system can be divided into some following points:

       1. The Central Organization can be responsible for making institutional guidelines and information.

2. The libraries, documentation centers, and other similar services can be responsible for creating large databases, including bibliographies and large repositories (theses, pre-prints, and reports)
3. Individuals or teams must manage their own websites and enrich their archives.

They can also utilize external sources as the third parties to increase the website visibility, such as: website conferences, software repositories, the research community and their publications, especially the electronic journals.

c) Contents Conversion
Some important resources that are not available in the electronic format can be easily converted to the webpages. Most universities have records of their academic activities that can be published on historical websites. Other sources can also be converted, including past reports or image collections.

d) Interlinking
A web is a book full of "hypertextual corpus" texts, where the links connect every page. If the content is unknown (poor design, limited information, minor languages), and the quality is low, the site will likely get a few links from other sites. Measuring and classifying links from others is pointless. Links are obtained from local and regional institutional partners, site directories of similar organizations, site topic portals, and colleagues or personal page partners. The page must have influence within the community. Check pages that are free from links.

e) Use English
The site users are global, so use the languages that can be understood globally, especially English, not only on the main page but in every section, especially for the important documents.

f) Rich dan media files
Although html is the standard format for web pages, it is sometimes better to use rich file formats such as Adobe Acrobat PDF or Microsoft Words DOC to facilitate the distribution of documents. PostScript is a popular format on certain fields (physics, engineering, mathematics) but the format will be difficult to open, so we had better provide another alternative in PDF format.

g) Search engine friendly designs
Avoid menus which are based on Flash, Java or JavaScript that can block robot access. Distant directories or complex links can also block the robots. Databases and even highly dynamic pages can be invisible for some search engines, so use directories or static pages instead or as an option.

h) Popularity and statistics
The number of visits is important, but it is equally urgent to monitor where they come from, distributions, and the reasons why they visit the website. Most recent log analysis offers many tables and graphs that show the relevance of demographic and geographic data, but make sure there are references that indicate what terms or words are used to search web pages on the search engines. Popular pages and directories are also relevant.

i) Archiving and persistence
Managing the copy of obsolete material on the site is a must. Sometimes the value of relevant information is lost when a site is redesigned or updated, and there is no easy way to restore a lost page.

j) Standard of the site enrichment
Use meaningful titles, and metatags descriptions can increase the visibility of the pages. There are also standards such as Dublin Core which can be used to find author info, keywords, and other data about a website.

4.2. Analysis of 4ICU

The main indicators for the 4ICU assessment are drawn from backlinks and indicators of the number of scientific publications. College website backlinks data are obtained using Majestics and Ahrefs which are two online tools to get information on the number of backlinks from the university websites. Backlinks are links that are located outside the website that we manage and lead back or commonly called as feedback. From the correlation path obtained, it can be seen that the number of backlinks that lead to the university website affects the PageRank. PageRank is a ranking assessment issued by Google with the main elements in assessing backlinks, and the PageRank on the website is shown on a scale of 0 to 10 based on the quality standards of the assessed backlinks. The influence of PageRank on the university website is that the higher the PageRank value obtained, the better the priority of the website on it position of the Search Engine Result Page (SERP) of the search engines based on the keywords sought by the visitors. The number of visitors who visit the website will affect the Alexa rank, because it is made based on the number of visitors and daily page views of the website.

Table 3. Analysis of 4ICU

Strategies of Backlinks Improvement	Expected Indicators
Building the backlinks by searching the relevant links	More backlinks obtained from the website with the topic of education
The backlinks should come from contextual links	More contents from both inside and outside of the website that give backlinks to the university website
The backlinks should come from High PageRank (PR)	More backlinks from the website which has high PageRank
The backlinks come from established domain	Increasing number of backlinks coming from relatively old domains
Pay attention to the quality of Alexa traffic rank	Increasing number of visits to the university website
Avoiding low Outbond link	Minimizing outward links
Searching the backlinks from the websites that have Dofollow attribute and avoiding nofollow attribute	Obtaining good quality backlinks
Prioritizing more on One-way Link	Minimizing broken links

From the research results, the comparison of Web Impact Factor (WIF) obtained from WIF results generated from Google Search Engine has the same significant value or accepts 0 H because the p value for 2 = 1.03 F c is 0.5975, where p has the value higher than a = 0.05. There is a need to increase the number of websites that can support existing backlinks on the university websites. From the results of the analysis of the two ranking websites, there are some inputs as the concern for each university. First, in improving the ranking on Webometrics, there should be good collaborations with various parties, such as web admin and library section. The development of library activities needs to be done to support the ranking in Webometrics. Second, in 4ICU, it focuses on the strategies of increasing backlinks on the university websites to improve the ranking on 4ICU.

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