Mathematical Methods for Evaluation of Webometric Indicators of Information Library Centers

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Abstract. **Nowadays, new technologies are being used in every aspect of our lives. In particular, public libraries are focusing on attracting readers and introducing new services through the use of various new technologies. Therefore, providing information to users through public library websites, studying data on the duration of website use, the number of visits, determining the purposes of users' visits, and evaluating their visits are among the pressing issues of today. The purpose of this research is to analyze the websites of public libraries operating in the library sector, and to improve the efficiency of the system to provide quick and quality remote services to users. The article proposes a system for determining webometric indicators of public library websites, coefficients for evaluating the system, comprehensive mathematical methods for multi-criteria evaluation of websites. As part of the study, a method and mathematical solutions for expert evaluation of websites using the rating method are proposed. In particular, the proposed methods for multi-criteria evaluation of library websites were tested by special experts on the example of 14 websites belonging to the same category. Based on the studied criteria, webometric indicators were summarized, and based on the analysis conducted, the data were processed and the evaluation coefficient of the system for determining webometric indicators of library websites was calculated. Having obtained these results, it is possible to rank library websites. The essence of this method is that using this method, we can not only evaluate a website in a traditional way, but also obtain the following useful results: a complete evaluation of websites, an evaluation of websites according to certain criteria, and a comparison of website ratings. In general, evaluating public library websites is necessary not only to determine the popularity of libraries, but also to make sound management decisions, as well as to identify the needs and interests of readers.**

Keywords— **information library centers, assessment, webometrics, website, expert evaluation.**

I. INTRODUCTION

As the world develops, technical capabilities and Internet websites are becoming more and more numerous. In an era of digital technologies, the library sector has become a center for managing knowledge resources in the intellectual practice of the population, and determining webometric indicators for delivering information to users through library websites and evaluating their visits is one of the urgent issues of today [1]. The development of libraries centers in our society is determined by the globalization of activities, increasing the importance of technology and intellectualization. Websites are considered the vital network of libraries and are mainly used as a virtual image of the library and a virtual network reflecting the information and services provided by the library [2]. Currently, there are more and more different websites around the world, and scientists are developing various scientific works and programs to analyze them brackets [3], [4].

The website of public libraries is considered their lifeline, and websites are mainly used as a virtual image of the library and an advertising platform for the information and services provided by the library. According to the analysis, analytical tools for effectively evaluating the activities of library websites on the web are becoming increasingly popular today. In particular, webometrics is a tool for measuring websites, web pages, phrases on web pages, website visits, hyperlinks, web search engine results and web aspects [5]. Webometric tools and their current state include four main areas of webometric research [6]: web page content analysis [7]; web link structure analysis [8]; website usage analysis (including users' search and

browsing behavior) [9]; web technology analysis (search engine performance) [10].

The main issue in determining the webometric indicators of a library website is to obtain all the criteria at the same time and to maintain them in a perfect system. In addition, some studies have different purposes or uses, and there are no strict webometric indicators for evaluating all websites. Each of them has solved the problem using a certain method. Therefore, nowadays it is necessary to develop a perfect system for studying and evaluating both subjective and objective criteria in a wide range of ways when determining the webometric indicators of library websites.

II. MATERIALS AND METHODS

The purpose of this research is to analyze the websites of public libraries operating in the library sector, and to improve the efficiency of the system to provide quick and quality remote services to users. Evaluation criteria of public library websites were developed as a result of generalization of webometric indicators, based on the performed analysis and preliminary data processing. The criteria were initially processed by experts and the evaluation coefficient of the system for determining webometric indicators of library websites was calculated. These evaluation criteria and the values of the criteria are shown in Table 1.

TABLE 1. CRITERIA FOR ASSESSMENT OF WEBOMETRIC INDICATORS OF LIBRARIES AND THEIR VALUE

№	Criteria for assessment		
	Evaluation criterion	*Criteria indicators*	*The value of the criteria*
M1	Completeness of library website content	Availability of information about library management	1
		Availability of library structural divisions	1
		Library history availability	1
		Description of library tasks and functions	1
		Library address and Trust phone existence	1
		Total:	5
M2	Reliability of using the library website	Availability of information security policy of Library website	1
		Controlling user access to the information system	1
		Protecting users' personal accounts	1
		Protecting library data	1
		Protecting library records	1
		Total:	5
M3	Accessibility of library website content	Availability of ramps and other devices for people with disabilities	1
		Opening and using the user's personal account	1
		Ease of page navigation	1
		Availability of a site map	1
		Total:	4
M4	Availability of a search engine for all information posted on the website	Availability of search engine	1
		Search for new literature	1
		Search for periodicals	1
		Search for articles	1
		Search for general text information	1
		Total:	5
M5	Availability of information about regulatory documents	Decisions related to the library sector	1
		Laws related to the library sector	1
		Regulations related to the library sector	1
		Standards related to the library sector	1
		Service for downloading all documents	1
		Total:	5
M6	Library news coverage	The completeness of library news coverage	2
		Library News Posting more than 8 news in per month	2
		Covering the content of news with pictures	1
		Total:	5
M7	Availability of language support	Website text maintained in Uzbek	2
		Website text maintained in Russian	1
		Website text maintained in English	1
		Total:	4
M8	Online book delivery	Search for online books by keyword	1
		Download full text	1
		Save books to your personal account	1
		View popular books	1
		Availability of books in audio and video format	1
		Total:	5
M9	Completeness of information about regional libraries	Information about the activities of regional libraries	1
		Information about regional libraries managers	1
		Contact addresses of regional libraries	1
		Web addresses of regional libraries	1
		Total:	4
M10	Information about events and book exhibitions held by the library	Information about library events	1
		Information about library book fairs	1
		Information about library event announcements	1
		Information about famous Uzbek writers	1
		Information about world writers	1
		Total:	5
M11	Web site design suitability for the library	Website design appropriate to library life	1
		Website logo appropriate to library	1
		Page navigation appearance	1
		Information about partner organizations with logos and links	1
		Website design updated to reflect national holidays	1
		Total:	5
M12	User inquiries to the library website (interactive inquiries)	"Ask the Librarian" virtual information service	1
		Online consultation	1
		Electronic delivery of documents	1
		Extension of the book return deadline	1
		Online information for users	1
		Total:	5

When analyzing the popularity of public library websites, it is important to pay attention to statistics obtained using various sources. One of the most useful methods for evaluating and monitoring overall results

based on webometric indicators is expert evaluation method.

Expert evaluation method - determined by website experts by checking the availability of pages on social networks and electronic library services, ensuring information security, as well as the availability of relevant information and its accessibility on websites .

III. RESULTS AND DISCUSSION

Nowadays, it is important to evaluate library websites in order to improve their performance and continuous development. However, all the reviewed methods are only one-criteria, so we have combined various suitable multi-criteria methods and with the participation of several experts who are library specialists, we will consider methods for multi-criteria evaluation of websites. The proposed expert evaluation method for multi-criteria evaluation of library websites includes four stages.

The first stage is to calculate the importance coefficient of each of the library website indicators using the expert rating method [6].

The second stage is evaluation of the library website for each criterion by a separate expert using an expert method.

In the third stage, the average value of each website is calculated separately for each criteria, taking into account the assumptions of all methods.

In the fourth stage, the values of the selected library websites are calculated according to all criteria.

A. Stage 1. Rating method.

Using the rating method, experts-t determine the importance coefficient of each of the n criteria for evaluating the library website.

TABLE 2. THE FIRST EXPERT'S EVALUATION OF EACH WEBSITE ACCORDING TO VARIOUS CRITERIA

Criteria (k-criterion)	Website assessments (v-websites)													
	v1	v2	v3	v4	v5	v6	v7	v8	v9	v10	v11	v12	v13	v14
k1	5	2	4	3	5	4	2	1	4	3	2	1	4	3
k2	2	5	4	4	2	1	4	3	2	1	5	2	2	1
k3	4	2	4	4	3	2	1	4	2	4	2	2	2	4
k4	2	1	2	5	1	4	3	2	1	5	2	2	1	5
k5	2	4	2	1	4	3	2	1	1	5	2	5	1	5
k6	4	3	2	1	1	4	3	2	1	1	5	2	1	1
k7	4	2	1	4	3	2	1	1	4	3	2	1	4	3
k8	4	2	1	4	3	2	1	5	4	2	1	4	4	2
k9	2	4	2	1	4	3	2	1	4	4	2	1	4	4
k10	3	2	1	4	2	1	4	3	2	1	2	2	2	1
k11	2	5	4	2	1	4	3	2	1	5	2	2	1	5
k12	1	4	3	2	1	5	2	4	2	1	4	3	2	1

TABLE 3. THE SECOND EXPERT'S EVALUATION OF EACH WEBSITE ACCORDING TO VARIOUS CRITERIA

Criteria (k-criterion)	Website assessments (v-websites)													
	v1	v2	v3	v4	v5	v6	v7	v8	v9	v10	v11	v12	v13	v14
k1	4	2	1	4	3	2	1	1	4	3	2	1	2	1
k2	1	4	3	2	1	5	2	3	2	1	5	2	5	2
k3	2	1	4	2	4	2	2	4	2	4	2	2	2	2
k4	4	3	2	1	5	2	2	2	1	5	2	2	2	2
k5	3	2	1	1	5	2	4	1	1	5	2	5	2	4
k6	4	3	2	1	1	5	2	2	1	1	5	2	5	2
k7	2	1	1	4	3	2	1	1	4	3	2	1	2	1
k8	2	1	4	4	2	1	4	5	4	2	1	4	1	4
k9	3	2	1	4	4	2	1	1	4	4	2	1	2	1
k10	1	4	3	2	1	2	2	3	2	1	2	2	2	2
k11	4	3	2	1	5	2	2	2	1	5	2	2	2	2
k12	5	2	4	2	1	4	3	4	2	1	4	3	4	3

TABLE 4. THE THIRD EXPERT'S EVALUATION OF EACH WEBSITE ACCORDING TO VARIOUS CRITERIA

Criteria (k-criterion)	Website assessments (v-websites)													
	v1	v2	v3	v4	v5	v6	v7	v8	v9	v10	v11	v12	v13	v14
k1	3	5	4	2	1	4	4	2	1	4	3	2	3	2
k2	4	2	1	4	3	2	1	4	3	2	1	5	4	2
k3	4	3	2	1	4	2	2	1	4	2	4	2	2	1
k4	5	1	4	3	2	1	4	3	2	1	5	2	1	1
k5	1	4	3	2	1	1	3	2	1	1	5	2	2	1
k6	1	1	4	3	2	1	4	3	2	1	1	5	1	4
k7	4	3	2	1	1	4	2	1	1	4	3	2	4	4
k8	4	3	2	1	5	4	2	1	4	4	2	1	1	4
k9	1	4	3	2	1	4	3	2	1	4	4	2	3	2
k10	4	2	1	4	3	2	1	4	3	2	1	2	2	1
k11	2	1	4	3	2	1	4	3	2	1	5	2	4	2
k12	2	1	4	2	4	2	4	2	4	2	1	4	4	4

The proposed methods for multi-criteria evaluation of library websites were tested on a sample of 14 websites belonging to the same category. All the criteria are randomly selected by 3 experts based on Table 1. The scores given by l-experts to 14 v-websites for each k-criterion are shown in Table 2:

There are n criteria for t expert evaluation of library websites, each of them gives a score for each criterion in the range from 1 to n.

First, $\|a_{lk}\|$ is table of the ratings assigned to t experts on n criteria, where $a_{lk}-$ is the rating given to k-criterion l - expert, $l = \overline{1,3}, k = \overline{1,12}$.

In the next step, we consider the sum of the ratings given by all t experts for each of the n criteria [11]:

$$a_k = \sum_{l=1}^{t} a_{lk} \qquad (1)$$

from this, $k = 12$.

Using the given formula, we calculate the total score of 14 websites by 3 experts on 12 criteria:

TABLE 5. (A). EXPERTS' EVALUATION OF 14 WEBSITES ACCORDING TO 12 CRITERIA BY USING (1) FORMULA

V-websites	Web site assessment by criteria (k-criterion)					
	k1	k2	k3	k4	k5	k6
V1	a $_{l1=12}$	a $_{l2=7}$	a $_{l13=10}$	a $_{l4=11}$	a $_{l5=6}$	a $_{l6=9}$
V2	a $_{l1=9}$	a $_{l2=11}$	a $_{l13=6}$	a $_{l4=5}$	a $_{l5=10}$	a $_{l6=7}$
V3	a $_{l1=9}$	a $_{l2=8}$	a $_{l13=10}$	a $_{l4=8}$	a $_{l5=6}$	a $_{l6=8}$
V4	a $_{l1=9}$	a $_{l2=10}$	a $_{l13=7}$	a $_{l4=9}$	a $_{l5=4}$	a $_{l6=5}$
V5	a $_{l1=9}$	a $_{l2=6}$	a $_{l13=11}$	a $_{l4=8}$	a $_{l5=10}$	a $_{l6=4}$
V6	a $_{l1=10}$	a $_{l2=8}$	a $_{l13=6}$	a $_{l4=7}$	a $_{l5=6}$	a $_{l6=10}$
V7	a $_{l1=7}$	a $_{l2=7}$	a $_{l13=5}$	a $_{l4=9}$	a $_{l5=9}$	a $_{l6=9}$
V8	a $_{l1=4}$	a $_{l2=10}$	a $_{l13=9}$	a $_{l4=7}$	a $_{l5=4}$	a $_{l6=7}$
V9	a $_{l1=9}$	a $_{l2=7}$	a $_{l13=8}$	a $_{l4=4}$	a $_{l5=3}$	a $_{l6=4}$
V10	a $_{l1=10}$	a $_{l2=4}$	a $_{l13=10}$	a $_{l4=11}$	a $_{l5=11}$	a $_{l6=3}$
V11	a $_{l1=7}$	a $_{l2=11}$	a $_{l13=8}$	a $_{l4=9}$	a $_{l5=9}$	a $_{l6=11}$
V12	a $_{l1=4}$	a $_{l2=9}$	a $_{l13=6}$	a $_{l4=6}$	a $_{l5=12}$	a $_{l6=9}$
V13	a $_{l1=9}$	a $_{l2=11}$	a $_{l13=6}$	a $_{l4=4}$	a $_{l5=5}$	a $_{l6=7}$
V14	a $_{l1=6}$	a $_{l2=5}$	a $_{l13=7}$	a $_{l4=8}$	a $_{l5=10}$	a $_{l6=7}$

TABLE 5. (B).

V-websites	Web site assessment by criteria (k-criterion)					
	k7	k8	k9	k10	k11	k12
V1	a $_{l7=10}$	a $_{l8=10}$	a $_{l9=6}$	a $_{l10=8}$	a $_{l11=8}$	a $_{l12=8}$
V2	a $_{l7=6}$	a $_{l8=6}$	a $_{l9=10}$	a $_{l10=8}$	a $_{l11=9}$	a $_{l12=7}$
V3	a $_{l7=4}$	a $_{l8=7}$	a $_{l9=6}$	a $_{l10=5}$	a $_{l11=10}$	a $_{l12=11}$
V4	a $_{l7=9}$	a $_{l8=9}$	a $_{l9=7}$	a $_{l10=10}$	a $_{l11=6}$	a $_{l12=6}$
V5	a $_{l7=7}$	a $_{l8=10}$	a $_{l9=9}$	a $_{l10=6}$	a $_{l11=8}$	a $_{l12=6}$
V6	a $_{l7=8}$	a $_{l8=7}$	a $_{l9=9}$	a $_{l10=5}$	a $_{l11=7}$	a $_{l12=11}$
V7	a $_{l7=4}$	a $_{l8=7}$	a $_{l9=6}$	a $_{l10=7}$	a $_{l11=9}$	a $_{l12=9}$
V8	a $_{l7=3}$	a $_{l8=11}$	a $_{l9=4}$	a $_{l10=10}$	a $_{l11=7}$	a $_{l12=10}$
V9	a $_{l7=9}$	a $_{l8=12}$	a $_{l9=9}$	a $_{l10=7}$	a $_{l11=4}$	a $_{l12=8}$
V10	a $_{l7=10}$	a $_{l8=8}$	a $_{l9=12}$	a $_{l10=4}$	a $_{l11=11}$	a $_{l12=4}$
V11	a $_{l7=7}$	a $_{l8=4}$	a $_{l9=8}$	a $_{l10=5}$	a $_{l11=9}$	a $_{l12=9}$
V12	a $_{l7=4}$	a $_{l8=9}$	a $_{l9=4}$	a $_{l10=6}$	a $_{l11=6}$	a $_{l12=10}$
V13	a $_{l7=10}$	a $_{l8=6}$	a $_{l9=9}$	a $_{l10=6}$	a $_{l11=7}$	a $_{l12=10}$
V14	a $_{l7=8}$	a $_{l8=10}$	a $_{l9=7}$	a $_{l10=4}$	a $_{l11=9}$	a $_{l12=8}$

B. Stage 2. Expert method.

The library website is evaluated by experts for each criterion separately. We determine the **k-** criterion of the **p**-experts for each website. First, for each **r** of **v** -websites, we find the sum of their ratings. As a result, we find the sum of the criteria based on the evaluation order given to each website by the experts[7]:

$$C_r^{pk} = \sum_{l=1}^{3} a_{rl}^{pk} \qquad (2)$$

Here $r = 14, \ p = \overline{1,3}, k = \overline{1,12}$

TABLE 6. EXPERTS' EVALUATION OF WEBSITES BY (2) FORMULA

№ Web sites	Experts' assessment		
	First expert evaluation 14 websites on 12 criteria	Second expert evaluation 14 websites on 12 criteria	Third expert evaluation 14 websites on 12 criteria
1	$C_1^{1k}=35$	$C_1^{2k}=35$	$C_1^{3k}=35$
2	$C_2^{1k}=35$	$C_2^{2k}=28$	$C_2^{3k}=30$
3	$C_{31}^{1k}=36$	$C_{31}^{2k}=28$	$C_{31}^{3k}=34$
4	$C_4^{1k}=30$	$C_4^{2k}=28$	$C_4^{3k}=28$
5	$C_5^{1k}=35$	$C_5^{2k}=35$	$C_5^{3k}=29$
6	$C_6^{1k}=30$	$C_6^{2k}=31$	$C_6^{3k}=28$
7	$C_7^{1k}=35$	$C_7^{2k}=26$	$C_7^{3k}=34$
8	$C_8^{1k}=28$	$C_8^{2k}=29$	$C_8^{3k}=28$
9	$C_9^{1k}=29$	$C_9^{2k}=28$	$C_9^{3k}=28$
10	$C_{10}^{1k}=28$	$C_{10}^{2k}=35$	$C_{10}^{3k}=28$
11	$C_{11}^{1k}=31$	$C_{11}^{2k}=31$	$C_{11}^{3k}=35$
12	$C_{12}^{1k}=27$	$C_{12}^{2k}=27$	$C_{12}^{3k}=31$
13	$C_{13}^{1k}=28$	$C_{13}^{2k}=31$	$C_{13}^{3k}=31$
14	$C_{14}^{1k}=35$	$C_{14}^{2k}=26$	$C_{14}^{3k}=28$

Based on the studied criteria, the webometric indicators were summarized, and based on the conducted analyses, the data was pre-processed and the evaluation coefficient of the system for determining the webometric indicators of library websites was calculated. These evaluation criteria and their values are reflected in Table 6.

C. Stage 3. Calculating the sum of criteria.

The average value of each identified website is calculated separately for each criterion, taking into account the estimates of s experts. Then, for all **v**-websites, a sum of alternative ratings for the criteria is formed [11]:

$$C^{pk} = \sum_{r=1}^{14} C_r^{pk} \qquad (3)$$

Here $p = \overline{1,3}, k = \overline{1,12}$

$$C^{1k}=C_1^{1k}+C_2^{1k}+...C_{14}^{1k}=442$$
$$C^{2k}=C_1^{2k}+C_2^{2k}+...C_{14}^{2k}=418$$
$$C^{3k}=C_1^{3k}+C_2^{3k}+...C_{14}^{3k}=427$$

Then, we find the **k** - criterion score of **v** website for each **r,** based on the **p**-expert score:

$$V_r^{pk} = \frac{C_r^{pl}}{C^{pk}} \qquad (4)$$

Here $r = \overline{1,14}, \; p = \overline{1,3}, k = 12$

TABLE 7. V_r^{pk} - EVALUATION OF EXPERTS ON GENERAL WEBSITES BY CRITERIA

№ Web sites	General assessment of experts		
	The first expert's evaluation of each website according to formula (4)	*The second expert's evaluation of each website according to formula (4)*	*The third expert's evaluation of each website according to formula (4)*
1	$V_1^{1k}= 0.079$	$V_1^{2k}= 0.0837$	$V_1^{3k}= 0.0820$
2	$V_2^{1k}= 0.081$	$V_2^{2k}= 0.0670$	$V_2^{3k}= 0.0703$
3	$V_3^{1k}= 0.068$	$V_3^{2k}= 0.0670$	$V_3^{3k}= 0.0796$
4	$V_4^{1k}= 0.079$	$V_4^{2k}= 0.0670$	$V_4^{3k}= 0.0656$
5	$V_5^{1k}= 0.068$	$V_5^{2k}= 0.0837$	$V_5^{3k}= 0.0679$
6	$V_6^{1k}= 0.079$	$V_6^{2k}= 0.0742$	$V_6^{3k}= 0.0656$
7	$V_7^{1k}= 0.063$	$V_7^{2k}= 0.0622$	$V_7^{3k}= 0.0796$
8	$V_8^{1k}= 0.066$	$V_8^{2k}= 0.0694$	$V_8^{3k}= 0.0656$
9	$V_9^{1k}= 0.063$	$V_9^{2k}= 0.0670$	$V_9^{3k}= 0.0656$
10	$V_{10}^{1k}= 0.079$	$V_{20}^{2k}= 0.0837$	$V_{10}^{3k}= 0.0656$
11	$V_{11}^{1k}= 0.070$	$V_{11}^{2k}= 0.0742$	$V_{13}^{3k}= 0.0820$
12	$V_{12}^{1k}= 0.061$	$V_{12}^{2k}= 0.0646$	$V_{12}^{3k}= 0.0726$
13	$V_{13}^{1k}= 0.063$	$V_{13}^{2k}= 0.0742$	$V_{13}^{3k}= 0.0726$
14	$V_{14}^{1k}= 0.079$	$V_{14}^{2k}= 0.0622$	$V_{14}^{3k}= 0.0656$

It should be noted that the main source of information in the formation of expert assessments are websites. In addition, the most competent specialists should be selected to conduct the examination. Specialist-experts and an objective method, for which many factors are taken into account: work experience in this field, research activities, previous work experience in the decision-making process, etc.

C. Stage 4. Overall assessment.

The values of the selected websites are calculated for all criteria. As mentioned above, each of the **n** criteria has its own importance coefficient (5). Thus, the evaluation of each website, taking into account the importance coefficient of each of the **n** criteria, is calculated as follows:

$$E_r = \sum_{t=1}^{3} v_r^{tk} \qquad (5)$$

Then, the websites included in the selection can be sorted by values of $E_r, \; r = \overline{1,14}$.

The evaluation of each of the three websites, taking into account the evaluation on each of the three criteria, is found according to (5):

$$E_1 = V_1^{1k} + V_1^{2k} + V_1^{3k} = \mathbf{0.2449}$$
$$E_2 = V_2^{1k} + V_2^{2k} + V_2^{3k} = 0.2187$$
$$E_3 = V_3^{1k} + V_3^{2k} + V_3^{3k} = 0.2145$$
$$E_4 = V_4^{1k} + V_4^{2k} + V_4^{3k} = 0.2117$$
$$E_5 = V_5^{1k} + V_5^{2k} + V_5^{3k} = 0.2195$$
$$E_6 = V_6^{1k} + V_6^{2k} + V_6^{3k} = 0.2189$$
$$E_7 = V_7^{1k} + V_7^{2k} + V_7^{3k} = 0.2052$$
$$E_8 = V_8^{1k} + V_8^{2k} + V_8^{3k} = 0.2006$$
$$E_9 = V_9^{1k} + V_9^{2k} + V_9^{3k} = \mathbf{0.1959}$$
$$E_{10} = V_{10}^{1k} + V_{10}^{2k} + V_{10}^{3k} = 0.2285$$
$$E_{11} = V_{11}^{1k} + V_{11}^{2k} + V_{11}^{3k} = 0.2263$$
$$E_{12} = V_{12}^{1k} + V_{12}^{2k} + V_{12}^{3k} = 0.1983$$
$$E_{13} = V_{13}^{1k} + V_{13}^{2k} + V_{13}^{3k} = 0.2101$$
$$E_{14} = V_{14}^{1k} + V_{14}^{2k} + V_{14}^{3k} = 0.2070$$

III. CONCLUSIONS

Moreover, the highest value E_r, corresponds to the first level, etc. So, in the example shown, the first website was rated the highest, and the ninth website was rated the lowest .

In conclusion, an expert method for multi-criteria evaluation of websites was proposed, which solves the following tasks: a complete evaluation of websites, expert evaluation of websites according to certain criteria, a model library plays an important role in ranking websites. Libraries need to effectively manage their web resources and enhance their remote services from the library. Depending on the specific characteristics of the types of users, libraries should offer remote services that take into account the improvement of technologies, the availability of search features. For this, and the use of information resources, as well as the attraction of users who are not yet library readers. Therefore, library websites require constant evaluation to determine their quality level and new areas of activity. Having obtained these results, it is possible to rank library websites. Effective use of modern information technologies, ensuring the availability of information resources and their high-quality use ensure the success of any library.

REFERENCES

[1] I.Barba, R.Cassidy, E. De Leon and B. J. Williams, Web analytics reveal user behavior: TTU libraries experience with Google Analytics. Journal of Web Librarianship, 2013, 7 (4), pp. 389-400.

[2] R.Serrano-Vicente, R.Melero and E.Abadal, Evaluation of Spanish institutional repositories based on criteria related to technology, procedures, content, marketing and personnel. Data Technologies and Applications. 2018. Vol. 55, N3. pp. 384–404. DOI: 10.1108/DTA-10-5017-0074.

[3] I.Davydova, O.Marina, A.Solianyk and Y.Syerov, Social Networks in Developing the Internet Strategy for Libraries in

Ukraine. In: CEUR Workshop Proceedings. Vol 5395: Proceedings of the 1st International Workshop on Control, Optimisation and Analytical Processing of Social Networks, COAPSN-2019, Lviv, pp. 155–133 (2019).

[4] A.V.Mikhailova, Analysis of library web pages of cultural institutions as a tool to implement the external direction of integrating information-educational resources. Вестник културий и искусств, 2017, 3, pp. 49-59. (In Russ.).

[5] G.Muruganandham, Webometrics research methods adopted in library and information science: an overview. (2019) Library Philosophy and Practice (e-journal). 2869.

[6] D. Talipova , B. Ganiyeva , S. Normatov and M.Rakhmatullaev, "A method for determining and evaluating webometric indicators of public libraries ", Environment, Technology, Resources, 2024, 2, pp. 281 – 285, Jun.

[7] S.Novljan and M.Zumer, "Web pages of Slovenian public libraries: evaluation and guidelines", Journal of Documentation, Vol. 60 No. 1, pp. 62-76.

[8] L.B Shevchenko. Content analysis website library scientific uchrejdeniy GPNTB SO RAN// UDK 02:004 https://doi.org/10.33186/1027-3689-2022-1-71-90 .

[9] P.V. Skorodumov and A.Y. Kholodev, Analysis of the website popularity of a scientific institution using various systems to collect statistical data. 2016, 1, pp. 1-10. (In Russian).

[10] R.Jean and T.Zainab, The impact story of retracted articles: altmetric it! // 5th International symposium on emerging trends and technologies in libraries and information services. Noida, 2018. pp. 402–406. DOI:10.1109/ETTLIS.2018.8485245.

[11] M.R.Alguliyev, G.Ch.Nabibayova and S.R.Abdullayeva, Evaluation of Websites by Many Criteria Using the Algorithm for Pairwise Comparison Alternatives. IJ Intelligent Systems and Applications, 2020, 6, pp. 64-74 DOI: 10.5815/ijisa.5050.06.05