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Webometrics Ranking and Its Relationship to Quality Education and Research in Academic Institutions in Kenya

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Introduction and Background Information

Webometrics ranking is the system of rating the world's universities based on composite indicators of visibility and activity measures (Drussa, 2014). Universities are ranked based on quality and research results reflected through website presence and domain, repositories and informal scholarly communication (Webometrics, 2011). Scholars are turning to the internet for scientific information while institutions of higher learning are devoting more and more resources to improve their website presence (Aguillo et al., 2008). Practice of ranking universities in the United States of America (USA) and many other countries around the world has become common although this is much more recent phenomenon (World Education News and Services, 2015). Provision of higher educational opportunities has become increasingly international, and hence the need for reliable means of institutional comparisons where organizations compile and publish annual global university rankings using the most comprehensive and frequently cited systems - Academic Ranking of World Universities and Times Higher University World Rankings.

Institutions worldwide use consortiums as a means to enhance and strengthen associations among institutions and expand economic collaboration for mutual beneficial goals. Most important, information and communication technologies have increased the availability of resources for research and development purposes; and therefore, universities have joined with corporations and government agencies to form national and international consortia (Education Encyclopedia, 2015). Kenya Library and Information Services Consortium (KLISC) was established in 2003 with the main objective of collective subscription to electronic resources to cope with the increasing cost of information resources (Kenyatta University Library, 2014). The consortium has conducted several training workshops to enhance staff capacity as well as subscription to online resources which is crucial to an institution webometrics ranking performance (University of Nairobi Library, 2015). In addition, the development of digital repositories by institutions of higher learning and education is fundamental in supporting teaching and research. Channels of communicating research findings particularly the journals have been saddled by access barriers, and the institution repository has come to provide the alternative means of publishing scholarly work which is free to the entire academic community (Ezema, 2013). Repositories increase visibility and research impact of the authors, promote global ranking of the universities through dissemination of scholarly findings and international collaboration.

Research Context

The University of Nairobi is the leading and best ranked institution of higher education in Kenya as well as East and Central Africa. Web ranking complements the government performance contract system in which the University of Nairobi has consistently maintained the leading top position (University of Nairobi, 2014). The ranking confirms the scholarly competitive edge the university has steadily maintained in Kenya, Africa and the world; as a world-class university committed to scholarly excellence in offering programmes in diverse fields of specialization (University of Nairobi, 2016).

Statement of the Problem

Modern higher education and learning has become globalized and shifted to worldwide ranking system where different set of weighted indicators or metrics are used to measure performance (Ranking Web of Universities, 2014). Rankings informs the choice of institution among students, promotes the culture of transparency, strengthens competition in institutions and often brings about policy change in universities that strive to improve own standing in the league tables (Andrejs, 2011). Practice of rankings forms the basis for funding allocations to universities, formulation of policies, decisions about accreditation, sponsorship and employee recruitment. Institutions in the west have advanced information communication technology systems and digital repositories unlike in Africa the practice is still developing. Need to market and promote digital repositories is of importance in determining webometrics ranking is related to electronic resources and journals that additionally promotes visibility of institutions through usage statistics. Studies indicate that one common challenge in Africa is access to local research content (Obachi & Kachero, 2011:1). Existing research output in developing countries is often not available even within own borders. Africa as a continent is rich with local content materials that are critical in propelling national development but the greatest challenge is the ability of information professionals to bring together abundant local information resources and provide access to the global scholarly community (Ezema, 2013). In Kenya, there are no known baseline studies targeting webometrics ranking in institutions of higher learning to provide appropriate strategies necessary to enhance and harmonize the practice in bringing out the equilibrium of benefit to support the growth of quality education and competition.

Purpose and Objectives of the Study

The aim of the study was to examine the relationship between webometrics ranking and its role in promoting quality education and research in academic institutions in Kenya with reference to the University of Nairobi; and suggest appropriate solutions to enhance the sustainability of the practice. Objectives that guided the study are:

1. Find out how webometrics ranking promotes quality of research and education in academic institutions in Kenya.
2. Assess the perceptions of staff and students on webometrics ranking in institutions of higher learning in Kenya.
3. Examine the strategies used by academic institutions to be rated highly in webometrics ranking practices and performance.
4. Establish challenges faced in relation to webometrics ranking of universities in institutions of higher learning in Kenya.
5. Examine framework strategies for maintaining and improving webometrics ranking performance.

Research Questions

1. How does webometrics ranking promote the quality of research and education in academic institutions in Kenya?
2. What are the perceptions of staff and students towards webometrics ranking in institutions of higher learning?
3. Which strategies are used by academic institutions to be rated highly in webometrics ranking practices and performance?

4. What challenges are faced towards webometrics ranking of universities in institutions of higher learning in Kenya?
5. What framework strategies can be put in place to enable high webometrics ranking of institutions of high learning in Kenya?

Literature Review

Development of Webometrics Ranking

The emergence of ranking systems can be traced back in 1865 to European studies that aimed to define whether environment or heredity was the determining factor in producing man of genius (Ismail, 2008:1). The purpose was to examine the quality of institutions and affiliated scholars in science and medicine whereby the results influenced the thinking of educators regarding quality assessment. During the twentieth century several evaluation and ranking systems for educational institutions appeared from time to time emerging with different aims and objectives. Webometrics coined in 1997 by Tomas Almind and Peter Ingwersen (1997), refers to the quantitative analysis of activity on the World Wide Web like downloads that draws on informetric methods (Kousha et al., 2010). Introduction of the web impact factor (WIF) metric to assess the impact of the website or other area of the web based upon the number of hyperlinks relied on webometrics (Ingwersen, 1998). Web impact factors seemed to make sense because useful or important areas of the web would presumably attract more hyperlinks than average. The logic of the metric was derived from the importance of citations in journal impact factors although web impact factor had the advantage of easily being calculated using the new advanced search queries introduced by AltaVista. Webometrics subsequently rose to become the large coherent field within information science from the bibliometric perspective (Zhao & Strotmann, 2008), encompassing link and web citation analysis as well as range of other web-based quantitative techniques. Modern form of educational ranking was originally introduced by United States News and World Report over two decades ago in order to publish transparent comparative data about the institutions.

Global webometrics ranking by Times higher education (2014-15) indicate that, the United States had 15 slots among the top 20 universities, United Kingdom with 3, while Switzerland and Canada got one position each. African universities did not feature among the top 100 institutions. The best performing African university was the University of Cape Town in South Africa which was ranked position 124 with overall score of 52.6 per cent compared to California Institute of Technology (USA) that clinched the top position with overall score of 94.3 per cent (World University Ranking, 2015). During the global webometrics rankings of 2009, no Kenyan university featured in the top 500 although in 2012 the University of Nairobi was confirmed as the top ranked university locally. The University of Nairobi was second to Makerere University in East Africa with the University of Cape Town leading the rankings in Africa. Top positions in the world were dominated by universities from the United States followed by Canada and Western Europe countries while the University of Cape Town was the only one ranked from Africa.

World University Ranking Systems

University rankings differ immensely from one another with each ranking system having different weights of measures in determining the performance. Berlin meeting of the International Ranking Expert Group (IREG, 2006) established guidelines for university rankings known as the 'Berlin Principles' whose aim was to support continuous improvement and refinement of the methodologies used to conduct the process. Global ranking systems include the Shanghai, Quacquarelli Symonds, Times Higher Education, Higher Education Accreditation and Evaluation Council of Taiwan. First ranking of North American university was done in 1983, when educational bodies began to evaluate institutions of higher learning. International ranking of institutes of higher education known as the Academic Ranking of World Universities (ARWU) was first done by the Shanghai Jiao Tong University in China, however the publication caused a lot of disquiet, especially in Europe, because institutions from the United States and the United Kingdom were dominant in the listing of both the 20 and 100 best universities. Universities are ranked by several indicators of academic or research performance including alumni and staff winning Nobel Prizes and Fields Medals, highly cited researchers, papers published in the journals 'Nature' and 'Science', papers indexed in major citations, and the per capita academic performance of the institution.

Quacquarelli Symonds (QS) world university ranking was designed to present a versatile view of the strengths of elite and leading universities (QS, 2009). The system uses two indicators to characterize research and graduate employability as exemplified through peer review and citations per faculty, and employer review respectively. Two proxies are used to characterize the international outlook of universities: the proportion of international staff and the proportion of international students (Andrejs, 2011:26). The Times Higher Education World University Rankings was first published in 2004 which in a way was the 'answer' to the Shanghai ARWU that was first published in 2003. Times higher education chose to co-operate with Thomson Reuters and Elsevier, and created a new ranking system. Times Higher Education World University Rankings is considered as one of the most widely observed university measures (Altbach, 2010:1), praised for having a new improved methodology although undermining non-English-instructing institutions and being commercialized. Times higher education uses five criteria for rankings namely; teaching, research, citations, international outlook and industry income (Times Higher Education, 2013:2).

Taiwan Higher Education Accreditation and Evaluation Council Ranking (HEEACT Ranking) is the annual world university ranking that has been produced since 2007. HEEACT Ranking evaluates performance in terms of the publication of scientific papers for the top 500 universities worldwide using data drawn from the science citation index (SCI). This ranking system emphasizes on research performance as compared to the Times higher education and ARWU that focuses on university ranking and academic ranking respectively (Huang, 2011:37). HEEACT Ranking has eight indicators in three main categories: research productivity, research impact and research excellence. The three ranking systems vary in methodologies but heavily rely on the research production of universities, most important use of scientific papers indexed in the ISI citation index databases (Huang, 2011). There are also rankings that deal with professional accreditation of business schools and programmes such as the Financial Times, The Economist, the Wall Street Journal and Business Week.

Webometrics Ranking Process and Performance Indicators

Webometrics ranking measures visibility and impact and activity (presence, openness and excellence) of university webpages with special emphasis on scientific output. Creators of webometrics believe that strong web presence provides information on a wide variety of factors are clearly correlated with the global quality of the university in question based on widespread availability of computer resources, global internet literacy, policies promoting democracy and freedom of speech, competition for international visibility or support of open access initiatives (Aguillo et al., 2008). Parameters measured include the number of external links, sub-domains and visits to the website. Central hypothesis behind webometrics ranking is the web presence that measures the activity and visibility as a reliable indicator of global performance and prestige of universities that provides an indirect way to measure the mission in relation to teaching, research and transfer (Aguillo et al., 2006). Cyber metrics lab is devoted to the quantitative analysis of the internet and web contents especially those related to the processes of generation and scholarly communication of scientific knowledge bringing about webometrics as the new emerging discipline. Webometrics ranking intends to motivate both institutions and scholars to have a web presence that reflect accurately teaching and research processes and activities. If the web performance of the institution is below the expected position according to the academic excellence, university authorities should reconsider the web policy, promoting substantial increases of the volume and quality of electronic publications (Webometrics Ranking of Universities, 2015)

Webometrics ranking measures the size and visibility of university web pages (Aguillo et al., 2008: 48). Size is characterized by the number of pages on the website of the university and the number of publications of 'rich files' (pdf, ppt, doc and ps) while visibility is measured by the number of inward links to the website. Webometrics recognizes that the internet is the repository for the vast number of documents and the powerful vehicle for knowledge dissemination and access. Ranking involves measuring the volume, visibility, and impact of web pages published by universities with special emphasis on scientific output (refereed papers, conference contributions, preprints, monographs, theses and reports) including examining other materials (courseware, seminars or workshop documentations, digital libraries, databases, multimedia, and personal pages and blogs) and general information on the institution, the departments, research groups or supporting services, and people working or attending courses. Ranking lists are prepared for the institutions, departments, programs, specific subjects or fields.

Activity accounts include the aspect of presence, openness and excellence. Presence entails the total number of web pages hosted in the main web domain including all the subdomains and directories of the institution as indexed by the largest commercial search engine (Google). Openness implies the global effort of setting the institutional research repositories that take into account the number of rich files (pdf, doc, docx, ppt) published in dedicated websites according to the academic search engine Google Scholar. Excellence accounts for academic papers published in high impact international journals that play a very important role in the ranking of universities.

Ranking can be undertaken using a number of approaches that in particular include link analysis, web citation analysis, search engine evaluation and purely descriptive studies of the web (Thelwall, 2007). Webometrics team uses commercial search engines to collect data with the help of specially designed robots that collect basic information and statistics through hyper textual navigation. Despite coverage biases or other shortcomings, if the webpage is not indexed by the engine, then that page does not exist for any purpose (Aguillo et al., 2009:242). Webometrics ranking is updated every six months where data is collected in January and July and published one month later. Data collection is automatic, but the final positions of universities in the league table are calculated manually and comparisons with previous years are made. Rankings are subjectively perceived as indicative of quality teaching and learning based on some combination of empirical data or opinion derived from different surveys of scholars, academics, alumni, present and prospective students, employers of the institutional graduates, and research publications and citations.

Strategies for Sustainable Webometrics Ranking Performance

Fundamental strategies for promoting sustainable webometrics ranking performance include:

- Uniform resource locator naming: Institution should choose a unique domain name for used by all websites to avoid confusion.
- Creation of contents: Effective website is made possible only with the effort of large group of authors and potential users.
- Conversion of contents: Important resources available in non-electronic formats need to be easily converted to webpages.
- Interlinking: Provide the ability to hyper connect the information and contents of the websites.
- Language: Web audience is truly global, and language versions especially in English are mandatory not only for the main pages but also for selected sections and especially for scientific documents.
- Rich and media files: Hypertext markup language is the standard format for creating websites although sometime it is advisable to use rich file formats like adobe acrobat pdf or Microsoft word document.
- Interactive search engine: Institutions web designers should avoid cumbersome navigation menus based on flash, java or JavaScript that block robot access.
- Popularity and statistics: Number of visits is important although it is necessary to monitor origin, distribution and reason for reaching the websites.
- Archiving and persistence: Maintaining the old copy of outdated material in the site is mandatory as sometimes relevant information is lost when the webpage is redesigned or updated.
- Standards for enriching sites: The use of meaningful titles and descriptive metatags can increase the visibility of the pages. Standards like Dublin Core can be used to add authoring info, keywords and other data about the web sites.
- Open access initiatives: Electronic access to scientific publications and other academic materials are regarded as crucial strategies towards webometrics ranking (Aguilo, 2008).

Importance of Webometrics Ranking

The aim of ranking is to promote web publication, support open access initiatives, electronic access to scientific publications and other academic material. Web indicators reflect better the whole picture based on global performance, visibility of the universities and many other activities of professors and researchers (Ranking Web of universities, 2014). Moreover, universities that rank top are those that have integrated the web research, teaching and learning culture. This increases the global presence and perceived impact in addition to improving visibility and the perceptions of the stakeholders. Ranking promotes quality research and education through provision of information to the public on the standing of higher education institutions for individual or group decision making including potential students, parents, politicians, foundations and funding agencies; provides additional evidence about performance of particular academic institutions and study programmes; stimulates the evolution of centres of excellence; and provides additional rationale for allocation of funds (Sadlak, 2011); fosters collaboration and research partnerships among student and faculty exchange programmes (IHEP, 2009).

Webometrics ranking of institutions of higher learning has enabled institutions to support open access initiatives and electronic access to scientific publications and other academic materials, aid in creation of knowledge through call for scholarly publications and dissemination and sharing of knowledge through digital repositories hence supporting preservation of local content. Rankings also help in encouraging the collection and publication of reliable national data on higher education (Rauhvargers, 2011) for decision making. From the international standpoint, rankings encourage and stimulate national debate and focused analysis on policy planning, adds the same author. From the international standpoint, rankings encourage the search for common definitions of those elements on which data is collected. The results of global rankings can stimulate national debate and focused analysis of the key factors determining success in rankings, which in turn may lead to positive policy changes at system level (Rauhvargers, 2011:48). Rankings also promote discussion on how to measure institutional success and improve institutional practices (IHEP, 2009); platform for internal analysis of university strengths and weaknesses (Van et al., 2012); and help to convince the general public on the need for university reform (Hazelkorn, 2011).

Most rankings focus disproportionately on research either directly by measuring research output or indirectly by measuring the characteristics of research-intensive universities (such as low student or staff ratios or peer reputation). Rankings have strong impact on the management of higher education institutions and provide the platform in which the salary or positions of top university officials are influenced to justify claims on resources (Espeland et al., 2007 & Hazelkorn, 2011). Highly ranked universities tend to attract foreign students since the process favours the development or reinforcement of stratified systems revolving around “world-class universities”, thus encouraging a “reputation race” in the higher education sector (Van, 2008). The internet is currently one of the most promising and innovative approaches for branding academic institutions and education programmes. The World Wide Web has rapidly become global machinery for the propagation of academic findings and reliable tool for communication among scholars. Effectiveness of internet branding as marketing tool explains how information is accessed and disseminated with institutions using the web having the competitive edge in the marketplace of education and learning. Website branding supplies the content and function that

potential student needs in order to achieve desired goals. Potential students looking for affordable institution offering business, technology, arts and design courses need content that must include course fees and website function that allows online application immediately. Websites also need navigation that helps users to find the content needed in addition to understanding the same Kim, 2014).

Challenges of Webometrics Ranking

Webometrics ranking of world universities is highly dependent on search engines algorithm. Process of knowing the search algorithm and how websites are being indexed or crawled is basically a trade secret. Development and knowledge level also determines the success of web visibility and presence, for instance, a page that contains useful information may not be indexed. Poorly written headers, titles or metatags (keywords), incorrect syntax and missing tags are the common problems faced in search engine algorithm of which such neglect can seriously compromise web ranking. Moreover, universities with dynamic website pages that are generated automatically by the web server using variables defined by users such as language, geographical location and search terms may not be indexed well because of heavy use of scripts. Deceitful use of scripts to create pages can trap crawlers and in turn leads the search engine to conclude that the page is used for spamming (Nissom et al., 2012: 2).

Institutions with larger websites may have low visibility ranking than smaller counterparts due to limited time that crawlers spend on the particular website. Bigger website means getting smaller visibility and vice versa (Wouters et al., 2009: 42). The success of ranking algorithm relies on searchers experience. Most searchers always prefer to click the top and most popular though with few results while favorite ones get less exposure. (Introna et al., 2010). Webometrics ranking system is also biased towards country with high income. Based on webometrics ranking table, majority of the top universities are from the United States of America where the websites receive lots of popular links due to marketing expenditures and prominence. Most top universities also originate from countries with highest gross domestic product (Rajesh et al., 2008). Webometrics ranking draws criticism on two counts, first, the traditional linguistic bias where more than half of the internet users are English-speaking people (Ismail, 2008). Second, new disciplinary bias since the technology gets more coverage in the web-world as compared to biomedical and some other disciplines. Webometrics ranking correlates well with quality of education provided and academic prestige although other non-academic variables need to be taken into account.

Research Methodology

Research Design, Sample and Sampling Techniques

Descriptive survey employing the use of both qualitative and quantitative research used alongside structured questionnaires to collect data and information. Sample size was based on the total membership of staff of information and communication technology, digital content, electronic resources, web champions and postgraduate students. Postgraduate students of library and information science were chosen purposively as being representative and familiar with webometrics ranking practices. Stratified purposive sampling technique was adopted to illustrate characteristics of particular subgroups of interest and facilitate comparisons in order to get information from the various respondents. Questionnaires were administered to 100 respondents of both staff and students.

Discussion of the Findings

Demographic Information of the Respondents

General information on the respondents was generated and explained based on gender, highest education level and age. This was necessary to validate the responses and understand the level of experience of the respondents in relations to the answered questions. Age of the respondents determined the inclination to disseminate webometrics ranking practices as majority of the respondents were in the age range of between 26-35, 36-55 and 46-55. This implies that the higher the advancement in age and professional development and growth, the higher the contribution to sustainable practices in webometrics ranking process. Level of education was important in getting the views and opinions of the students and staff towards webometrics ranking process, challenges and possible solutions in sustaining the performance of the university. The findings revealed that most respondents were masters and degree holders hence confirmed the assumption that students and staff in higher levels of education contribute immensely in research activities, publishing, access of journals and electronic resources which raise the performance of the institution in web ranking.

Webometrics Ranking

First objective sought to find out how webometrics ranking promotes quality of research and education in academic institutions in Kenya. Webometrics ranking to a great extent increases visibility of the institution to the general public through activities that support research work, enhance competition among institutions and increase student enrollment (Table 3). Respondents also alighted the nature of the website as user friendly and appropriate content (Table 4).

Table 3: Benefits of Webometrics Ranking

Benefit	Mean	Standard Deviation
Support research work	4.62	0.65
Enhance competition among institutions	4.44	0.75
Enhance collaboration with other institutions	3.94	1.09
Increase donor funding to the institution	3.66	1.01
Increases student enrollment	4.02	0.99
Increases visibility of the institution	4.70	0.73

Table 4: Website and Access of Journals

Website Design	Mean	Standard Deviation
User friendly	4.47	0.770
Navigation routes	3.90	0.852
Loads pages faster	3.65	1.085
Multiple language selection	2.78	1.354
Save document via e-mail or social network	3.69	1.228
Appropriate content	4.22	0.837

Perceptions on Webometrics Ranking Process

Second objective assessed the perceptions of staff and students on webometrics ranking in institutions of higher learning in Kenya. High numbers of staff were satisfied with the process of webometrics ranking unlike students as in Table 5.

Table 5: Respondents Perceptions on Webometrics Ranking

Respondents	Satisfactory	Not Satisfactory	No Opinion	Total
Staff	40	11	3	54
Students	16	5	2	23
Total	56	16	5	77

Strategies on Sustaining Web Ranking Performance

Third objective examined the strategies used by the selected academic institution to be rated highly in webometrics ranking of universities. Majority of the respondents learnt about webometrics ranking through the internet and library website with few through the media as in Table 6. Similarly, majority of the staff gained skills and information on webometrics ranking through formal training in the library with the least through self-instruction as in Table 7. Students also rated the level of training in relation to use and access of electronic resources in the university as very high as illustrated in Table 8.

Table 6: Knowledge on Webometrics Ranking

Source	Frequency	Percent	Valid Percent
Colleague/friend	6	7.76	7.76
Lecturer	9	11.68	11.68
Library website	24	31.16	31.16
Internet	28	36.62	36.62
Media	3	4.29	4.29
University mandate	7	9.08	9.08
TOTAL	77	100	100

Table 7: Information and Skills on Web Ranking

Source	Frequency	Percent	Valid Percent
Formal training - Library	24	44.44	44.44
Seminars and workshops - Library	10	18.52	18.52
Informally	12	22.22	22.22
Self-Instruction	8	14.81	14.81
TOTAL	54	100	100

Table 8: Training in Electronic Resources

Level	Frequency	Percent	Valid Percent
Very High Level of Training	12	52.17	52.17
Low level of Training	1	4.34	4.34
Highly Trained	5	21.74	21.74
Moderately Trained	4	17.39	17.39
TOTAL	23	100.00	100

On possible strategies for promoting the ranking process, most respondents advocated for training and uploading of research materials (Table 9). Factors that contributed to the latest high webometrics ranking in the university include collaboration and partnerships, benchmarking system open, and marketing and branding strategies (Table 10).

Table 9: Strategies for Promoting Web Ranking Process

Strategy	Frequency	Percent	Cumulative Percent
Embrace local measures	5	7	6.67
Training	14	20	25.97
Uploading of research materials	11	15	37.33
Increase awareness	7	9	46.67
Enrich repositories content	9	12	58.67
Increase funds	6	8	66.67
Harmonization	3	4	70.67
Modern facilities	2	3	74.67
Avoid bias	6	8	82.67
Improve accessibility	4	5	88
Improve technology	6	8	100

Table 10: Strategies for High Web Ranking Performance

Strategy	Mean	Standard Deviation
Open access policy	1.15	0.408
Electronic access to scientific publications	1.18	0.438
Scholarly research and publications	1.07	0.264
Marketing and branding strategies	1.46	0.636
Collaboration and partnerships	1.56	0.607
Benchmarking system	1.48	0.574

Create user friendly websites, marketing and awareness and enrichment of institutional repositories are among the strategies for sustaining performance on webometrics ranking in universities as in Table 11. Management support is essential in the process of webometrics ranking as exemplified through . provision of funds, education and training of staff, promotion and marketing strategies and provision of adequate computer hardware as shown in Table 12.

Table 11: Strategy for Sustaining Webometrics Ranking Performance

Strategy	Mean	Standard Deviation
Archiving of content	4.04	0.928
Publishing	4.30	0.635
Create user friendly websites	4.52	0.665
Enrichment of institutional repositories	4.35	0.775
Marketing and awareness	4.39	0.656
Optional use of multiple languages	3.56	1.12

Table 12: Management Support

Facilities and Services	Mean	Standard Deviation
Adequate computer hardware	2.02	0.858
Education and training of staff	2.20	0.737
Promotion and marketing strategies	2.19	0.848
Funding	2.63	0.875

Challenges of Webometrics Ranking

Fourth objective established challenges faced in support of webometrics ranking of universities in institutions of higher learning in Kenya. Encountered challenges cited include absence of digital repositories, inadequate information communication technology and lack of knowledge and skills as shown in Table 13. Respondents also noted numerous possible solutions for improving webometrics ranking practices and performance as illustrated in Table 14.

Table 13: Challenges of Webometrics Ranking Process

Risks	Mean	Standard Deviation
Inadequate information communication Technology	1.86	0.388
Few or no scholarly publications	1.66	0.503
Courses or programs offered	1.74	0.497
Absence of digital repositories	1.91	0.369
Inadequate funds	1.27	0.448
Lack of knowledge and skills	1.52	0.528

Table 14: Possible Solutions to Institutional Challenges

Solutions	Frequency	Percent	Cumulative Percent
Upload publications	12	15.58	15.58
Funding	13	16.88	32.47
Sensitization	12	15.58	48.05
Training	13	16.88	64.94
Provision of modern systems and technology	9	11.69	76.62
Revisit teaching mode	4	5.19	81.82
Enhance information literacy skills	7	9.09	90.91
Organize seminars and workshops	4	5.19	96.1
Consortia	3	3.9	100
TOTAL	77	100	

Framework on Strategies for Sustainable Webometrics Ranking Performance

Fifth objective suggested the framework on strategies for maintaining and improving webometrics ranking performance. Framework strategies for sustainable webometrics ranking performance include web champions, Publications, open access, marketing and awareness.

- Web champions: Helps in design and creation of interactive websites that are friendly to access from anywhere anytime across the world thus enhancing visibility of the institution.

- Publications: Promote research activities and knowledge through uploading of materials online and development of institutional repositories to increase visibility and sharing of rich local content.
- Open access: Provides electronic access to scientific publication free of charge. Consequently, institutions should enhance information communication and technology infrastructure to support open access initiatives by increasing the bandwidth and internet connectivity within the university and remote access outside the university.
- Marketing and awareness: Supports promotion of webometrics ranking practices to all stakeholders through various strategies and techniques.

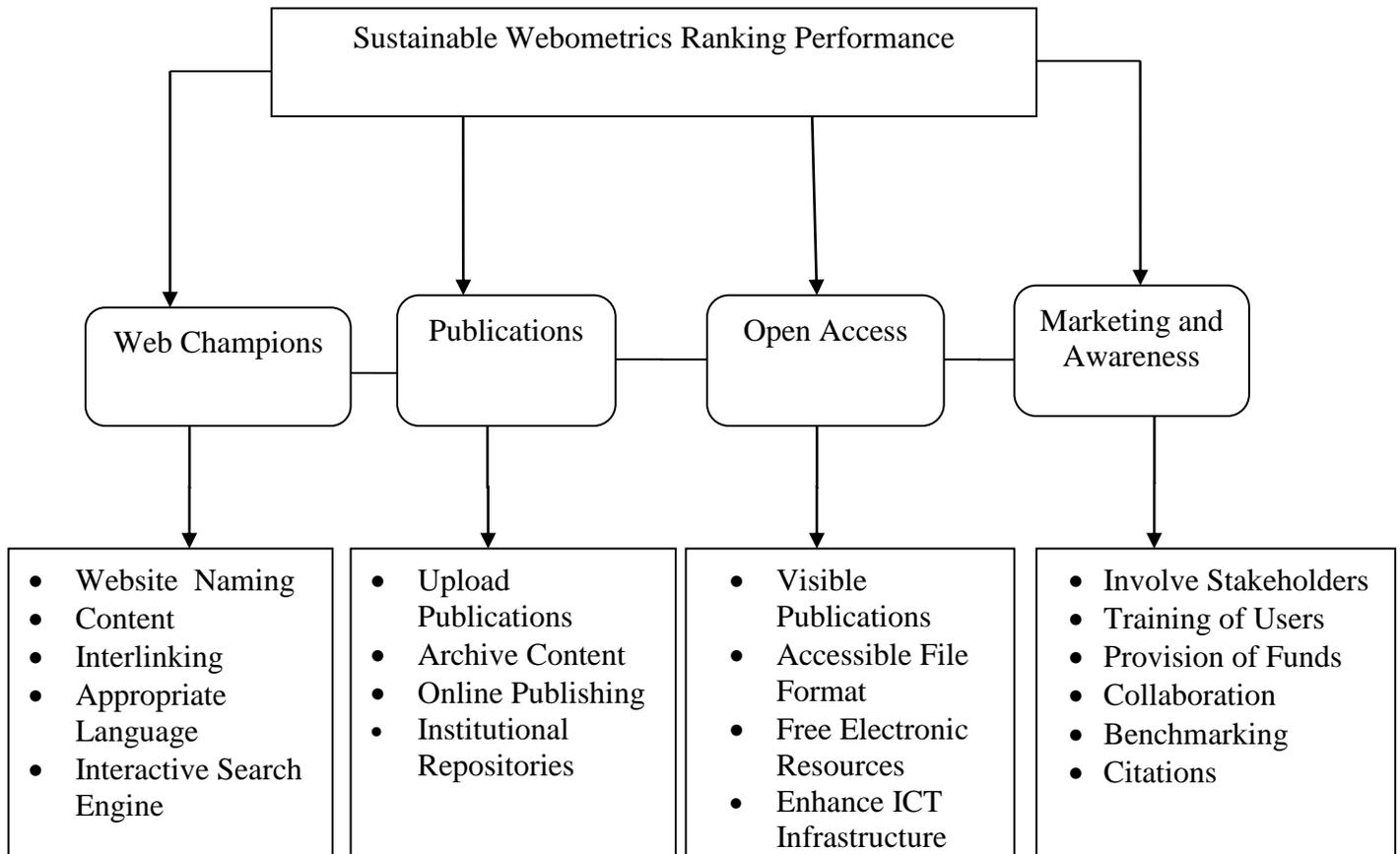


Figure 1: Strategies for Webometrics Ranking (Researcher, 2015)

Conclusion

- Webometrics ranking promotes quality of research and education in academic institutions through various strategies such as collaboration and partnership, marketing and branding and increasing scholarly research publications.
- Hindrance of digital divide and absence of repositories to deposit local content are major barriers to webometrics ranking practices in universities. There is need for provision of local ranking measures to curb the divide between developed and developing countries.
- Institutions of higher learning in Kenya are putting down measures to support the process of webometrics ranking through open access policy, advocating for scholarly research

and publications, collaboration and partnership, and enrichment of institutional repositories.

- Provision of advanced systems and technology will boost the ability of academic institutions to compete in the global ranking process. Revisiting the teaching mode is also important since most students just read for the sake of passing exams and not gaining the relevant skills and information for the future.

Recommendations

- Enrichment of digital repositories: Digital repositories should be updated with more local content, course outlines, lecture notes and presentations in order to enhance high level of online usage hence promoting webometrics ranking strategies.
- Adequate modern facilities: Need to embrace new advanced modern computing technologies to support and facilitate webometrics ranking performance. The facilities should be adequate to cater for the growing number of student population in institutions.
- Measures for sustainability strategies: Institutions should create awareness on webometrics ranking practices with the aid of management support.
- Education and training opportunities: Change management from one system to another should be done systematically to avoid culture shock and bring out ease in working with the systems through education and training of staff including stakeholders.

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