Investigating Web impact factors of type 1, type 2 and type 3 medical universities in Iran

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ABSTRACT

Investigation of the web impact factor and analysis of the web links belong to webometric studies. A high impact factor, accompanied by more frequent links to a particular website, can indicate greater influence and better accessibility of that particular site. In this regard, bearing in mind the significance of medical universities' web sites for education and research, the current study compared and analyzed their impact factors, their web links and web pages, using AltaVista search engine. The investigation included different ranks of medical universities, commonly referred to as type 1, type 2 and type 3 universities in Iran. The median was used as a measure of central tendency of the scores. The search engines of AltaVista were adopted on 26 February 2010 to collect the data. According to the results, in terms of indexed pages, Shahid Baheshti of type 1, Guilan of type 2, and Shahrekord of type 3 universities had the best records. Regarding web links, medical universities of Iran, Kermanshah and Lorestan, from type 1, type 2 and type 3 universities had the best records and, in terms of impact factor, universities of Ahvaz (type 1), Zahedan (type 2), and Fessa (type 3) manifested the greatest influence. As the results imply, the universities are expected to pay more attention to webometric issues; they are also recommended to allocate more budget to enhance their web pages.

Keywords: web impact factor; medical universities; Type 1, type 2 and type 3 universities; AltaVista search engine; Iran

INTRODUCTION

Webometric analysis is one of the most important tools used to measure the quantitative activities of the Web. Bjorneborn has referred to webometric analysis as "The study of the quantitative aspects of the construction and the use of information resources, structure and the technologies on the Web, drawing on bibliometric and informatic approaches" [1]. This definition could entail four types of analyses as follows:(1) web page content analysis; (2) web link structure analysis; (3) web usage analysis (including log files of users' searching and browsing behavior); (4) Web technology analysis (including search engine performance) [2].

Among the quantitative methods of webometric analysis, the web impact factor can be a suitable example. The idea of assessing (analyzing, measuring, computing) the web impact factor was first introduced by Ingwersen in 1998. Of course a year earlier, Gairin had postulated the idea of the effect of information available in the Internet in a Spanish journal, but his article failed to be as influential as that of Ingwersen [3].

The impact factor of a website is comparable to that of a journal and is obtained by dividing the count of links to a website to the number of pages of the website. A greater impact factor would indicate more visibility and greater success of the Web site, both nationwide and internationally, making the site more reliable and popular [4].

One of the researchers with numerous studies in this field is the English researcher, Thellwall. He believes the links could have a high potential in presenting new types of information on scientific relations and the value of Web pages [5]. According to

Nouruzi the web impact factor is a useful tool, with no charges, that is used to compute and compare popularity rate, efficiency and the impact factor of a country or a particular Web field [6].

The computation of the web impact factor is also used as a method to compute and identify the level of influence and impact rate of university websites. It can be employed to rank the universities in terms of effective presence on the web [7].

In a study on 99 University Web sites from 20 Arab counties, Elgohary (2008) reported a strong relationship between foreign links and level of presence on the web [8].

The significance of the web impact factor is so much that today it has internationally been accepted as an important criterion in ranking the universities. The Spanish National Council for research is one of the organizations which publish the webometric ranks of the universities from January to July each year, since 2004 [9].

Although this criterion has not yet been officially recognized in the evaluation system of the universities in Iran, owing to its significance, it is expected to enjoy some new developments. On the other hand, Iran's Ministry of Health and Medical Education has embarked upon ranking the medical universities in relation to certain measures as dissemination of information, promotion of Web pages, enhancement of data-bases and publication of research-oriented electronic journals [10].

It can be claimed that the fulfillment of such measures could entail a wider application of the Web site, resulting in more references to the site which increase its Impact Factor coefficient. So, together with other measures, the web impact factor can be used as another option to rank the universities. The performance of different research in this regard could help to identify the position of this significant measure in the assessment system of universities. Therefore, the current research is intended to analyze and identify the Impact Factor coefficient of types 1 to 3 medical universities in Iran. With the identification of a coefficient for type 1, type 2 and type 3 universities, the results can be used to plan for future policies and programs in an attempt to enhance the value of this measure. Also, the results can lay a foundation for future policies of the Ministry of Health and Medical Education in ranking medical universities nationwide.

MATERALS AND METHODS

The current research belongs to webometric studies and is intended to rank websites of medical universities in Iran in terms of the total number of pages indexed by search engines, the number of in-links in each website, their impact factor and the comparison of impact factor coefficients across types 1, type 2 and type 3 universities.

In this research, the AltaVista search engine has been used to investigate the number of indexed web pages and count of links to them. The reason for the selection of this particular search engine is that it has advanced search facilities, providing proper coverage of university websites. Most studies dealing with webometric research and link analysis have also used AltaVista to carry out their analyses [6, 11-14].

The population under study was composed of 42 medical universities of type 1, type 2 and type 3 with their names and addresses obtained from the Web sites of the Ministry of Health and Medical Education. In order to identify the search strategy, numerous search algorithms suggested by different sources were assessed and the results were then compared to choose the most appropriate search strategy. Ultimately the following search terms were selected to perform the search via the AltaVista search device [15]:

1) To identify the number of indexed pages by the search engine: Site: xxx.ac.ir
2) To identify the Inlinks received (disregarding self-links): Linkdomain: xxx.ac.ir -site:xxx.ac.ir
3) To compute the impact factor of the web sites, the following formula was used:

The Impact Factor coefficient = number of links to a web site divided by the number of indexed pages of that website by the search engine.

The relevant data were retrieved on 26 February 2010; then, according to the data, the impact factors of websites of types 1 to 3 medical universities were computed and compared.

RESULTS

As table 1 shows, in terms of the number of indexed web pages, Shahid Beheshti, Tehran and Iran Medical Universities successively scored ranks one to three among type 1 and all other medical universities.

In terms of the number of web pages, among type 2 universities, Guilan Medical University obtained the first rank while among type 3 universities Shahrekord medical university scored the first rank.
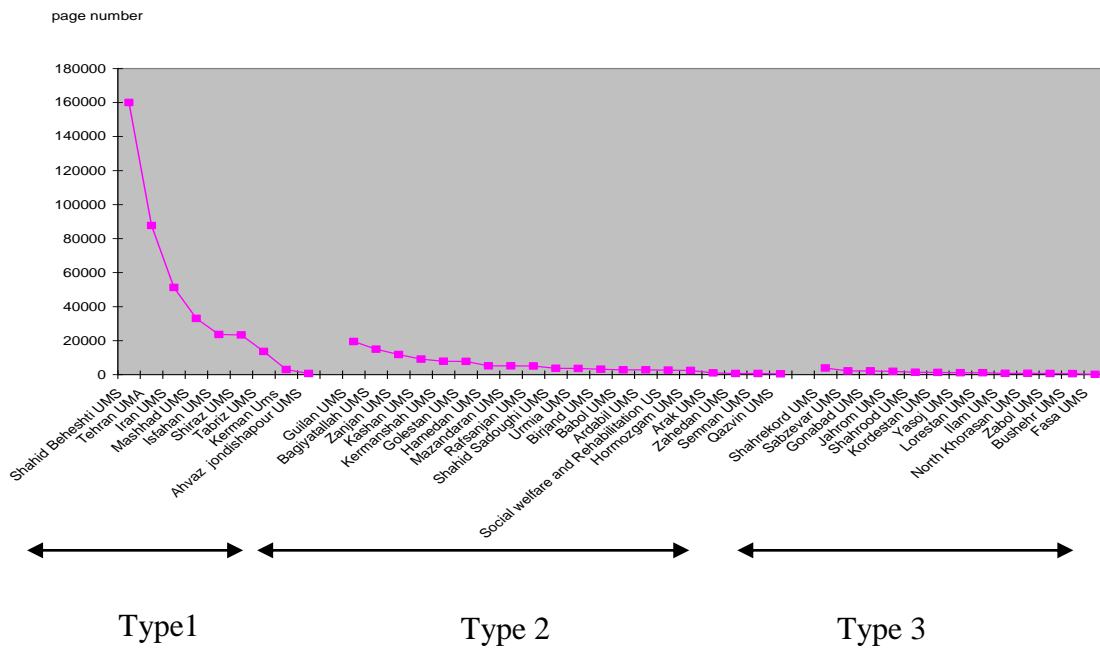

Figure 1. Ranking Iran's medical universities based on the number of website pages, indexed by AltaVista
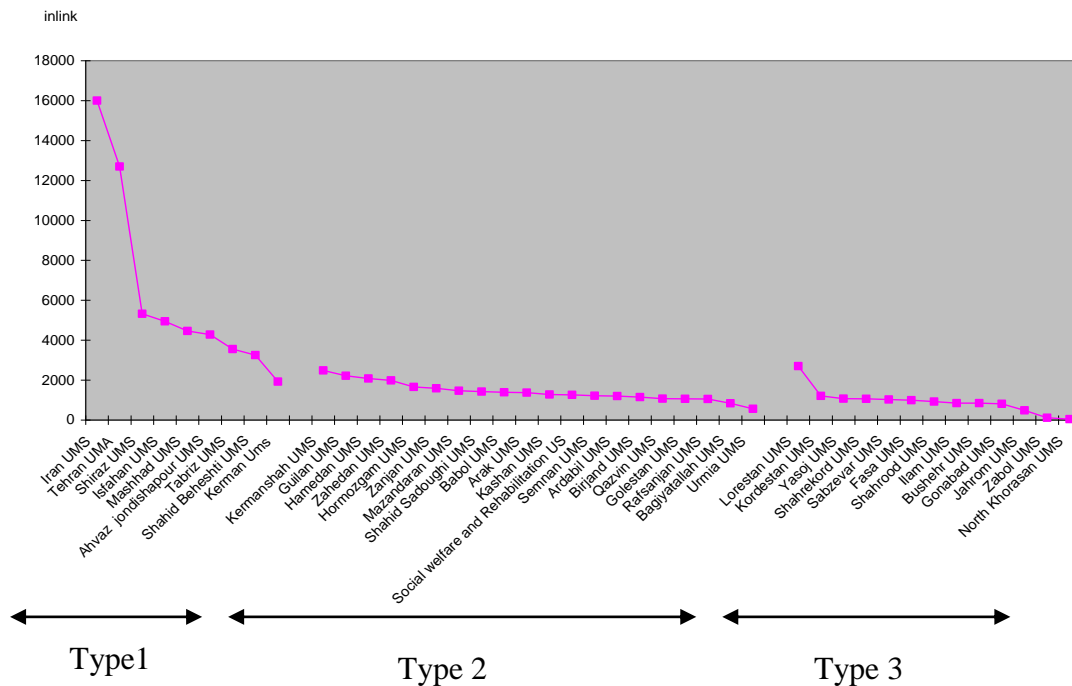

Figure 2. Ranking Iran's medical universities, based on the number of inlinks

As figure 2 shows, in terms of number of web links that they received, medical universities of Iran, Tehran and Shiraz, among type1 and all other medical universities, obtained ranks 1 to 3 successively. Meanwhile, among type 2 universities, Kermanshah medical university obtained the best rank, while in type 3 universities; Lorestan Medical University scored the first position.
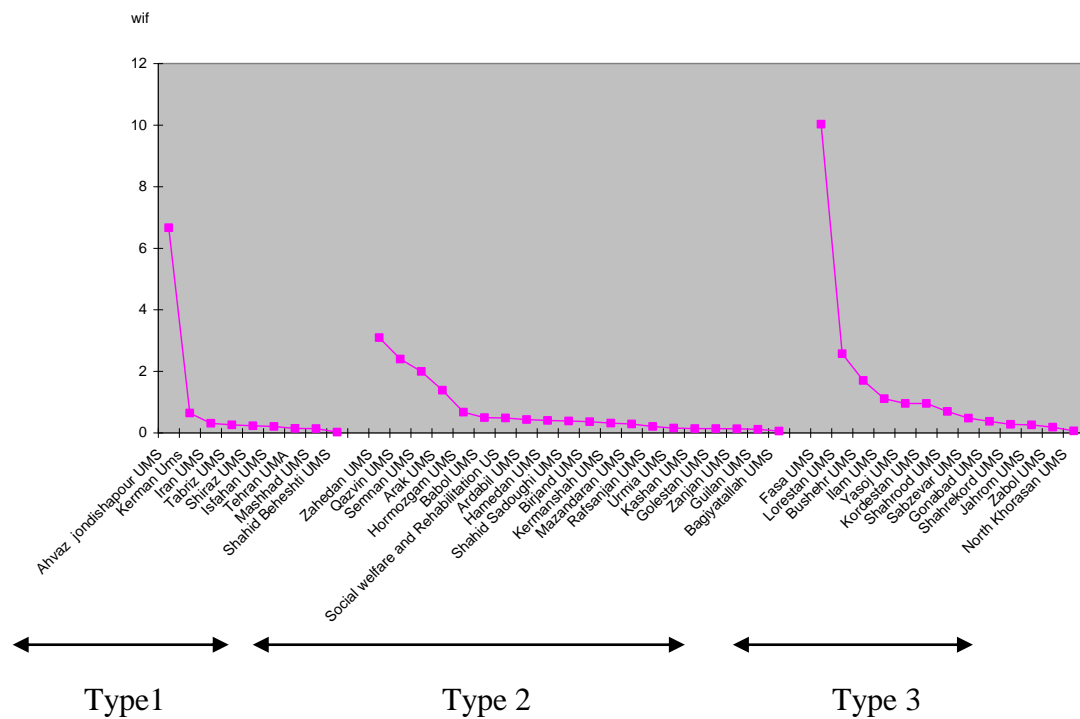
Figure 3. Ranking Iran's medical universities based on their web impact factors

Figure 3 shows that, in term of web impact factor quotient, Fessa Medical University scored the highest rank among type 3 universities and all other medical universities nationwide. Ahvas Medical University from type 1 and Zanjan Medical University from type 2 scored the second and the third ranks successively. The figures above present useful information on the study's findings. However, to investigate the data more accurately, the study developed a number of tables as well. The tables, 1-3 below, show the number of pages indexed by search engines, the number of inlinks and the web impact factor of types 1 to 3 universities.

Table 1. The number of indexed Web pages, inlinks and web impact factor of type 1 medical universities

University Name (type 1)	page number	inlink	wif
Ahvaz Jondishapour University Of Medical Sciences	642	4280	6.666667
Kerman University of Medical Sciences	2980	1920	0.644295
Iran University of Medical Sciences	51200	16000	0.3125
Tabriz University of Medical Sciences	13600	3550	0.261029
Shiraz University of Medical Sciences	23300	5320	0.228326
Isfahan University of Medical Sciences	23600	4940	0.209322
Tehran University of Medical Sciences	87700	12700	0.144812
Mashhad University of Medical Sciences	33000	4460	0.135152
Shahid Beheshti University of Medical Sciences	160000	3250	0.020313

Due to the skewness observed in data distribution, the median, which is a better measure for such occasions, was used, instead of mean, to indicate the central tendency of data.

Comparison of the median of retrievable Web pages in three types of universities indicated that type 1 universities with 23600 retrievable pages occupied the first best position, while type 2 and type 3 universities with 3645 and 1120 pages filled the second and third positions respectively.

Comparison of the number of the received inlinks among the three types of universities showed that type 1 universities, with a median of 4460 inlinks, obtained the highest number of such links while type 2 and type 3 universities with 1325 and 920 links

achieved the second and third positions respectively.

The median for the web impact factors of the three types of universities showed that type 1 universities achieved an impact of 0.228 whereas type 2 and type 3

universities obtained the impacts of 0.373 and 0.696 in order. Hence, in this regard, type 3 universities did better than type1 and type 2 universities by achieving the greatest impact factor.

Table 2: The number of indexed Web pages, inlinks and web impact factor of type 2 medical universities

University Name (type 2)	page number	inlink	wif
Zahedan University of Medical Sciences	640	1980	3.09375
Qazvin University of Medical Sciences	446	1070	2.399103
Semnan University of Medical Sciences	612	1220	1.993464
Arak University of Medical Sciences	987	1370	1.388045
Hormozgan University of Medical Sciences	2470	1660	0.672065
Babol University of Medical Sciences	2820	1390	0.492908
University of Social welfare and Rehabilitation sciences	2600	1260	0.484615
Ardabil University of Medical Sciences	2800	1200	0.428571
Hamedan University of Medical Sciences	5160	2080	0.403101
Shahid Sadoughi University of Medical Sciences	3710	1420	0.382749
Berjand University of Medical Sciences	3150	1150	0.365079
Kermanshah University of Medical Sciences	7820	2480	0.317136
Mazandaran University of Medical Sciences	5100	1470	0.288235
Rafsanjan University of Medical Sciences	5070	1050	0.207101
Urmia University of Medical Sciences	3580	560	0.156425
Kashan University of Medical Sciences	9110	1280	0.140505
Golestan University of Medical Sciences	7770	1060	0.136422
Zanjan University of Medical Sciences	11800	1590	0.134746
Guilan University of Medical Sciences	19400	2220	0.114433
Baqiyatallah Medical Sciences University	14900	839	0.056309

Table 3: The number of indexed Web pages, inlinks and web impact factor of type 3 medical universities

University Name (type 3)	page number	inlink	wif
Fasa University of Medical Sciences	99	993	10.0303
Lorestan University of Medical Sciences	1050	2700	2.571429
Bushehr University of Medical Sciences	497	847	1.704225
Ilam University of Medical Sciences	763	847	1.110092
Yasoj University of Medical Sciences	1120	1070	0.955357
Kordestan University of Medical Sciences	1270	1210	0.952756
Shahrood University of Medical Sciences	1320	920	0.69697
Sabsevar University of Medical Sciences	2170	1030	0.474654
Gonabad University of Medical Sciences	2160	811	0.375463
Sharekord University of Medical Sciences	3850	1060	0.275325
Jahrom University of Medical Sciences	1850	479	0.258919
Zabol University of Medical Sciences	602	111	0.184385
North Khorasan Universith of Medical Sciences	705	43	0.060993

Further investigation of the results showed that although in terms of the number of pages and the internet links type 1 universities surpassed type 2, and type 2 universities overtook type 3, in terms of impact factor they did not follow a similar trend; the reason for such different patterns seemed to have been rooted in the impact factor formula.

DISCUSSION

Due to the variable nature of the Web and their search engines (such as data gathering devices) and owing to unfamiliarity with motives behind establishing Web links, the web impact factor cannot be a thorough criterion for evaluation and measurement of academic activities of universities. Nonetheless, as

one of numerous measures of ranking universities, the web impact factor has enjoyed universal recognition. It has been used as a webometric measure to rank universities in Spain [9], for example. Therefore, the universities in Iran also should pay more attention to key webometric measures by having greater number of Web pages indexed via search engines, by expanding their Web links and by planning for greater web impact factors.

In their article, Asadi and Shekofteh (2009) investigated the relationship between the web impact factors of Iranian medical universities and their research activities but did not find any significant relations [7]. In that research, the number of web pages indexed by AltaVista search engine, in 10 medical universities, was fewer than 500 pages. According to the current research, however, just three universities have developed these number of (i.e. 500) web pages, indicating that the universities have paid more attention to the expansion of their web pages.

In terms of the number of web pages indexed by AltaVista search engine, according to Assadi & Shekofteh and Aminpour et al., Tehran Medical University had scored the first rank [7, 14], but in the current research Shahid Beheshti Medical University has surpassed Tehran University by obtaining the first rank. Of course, bearing in mind the variable features of the web sites, shifts in university ranks are expected to happen, although a positive shift to the first best position can indicate Shahid Beheshti's interest in elevating its web pages.

Regarding inlinks, medical universities of Iran, Tehran and Shiraz achieved the best scores. This means that, in this regard, like previous studies, Tehran University has maintained a superior position. In Assadi and Shekofteh's study [7], for example, Tehran, Isfahan and Tabriz Medical Universities achieved ranks 1 to 3 successively. In Aminpour et al. [14] also Tehran and Iran Medical Universities obtained ranks 1 and 2 in orders. Hence, in three different studies, the Medical University of Tehran managed to preserve its superiority.

Further investigation of the results shows that, although in terms of number of web pages and internet links type 1 surpassed type 2 and type 2 did better than type 3 universities, in terms of impact factor they followed a different trend. For example, Fessa Medical University, from type 3 universities, achieved the best impact factor while Ahvaz Medical University, from type 1 Universities, and Zahedan Medical University, from type 2 universities, obtained the second and third ranks. This phenomenon is rooted in the web impact factor's formula whose denominator forms the number of web pages indexed by search engines. This enabled Fessa Medical University, with 99 web pages and 993 received links, to achieve an impact factor of 10, whereas Tehran Medical University with 87700 Web pages and 12700 received links obtained an impact factor below zero. This problem can be observed in other similar studies as well [7, 14].

Therefore it can be concluded that the web impact factor alone is not a good measure for ranking the universities. In such occasions, a compound measure similar to Ranking of Spain is recommended. In such measure, beside the web impact factor, the number of web pages and number of received links will also be used.

Dramatic variations of this type can be minimized given that the universities use experienced consultants and skilled specialists to design their web pages and then continuously assess the quality of work to make sure that the site maintains the right standards. This could help to achieve a relative stability in this regard and accordingly enhance their visibility both nationally and internationally.

Establishing new websites and web logs by the faculty members and linking them to their affiliate universities can be very effective in enhancing the rate of web links and web impact factor of universities, if such links are to follow various scientific motives such as getting access to the university's electronic journals, library resources, the news, information from conferences organized by universities, etc. Also, elevation of the content of web pages, focus on the language and content of the websites, introduction of students, working staff and faculty members of the colleges and research centers to the sites, and inclusion of academic activities, course descriptions and resumes in websites are some of the issues that can be followed to enhance web-related activities.

Allocation of adequate budget to

websites, attention to different formats of the resources and indexing methods of search engines, inclusion of web map and attention to its stability are among the factors that could be followed to enhance the ranks of Iranian universities in relation to webometric measures. Indeed, modification of web sites and enhancement of content and quality of electronic publications, which are also referred to in university rankings worldwide, have to be given due attention by the Higher Education authorities.

Medical universities' tendency to use digital resources, the Health Ministry's support in getting access to such resources, establishment of digital libraries, development of instructions about proper ways of using such resources and their inclusion in the universities' websites and continuation of such policies in the coming years could provide a suitable background for developing more weblinks, resulting in greater web impact factors.

As Heidari et al. [16] have indicated, there are numerous reasons to avoid establishing links between different sites as follows: language difficulties, geographic problems, political problems of the governments and formality of their relations, socio-cultural, ethnic and racial problems, technical problems of the sites, change of website addresses, change of content and subjects of the sites, weaknesses in the contents of the sites, insufficient scientific data and failure in imparting electronically appropriate information, inadequate information about website functions and users' unawareness of the potential facilities of websites. Nonetheless, the weak presence of Iran's universities and research centers in the websites is not justifiable at all. It is essential that the relevant specialists do their best to inform the web managers and the Health Ministry's authorities, as accountable bodies for ranking universities, of the significance of webometric studies. They should also draw the attention of authorities in charge of universities or colleges and the faculty members to the importance of their greater focus on enhancing websites, by being more actively involved in web-related activities, thereby elevating the current status of the web nationally and globally. It is additionally essential that the web managers expand electronic publications

in English, include English pages in the website, update such pages regularly and make it possible for students to register electronically.

The comparison of types 1 to 3 medical universities shows significant differences among these universities regarding the number of indexed web pages by the search engine and the number of web links which they possess. To account for the differences among type1, type 2 and type 3 universities, in relation to the measures under study, the Ministry of Health can provide more financial, scientific and technological supports to them, particularly to those with insufficient financial and research capacities, such as type 3 universities. Meanwhile the encouragement of universities with more successful web records for further activities can lay a sound foundation for greater web-related academic work.

Bearing in mind the instability of web data, it is recommended that webometric studies be carried out under the auspices of a committee at the Ministry of Health and Medical Education, with the results being published at regular intervals. The committee should additionally do its best to sort out web-related language barriers and technological problems that could, otherwise, downgrade the presence of Iranian universities in the worldwide web.

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