



# Health Websites Evaluation in Saudi Arabia: A Case Study

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**Abstract:** Internet and web services are fast becoming critically important to business, industry and individuals. Where Creating online brand and community is the chief objective of web serving. They recognize that web-based systems can enhance their scale of communication as the Internet is capable of rendering large amounts of data in a speedy manner to the public. To be successful, web-based systems need to have good usability. Usability is a measure of how easy the interface is to use. In order to achieve these measurements, we need to analyze them to detect its drawbacks, and find a way to improve them. This paper aims to analyze some of the top hospitals websites in Saudi Arabia that are Dr. Sulaiman Alhabib Hospital, King Fahad Medical City, Saad Specialist Hospital, Dallah Hospital, King Faisal Specialist Hospital and Research Center & International Medical Center. The evaluation involves testing sample pages related to the selected hospitals. This study provides an overview regarding the weakness and strengths of the six Saudi hospital websites.

**Keywords:** Website Evaluation, Health Website, Usability, Human Computer Interaction, Search Engine Optimization, Alexa

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## 1. Introduction

Nowadays, websites have many functions and can be used in various ways; it can be personal, commercial, government or non-profit organization website. Since the website is an important part of any business it should be flawless, user-friendly and well-designed.

Various evaluation methods have been produced to evaluate the websites. The methods could be sorted out as three categories, which are users, evaluators, and tools. Evaluator based methods are directed at finding usability problems that users might encounter while interacting with an interface, from the evaluator's point of perspective. It requires accepting a number of evaluators assess the user interface, and judge whether it adjusts to a set of usability principles. The other evaluation methods, which involve users in the process of identifying usability problems, include observations, questionnaires, and interviews [1]. Evaluation instruments are software tools or online services that help determine if a website is usable and accessible [2].

This paper aims to analyze some of the top hospitals websites

in Saudi Arabia, which are: Dr. Sulaiman Alhabib Hospital, King Fahad Medical City, Saad Specialist Hospital, Dallah Hospital, King Faisal Specialist Hospital and Research Center and International Medical Center. Online analysis tools which are Alexia and WooRank are used.

### 1.1. WooRank.com

It provides in-depth analysis of any website, and provides a huge help for anyone who wants his website to climb the Google ladder [3]. It analyzes the website from the following aspects:

- Search Engine Optimization (SEO)
- Usability
- Technology
- Mobile optimization

### 1.2. Alexa.com

Alexa is a famous website for the statistics of internet traffic, which provides a range of flow data and some indexes reflecting the credibility and the quality of the website, such as external links, bounce rate, and so on [4].



Figure 1. Search engine optimization process.

## 2. Search Engine Optimization Analysis

Nowadays, websites become an essential part of any business. Well-designed websites are not enough to attract potential customers. There is another job must be done to make the website profitable, which is Search Engine Optimization (SEO) Evolution [5-7]. SEO is the science of positioning the website in the top place in the search engine for relevant keyword phrases by making search engines

believe that your website is more relevant than your competitors [5][8] (see Figure. 1). Another definition: “SEO is the process of trying to rank highly a given web page or domain for specific keywords” [9].

### 2.1. What Makes SEO Important

At the beginning, the Internet there was no interest in website ranking due to the website rareness. So getting high ranking in the search engine was simple. Now everything has changed, every week internet witnesses tens of new websites so, things become much more complex. Therefore needing SEO evolution is essential for any new business [9].

### 2.2. SEO and SEM (Search Engine Marketing)

SEO belongs to Search Engine Marketing (SEM) topic, and both of them are ways of Internet Marketing, which refers to the network that is used to carry out site or brand marketing actions. A term used to describe all marketing strategies for search. SEM involves both organic and paid search Figure. 2. With paid search, you pay to list your website on a search engine so that your website appears when some types in a specific keyword or phrase [10][11]. Improving website’s SEO would be much cheaper than paying to make the website on the top of search engine result. SEO is an investment [12].

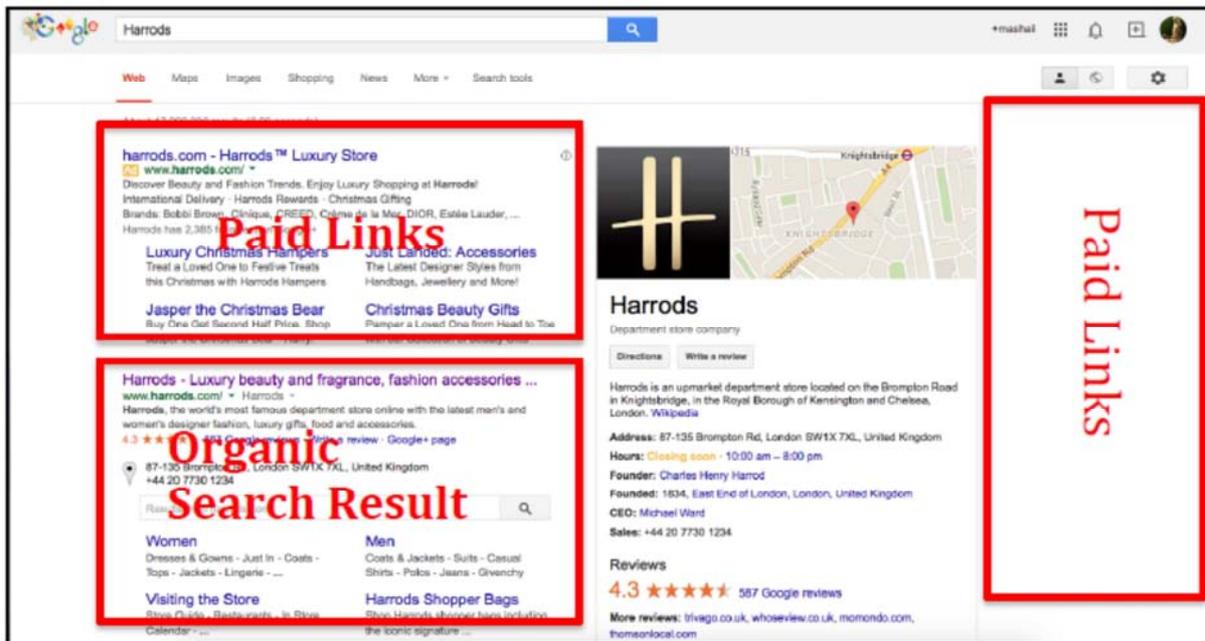


Figure 2. Organic and paid Search.

### 2.3. Essential Factors for Good Ranking Positions in All the Main Search Engines

1) On-page optimization: Matching key phrases or keywords searched and web page content. The prime factors to optimize web pages are keyword and key phrase density,

keyword formatting, putting keywords in the document metadata (page title tags, Meta description tags, Meta keyword tags etc.) and anchor text. On any website, each web page should have different title tag, Meta tag keywords and Meta tag description. The number of times the key

phrase is repeated in the web page text is a key factor in determining the position for a key phrase.

2) Inbound links and External link: Search engines count links to a page from another website as vote for this page. In other words, websites and web pages with more external links from other websites will be ranked more highly. Many of web focused companies should improve this aspect of search engine optimization in the process called the internal link architecture and external link building. Web companies should always try to get links from web pages with the highest Page Rank (PR) or from web pages with PR4 (a PR rating at least four). PR is a scale between 0 and 10 used by Google to determine the websites importance according to the quality and number of inbound links and external links (back links). External or Incoming links to a website should always come in natural textual form, rather than in graphic form (Banner adds images etc.). Google and other search

engines does evaluate or index image links, but without textual link, web companies will not increase the popularity or rank of a website. The Domain name maturity, URL structure, Internal link structure, Bounce rate, etc.. are very important factors for good ranking position in the search engine [13].

3) Understand SEO more: SEO of Amazon.com was demonstrated by searching for Programming in Java Book (Figure. 3), Programming in C++ Book (Figure. 4), and Human-Computer Interaction Book (Figure. 5). In Google as shown in (Figure. 3) Amazon.com is the third result and in (Figure. 4) Amazon.com is the First result. But in (Figure. 5) Amazon.com is the second result. The reason of this difference is that there are some websites have higher SEO rank than Amazon.com, which make Amazon.com doesn't become the first result.

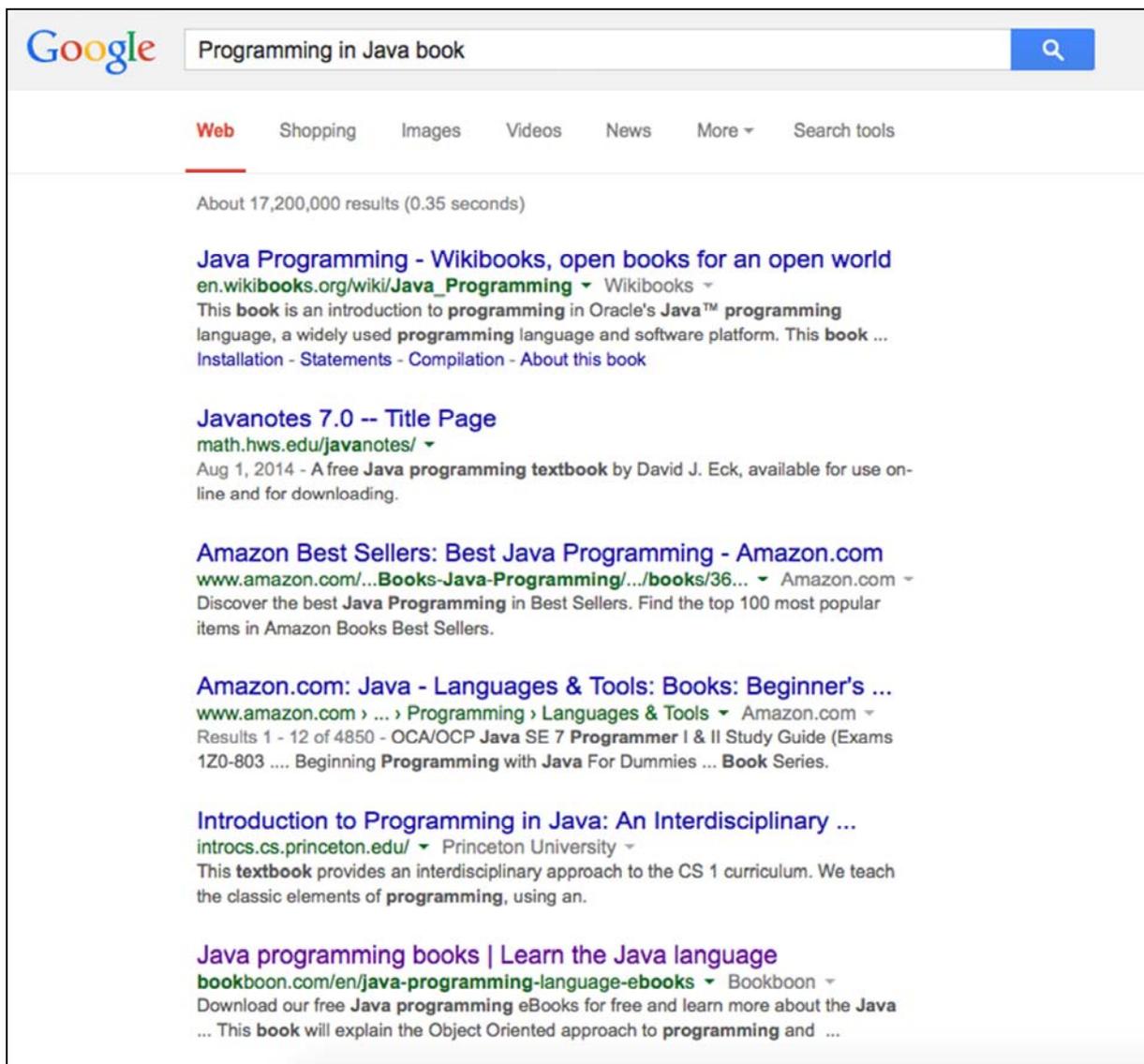


Figure 3. Searching for Programming in Java book.

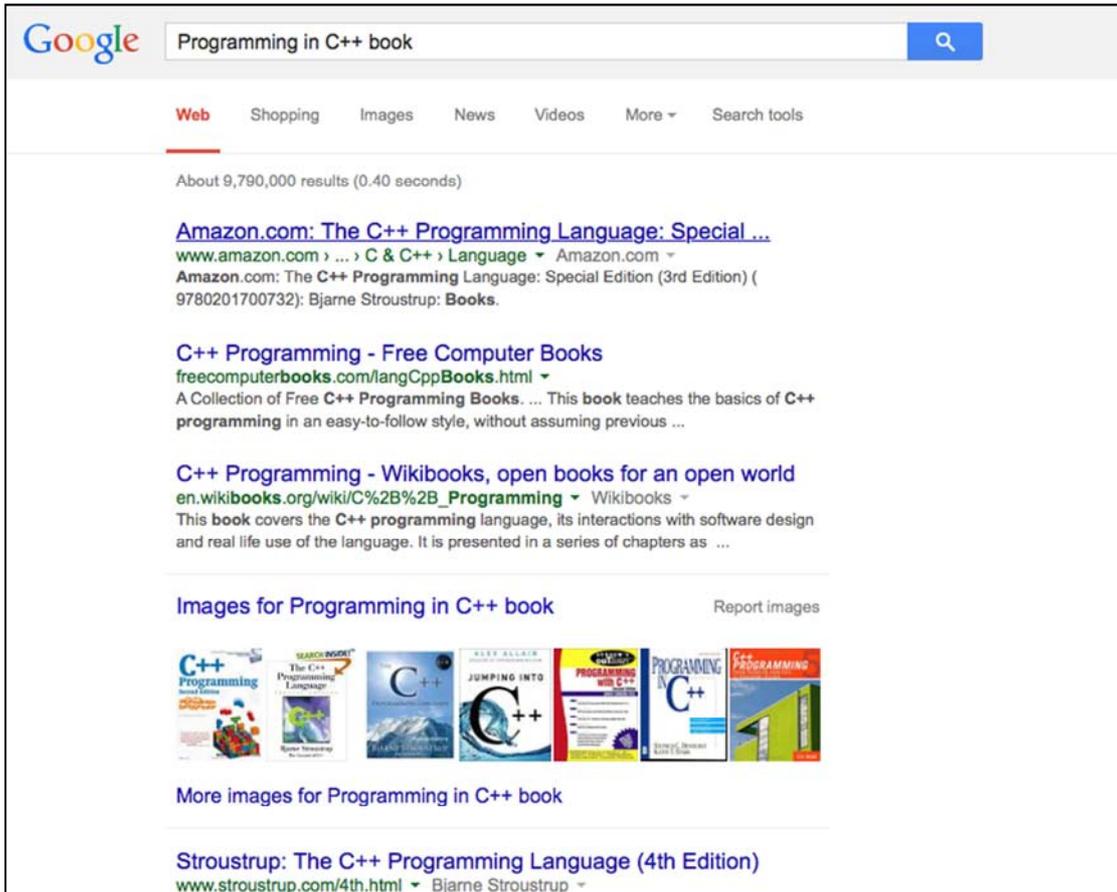


Figure 4. Searching For Programming in C++ book.

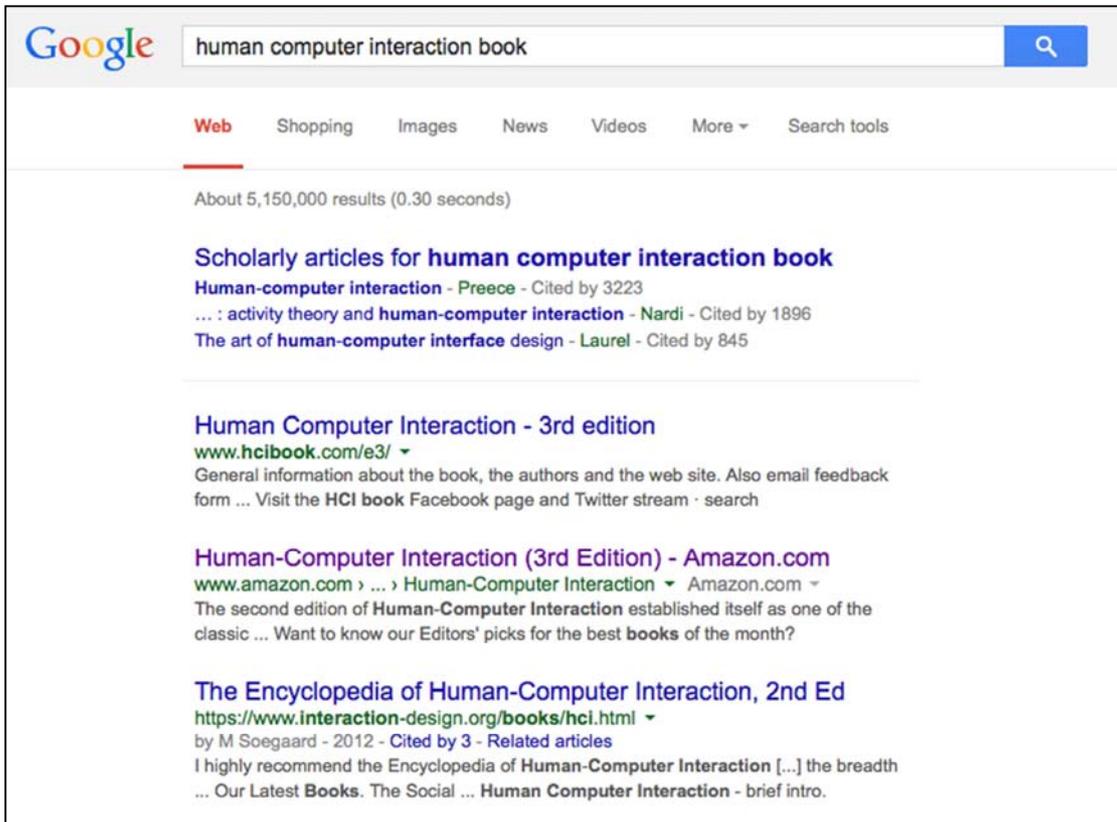


Figure 5. Searching for Human Computer Interaction book.

**2.4. Analysis Criteria**

The website evaluation measures have been proposed in various contexts in recent years; researchers in this area struggle determine important factors for evaluating websites [14].

1) Page Rank: The Page Rank (commonly called PR) is a link analysis algorithm used by Google to assess the popularity of a website. Common methods for ranking are either based on relevancy such that documents are ordered from most relevant to least relevant, or by popularity where documents are ordered from most popular to least popular. It is important to understand that the term popularity is normally the result of link analysis and not the result of user feedback.

The general purpose of a ranking algorithm is to impose an order on relevant Web pages. For example, a search engine responds to a search query with a set of relevant Web pages, which are listed in the order of rank. Ranking algorithms can be based on various criteria such as link structure only, document property based only, and a combination of the former [15].

The PageRank ranges from 0 to 10. New websites start at PR0 and popular websites, like Twitter.com, have a PR10. The good page rank should range from 4 to 10.

1) Title: Title of a webpage is stored in the <title> tag in the <head> tag. 10 to 70 characters length of title means a good title.

2) Description: Meta Description is an HTML attribute

that is used to provide concise explanations of the content of a web page, the following lines a sample of a webpage [16].

```
<head>
<meta name="description" content="This is an example of a meta
description. This will often show up in search results.">
</head>
```

A good web page description ranges from 70 and 160 characters (spaces included).

3) Keywords Cloud: The Keywords provides an idea of the most frequently recurring keywords. They are likely to be the keywords with the greatest probability of ranking high in the search engines.

4) Text/HTML Ratio: The webpage's ratio of text to HTML by the equations (1) & (2):

$$\text{Ratio} = \text{Text/HTML} \tag{1}$$

$$\text{Ratio in Percentage} = \text{Ratio} * 100 \tag{2}$$

When the webpage's ratio is below 15%, this means that the webpage, probably needs more text content. A ratio between 25% and 70% is ideal. When it goes beyond that, the page might run the risk of being considered spam.

5) Indexed Pages: This is the number of pages on the website that are indexed by search engines. The more pages that are indexed, the better, as this offers more opportunity for the website to be found.

*Table 1. SEO Analysis.*

Criteria	King Fahad Medical City	King Faisal Specialist Hospital	Saad Specialist Hospital	Dr.Sulaiman Alhabib Hospital	Dallah Hospital	International Medical Center
Page Rank	PR4 Good	PR6 Good	PR4 Good	-	PR4 Good	PR4 Good
Title	30-chars Good	Missing	72-chars >70 not Good	23-chars Good	22-chars Good	Missing
Description	Missing	Missing	Missing	Missing	Missing	Missing
Keywords Cloud	Medical-16 city-9 king-8 fahad - 6 services-4 hospitals-3 middle-2 advanced-2 complex-2 east2-	—	Saad-19 hospital-15 specialist-14 events-7 services-7 share-6 patient-4 eastern-4 news-4 province-4	Alhabib-467 Sulaiman-452 Hospital-188 in Riyadh-112 Surgery-95 Succeeded-84 Doctor-73 in Al-Qassim-71	Hospital-18 health-15 services-13 medica-19 dallah-8 book-7 nursing-7 doctor-7 patient-6 ask-6	—
Text/HTML Ratio	2.3% need more text	0.0%	9.7% need more text	7.8% need more text	5.4% need more text	0.0%
Indexed Pages	1441	3917	2220	7830	3099	677
Robots.txt	Missing	Missing	Missing	It has Robots.txt	Missing	Missing

6) Robots. txt file: Check the existing Robots. txt file that is a simple file that contains components used to specify the pages on a website that must not be crawled (or in some cases must be crawled) by search engine bots. This file should be placed in the root directory of the site [17]. It allows restricting the access of search engine robots that crawl the web and it can prevent these robots from accessing specific directories and pages. Where, Robots or bots are very simple and automated data retrieval programs, traveling the web to find information and links. They can only collect what they can see. They can only read and understand the

text and then only if it's laid out in a format that is tuned to their needs. Ensuring that they can access and read all the content from within a web site must be a core part of an SEO Evolution [18]. Also, Robots. txt file specifies where the XML sitemap file is located. The following table shows the analysis of SEO for the chosen hospitals' websites.

Table 1 shows SEO Analysis some the top hospitals websites in Saudi Arabia, which are: Dr. Sulaiman Alhabib Hospital, King Fahad Medical City, Saad Specialist Hospital, Dallah Hospital, King Faisal Specialist Hospital and Research Center and International Medical Center.



Figure 6. 404 Error Message "Page not found".

Table 2. Usability analysis.

Criteria	King Fahad Medical City	King Faisal Specialist Hospital	Saad Specialist Hospital	Dr.Sulaiman Alhabib Hospital	Dallah Hospital	International Medical Center
URL	Good, short and meaningful	Good, short and meaningful	Good, short and meaningful	Long, but meaningful	Good, short and meaningful	Good, short and meaningful
Custom 404 Page	has custome Error page	Does not has custome Error page	Does not has custome Error page	-	has custome Error page	-
Above the Fold Content	Low Impact	Low Impact	Low Impact	Low Impact	Low Impact	Low Impact
Page Size	48.7KB	49.7KB	54.1 KB	72.5KB	87.9KB	69.2KB
Load Time	5.73s, slow	3.2 s, good	5.93s, slow	5.4s, slow	1.06s, slow	4.99s, slow
Printability	✗	✗	✗	✗	✗	✗
Email Privacy	✓	✓	✓	✓	✓	✓

### 3. Usability Analysis

Usability is a quality attribute that measure how easy user interfaces are to use. It doesn't confine "easy to use", a more precise definition can be used to, understand user requirements, formulate usability goals and decide on the best techniques for usability evaluations [19]. Table 2 shows the Usability analysis.

1) URL: URLs should be short and avoid long domain names. A descriptive URL is better recognized by search engines, and once your URL is descriptive user can guess about the content of the page [14].

2) Custom 404 page: The Error 404 "Page not found" is the error page displayed whenever someone asks for a page

that's simply not available on your site. The reason for this is that there may be a link on your site that was wrong or the page might have been recently removed from the site. As there is no web page to display, the web server sends a page that simply says "404 Page not found". The 404 error message is an HTTP (Hypertext Transfer Protocol) standard status code. Figure. 6 shows the default 404 error page on Internet Explorer [18].

3) The Fold Content: Place the most important content above the fold line. (The top section, which is visible without scrolling).

4) Page Size: There are things that increase Page Size such as images and JavaScript files. Page size affects the speed of the website; the optimum page size is under 300 KB.

5) Load Time: If the load page time is long, this could be

due to a server problem, a network problem, poor code optimization. Otherwise, the load page time will be short.

6) Printability: This is a special Cascaded Style Sheet CSS, which ensures that unnecessary interface designs and images are left out when printing pages from your site, saving the user a lot of ink.

7) Email Privacy: Malicious bots scrape the web in search of email addresses and plain text email addresses are more likely to be spam. Where Bots short for robots, they are highly adaptable worker bees that do their master's instructions over a broad "net"—in the case of bots, scattered throughout the global Internet. There are two types of bots: Malicious (bad) and good bots. The malicious bots may be given complete control over a computer and often included a control panel called "fun stuff" to open the CD-r OM tray, flash the keyboard lights, change the desktop, produce customized error windows, and more [21].

#### 4. Technologies Analysis

Nowadays, there is no website that doesn't use any of the technologies which help the website to look good and for your security and Table 3 shows Technologies analysis.

1) Server IP: Try to host your website on a server which is geographically close to your visitors. Search engines take the geographic location of a server into account as well as the server speed [14].

2) W3C Validity: You should reduce errors as possible, because syntax errors can make your page difficult for search engines to index.

3) Doctype: Declaring doctype helps web browsers to detect the document type to render content correctly.

4) Directory Browsing: Disable directory browsing because directory browsing can be used by hackers to find out if you have any files with known vulnerabilities, so they can take advantage of these files to gain access. By default, directory browsing is disabled in IIS so that users cannot see the contents of directories. To enhance security, you should leave directory browsing disabled unless you have a specific reason to enable it. If you enable directory browsing, make sure that you only enable it on the particular directory or directories that you want to share [22].

5) Server Signature: Revealing web server signature with

server/PHP version info can be a security risk as you are essentially telling attackers known vulnerabilities of the system. Thus, it is recommended to disable all web server signatures as part of server hardening process [23]. The following Figure. 7 shows the error "Not Found" with revealed a web server signature.



Figure 7. The error "Not Found" with revealed a web server signature.

#### 5. Mobile Compatibility Analysis

Since web-enabled platforms are no longer limited to a desktop or laptop computer systems running typical GUI operating systems, and number of users accessing the web from handheld devices are increasing [24]. It is important to know the compatibility of a website with every smartphone or tablet coming in the global market today, so, the websites in mobile compatibility aspects had to be analyzed and suggest improvements which can be incorporated to improve the mobile version of the website. Table 4 shows the analysis result of the hospitals' websites in Mobile compatibility aspects.

1) Mobile Rendering: Mobile rendering can be considered a means in which a "standard" website can be modified for access via mobile web browsers, such as on an iPhone or Android device. This can include subtle tweaks to your overall layout to present your content in a more suitable size and format for the smaller screen. Or it can mean a complete overhaul, presenting only a few key pieces of functionality and content to the mobile visitors [25]. In Figure. 8 WooRank displays a mobile version of the website and evaluate based on that.

Table 3. Technologies analysis

Criteria	King Fahad Medical City	King Faisal Specialist Hospital	Saad Specialist Hospital	Dr.Sulaiman Alhabib Hospital	Dallah Hospital	International Medical Center
Server IP	serever loction: RİYADH	serever loction: RİYADH	serever loction: AL KHUBAR	serever loction: RİYADH	serever loction: DENVER	serever loction: RİYADH
W3C Validity	✗	✗	✗	✗	✗	✗
Doctype	HTML5	HTML5	HTML5	XHTML1.0	XHTML1.0	XHTML1.0
Directory Browsing	✓	✓	✓	✓	✓	✓
Server signature	✓	✓	✓	✓	✓	✓

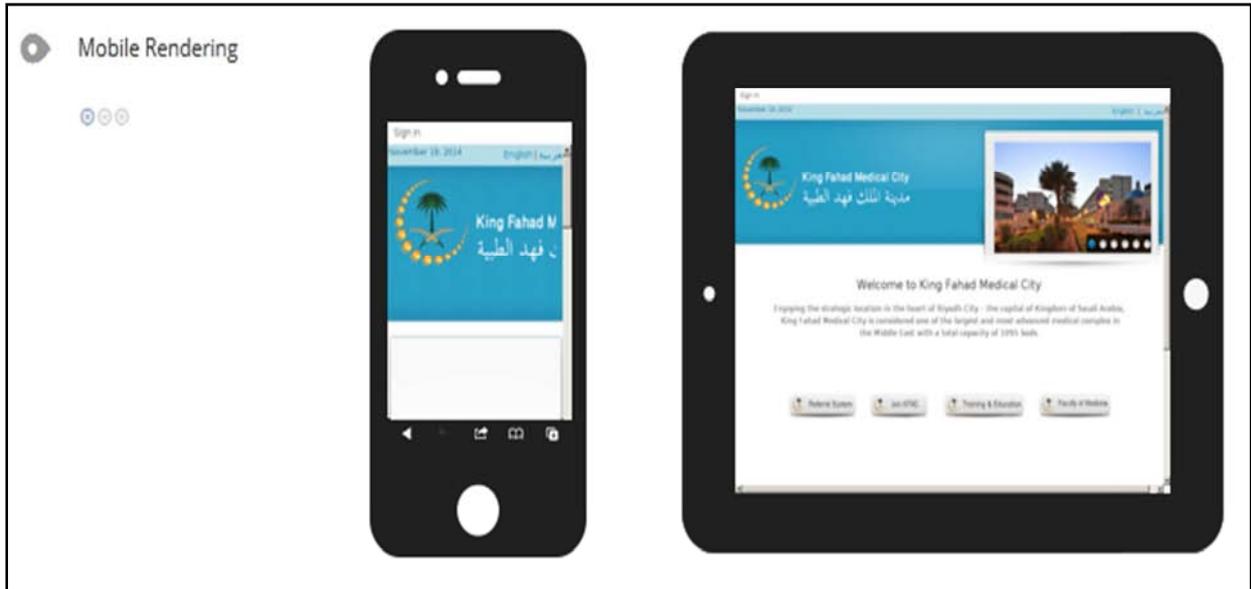


Figure 8. Mobile rendering.

2) Mobile Load Time: It measures the time taken to load the page on the mobile device, the faster the better. WooRank provides useful tips for optimizing mobile site speed.

3) Mobile Optimization: This criteria has additional mobile optimization criteria, they are:

a) Mobile CSS: CSS Media Queries allow a web designer to design content depending on the properties of the target output device, such as a smartphone or tablet [26]. Also, CSS Media Queries allow the web designer to target CSS rules based on screen size, device orientation or display density. Figure. 9 shows a website opened in a desktop browser, Figure. 10 shows a website opened in a mobile device and Figure. 11 shows a website opened in a mobile device with CSS media queries.

b) Meta Viewport Tag: This tag instructs mobile devices what scale and dimensions to use to display a page, so that

users can be instantly greeted with a properly scaled page where they can immediately start reading and consuming your information without zooming [27].

c) Icon: Getting an icon create a unique identity of your website for mobile devices users. Figure. 12 shows a website without an icon.

d) Mobile Redirection: It's important to redirect website visitors to the correct page they click on when viewing from a mobile device.

e) Flash Content: When the website is completely produced in Flash there is just one website URL for all the web pages within the website. Search engines cannot identify or rank a particular page based on its contents and the number of incoming links and other ranking factors, since they are all in the same location [28].

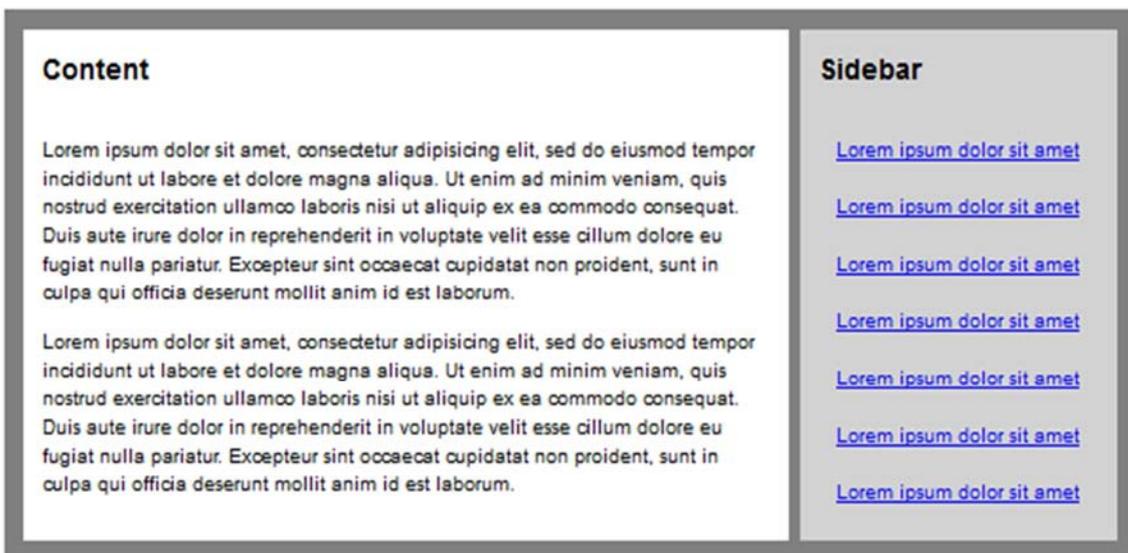


Figure 9. A website opened in a desktop browser.



Figure 10. A website opened in a mobile device (without CSS Media Query)

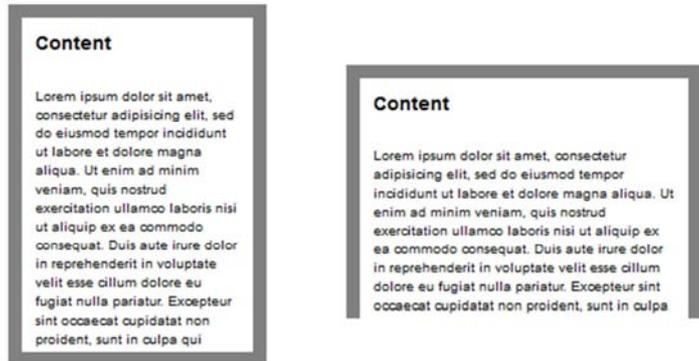


Figure 11. A website opened in a mobile device (with CSS Media Query).

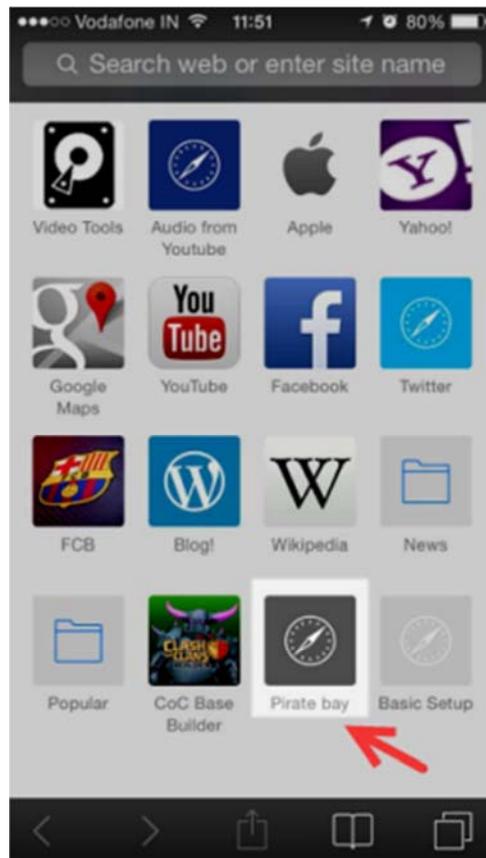


Figure 12. A website without an icon.

Table 4. Mobile optimization analysis.

Criteria	King Fahad Medical City	King Faisal Specialist Hospital	Saad Specialist Hospital	Dr.Sulaiman Alhabib Hospital	Dallah Hospital	International Medical Center
Mobile Rendering	Low impact	Low Impact	Low Impact	Low Impact	Low Impact	Low Impact
Mobile Load Time	Slow	Fast	Very Slow	Very Slow	Very Slow	Fast
Mobile Optimization						
Mobile CSS	✗	✗	✓	✗	✓	✗
Meta Viewport Tag	✗	✗	✓	✗	✓	✗
Apple Icon	✗	✗	✓	✗	✗	✗
Redirection	✗	✓	✗	✗	✗	✓
flash Content	✓	✓	✓	✗	✓	✓

### 6. Visitors Analysis

Visitor analysis helps us to understand how visitors are interested with the website contents. Alexa.com tool is used to analyze daily page views per visitors, bounce rate, and user time on site. Table 5 shows the analysis of hospitals' websites in Visitors aspects.

a) Bounce Rate: It is the measurement of the percentage of how many website visitors visit only one page within a website. It means those visitors are viewing only that single page and exit from the website on that same page. The bounce rate equation (3) is [29] [30]:

$$BR = (Tv / Te) \tag{3}$$

Where: BR is Bounce Rate.

Tv is Total number of visits viewing one page only

Te is Total entries in page.

b) Daily Page views per Visitor: It is used to calculate how many times a page is viewed by the visitor. The visitors who spend more time on the website will generate more page views than visitors who just visit the home page and exit [31] [32].

c) Daily Time on Site: The average number of minutes spent on your website by each visitor per day [33].

Table 5. Visitors analysis.

Criteria	King Fahad Medical City	King Faisal Specialist Hospital	Saad Specialist Hospital	Dr.Sulaiman Alhabib Hospital	Dallah Hospital	International Medical Center
Bounce Rate	29.40%	46.00%	55.20%	27.60%	19.00%	19.00%
Daily Page views time Per Visitor	3.10	5.00	2.00	3.30	3.00	2.60
Daily Time On Site	2:45m	3:23m	1:45m	3:56m	2:29m	2:39m

### 7. Conclusion

Aside from being able to distinguish between fiction and fact, it's significant for you to be able to assess the security, accuracy, currency, usability and content of information to your particular use. Using poor quality data sources or worse still-citing misinformation–will put down the quality of your work. While evaluation of hospitals website has always been important, this tone is especially significant when utilizing information found on the Health websites.

Hospitals continue to develop in importance as a service channel, and Patients' expectations have been higher. Hence, health organizations need to measure and improve their hospitals websites in a manner that will improve their success. The website evaluation is particularly useful for managers of health organizations who might be interested in identifying usability problems on their websites and improving the design to fit users' demands. The website evaluation, which explicitly clarifies the effectiveness of these sites.

This work helps health organizations to find the usability method that best meets their needs. It is expected that the website evaluation will aid them in taking appropriate

decisions regarding which usability method to apply and how to apply it in order to improve part or the overall usability of their websites, which could help increase their profitability. Considering the proportion of core-service, content rich websites do enjoy the higher rank in Alexa.

Using software tools like Alexa to provide an easy, cheap, and quick indication of potential usability problems on health websites and their pages. By applying the methods strategically could help to cut back both time and valuation costs.

This exploratory study on the selected hospitals websites has been able to identify several features that are important in ensuring the visibility and accessibility of the websites. The findings show that unless barriers to accessibility and visibility are removed then usability of the websites would be compromised. The return on investment for the health websites would be maximally exploited if those prerequisites are given due recognition.

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