The university index of virtual representation in the context of digital marketing

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Abstract — Websites and their effective optimization and promotion through web analytics and internet marketing become the integral part of educational services during industrialization and transformation of digital economy. Now, when most of applicants chooses a university on the basis of information on the Internet, such the site should be easy-to-use and be continuously updated. However, the question is how “user-friendliness” and “usefulness” of a website of an education institution can be estimated. The development of the weighting mathematical model of the university index of virtual representation which allows to estimate usability and completeness of information of one or the other site and to propose recommendations on its improvement on the basis of obtained data is proposed for that in this article. This model is successfully tested on the several websites of the Ural region universities.

Keywords — internet marketing, website effectiveness score, model of website score, score of websites, website, digital marketing, web analytics.

I. INTRODUCTION

Any organization should be on the Internet and have the modern and optimized website, including educational institutions, during industrialization. Due to the information technologies development, applicants choose a university, building on representation and completeness of information of this university on the Web. The official website is a reflection of virtual representation of a university on the Internet [5].

The purpose of the site creating on the Internet is to get users to its content eventually. The question is how to determine “user-friendliness” and “usefulness” of one or the other site. The main tools of internet marketing can be used to deal with this issue [3].

Internet marketing is the practice of using all aspects of traditional marketing on the Internet concerning the main elements of marketing-mix: price, point of sale and promotion [2]. The important aim of internet marketing is to attain the maximum economy effect on the target audience of a site. In this case, the target audience is applicants who want to pursue higher education and their parents, therefore, the main informational source of a university is its website and groups on social media [1, 4].

According to the Ministry of Education and Science of the Russian Federation requirements, specificity of education activity and maintenance of the university site do not allow to analyze a site through the well-known tools. That is why we developed the weighting mathematical model by calculating the quantitative and qualitative criteria.

II. MATERIAL AND METHODS

The formation of the pool of criteria and indicators which affect these processes is necessary for creation of the mathematical model of the cumulative university score. This pool includes not only web-criteria but also psychosocial ones. The model has to incorporate the largest possible number of both quantitative and qualitative indicators, including intangible factors which are difficult to assess.

Two main groups of criteria (indicators) were identified for the formation of the cumulative website score model.

• psychosocial criteria (they are measured in the range of 0 to 1);
• web-criteria (they are measured in the range of 0 to 1).

Each criterion has its own impact, therefore, this model is quality-weighting. Figure 1 reflects a systematic assessment of original consolidated criteria of CUS (cumulative university score).

This economic model can be presented as mathematical:

\[
CUS = x_2S + x_3W
\]  

where CUS – university index of virtual representation;
S – psychosocial criteria;
W – web-criteria;
\(x_{1,2,3} – \) weighting rate of an indicator.

The cumulative score of a university website is from 0 to an undefined indicator, the maximum value means completeness of a university website and sufficient promotion of it on the Internet.
III. MODEL DESCRIPTION

In our model we identify psychosocial criteria as usability of a site (S_1, its design (S_2)), i.e. this is the group of criteria which is impossible to determine in quantitative way, and therefore, the pool of these criteria will be defined by the expert method.

We consider web-criteria of the cumulative score of a university website as the main indicators of the website score: Yandex thematic index of citing (T), a number of pages indexed on Google at present (GC), a number of pages indexed on Yandex at present (YC), a number of requests a month related to a university title on Yandex (YZ), a number of requests a month related to a university title on Google (GZ), a place of an official site in requesting a university title on Yandex (YM), a place of an official site in requesting a university title on Google (GM).

Let us consider each criterion of a website in more detail. Yandex thematic index of citing (T) is a way of calculating credibility of a web-based facility, taking into account links to the other sites resources. The main subparameter of Yandex thematic index of citing is the similarity of sites theme. That is, the cross-reference of a university with the other one is more valuable than, for example, with a news site. Moreover, an indicator is calculated for each page of a site and then is summarized. The higher this indicator, the better and more successful a site.

It is necessary to use [http://pr-cv.ru/](http://pr-cv.ru/) service to identify thematic index of citing of an official university site.

Let us turn to the following criteria such as “a number of sites indexed on Yandex at present (YC)” and “a number of sites indexed on Google at present (GC)”. These indicators refer to the quantity of site pages which are indexed in search engines at present. It is possible to use the above service to identify these data of a particular site. The higher this indicator, the better and more successful a site.

Next are “a number of requests a month related to a university title on Yandex (YZ)” and “a number of requests a month related to a university title on Google (GZ)”. They refer to the frequency of users requests of information about a university on the Internet. The higher this indicator, the better and more successful a site. It is necessary to use “Yandex.Wordstat” to identify this criterion.

The last of them are “a place of an official site in requesting a university title on Yandex (YM)” and “a place of an official site in requesting a university title on Google (GM)”. These criteria indicate the popularity of a site, its optimization for users and search engines. The lower this indicator, the better and more successful a site.

The primary model (1) has the following form, taking into account the detailed subparameters:

\[
VRI = (x_1(y_1S_1 + y_2S_2) + x_2(y_3T + y_4GC + y_5YC + y_6YZ + y_7GZ + y_8YM + y_9GM))
\]  

where L – consumer’s loyalty;  
S_{1,2} – subparameter of the group of psychosocial criterion;  
W_{1,2,3,4,5,6,7} – subparameter of the group of web-criterion;  
\(x_{1,2}\) – weights of the criteria group;  
\(y_{1,2,3,4,5,6,7,8,9}\) – weights of the subparameters group.

It is necessary to identify the weights to finalize the model: \(x_{1,2}\) – the weights of the criteria group and \(y_{1,2,3,4,5,6,7,8,9}\) – the weights of the subparameters group.

Let us use the expert method of the hierarchy analysis to identify the weight of one or the other criterion and its importance. The analytical and intellectual service MakeItRational ([https://makeitrational.com/demo/decision-making-software](https://makeitrational.com/demo/decision-making-software)) can be used for ease of understanding.
Eventually, the weights of criteria were distributed in the following way. Indicators EXP1, EXP2, EXP3, EXP4, EXP5 correspond to 5 different experts’ opinions, and indicator VALUE identifies the final weight of one or the other quantitative criterion (Table 1).

<table>
<thead>
<tr>
<th>TABLE I. Weights of criteria</th>
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<tbody>
<tr>
<td>EXP1</td>
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<tr>
<td>0.5</td>
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<tr>
<td>0.5</td>
</tr>
<tr>
<td>0.6</td>
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<tr>
<td>0.4</td>
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<tr>
<td>0.05</td>
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<td>0.1</td>
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<td>0.15</td>
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<td>0.05</td>
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<td>0.1</td>
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<tr>
<td>0.25</td>
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<tr>
<td>0.3</td>
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IV. RESULT AND DISCUSSIONS

Following the development of our model of the university index of virtual representation, it is important to test it. The Ural region universities websites will be the basis of testing this model. We choose 10 universities such as the Ural Federal University, Ural State Economic University, Russian State Vocational Pedagogical University, Ural State University of Railway Transport, Ural State Forestry University, Ural State Medical University, Ural State Agrarian University, Ural State Pedagogical University, Ural State Law University, Ural State Mining University. The interface of 2 universities sites such as the Ural Federal University (Fig.1) and the Ural State Economic University (Fig.2) are presented.

Several expert opinions were used to estimate the “usability of a website” and “design of a website” criterion. Every expert measured these criteria in the range of 0 to 1 and then the model calculated an arithmetic mean of the expert scores for each criterion.

Table 2 shows the following results received through the mathematical model of the university website effectiveness score.

<table>
<thead>
<tr>
<th>TABLE II. RESULTS OF THE DEVELOPED MODEL</th>
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<tbody>
<tr>
<td>UNIVERSITY</td>
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<tr>
<td>-------------------------------------------</td>
</tr>
<tr>
<td>Ural Federal University</td>
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<tr>
<td>Ural State Pedagogical University</td>
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<tr>
<td>Ural State Law University</td>
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<tr>
<td>Ural State University of Railway Transport</td>
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<tr>
<td>Ural State Medical University</td>
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<tr>
<td>Russian State Vocational Pedagogical University</td>
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<td>Ural State Forestry University</td>
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<tr>
<td>Ural State Pedagogical University</td>
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<tr>
<td>Ural State Agrarian University</td>
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<td>Ural State Mining University</td>
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V. CONCLUSIONS

Results show that the most effective site in terms of the internet marketing and analytics tools is the site of the Ural Federal University, next is the site of the Ural State Economic University, and next comes the Ural State Law University and Ural State University of Railway Transport sites. The official sites of the universities above have the competent inner and external SEO-optimization, as evidenced by the high indicators of thematic index of citing (Yandex TIC).

Eventually, the developed model was successfully tested and identified the pros and cons of the Ural region universities sites.

We intend to implement a negative point “risks” in this model and represent it as the intellectual system of the university website effectiveness score, designed to automatically scan a web-based facility, to make recommendation on the improvement of a website on the basis of the developed criteria, and to realize these recommendations in real-time through visual and structural change of a site.

References