

## University Website Ranking from Usability Criteria Perspective; A Case Study in IRAN

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### **Abstract**

*The Web is becoming the most important scholarly communication tool and it makes more and more scientific information accessible. In recent years, university Web rankings have become in importance around the world. The central hypothesis of the ranking is that the university's web presence reflects its global performance, the quality of its departments and services, the impact of its outputs and its international prestige. One of the most important dimensions in university Website ranking is visibility factor and usability. The dimension includes qualitative and quantitative criteria. The current paper attempts to priorities usability criteria for university Website then evaluate selected universities' websites as a case study by some of the qualitative sub-criteria. The results show there are strong correlation between usability factors and university Website ranking.*

**Keywords:** *Web Quality, University Web Ranking, Usability, AHP*

### **1. Introduction**

Every year millions of people visit university web portals looking for information. This could be, for example, students looking for course information, change in lecture times, account access or teacher contact information. It is very important that the whatever it is the user is searching for is easy to find and the content is easily understood. Importance of university Website opened a new field in Web evaluation studies. The rankings went truly international in 2003 when Shanghai Jiao Tong University published the results of the first global university ranking. The importance of rankings seems, since then, to have grown exponentially. Webometric is a new term which was launched in 2004 [1]. It is an initiative of the Cybermetrics Lab, a research group of the Centro de Ciencias Humanas Sociales (CCHS), which is part of the National Research Council of Spain.

The Webometrics University Ranking is a ranking system based on university web presence, visibility and web access [2]. This ranking system measures how strongly a university is present in the web by its own web domain, sub-pages, rich files, scholarly articles etc. The central hypothesis of this approach is that web presence is a reliable indicator of the global performance and prestige of the universities and as such, is an indirect way to measure all the university missions (teaching, research, transfer).

Usability and visibility of university website is one of the most important dimensions of the web quality. This field is a common issue in different Websites apart from their application and usage. More attention should be placed on the visual appearance of the website, in terms of a more usable layout and pleasant graphics, due to their role on perceived online service and quality [3, 4]. However when evaluate a Websites dimensions such as data quality visibility and usability must be considered [5]. Also we have to keep in mind that some of the criteria are depend to context of the Website and priorities and influence coefficient may be changed. This study attempts to gain priorities in measuring quality of university website and evaluate selected universities website by some quantitative criteria.

## 2. Related Works

However Web quality is not a new field in information technology but there is a lack of academic research which focuses on university web quality. Moreover, far too little attention has been paid to usability problem in university web quality. For evaluating usability problem the current research was classified web and information quality, because these areas influence the web usability. In addition, there are many of common criteria between usability, and web and information quality.

Web and information quality research that started two decades ago has entered a new era where a growing number of researchers actively enhance the understanding of information quality problems and develop solutions to emerging data quality issues. Recently, Madnick et al [6] introduced a framework for characterizing information/data quality research along the dimensions of topic and method. Also, In our earlier work [7], it was classified IQ research into four broad categories; a) Many of resources, librarian and websites have attempted to suggest some IQ criteria to help their respondents for finding quality information.

b) Some of the academic research proposed information quality models rather than suggest the information quality criteria. The conducted models include general purpose and special purpose models. For instance, most popular general purpose models such as Naumann's model [8] and AIMQ [9] focused on common IQ criteria. On the other hand, special purpose models such as IQIP for information retrieval purposes [10] and quality of information in Wikipedia [11] conducted the customized IQ models for their specific applications .

c) Another group of studies in web and information quality attempted to find and develop methods for measuring and quantifying the quality criteria. For instance, Zhang [12] developed methods for measuring timeliness.

d) A number of studies attempted to propose frameworks for evaluating the quality of conceptual models. . For instance, Moody et al [13] conducted an empirical analysis of the conceptual model quality framework.

## 3. Research Design and Methodology

The main objective of this research is to prioritize usability criteria in university website. The current research includes two main stages; one prioritizes usability criteria in the university website and, the other, measure some of the quantitative sub-criteria for the selected university website. Because of difference nature of web applications particularly in the university website, it is needed to audit priorities of the criteria. In fact, measuring quality needs to be assessed within the context of its generation [14] and intended use. This is because the attributes of web quality can vary depending on the context in which the web is to be used.

According to our previous work [15], 18 criteria were selected for evaluating usability of university website. Horizontal line of figure 1 shows the selected criteria. The selected criteria have are general. Some of the criteria are quantitative and some qualitative. Also each of the criteria may include a number of sub-criteria. Because aim of the first stage of the research is gaining priorities between the criteria, there is not concern which how to measure them and they are quantitative or qualitative. The aim is just prioritize the criteria hence we searched a methodology to prioritize criteria apart from quantitative or qualitative nature of the criteria. This strategy led to selecting Analytical Hierarchy Process (AHP) model. The AHP has been proposed in recent literature as an emerging solution approach to large, dynamic, and complex real world multi-criteria decision-making problems [16].

The fundamental principle of the AHP is to decompose a decision problem into a hierarchy of parts. According to Saaty [17], by structuring a system into clusters and subdividing clusters into smaller pieces, it is possible to form a complete picture of the whole system. The hierarchy is formulated by starting from the goal of the decision making and proceeding to objectives and covering objectives. In making the judgments, the elements of the problem are looked at in isolation, and one element compared against another with respect to a parent element. A pair-wise comparison is used throughout

the hierarchy to derive the priorities of the elements. Finally, the performance of each alternative is evaluated with respect to objectives. One advantage of the AHP is that it provides a rational way to conduct expert opinions by taking into account the inconsistency of judgment. It also harmonizes the comparison between tangible and intangible measures by allowing the use of the verbal linguistic scale in the assessment [18].

The AHP methodology comprises four steps: Developing the hierarchical structure, assigning different levels of relative importance to each of the selection criteria, ranking the alternatives under each criterion, and finally ranking the contribution of each alternative [19]. The AHP application is illustrated through a case study of four universities Website in Yazd province in Iran include IAU of Yazd, Maybod, Bafgh and Taft. Expert Choice, incorporated one of the vendors of AHP software, is widely used by researchers worldwide. This study use Expert Choice 2000 software. A total of 30 students participated in the AHP model. Because of 18 criteria, according to the AHP model, each respondent must compared 153 ( $18 * 17/2$ ) pairs of criteria

After prioritization of the usability criteria, in the second stage of the research it was decided to measure some of the quantitative sub-criteria for the sample universities Website. the aim of this stage was evaluation of the sample university website based on the usability sub-criteria. Each of the sub-criteria can be gained automatically and have qualitative nature. Our investigation showed that 15 quantitative sub-criteria can be achieved by source code parsing. For parsing the selected universities websites, were developed several scripts by JavaScript in the client side and some modules in the server side by PHP. Our source code extracted Meta data and related information for mining the selected Websites. Moreover a number of tools and Website analyzer and checker such as W3C HTML checker and CSS validation tools were employed.

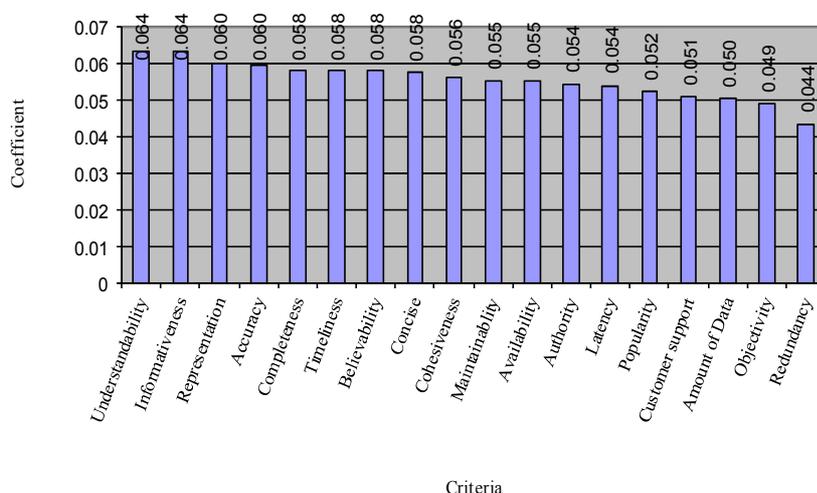
#### 4. Findings and Discussion

To prioritize the IQ criteria, the respondents were asked to compare pairs of IQ criteria. The judgments were based on a nine-point relational scale of importance –similar to the one used in the original AHP instrument [17].

After the respondents' judgments had been obtained, it was necessary to check the consistency of each respondent's tradeoff judgments. This was measured by a consistency index (denoted as CI). For each respondent, the CI was computed for each pairwise comparison matrix. A CI value of 0.15 was adopted as the allowable upper limit. Only the samples with a CI value equal to or smaller than 0.15 were accepted for analysis.

After checking for the consistency of the respondents' judgments, the product of the respondent's importance judgments for each IQ criterion was conducted. We apply Expert choice to compute and synthesis the weights of the IQ criteria. Figure 1 presents the result of synthesis of the AHP model used in comparing the relative importance of the IQ criteria.

Figure 1 shows output of conducting AHP by Expert choice on selected usability criteria. The figures shows priority coefficient for each criterion. The highest coefficient is .064 related to understandability and informativeness and the lowest is .040 related to redundancy. The extracted data shows that there are no significant differences between the priorities coefficients. The results declare that priorities are almost in the middle of the scale (.04 to .06).



**Figure 1.** Priority of Usability Criteria in the Selected Universities Website

The second stage of the research was implementation of 15 sub-criteria which influence usability of the universities Website. Table 1 shows results of conducting the sub-criteria in the four universities Website which were our case study. Analysis of parsing the Websites source code shows some interesting information about the weakness and robustness of the selected Website; number of HTML error for IAU of Yazd is 8537 while in IAU of Taft is 2. Here is a significant difference between two universities. As number of CSS error in IAU of Taft is 0, while in Yazd is 47. CSS and HTML errors can closely present quality of presentation of Website. From this perspective Taft has the best quality and Yazd the worst one. Yazd has some of significant weakness in other factors. For example there is not any anchor in the Website.

**Table 1:** Usability Sub-criteria score for Selected Universities Website

Sub-criteria/ Website	University	IAU of Yazd	IAU of Maybod	IAU of Taft	IAU of Bafgh
Number of HTML error		8537	1335	2	942
Number of HTML warning		16	1051	1	70
Number of CSS error		47	27	0	25
Number of CSS warning		9	17	675	117
Number of broken links		2	4	2	4
Number of Robot links		1	0	4	1
Number of anchors		0	220	45	70
Page size (KB)		271	168.3	46.4	74.4
Download time (on 56 Kbps modem)		78	32.93	122.03	180.37
Number of Meta words		0	6	8	11
Text/Page size weight (%)		0	17.3	27.8	17.8
Page load (second)		5.321	21.234	.849	8.094
Number of External link		26	300	20	3
Number of internal links		32	9	103	22
SEO score (Whois)		.64	.83	.84	.91

This means that connection between internal components in the one page is zero. Also there is not any Meta words in the Website and just has one robot link in the Website. All of the drawbacks can be

led to minimal SEO factor i.e. equal to .64. In Maybod most of the factors are in middle edge. Only the number of robots links is zero, but is repaid by Meta words. This Website also has maximum connections and navigation in compare to others samples. Thus can declare Maybod has best quality in navigation. in Taft, as mentioned before, has a acceptable quality in presentation with minimal errors. Also this Website has very good load time with significant differences in the samples. The results show that quality of usability influence quality of the Website and its search engine ranking. This relation and correlation reveal that website developer team must be considering usability criteria in the implementation of Website. The weakness of the visibility for a website will decrease ranking of the website.

One of the pitfalls in university web ranking is reputation and traffic rank factors. Some of the universities Website may have good traffic rank and reputation but they gain very low ranking at all. We investigated this issue by one of the most popular tools by Alexa on the selected Websites. Table 2 shows results of traffic rank for the universities Website collected and extracted by Alexa [20].

**Table 2:** Traffic rank for selected universities Website (collected by Alexa [28] )

	Traffic Rank in IRAN	Reputation (linking sites)
IAU Yazd	3,877	50
IAU Maybod	4,992	15
IAU Taft	11075	9
IAU Bafgh	12750	22

A comparison between results of Table 1 and Table 2 shows Traffic rank cannot be as an appropriate criterion for judgment of website ranking. In the current research, IAU Yazd gained lowest scores between the selected Websites but has best Traffic rank between them. Also this website has highest reputation between the selected Websites. We investigated the anomaly and answer was very clear. In comparison with other selected Websites, Yazd was twice as number of students and visits of the population caused higher traffic rank. Thus a high traffic rank should not deceive us for website ranking.

## 5. Conclusion

Nowadays Web pages play an important role in education and training. Every year millions of people visit university web portals looking for information. The university website has a key role in interaction between students, instructors, faculty members and staff. Emerge of university ranking issue has made the university website ranking as an hot topic in quality assessment so that quality of university Website influences whole university raking. One of the most important of dimensions in website quality is usability and visibility factors. In the current research, priorities of 18 selected criteria were obtained. For a quantitative assessment, 15 sub-criteria which are able to gain automatically were selected. The criteria could parse source code of the Websites. The developed parser was conducted on four universities Website as our case study. The results of the implementation showed there are significant relationships between usability criteria and SEO factors and universities Website in which visibility and usability factor is low, the ranking is also weak. This means that efforts for usability improvement are able to increase ranking of university Website considerably. Also our investigation showed high traffic rank cannot be as a criterion for website ranking because population and number of visitors can increase reputation.

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