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Comparative analysis of web visibility using SEO tools and its effect on website improvement

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Abstract

Due to the incremental growth of web pages that are accessible to internet users as well as the percentage of internet users who use search engines for their daily work, the need for search engine optimization (SEO) is increasing. Two main functions of search engines are crawling, which is indexing the site and its content in offline phase, and providing a ranked and query-relevant list of sites as an online service. SEO, in addition to improving the content, improves the ranking and visibility of the websites. SEO visibility index measures visibility of the website in search results and in queries in search engines. It is an index for website optimization analysis. In this research, the web visibility of the top 20 universities and their related libraries are compared and the effective factors on increasing of web visibility are examined. SEO tool and SISTRIX Toolbox have used for comparative analysis.

Keywords: search engine optimization, web visibility, rank, crawling, indexing

1. Introduction

Search engine is a software to collect data related to websites' contents in order to response search's queries. The data collected includes URLs of the sites, the keywords that represent the content of the website, the code structure that forms the website, and the links on the websites. Relevant collected data is indexed and stored in the database. Search engines use special programs called crawlers, spiders or robots. These programs use the web hyperlink structure to move through web pages periodically and store the changes made by the latest navigation (spiders / crawlers). Data of related programs is stored in a very large database system called a search engine index (this task is called indexing). When users request to get some data or information, the query is transferred to the search engine index and the related documents are retrieved and shown to the users. One of the main factors in search engine optimization is the design of a website. After determining the pages related to the query, they should be ranked before displaying to the users. Therefore, search engine optimization algorithms play an important role, they try to show the most relevant results to users. In summary, the search robot collects data about each URL and stores the collected data in a database. When a user connects and sends her query to a search engine, documents are evaluated based on the relevancy and the results are returned to the user. Fig.1 shows the workflow of a search engine [21].

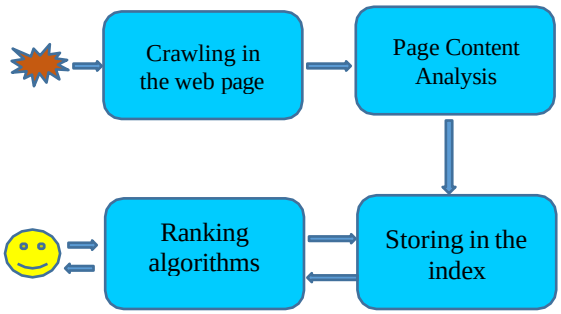

Fig. 1: Search engine workflow

1.1. Search engine optimization

Data or information about an unknown topic is usually on the first page of search engines. After testing the 5 top pages of results, another remaining page are not evaluated by users. For this reason, it is important to move the web page to the top of the list of search engines in order to better introducing it. Having an effective, well-structured, good-looking web page is important to better introducing the related company's products or services. It is also important to search and easily find relevant web pages on a search engine. In addition, 80% of Internet users search for products and services, using more search engines (interactive and advertising), which is the most effective and efficient way to introduce and market a company using a web page. In order to achieve this, information related to the company is obtained using search engines. Within a competitive business environment, moving to the top of the list is achieved by using website optimization. So that, search engine optimization (SEO) is able to make a website appear at the top of a search engine results list for a number of keywords. There are many different factors that a website is able to transmit the results to the top of the list. The most effective way to get the attention of many users is search engine optimization. Search engine optimization is an effective way to increase website visibility in search engine search of results and because the keywords are appropriate to the website and can be used to search in search engines, search engine optimization is based on keywords. In order to optimize a website according to search engines, It must be adapted using some technical conditions. Fig.2 shows a type of search engine optimization's process to improve website [21].

Fig. 2: search engine optimization's process [21]

Search in searches engine requires three types of SEO (Fig.3):

Fig. 3: Types of SEO

On-page SEO: It is related to the content of the website and includes activities to improve the ranking of a website. Hence, it includes the following factors (Fig.4):

- Research on keywords
- Title tag
- Description meta tag
- Robot.txt
- URL optimization
- Content
- Header tags
- Keyword placement

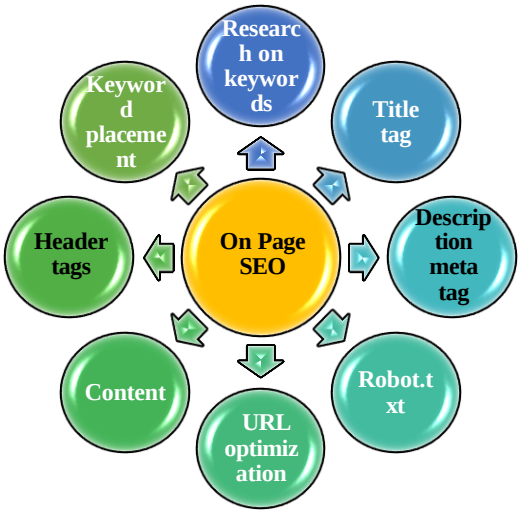

Fig. 4: Search engine optimization on page

Technical SEO: There are strategies to improve the structure of the site. Using this type of optimization improves the readability of the site and website crawling is facilitated for search engines.

Off-Page SEO: Includes members who are not under the direct control of the developer. Mostly off-website ads, backlinks, social media ads etc. Some off-page SEO factors are as follows (Fig.5):

- Sharing
- Blog comments
- Star ranking
- Link building

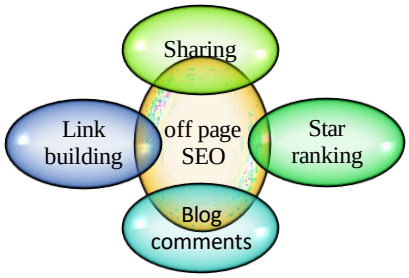

Fig. 5: Off page search engine optimization

Keywords Words and phrases that users use when searching for information and online content, and they define also provide ideas and topics about what the web content is about its. A search keyword is a word or combination of words, entered by users in a search engine [1].

1.2. Backlinks

Backlinks are also known as inbound links and incoming links, links from one site to a page on another site, are called. Search engines consider backlinks as score to a page of the site. As much as backlinks a page receives, the more scores it will get from search engines.

1.3. Benefits of Backlinks in Search Engine Optimization

Backlinks help improve a website's ranking when it is showing in search engine results. If any of the content or pages of the website get links from other sites normally (not by agreement or for a fee), those content or pages will rank higher in search engine results. Backlinks help search engine robots to find faster links given to the website and crawl effectively on the website.

1.4. (URL) Uniform Resource Locator

A coordinated and integrated way to locate uniform resources in the internet space, and it used to retrieve the page that is known as the protocol. An URL includes a domain name, directory name, and file name.

1.5. Visibility Index

Web visibility index is the amount of visibility of a domain that appears in Google results. Utilizing of visibility index will clearly and reliably display superiority on the search engine results page (SERP).

1.6. Literature review

This research comparatively analyses the web visibility of libraries according to the top 10 universities in the Times Higher Education World University Ranking (The) website and the 10 largest universities in Spain and the relationship between the web visibility of libraries and universities to extract it. To study web visibility, a search engine optimization's tool called the Sistrix toolbox is used. A lot of data, and notably the Web Index, which combines different data indexes (scales) to analyse Web visibility. The results are analysed with xovi, another SEO tool that offers its visibility index. Both tools that allow us to observe similar tendencies in the visibility of library websites. The results show that the visibility of the university library is generally low, and there is no direct relationship between the visibility index of libraries and their universities. Some disclosure exceptions have defined so that libraries have made a significant contribution to the web visibility of their universities. The results suggest that educational institutions need to implement SEO strategies in order to provide a more effective visibility of them [20]. To manage tourist websites, it is important to understand the keywords in the minds of researchers. Optimization tools by Alexa, SimilarWeb, SEMRUSH, and MOZ help the sales managers build the visibility of tourist websites among researchers. This research is useful for managing websites and finding keywords used by foreign tourists. The ranking method will act as a guide for future research on ranking websites [3]. Webometrics is for analyzing new forms of data. Thus, data collection and processing methods have highlighted in many studies. Because web, text, or multimedia documents are recorded information, webometrics is completely surrounded by bibliometric. Commercial search engines are widely used for webometric research, and they are especially useful for many pages on a large area of the web. Commercial search engines have many problems. They do not generally cover the entire web or indexable web. Crawling and reporting algorithms are commercial secrets, which is an issue for their use in scientific research. Search engine results are unreliable and fluctuate even over short periods of time [19]. This research provides webometric ranking of universities using the WR Combined Index, which is the number of published pages (S) (twenty-five percent), the number of rich files, which are in PDF, PS, doc and ppt (R) format (12.5 percent), the number of articles from the database Google Scholar (12.5%) and the total number of external inlinks (V) (50%) is collected. The results show that there is a larger-than-expected academic digital divide between larger educational institutions in the United States and its European units. This type of ranking using the web index should be used as a measure of the efficiency of universities compared to most academic indicators [9]. In this study, the level of metadata quality in Google Scholar (IGS rate) is related to the coverage of four types of documents (thesis, articles, books, and conferences) in the repository of Peruvian universities. This research is a descriptive and cross-sectional study with non-probabilistic sampling of 48 repositories from (n = 10) National University and (n = 38) private (free) universities that are aggregated in Alicia repository. The Google Scholar Indexing (IGS rate) shows an average of 0.32 [RIC: 0.241-0.596] for national universities and 0.62 [RIC: 0.494-0.891] for private universities, with a statistically small difference. Private universities show a higher number of item indexing in Google Scholar (60%) compared to (43%) national universities, which indicating more work in terms of content visibility in the private section. The number of items in the repositories of a national university is more than the number of items in the repository of a private university [11]. This research introduces and discusses an aspect of academic search engine optimization. Based on three recent studies, the guidelines generally provide how to optimize the research literature for the academic search engine

and in particular for Google Scholar. The fields of documentation may be Guide differently by academic search engines as follows [12]:

- Document text
  - Title
  - Abstract
  - (Sub) Headers
  - Author keywords
  - Body text
  - Tables and figures
- Document metadata
  - Author names
  - Name of publications (name of journal, conference, book, etc.)

This research tries to reveal the process of interest and development space for the less covered area from the point of view of the selected webometric research area. Recent estimates of the efficiency and coverage of the research engine are considered as a frame for content analysis and selected quality. Issues are discussed by measuring impact coefficient Web-IF. About concluding the research, new aspects of the web to do knowledge discovery and the topic is based on web tracking, and in part of it is based on the bibliometric methods used in bibliographic and database citations is planned. In this framework, graph theoretical approaches, including path analysis, transversal links, weak ties, and small world phenomena are integrated [16]. Academic library websites contain large amounts of complex content and often lack the established process for creating, editing, and deleting content. There is no clear vision or suggestion for content, and a large number of staff are expected to maintain content with little guidance. Because of this, many library websites end up with content that is poorly written or duplicate or out of date. This study describes how a website content strategy should be developed for the University of Arizona libraries so that all content is useful, practical, and accessible in the future [22]. This research presents a standard innovation for libraries to be used for users at the level of their paid database through the open web using linked and structured data methods. The results of the open SESMO case study have an obvious advantage for library databases and resources in SERPs. In the SERP configuration as an interface for the library, increment visits and use of library databases and resources is observed. The results show that optimization and linked data and structured data are effective on discovery in search engines [10]. This research has planned some basic tools using content strategies and discusses how usage them by librarians. The hidden key idea in content strategy is planning and strategizing the content of all library communication frameworks. An understandable feature is the content strategy, a valuable tool for librarians searching to update and enhance their websites and social media [17]. The Invisible web is essential knowledge for librarians, even though they work at reference desks, relate to research requests, or try to convey the basics of information literacy to students. The invisible web can also be used to increase interest in library resources. Most students are not aware of the limitations of standard search engines. Introducing the invisible web to scientific library clients not only gives them information they need to know but also provides an opportunity for outstanding library services, especially librarians and their research expertise. This research provides a principle for the invisible web and suggests ways to promote the use and interest in library services [13]. Information about the faculty and their publications in the library database like the library congress name validation file, VIAF, WorldCat, and organizational repositories; in registering IDs such as ORCID and ISNI; and educational social networking sites such as Academia, Google Scholar, and ResearcherGate, but search engine methods are not as clear as IDs and profiles. Therefore, researchers at the Comprehensive University conducted several web searches before and after the creation and modify of the faculty identification records. The sample included 24 colleges and 30 journals related to their licenses. Researchers identified faculty and their publications directly on social networks and websites, and then followed by Google, Bing, and Google Scholar to record faculty members' profile and publications, the top 50 results. The college with the most profiles was more visible in the search engine, and the college with the identification records was ranked higher on google. The results associated with the discovery and ranking of the journal were indefinite, but showed a clear difference between the search tools. The concepts of this research can support educational efforts on academic identification and research profiles [23]. This research describes how search engine technology can be used in online public access catalogs (OPACs) to identify users' interests. It also specifies how to use it in the library text, and how to apply the sophisticated ranking metric in the online library catalog [4]. The purpose of this study is to test the phenomenon of search engine optimization as a mechanism to improve the digital content of libraries findability on the web. The results show that the characteristics of the main website effect on how libraries websites are ranked by search engines. This research has identified several website features that can be optimized for ranking search engine results pages (SERPs) [5]. The focus of this research is on evaluating the SEO criterion as an MCDM problem, which is at different priority levels and criteria values from a set of hesitant fuzzy linguistic term sets to facilitate the elicitation of information in hesitant situations [2]. In this research, considering the features of university journal websites, SEO strategies are performed from the following aspects: directory structure, keyword strategy, pseudo-static URL, code optimization, and inbound links [14]. This research discusses the evaluation of search engine ranking factors in a Web 2.0 and Web 3.0 text. An LSHrank benchmark crawler has developed, which uses the well-known search engine API and uses the results against a variety of previously established criteria in different types and domains of web content. LSHrank ultimate goal is to develop a search engine (SEO) mechanism that will enrich the content of a website and changes the content of a website in order to obtain its optimal ranking in search engine result pages (SERPs) [24]. This research introduces an SEO case, and it specifically designed for a research open access information website in the field of STEM. As a result of implementing metadata and creating an XML sitemap, KoreaScience web pages have significantly increased the relevancy of search results list on Google and Google Scholar. In addition, the KoreaScience framework has received increment traffic from around the world [18]. When a query is given to multiple search engines, each search engine returns a ranked list of documents. The researchers presented the combined results, in

the form of metasearch engine, is obtained significant improvements in coverage and search effectiveness. This research provides a mathematical model of linear programming to optimize the results of a ranking list of a given group of web search engines for a query topic. An application with a numerical tool demonstrates the advantages of the proposed method. The application demonstrates the advantage of the proposed method in finding the optimal weights over the pre-assigned weights for ranking search engine results documents. An important issue related to the results obtained in this method is that the proposed model shows that all engines are of equal importance [8]. This research investigates the value concept of web observation and company heterogeneity and analyze the process of creation of corporate web visibility value using its mapping in company web performance and then business performance. It is identified with a comprehensive sample of 2840 American companies that web visibility significantly determines the firm's web traffic and improves the company's short-term and long-term performance. The results also show that web visibility generates higher values for business-to-consumer (B2C) than business-to-business (B2B) firms, for firms with a value suitable focus than firms with a value creation focus, and for firms with search goods that those of experience goods [6]. This research suggests a way to optimize video ranking by search engine's search strategy that eventually leads to an increase in the number of visit of videos with a higher rank and as a result improve the relevant website for each visit. For testing, YouTube.com is considered. To promote white hat SEO, a method has proposed that uses keyword tags in the title. Videos ranks are analyzed before and after VSEO. The main idea of the proposed strategy is to select the appropriate keyword tag based on navigation query, transactional query, and information search query [15]. The focus of this research is on the importance of search engines and search engine optimization (SEO). In particular, the certain focus is on the importance of time, speed, reduced jump rate, page visits, and page layout in keeping the user on the site. Finally, SEO factors on an examinational project are considered and the positive impact of these factors on websites is explained in more detail. There are many factors for SEO and the most important of these factors is duration of stay on the site [7]. The brief summary for section related works is shown in (Table1):

Table 1: Review and compare different methods of SEO

Author(s)	Year	Subject	Proposed method
L.Bjorneborn, P.Ingwersen	2001	Perspectives of webometrics	Investigating the efficiency and coverage of a research engine for content analysis and quality by measuring impact factor Web-IF
J.Davine, F.Egger-Sider	2004	Beyond Google: The Invisible Web in the Academic Library	This research provides a principle for the invisible web and suggests ways to promote the use and interest to library services.
M.Thelwall, L.Vaughan, L.Biorneborn	2005	Webometrics	Study and investigate of webometrics and crawling algorithms and them usage in search engines.
I.F.Aguillo, J.L.Ortega, M.Fernandez	2008	Webometric Ranking of World Universities: Introduction, Methodology, and Future Developments	Evaluation of Webometric Ranking Criteria of Universities Using WR Combined Index
D.Lewandowski	2010	Using Search Engine Technology to Improve Library Catalogs	Investigate search engine technology in online public access catalogs (OPACs) and identify user interests
J.Beel, B.Gipp, E.Eilde	2010	Academic Search Engine Optimization (AESO)	A study of academic search engine optimization and Google Scholar
J.Shi, Y.Cao, X.j.Zhao	2010	Research on SEO Strategies of University Journal Websites	Perform SEO strategies in terms of directory structure, keyword, pseudo-static URL, code optimization, inbound links
Gh.R.Amin, A.Emrouznejad	2011	Optimizing search engines results using linear programming	Provides a mathematical model of linear programming to optimize the results of a ranking list from a given group of web search engines for a query issue.
D.Onaifo, D.Rasmussen	2012	Increasing Libraries' content findability on the web with search engine optimization	The experiment search engine optimization phenomenon as a mechanism to improve the digital content of libraries, identify several web features to optimize the ranking of search engine results pages (SERPs)
R.Blakiston	2013	Developing a Content Strategy for an Academic Library Website	Describe a useful and practical content strategy for a website for the University of Arizona libraries
G.Egri, C.Bayrak	2014	The Role of Search Engine Optimization n Keeping the User on the Site	The certain focus of this research is on the importance of time, speed, reduced jump rate, page views and page layout

			in keeping the user on the site for search engine optimization.
K.Choudhari, V.K.Bhalla	2015	Video Search Engine Optimization Using Keyword and Feature Analysis	The main idea of the proposed strategy is to select the appropriate keyword tags based on navigational query, transactional query and information search query.
Th.Mavridis, A.L.Symeonidis	2015	Identifying valid search engine ranking factors in Web 2.0 and Web 3.0 context for building efficient SEO mechanisms	Evaluate search engine ranking factors in a Web 2.0 and Web 3.0 text. The LSHrank crawler uses the well-known search engine API.
F.Wang, B.Xu	2017	Who needs to be more visible online? The value implications of web visibility and firm heterogeneity	Investigating the value concept of web visibility and firm heterogeneity and the process of creating a web visibility using its mapping in firm performance.
J.Alhuay-Quispe, D.Quispe-Riveros, L.Bautista-Ynofuente, J.Pacheco-Mendoza	2017	Metadata Quality and Academic Visibility Associated with Document Type Coverage in Institutional Repositories of Peruvian Universities	Check the number of indexed items in the university repository and the level of metadata quality in Google Scholar
J.A.Clark, D.Rossmann	2017	The Open SESMO (Search Engine & Social Media Optimization) Project: Linked and Structured Data for Library Subscription Databases to Enable Web scale Discovery in Search Engines	Presentation SESMO standard innovation for libraries to pay users at the database level through the open web using linked and structured data methods
I.Datig	2018	Revitalizing library websites and social media with content strategy: Tools and recommendations	Content strategy planning is a valuable tool for searching librarians to update and strengthen their websites and social media.
M.Park	2018	SEO for an Open Access scholarly information system to improve user experience	SEO is designed for an open access research website in the field of STEM.
B.Özkan, E.Özceylan, M.Kabak, M.Dagdeviren	2019	Evaluating the websites of academic departments through SEO criteria: a hesitant fuzzy linguistic MCDM approach	Evaluation SEO criteria is an MCDM problem. Provides criteria values from a set of hesitant fuzzy linguistic titles.
Ch.Vyas	2019	Evaluating state tourism websites using Search Engine Optimization tools	Use Alexa, SimilarWeb, SEMRUSH and MOZ optimization tools to improve the visibility and ranking of tourist websites.
R.B.French, J.C.Fagan	2019	The Visibility of Authority Records, Researcher Identifiers, Academic Social Networking Profiles, and Related Faculty Publications in Search Engine Results	Researchers, faculty, and their publications validated on the social media and websites.
M.Vallez, A.Ventura	2020	Analysis of the SEO visibility of university libraries and how they effective the web visibility of their universities.	Comparing and analysing web visibility Top 20 libraries of universities to study web visibility and use Sistrix and Xovi search engine optimization tools

2. Methodology

The idea of this research is based on a comparative analysis of the web visibility of universities and related libraries and its impact on website improvement. For this purpose, 20 international universities and their related libraries have considered and the top 10 universities in the world listed in Times Higher Education 2019 and the 10 largest universities in Spain in terms of the number of students have selected for analysis. The results obtained in this study are compared with the results obtained in [20]. Search engine optimization tool of Sistrix has used to analyze the web visibility. SEO analysis of universities' domains and their subdomains was performed during the second week of May 2021. The Sistrix tool crawls the web, retrieves web indexes for domains, and displays data for comparable sites. Calculation based on checking the top 100 Google weekly search results for one million keywords or a combination of keywords (search phrases) that reflect search behaviors in different countries. 100 million items of data are obtained each week (one million keywords X 100 top search results) assigned to the domain. Visibility index is weighted according to the volume of searches and the ranking of search results. The Sistrix tool visibility index is not a website traffic index. Instead, it reflects the position of a domain and subdomain in Google, while prevents external factors that impinge on traffic [20]. Therefore, using the visibility index, is received that how to develop a website domain with Google. The best visibility index value for a website is obtained by comparing and competing with other websites. Improving the visibility index does not lead to better ranking in Google, but it is the improvement in Google ranking that improves the value of the visibility index. Using of competitive analysis, the best formats of websites for ranking in Google are determined.

2.1. Assessment of Results

(Table 2) shows the visibility index rankings and backlinks rankings and the top 10 and top100 keywords as well as the top 10 and 100 URLs for the 20 universities is studied.

Table 2: Web visibility Index Rankings for 20 Universities

University	Country	Visibility Index	BackLinks	Keywords Top-10	Keywords Top-100	URLs Top-10	URLs Top-100
Open University of Catalonia-UOC	ES	0.0276	3.644	71	1.758	1	1
Complutense University of Madrid-UCM	ES	0.5285	30.343	217	8.160	1	1
University of Granada-UGR	ES	0.0985	52.358	96	4.778	1	1
University of Seville-USE	ES	0	24	1	11	1	1
University of Barcelona-UB	ES	0.1012	3.615	144	1.613	19	51
University of Valencia-UV	ES	0.0534	32.183	87	3.022	1	1
University of the Basque Country-UPV	ES	0.1713	1.660	73	284	1	1
Autonomous University of Barcelona – UAB	ES	0.0112	62.124	17	673	1	1
King Juan Carlos University – URJC	ES	0.2885	14.765	368	12.655	1	1
The National Distance Education University-UNED	ES	0	206	0	0	0	0
University of Oxford	UK	0.3421	8.275	98	843	1	1
University of Cambridge	UK	0.2397	145.619	122	3.436	1	1
Imperial College London-ICL	UK	0.4003	30.707	210	3.523	1	1
Stanford University	US	0.8568	27.973	103	347	1	1
Harvard University	US	1.673	22.193	238	444	1	1
Massachusetts Institute of Technology-MIT	US	0.7433	5.480	71	151	1	1
Yale University	US	0.5769	18.019	72	288	1	1
Princeton University	US	0.6476	10.850	99	317	1	1
University of Chicago	US	0.7798	39.759	89	207	1	1
California Institute of Technology-Caltech	US	0.011	11.314	15	54	1	1

(Table 3) shows the visibility index ranking and Backlinks and the top 10 and 100 keywords, as well as the top 10 and 100 URLs for the 20 libraries studied.

Table 3: Web visibility Index Ranking for 20 University's Library

Library of university	Country	Visibility Index	BackLinks	Keywords Top-10	Keywords Top-100	URLs Top-10	URLs Top-100
Open University of Catalonia-UOC	ES	2.451	2.894	3.448	18.157	1.343	4.523
Complutense University of Madrid-UCM	ES	1.418	15.534	4.730	31.980	1.403	4.277
University of Granada-UGR	ES	0.6169	6.384	1.424	5.626	732	1.508
University of Seville-USE	ES	0.0838	834	190	1.378	1	1
University of Barcelona-UB	ES	0.1886	50	66	105	1	1
University of Valencia-UV	ES	0	6	0	1	0	1
University of the Basque Country-UPV	ES	0.0037	36	96	664	1	1
Autonomous University of Barcelona – UAB	ES	0.0025	7	90	438	1	1
King Juan Carlos University – URJC	ES	0.0015	56	77	421	1	1
The National Distance Education University-UNED	ES	0.0413	1.271	144	1.549	1	1
University of Oxford	UK	0.1016	9.373	727	7.657	498	2.274
University of Cambridge	UK	0.1686	133	77	260	1	1
Imperial College London-ICL	UK	0.2443	200	452	4.955	144	294
Stanford University	US	0.3342	548	20	28	1	1
Harvard University	US	0.1617	1.568	27	42	1	1
Massachusetts Institute of Technology-MIT	US	0.0377	1.531	21	30	1	1
Yale University	US	0.0391	197	17	56	1	1
Princeton University	US	0.2377	277	21	38	1	1
University of Chicago	US	0.1027	2.287	14	26	1	1
California Institute of Technology-Caltech	US	0.0162	2.820	2	3	1	1

The ranking of the web visibility index of the analyzed 20 universities is shown in Fig.6 and as shown in the figure, Harvard University has the highest web visibility index, and universities USE and UNED have the lowest web visibility index (value 0). In Fig.6, the horizontal axis represents the universities and the vertical axis represents the web visibility index for university websites.

The results show that the visibility of university websites and their libraries is generally low or zero, with the except Harvard University and the UCM and UOC libraries, which have a web index higher than 1. One of the reasons for the Webcam View Index for the library is that:

The library does not have its own subdomain, for example, if its URL is a directory of a university website address. The three cases are in the following respectively:

- Library of Autonomous University of Barcelona (UAB) : https://www.uab.cat/web/servicio-de-bibliotecas-1345733231312.html
- Library of The National Distance Education University (UNED): https://www.uned.es/universidad/biblioteca.html
- Library of University of Valencia (UV): https://www.uv.es/uvweb/libraries-documentation-service/en/libraries-documentation-service-1285867215074.html

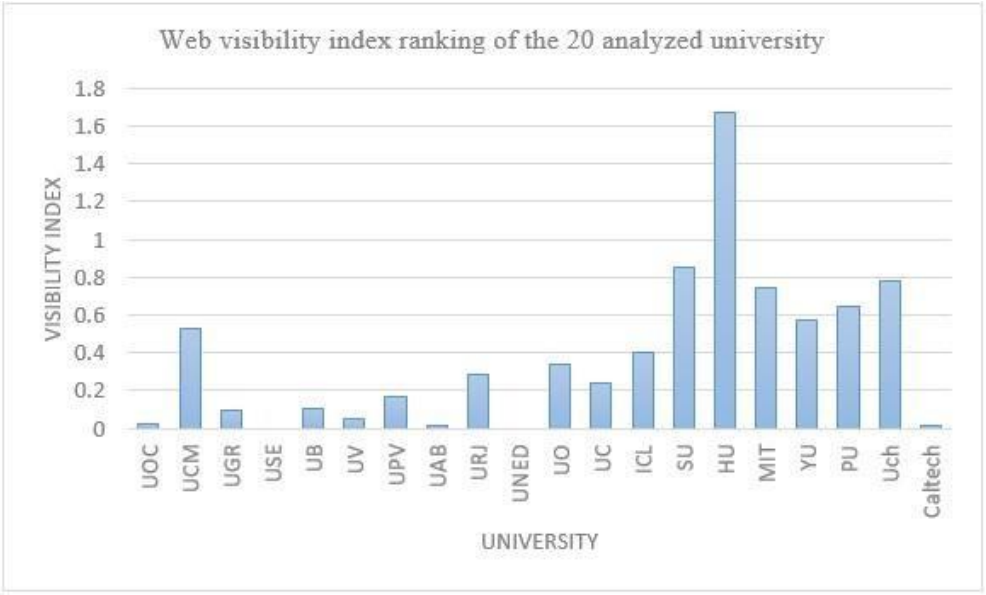

Fig. 6: Web visibility index ranking of 20 universities is analyzed

As shown in the Fig.7, there is no direction relationship between the web visibility index of universities compared to their libraries and in most cases, the web visibility index of universities is higher, with the exception of universities UB, USE, UGR, UCM, UOC, that have lower web visibility. The interesting point about this chart is this that has the lowest web visibility index for UOC university, while for the library of UOC university, it has the highest value.

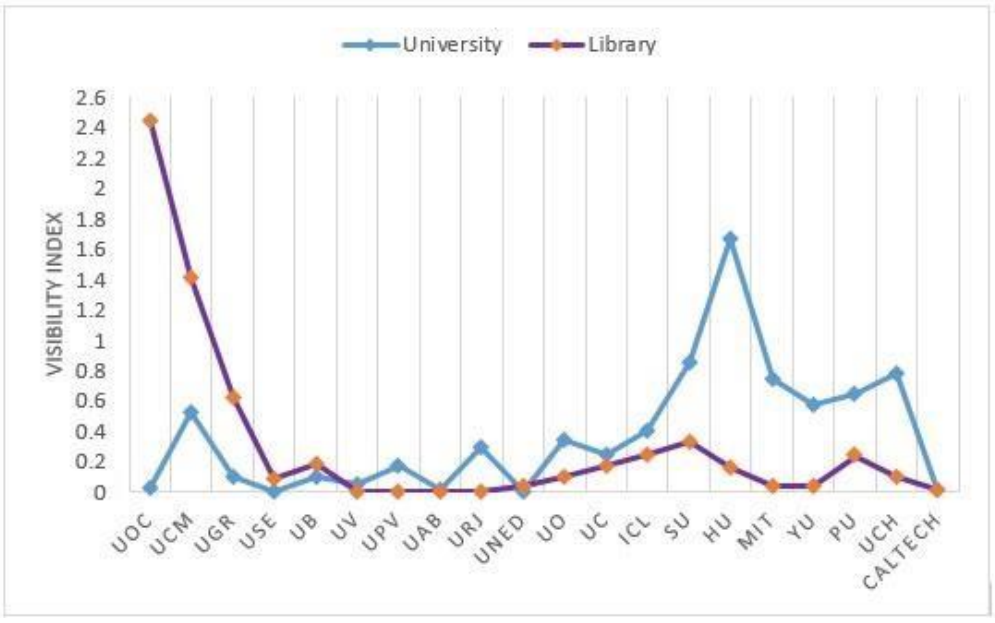

Fig. 7: Relationship between visibility index of university and its library

(Fig.8) the horizontal axis showing the university libraries and the vertical axis showing the web visibility index of the library's subdomains. The web visibility index in the tests performed in this research for the two libraries of UCM and UOC universities has a higher value than the research [20], which indicates the improvement of the library website of the mentioned universities (Fig.8). The figure below shows which of the libraries gained or lost their visibility after one year.

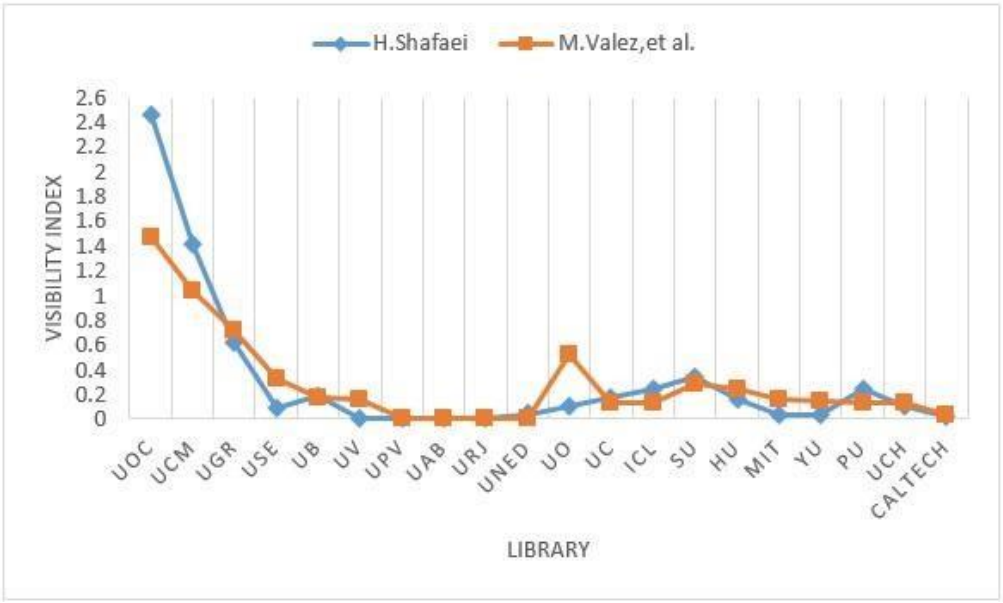

Fig. 8: Comparison of web visibility index ranking performed with [20]

As shown in Fig.9, it includes the horizontal axis of the universities and the vertical axis of the backlinks. The backlinks of the USE, SU and PU universities libraries have a higher value than the backlinks of these libraries in research [20], as a result, they have a higher score in search engines.

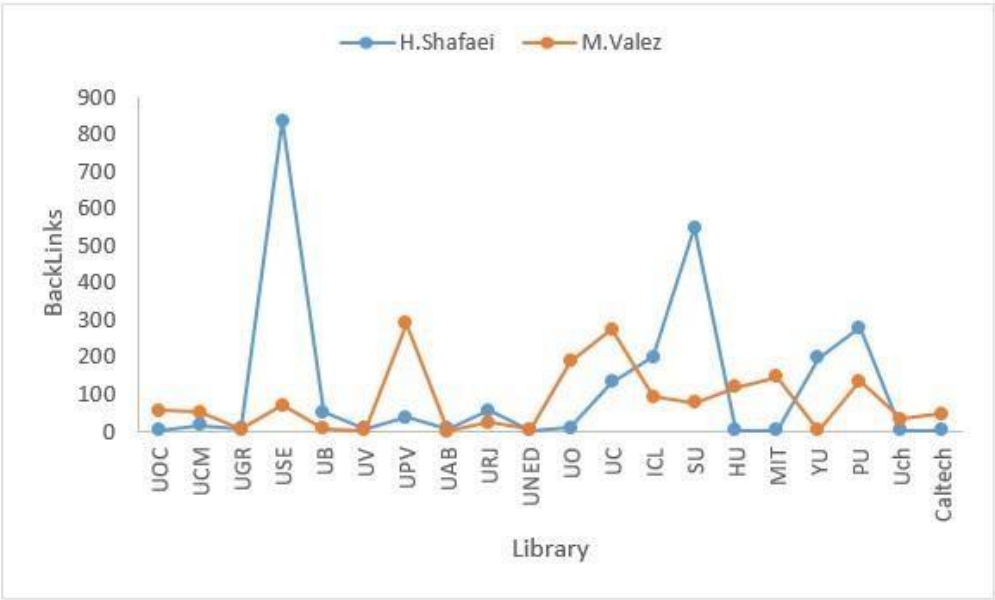

Fig. 9: Evaluation Backlinks for Libraries

In Fig.10, the horizontal axis represents the university libraries and the vertical axis represents the top 100 keywords of the library subdomains. Compared to the research [20], library of universities Yu, UPV, Uch, HU, URJ, MIT, UAB, UC, UNED, Caltech have number. The universities can find new keywords through their competitors, and thus they can achieve higher rankings.

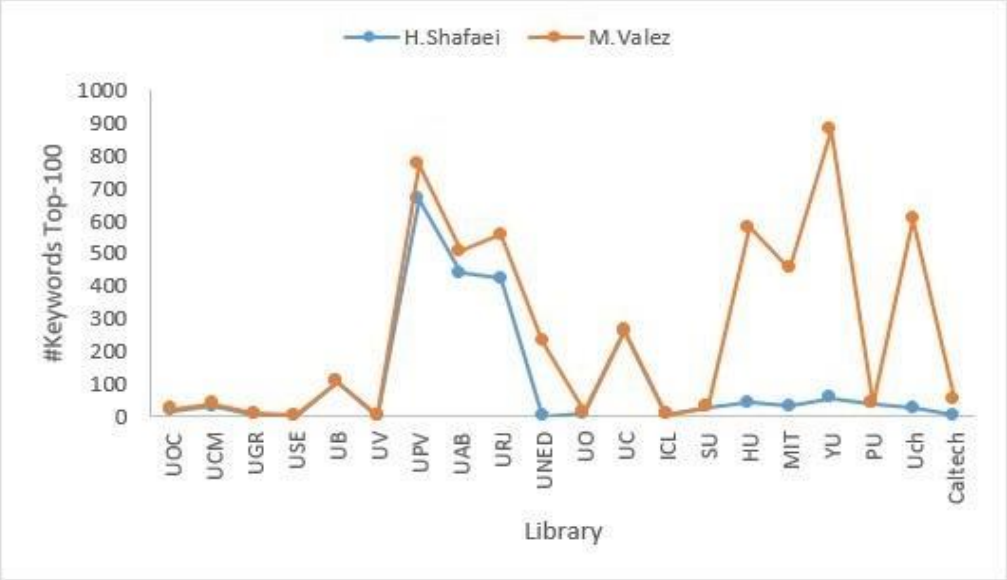

Fig. 10: Evaluation keywords for libraries compared to [20]

In Fig.11, the horizontal axis represents the libraries and the vertical axis represents the top 100 URLs. As shown in the figure, the top 100 URLs is less for most libraries than [20] research, except for one case where for ICL University the top 100URL for this research is more than [20]. The URLs provided by the UOC, UCM, UPV, UAB, URJ, UNED, UO, and Caltech libraries in this research are equal to than those in [20]. As can be seen in (Table A1). The low value of the top 100 URLs in this research for universities such as SU, PU, UC can be attributed to the use of HTTPS in the addresses of the libraries of these universities, while for research [20] in the test of these libraries the address it's HTTPS is not used .

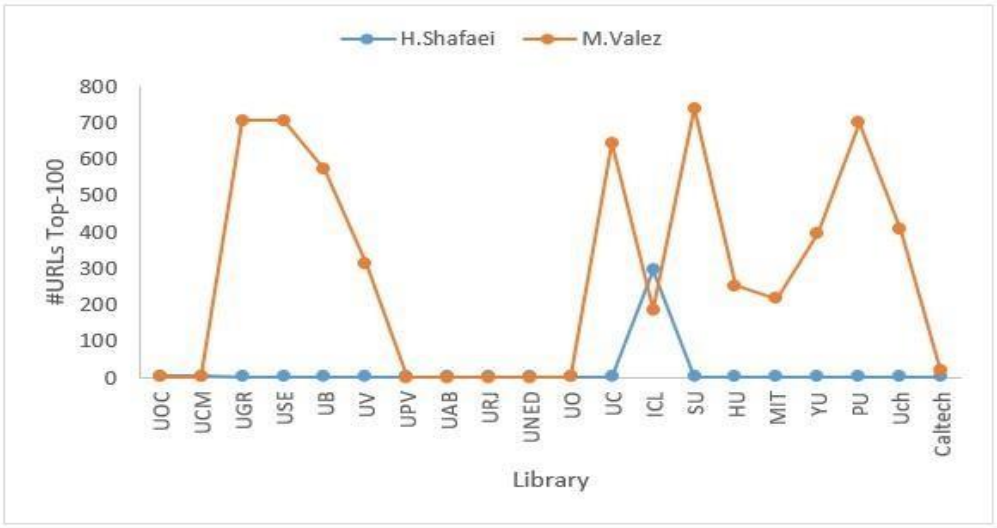

Fig. 11: Evaluation the top 100 URLs of libraries compared to the [20] method

3. Conclusions

The number of users who use search engines is increasing day by day, so search engine optimization and consequently the use of methods to improve the ranking and visibility of the website is of particular importance to attract and adhere to Internet users. There are several ways to optimize your search engine. Search engine optimization performs on-page SEO, content and internal optimization of a website for the search engine. Technical search engine optimization includes ways to improve the structure and readability of a website. Off-page search engine optimization includes out of the site optimization works. By identifying website features, search engine results ranking is improved. As a result of improving the ranking and visibility of the website, the user interaction with the website increases. The results show that the web visibility index obtained for libraries is not much different from the value of the web visibility index of libraries for research [20], except in the cases of the UO, UCM, and UOC university libraries, where the results show that, the URL used in the experiments is effective on the web visibility index. There is no direct relationship between the top 10 keywords and the top 100 keywords with the web index of universities and their libraries. The data obtained from the Sistrix tool is listed in the Appendix A.

Appendix A
TABLE A1

University	Acronym	Country	URL University	URL Library
Open University of Catalonia	UOC	ES	https://www.uoc.edu	http://biblioteca.uoc.edu/
Complutense University of Madrid	UCM	ES	https://www.ucm.es	https://biblioteca.ucm.es/
University of Granada	UGR	ES	https://www.ugr.es	https://biblioteca.ugr.es/
University of Seville	USE	ES	https://ics-seville.org	https://bib.us.es/
University of Barcelona	UB	ES	https://www.ub.edu/web/portal/ca/	http://crai.ub.edu/
University of Valencia	UV	ES	https://www.uv.es	https://www.uv.es/uvweb/libraries-documentation-service/en/libraries-documentation-service-1285867215074.html
University of the Basque Country	UPV	ES	https://www.ehu.eus	https://www.ehu.eus/es/web/biblioteka
Autonomous University of Barcelona	UAB	ES	https://www.uab.cat	https://www.uab.cat/web/servicio-de-bibliotecas-1345733231312.html
King Juan Carlos University	URJ	ES	https://www.urjc.es	https://www.urjc.es/estudiar-en-la-urjc/biblioteca
The National Distance Education University	UNED	ES	https://portal.uned.es	https://www.uned.es/universidad/biblioteca.html
University of Oxford	UO	UK	https://www.ox.ac.uk	https://www.bodleian.ox.ac.uk/
University of Cambridge	UC	UK	https://www.cam.ac.uk	https://www.lib.cam.ac.uk/
Imperial College London	ICL	UK	https://www.imperial.ac.uk	https://www.imperial.ac.uk/admin-services/library/
Stanford University	SU	US	https://www.stanford.edu	https://library.stanford.edu/
Harvard University	HU	US	https://www.harvard.edu	https://library.harvard.edu/
Massachusetts Institute of Technology	MIT	US	https://www.mit.edu	https://libraries.mit.edu/
Yale University	YU	US	https://www.yale.edu	https://web.library.yale.edu/
Princeton University	PU	US	https://www.princeton.edu	https://library.princeton.edu/
University of Chicago	Uch	US	https://www.uchicago.edu	https://www.lib.uchicago.edu/
California Institute of Technology	Caltech	US	https://www.caltech.edu	https://www.library.caltech.edu/

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