Search Engine Optimization (SEO): Universities Platforms Review in Gaza Strip

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Abstract— *Since the growing content on the internet exponentially, search engines have become the starting point for most websites. Search Engine Optimization (SEO) is a method for increasing the website ranking of the search engine results. Websites need to take SEO criteria into account in order to improve the performance of their search engines results and attract more users. This paper addresses the challenges faced by universities websites in Gaza Strip in terms of search engine results. Ten major universities in Gaza Strip included in our case study. Several SEO elements were used in qualitative and quantitative analysis. The quantitative analysis shows that the Domain Authority is low when compared with other related websites. This affected the ranking of these sites on the search engine. The Islamic University's website is ranked first by Alexa and Google Page Ranking, followed by Al Quds Open University, Al Aqsa University and the Palestinian University. The qualitative analysis showed that universities websites in Gaza face set of unique challenges for SEO. These challenges are Common Keywords, SEO Friendly URL, Image Alt, Inline CSS, Structured Data, Custom 404 Error Page, Disallow Directive, URL Canonicalization, Plain Text Emails, Site Loading Speed, Page Objects, CDN Usage, JavaScript Minification, and CSS Minification. It also finds that the response time of the websites is high and the security level is 54.2 %.In light of these results, we emphasize solving these problems to improve the website's search engine performance and make it more user-accessible.*

Keywords— SEO; Website optimization; University; Gaza Strip

1. INTRODUCTION

Nowadays, website competition has increased after the growth of the Internet and digital markets. Businesses and associations aim to draw the highest number of visitors to their websites to show their best online services and products. The users need to quickly and easily access the online resources and information. They also need to compare the services and products that companies offer through their websites. Search engines such as Google, Yahoo, and AOL are websites or software provide these tools to customers and businesses [1]. These tools use huge database to archive the main characteristics of web sites such as websites keywords. These keywords is used to compare the customer research query then retrieve and rank the relevant sites [2]. In order to make it easier for consumers to access the business's website, it is important to focus on improving the ranking in the search results. search engine optimization (SEO) is a methodology of strategies, techniques and tactics used to increase the amount of visitors (traffic) to a website by obtaining a high-ranking placement in the search results page of a search engine [1, 3].

There are 16 universities websites in Gaza Strip, classified as five traditional universities, four university colleges, six society colleges, and one open university [4]. These institutions use their websites to attract the largest number of students. However, the recent statistics show that the level of barriers to the use of search engines among students in Gaza was high [5]. The analysis of these websites is therefore very important for the discovery of their vulnerabilities for improvement. The current study aims to measure the performance of the university websites in Gaza Strip. It also addresses the weakness that websites are needed to improve.

2. SEARCH ENGINES

In recent years, the rapid growth of the Internet and digital media has led to a high reliance on search engines to access the information needed. Search Engines are web-based software that collects data from websites, such as website URLs and keywords, and then organizes this data into large databases. Users use this database to search for digital content, such as information, photographs, videos and websites [6]. According to [7] in January 2020, the number of these users reached 4.54 billion people all over the world. As a result, search engines are now the main source of digital information and their importance is growing on a daily basis [8].

The statistics indicate that search engines control 93% of internet traffic [9]. Most of these traffics are user's keywords which are identified and analyzed by search engine. The keywords of the websites that stored in the database are then compared with user's keywords. Websites that matched are retrieved and ranked according to their relevant to users keywords [2]. Most websites, however, suffer from low rank in search engine results. For this, it is very important to evaluate these sites in order to identify the obstacles that affect the search engine performance ranking[10].

3. Search Engines Optimization (SEO)

The concept of SEO has been emerging since the mid-1990s [11]. SEO is a set of processes, technique, or methodology that allow search engines to crawl, index, and understand the content of a website[12]. Therefore, the number of visitors to the website will increase and the search engine performance will be enhanced [3, 13-15]. According to [12, 16], SEO is an activity carried out to optimize web pages in order to become more visible in search engine result. Jain in 2013 summarized the advantages of SEO as increased popularity, increased visibility, increased number of visits to the website and increased sales volumes [6].

There are several factors that are affected the ranking of websites on the Search engines results. These criteria attracted the attention of many researchers to assess the extent of their effect on site rankings in search engine results. Khraim in 2015 analyzed the effect of the SEO dimensions on Jordanian online advertising [17]. He concluded that for online advertising in Jo, SEO competition, SEO experience and SEO techniques are very relevant. Egri and Bayrak in 2014 measured the significance of time, speed, reduced bounce rate, page views, and page layout in keeping the user on the site[8]. The results of this study indicated that websites should be designed for user's request, not for search engines. Solihin in 2013 recommended that best practices for search engines are Keyword research, Indexing, On-page, and page optimization [15]. According to [18], the top factors leading to higher rankings are SSL, URL keyword, backlinks, length of text and age of domain. Yalçın and Köse claimed that website design, use of frames, use of images, adding keywords to the web background, domain field, title labels, description labels, page content keywords, backlink, site map, separate image directory, and quick and useful website navigation are important points for SEO [12].

4. Selected SEO Elements

In the current research, the qualitative and quantitative analyses are conducted to analysis the universities website in Gaza strip. The selected SEO elements are as follows:

4.1 Quantitative SEO Elements

The elements selected for the Quantitative SEO test are:

- Domain Authority (DA) is a search engine score (one to 100) based on multiple factor tests, higher score is better than lower score [1, 19]. This check estimates the ranking of a website in the search engines.

- Spam Score (SP) is an illegal and immoral way to manipulate search engine algorithms in order to increase web page rankings. It includes applications in legal, political, and economic terms. Spam Score reflects the percentage of sites with similar features that Google will penalize or ban. Body spam, Title spam, Meta tag spam, URL spam, and Anchor text spam can all be similar features[15, 20].

- Total links (TL) refers to all links to this webpage, including internal, external, followed and not followed. The links help the search engines finding other pages within the same website and allow users to browse a website [10].

- External followed links (EFL) refers to the number of links followed by the search engines. A significant number of external links from other websites within the same community lead positively to visibility of the website [13] [13].

- Internal followed links (IFL) refers to the numbers of links from one page to another on the same domain that are followed by the search engines. Internal links can significantly enhance website performance in search engines.

- Total linking domains (TLD) is the number of unique root domains that link to a site, including the followed and not followed links.

- Ranking Keywords (RK) refers to the position of your web page for a specific keyword search query within the search results. The most effective way to improve website position for search engines is to define the keywords that users often use.

- Alexa rank (AR) is the websites rating according to the traffic they get. Websites which receive more traffic are listed above others [21].

- Google PageRank (GPR) is a link-quality-based algorithm used by Google to rank websites.

4.2 Qualitative SEO Elements

In the current study, the selected qualitative SEO elements comprise four classes, including general criteria, advance criteria, server & security and speed optimization.

4.3.1 General Criteria

There are 14 elements in the general SEO criteria which are as follows:

- The Meta title is the label will appear in the title bar of the browser window. The search engines are used this title to determine keyword relevance and even display the title text on the results page of a search. SEO are used Meta Title Test to check HTML tags that affect the indexing of websites in search engines [22].

- Meta tag description used to describe the websites contents which help search engines in retrieving them. This description is tested by meta description test [19].

- Robots.txt test used to inform search engine how to crawl pages on their website and index this pages. By default search engine index and crawl everything unless told otherwise [21, 23].

- Sitemap test check whether a website has a map where Sitemap is a way to inform a Search Engine of all pages and URLs on their websites [21, 23].

- Most common keywords tests to use evaluate and listing the relevant keywords user may enter when trying to find a specific category on a search engine [19].

- Heading Tags Test checks whether any H1 and H2 HTML header tags are used on the web page. The search engine results rely on the H level value in their algorithm. H1 is the most important HTML header tags [21, 24].

- SEO Friendly URL checks whether URL of the website is friendly to SEO tools. They will contain keywords related to the page subject to make URL SEO friendly.

- Image Alt Test used to checks whether the images on the site contain alternatives or not, Alt attribute useful for web accessibility, displaying text if an image file cannot be loaded, and provide descriptions to search engine crawlers, helping them to index an image.

- Inline CSS Test checks whether the HTML tags contain inline CSS on a website. Inline CSS increase the page size unnecessarily, and then increase the page load time.

- Media Query Responsive Test checks if the website implements responsive design functionalities using the media query technique. the responsive web design allows you to solves the compatibility devices size problems of web pages [25].

- Deprecated HTML Tags checks if a webpage is using html tag and attribute are becoming obsolete. These tags will eventually lose browser support and your web pages may render incorrectly as browsers drop support for these tags.

- Google Analytics Test used to check if your website is connected with Google Analytics tool. The Google Analytics tool is a web analytics service offered by Google that tracks website activity such as session duration, pages per session, bounce rate etc.

- JavaScript Error Test checks whether JavaScript errors exist in a web page. Such errors will prevent users from accessing your sites and decrease the opportunity of ranking your website in search engine results.

- The Social Media Test tests whether one or more of the popular social media networks are linked to a website

4.3.2 ADVANCED SEO

There are seven elements in the advanced SEO criteria which are as follows:

- Structured Data Test checks if a website uses HTML Microdata specifications.

- Custom 404 Error Test page tests whether the standard 404 error page for a website is using. Custom 404 error page is used to provide a friendly message to the wrong URL.

- Noindex Tag Test checks whether a website uses the Noindex tag. The Noindex tag is used to inform search engines that the content will not appear on search results pages.

- Canonicalization describes how a site can use different URLs for the same page. Canonical Tag Check a website for possible canonicalization of URL issues [19].

- Nofollow Tag Test checks if a web page is using the Nofollow attribute. The Nofollow attribute is used for informing search engines not to follow the specific links.

- Disallow Directive Test checks if robots.txt file is instructing search engine crawlers to avoid parts of your website. Disallowing means you're telling search engines not to crawl it. If a website has a lot of pages, it means that search engines waste time in crawling through those pages [23].

- SPF Records Test checks if website DNS records contain an SPF record. The SPF record is a Sender Policy Framework record to verify that a mail server has been allowed to send mail on behalf of website domain [26].

4.3.3 SERVER & SECURITY

There are 6 elements in the Server & Security SEO criteria which are as follows:

- URL Canonicalization Test checks if a website for potential URL canonicalization issues. Canonicalization describes how a site can use more than one URLs for the same page .

- HTTPS Test checks if a website is using HTTPS. HTTPS is a Secure Web Protocol using HTTPS indicates that an additional encryption/authentication layer was added between client and server has been added [24].

- Safe Browsing Test checks a website against regularly updated malware and phishing databases of problem websites.

- Server Signature Check tests if the signature of the website is ON. The signature contains operating system details and versioning of the web server.

- Directory Browsing Test check if a server allows the visitors to browse website directory.

- Plain Text Emails Test checks if a web page uses plain text email addresses. Plain text email is a simple email message that only includes text. A spam can read the pages in a website and extract plain text email addresses.

4.3.4 SPEED OPTIMIZATIONS

There are 12 elements in the Speed Optimizations SEO criteria which are as follows:

- HTML Page size check the size of HTML page's including the size of all the HTML code.

- HTML Compression/GZIP check a website's loading speed.

- The Site Loading Speed Test checks the speed of loading of the website. This test is an important part of the search engine rankings. Pages that take more than 5 seconds to load can lose up to 50 % of users.

- Page Objects Test check if all the objects requested by the web page can be retrieved.

- Flash Test tests whether a website uses Flash, an old technology that has traditionally been used to add rich multimedia content to a website.

- CDN Usage Test(content delivery network) checks if the webpage's resources (images, JavaScript and CSS files) are served via CDNs. CDNs manage the delivery of data in different locations.

- Image Caching checks if a website is using an image expires tag. Image expires tag is used to cash a page images, so browsers will fetch images from cash intended the server.

- JavaScript Caching and CSS Caching Test checks if a website is using caching.

- The website can use caching headers for all CSS and JavaScript resources, so instead of the server, browsers will get CSS and JavaScript files from cash.

- JavaScript and CSS Minification Test check that if any, external JavaScript and CSS files used on your page have been minified. Minefield files reduce the size of the page and the total load time.

- Nested Tables Test checks if the web site contains nested tables. The nested tables can be slower loading web page.

- Frameset Test checks if a website is using frames. Frames create problems for both users and search engine.

5. RESEARCH METHODOLOGY

The aim of this study is to analyze universities websites in Gaza Strip using both quantitative and qualitative methods. The aim of this study is to analyze universities websites in Gaza Strip using quantitative and qualitative methods. Our case study included ten major universities in Gaza Strip (Al-Aqsa AU, Islamic IU, Al- Quds QU, AL-Issra ISU, Palestine PU, and Polytechnics College PC, AL- Ummah UU, College of Science and technology CST). Domain Authority, Spam Ratings, Total Links, External Followed Links, Internal Followed Links, Total Link Domain, Followed Link Domain, and Ranking Keywords are included in the quantitative analysis. Qualitative analysis includes 45 checks categorized into four groups that are general criteria, advances criteria, server and

security, and speed optimization. For each university website, SEO-related data are collected using online SEO tools, for example "SEO Site Checkup," "Alexa" "Google Trend," "Woorank" and "MozBar".

6. RESULTS AND DISCUSSION

In each university website, data relating to search engine optimization are collected using the available SEO tool on the internet. The data obtained, including four dimensions and 45 test factors.

6.2 Quantitative Analysis

The quantitative analysis reveals that the average Domain Authority was 34.33%. Hence, we can conclude that the Domain Authority is small relative to other websites such as Birzeit University, which account for 59%. That's means the universities websites in Gaza Strip have difficulty rankings and not visible enough in the search engine. The results in table 1 show that the spam Score was 14.4%, which indicate that 14.4% of these sites banned by Google. It also show that The College of Science and Technology university has the highest external follow Links with (86.3 %), followed by the Palestine University with (33.5%) and Islamic university with (5.18%). On the internal follow links Al-Quds university with (99.4%) score the highest, followed by Al-Aqsa university with (99.3%) and Palestine University with (99.1%). The average of external follow links (16.2%) is less relative to total links which affected the score of the website domain authority.

Table 1: Quantitative Analysis Results

Factors	AU	IU	AZ	QU	PU	ISU	PC	CTS	UU	GU
DA%	37	54	46	44	33	23	30	23	19	25
SP%	29	3	3	0	37	31	13	-	4	30
TL	2M	4,6M	1M	5,5M	4M	159K	27K	11K	19K	92.5K
EFL%	0.7	5.18	2.7	0.5	0.86	0.64	33.54	86.3	15.5	.92
IFL%	99.3	94.1	97.1	99.4	99.1	99.1	65.3	13.7	84.4	91.614
TLD	1,276	6,832	2,774	2,034	1,235	64	262	7	872	121
FLD	1,131	5,804	2,535	1,674	1,101	49	121	6	861	73.
RK	24	5.5 k	159	42	73	189	33	0	3	2
AR	427k	37k	461k	164k	448k	2,5M	1,2M	3,9M	8,8M	5M
GPR	438k	41k	445k	173k	453k	2,M	1,2M	3,8M	8,9M	5M

Universities websites in Gaza were analyzed according to Alexa and Go1ogle PageRank. The results of the previous table show that website of Islamic university is ranked first, followed by Al Quds Open University, Al Aqsa University and Palestinian University. The analysis also indicates that there is a significant difference in the rank rating of these websites as shown in the figure 1.
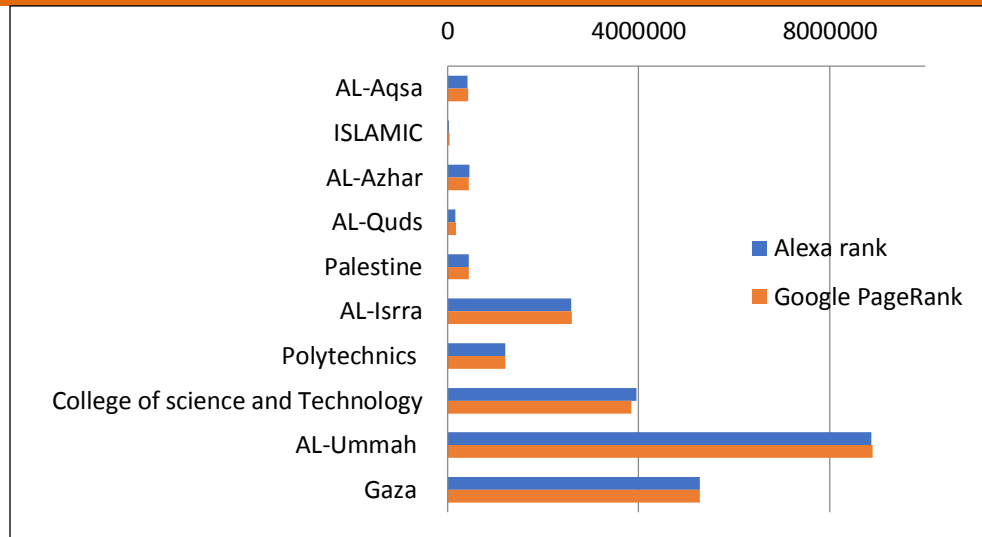
Fig 1. *Alexa and Google Page*

6.3 Qualitative Analysis

This study analyzed the universities websites in Gaza using Qualitative method. The results of Qualitative analysis are as the follows:

6.3.1 General Criteria

Results in the table 1 indicated that the universities websites in Gaza Strip failed to meet four General checks, which are Most Common Keywords Test, SEO Friendly URL Test, Image ALT Test, Heading Tags Test, and Inline CSS Test. On the other hand, it succeeds in the following General Checks: Meta Title Test, Meta Description Test, Keywords Usage Test, Robots.txt Test, Deprecated HTML Tags Test, Google Analytics Test, Favicon Test, JS Error Test, and Social Media Test. The average score for General Criteria was 52.5%. These findings have shown that universities websites in certain fields, such as Keywords, Image Alt and CSS need to be improved.

Table 2: SEO General Criteria Results

Test Factors	AU	IU	QU	AZ	PU	ISU	PC	CTS	UU	GA
Meta Title Test	√	√	√	√	√	√	√	√	√	√
Meta Description Test	X	√	√	√	X	X	X	√	√	X
Most Common Keywords Test	X	X	√	X	X	X	X	X	X	X
Keywords Usage Test	X	√	√	√	X	X	X	√	√	X
Heading Tags Test	X	X	X	√	√	√	√	X	X	X
Robots.txt Test	X	X	X	√	√	√	X	√	√	X
Sitemap Test	X	X	√	√	√	X	X	X	√	X
SEO Friendly URL Test	X	X	X	X	X	√	X	X	√	X
Image Alt Test	X	X	X	X	X	X	X	X	√	X
Inline CSS Test	X	X	√		X	X	X	X		X
Deprecated HTML Tags	√	√	√	√	√	√	√	X	√	√
Google Analytics Test	√	√	√	√	X	X	√	X	X	X
Favicon Test	√	X	√	X	X	√	√	√	√	√
JS Error Test	√	√	√	√	√	√	√	√	√	√
Social Media	√	√	X	√	√	√	√	√	√	√
Media Query Responsive Test	√	√	√	√	√	√	√	√	√	√
No. elements that need to be fixed	9	8	5	6	8	7	8	8	4	10

In addition, the results indicate that all university websites have been successful in Meta Title, JS Error, and Deprecated HTML Tags tests. The Average rate for SEO general criteria result is shown in the figure 1.

Fig 2. *The Average Score of SEO General Analysis*
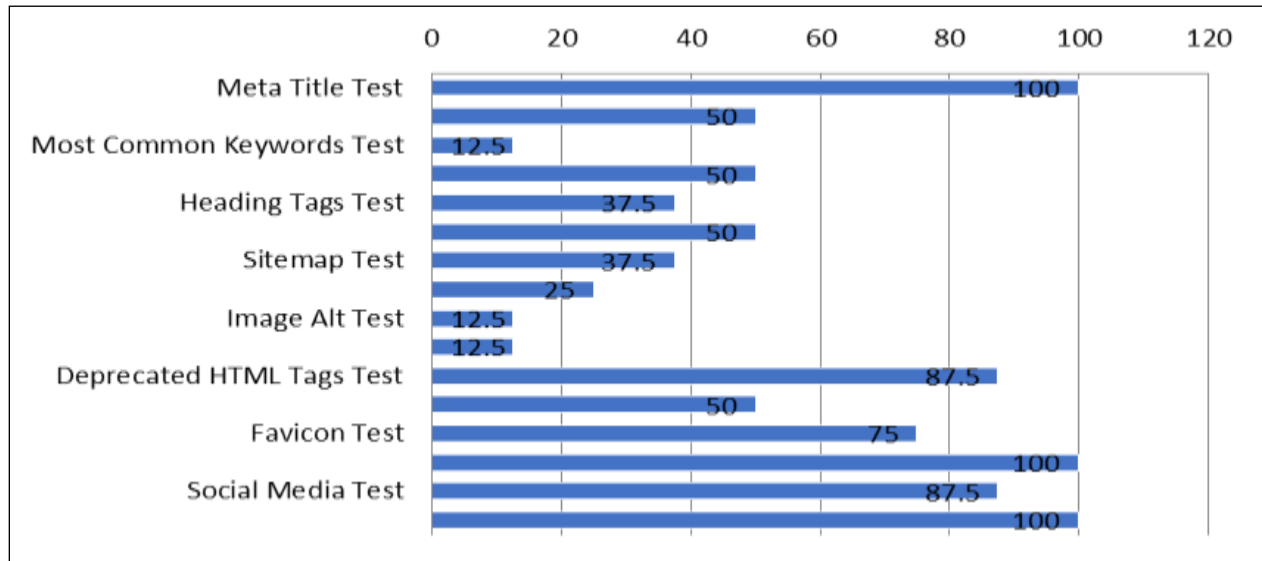
6.3.2   Advanced SEO

The advanced SEO test as shown in the table 3, indicates that three tests have failed. Failed tests include Structured Data Check, Custom 404 Error Page Check, and Disallow Directive Testing. The overall advanced SEO test score was 59.4 %. That's good, but it's needed to be enhanced in some field such as Structured Data, using Custom 404 Error Page and Disallow Directive Test. Also, the robots.txt file must be used to prevent wasting time in crawling a website.

Table 3: SEO Advanced SEO Results

Test Factors	AU	IU	QU	PU	AZ	ISU	PC	CTS	UU	GA
Structured Data Test	X	X	X	X	X	X	X	√	√	X
Custom 404 Error Page Test	X	X	√	X	X	X	√	X	X	X
No Index Tag Test	√	√	X	√	√	√	√	√	√	√
Canonical Tag Test	√	√	X	√	√	√	√	√	√	√
Nofollow Tag Test	√	√	X	√	√	√	√	√	√	√
Disallow Directive Test	X	X	X	X	X	X	X	X	X	X
SPF Records Test	√	√	√	X	√	X	√	X	√	√
No. elements that need to be fixed	3	3	5	4	3	4	2	3	2	3

6.3.3   Server & Security

In the table 4, the server & security test of Gaza Strip universities websites reveals that two tests failed. Failed checks include Canonicalization of URLs and testing of plain text emails. The total test score for Server & Security was 54.2%.

Table 4: SEO Server and Security Results

Test Factors	AU	IU	QU	AZ	PU	ISU	PC	CTS	UU	GU
URL Canonicalization Test	X	√	X	X	√	X	X	X	X	√
HTTPS Test	X	X	√		√	√	√	X	X	X
Safe Browsing Test	√	√	X	√	√	√	√	√	√	√
Server Signature Test	X	X	√	√	X	√	X	X	√	X
Directory Browsing Test	√	√	√	√	√	√	√	√	√	√
Plain Text Emails Test	X	√	√	X	X	X	X	X	X	√
No. elements that need to be fixed	4	2	2	2	2	2	3	4	3	2

6.3.4   Speed Optimizations

The Speed Optimizations test, as shown in the table 5, indicated that the universities websites in the Gaza Strip had some problems affecting their speed.   Site Loading Speed, Page Objects, CDN Usage, JavaScript Minification, and CSS Minification must be resolved to make these sites fast. The total test score for Server & speed was 43.8%. This means that the response time of these websites is high, which affects the satisfaction of the user.

Table 5: SEO Speed Optimizations Results

Test Factors	AU	IU	QU	AZ	PU	ISU	PC	CTS	UU	GU
HTML Page Size	X	√	√	X	X	√	√	√	√	√
HTML Compression/GZIP	X	√	√	X	X	√	√	√	√	√
Site Loading Speed Test	X	X	X	X	X	X	X	X	√	√
Page Objects Test	X	X	X	X	X	X	X	X		X
Page Cache Test (Server Side Caching)	√	√	√	√	√	√	√	√	√	√
Flash Test	√	√	√	√	√		√	√	√	√
CDN Usage Test	X	X	√	X	X	X	X	X		X

Image Caching	X	X	√	X	X	√	√	X	√	X
JavaScript Caching	X	X	√	√	X	√	√	X	√	√
CSS Caching Test	X	X	√		X	√	√	X	√	
JavaScript Minification Test	X	X	X	√	X	X	X	X	X	X
CSS Minification	X	X	X	X	X	X	X	X	X	X
Nested Tables Test	√	√	√	√	√	√	√	√	√	√
Frameset Test	√	√	√	√	√	X	X	√	√	√
Doctype Test	√	√	√	√	√	√	√	√	√	√
URL Redirects	X	√	√	√	√	√	√	X	√	√
No. elements that need to be fixed	11	8	4	7	10	6	6	9	4	6

The previous analysis disclosed many elements that need to be configured of universities websites in the Gaza Strip. The figure 3 shows the sum of these elements on each university website.

Fig 3. *No. of Elements that Need to be Fixed for each Website*
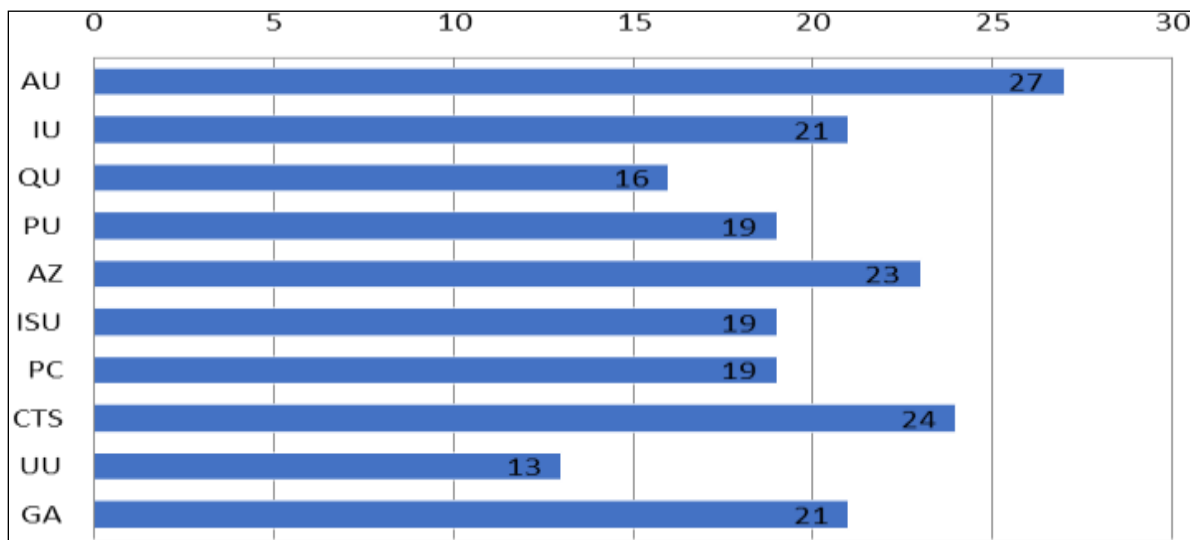
7   Conclusion

Since digital information on the internet increasingly growing, search engines have become the starting point for most websites. SEO is used to improve the ranking of websites in search engines. We analyzed high-education websites in the Gaza Strip in this paper using available online SEO tools such as "Search metrics," "Google trend", "Alexa", "MozBar." The results revealed that the Domain Authority is a relatively small that influenced the ranking on the search engine. In addition, these websites need to be optimized in the criteria of common keywords, SEO friendly, image alt, inline CSS, structured data, custom 404 error page, disallow directive, URL canonicalization, plain text emails, site loading speed, page objects, CDN usage, JavaScript Minification, and CSS Minification. The total server speed test score was 43.8%, which means the server response time is high, so reducing the total file size of the page and optimize images can improve server response time. Finally, the total test score for server & security was 54.2 %. SSL and HTTPS protocol must be used to enhance website security.

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