Anna A. Maltseva[1], Igor N. Veselov[2], Natalya E. Barsukova[3]
RESEARCH ON IMAGE CAPITAL OF STATE SCIENTIFIC CENTERS IN RUSSIAN FEDERATION USING THE WEBOMETRICS TOOLS

The authors used the tools of webometrics to study the image capital of state scientific centers as the key applied science organizations in Russian Federation. Their rating was designed using the techniques of the Institute of Applied Mathematical Research of Karelian Research Center of the Russian Academy of Sciences. The relationship between the level of development of organizations, Internet-resources and their effectiveness was determined.
Keywords: image capital; webometrics; scientific center; ranking; website.

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ДОСЛІДЖЕННЯ ІМІДЖЕВОГО КАПІТАЛУ ДЕРЖАВНИХ НАУКОВИХ ЦЕНТРІВ РОСІЙСЬКОЇ ФЕДЕРАЦІЇ З ВИКОРИСТАННЯМ ІНСТРУМЕНТАРІЮ ВЕБОМЕТРІЇ

У статті з метою дослідження іміджевого капіталу державних наукових центрів Російської Федерації як ключових організацій прикладної науки було застосовано інструментарій вебометрії. З використанням методики Інституту прикладних математичних досліджень КарНЦ РАН побудовано їхній рейтинг, встановлено взаємозв'язок між рівнем розвитку Інтернет-ресурсів організацій та їх результативністю.
Ключові слова: іміджевий капітал; вебометрія; державний науковий центр; рейтинг; сайт.
Табл. 1. Літ. 17.

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ИССЛЕДОВАНИЕ ИМИДЖЕВОГО КАПИТАЛА ГОСУДАРСТВЕННЫХ НАУЧНЫХ ЦЕНТРОВ РОССИЙСКОЙ ФЕДЕРАЦИИ С ИСПОЛЬЗОВАНИЕМ ИНСТРУМЕНТАРИЯ ВЕБОМЕТРИИ *

В статье с целью исследования имиджевого капитала государственных научных центров Российской Федерации как ключевых организаций прикладной науки был применен инструментарий вебометрии. С использованием методики Института прикладных математических исследований КарНЦ РАН построен их рейтинг, установлена взаимосвязь между уровнем развития Интернет-ресурсов организаций и их результативностью.
Ключевые слова: имиджевый капитал; вебометрия; государственный научный центр; рейтинг; сайт.

Problem statement. At the present stage the development of scientific organizations in Russian Federation one of significant challenges is caused by the search for new sources of economic growth, primarily based on innovations.

During the period of transition to the market the potential of applied science institutions has been lost due to lack of funding for its infrastructure and daily operations. Structures that have been separated on a competitive basis, received special status of the State Scientific Center of Russian Federation (SSC RF), preserved and

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developed their competitiveness in scientific community, reaching rather high effectiveness mostly thanks to state support.

At the present stage there is still an urgent problem of finding tools to improve their activity, and this issue has been already investigated by the authors in (Maltseva and Serov, 2015).

As a basis for research it is proposed to use the theory and methodology of intellectual capital which for the purposes of research organizations development is particularly preferred, mainly due to intangible nature of the resources used and the results of all activities.

The intellectual capital of SSC RF is the main intangible resource that allows accomplishing core activities and increase customer value and added value for further self-expansion and effective management.

Multidimensionality of intellectual capital concept requires specification and consideration of some of its aspects which are organization's image and attractiveness to stakeholders.

In the most general terms image capital can be interpreted as the formed opinion about the activity of an organization, the amount of customer expectations with regard to the company.

Image capital is a specifically generated reflection of SSC in the external environment that promotes a positive perception of both products and services and the organization itself. It is not a source of new knowledge but it contributes to the growth of customer value and, in some cases, the cost of scientific and technical products and services of SSC RF.

The necessity of image capital evaluation for management is proved by the impact of organization's image on its efficiency. Indeed, a positive image contributes to the development of business cooperation, competitive advantages of products, significantly increasing both the current financial results and the prospective value of a company.

The growth of efficiency of SSC RF can be achieved through effective development of image capital which requires its evaluation including the identification of their positions as compared to similar organizations in the field of science.

Analysis of the latest publications on the problem. Intellectual capital has been an actual topic for the past several decades as noted in (Maltseva, 2015).

Among the authors who have made significant contributions to the development of theoretical concepts of intellectual capital and its management methodology we should mention K. Bradley (1997), E. Brooking (1996), J. Daun (2002), L. Edvinsson and M.S. Malone (1997), H.A. Faskhiev (2011), V.L. Inozemtsev (1995), T. Stewart (1994), K. Sveiby (1997), D. Ulrich (1998).

The authors such as above are dealing with image capital as an element of intellectual capital, herewith we should highlight the scientists who have made the most significant contribution to the development of theoretical bases of organization's image — among them are D. Boorstin (1961), D.A. Gioia et al. (2000), J. Simmons and U. Mere (2002).

The issues of webometrics as the key study tool are discussed in: A.B. Antopolskii and Y.E. Polyak (2013), A.A. Pechnikov et al. (2009) and others. The term "webometrics" as such was introduced by T. Almind and P. Ingwersen (1997).

Webometric rankings are very widespread worldwide. One of the first organizations to create their own webometric rankings of higher education institutions and research institutions was a Spanish laboratory "Cybermetrics Lab".

In Russia, there are also projects on creating own webometric ratings of research institutions to determine the number of pages and the number of links on the organization's website not only in foreign search engines but also in the domestic ones that are somewhat different from their foreign counterparts.

The analysis showed that the most comprehensive is the approach of the Institute of Applied Mathematical Research of Karelian Research Center of Russian Academy of Sciences which was used in this work as a basis for creating the SSC RF webometrics rating.

The goal of this research is providing arguments to image capital role in the SSC RF activity and studying its formal values basing on the SSC RF webometrics rating.

Key research findings. As a result of the theoretical analysis of literature it was settled that at present stage there are no uniform standardized and formalized approaches to assessing the image of scientific organizations, its level can be determined only on the basis of indirect indicators or expert estimates.

The authors propose to use the following approaches to the evaluation of SSC RF image which have been selected basing on the available information sources and opportunities to establish the impact on organizations' image:

1. The system of quantitative indicators of SSC RF development programs:
- the number of scientific and popular publications written by employees of an organization;
- the number of positive and neutral references of the organization in mass media of federal and regional levels;
- the number of requests (traffic) of a website and (or) organization's pages;
- number of scientific conferences with international participation held by an organization;
- participation (membership) in international organizations;
- participation in exhibitions and fairs.

2. The presence of SSC RF and their position in official domestic and international rankings of organizations in the field of science:
- SCImago rating of the world's best research institutions and organizations;
- National Register "Leading scientific organizations in Russia" etc.

3. Webometric analysis by the method of the Institute of applied Mathematical Research of Karelian Research Center of Russian Academy of Sciences.

The system of indicators for SSC RF development programs describing the image characteristics is very limited and subjective (data is often difficult to cross-check). It includes as the indicators of performance for the targeted image creation (the number of positive and neutral references of organization in mass media of the federal and regional levels, the number of requests (traffic) of website and (or) organization's pages), and the indicators of work held in a specified direction (other parameters).

In fact, the indicators characterize mostly the efficiency of interaction with mass media and the promotion of own Internet resources, i.e. the interest of a wide range of users to an organization or its products, but not peer review by experts competent in a specific activity.

Positions of research institutions are determined by specialized ratings but their insufficiency is quite notorious. This is due to the fact that research organizations are mostly highly specialized and it is very difficult to make their unified assessment. In addition, a number of SCC RF serves the needs of the Defense Ministry of Russian Federation, thus information on their activities is not public and, as a consequence, they do not participate in official ratings.

The analysis shows that the cumulative assessment of image characteristics of SSC RF can be carried out using the webometrics method of the Institute of Applied Mathematical Research of Karelian Research Center which was developed for the purpose of studying the performance Russian Academy of Sciences.

In view of the complexity of this technique there is a possibility for a comprehensive study of users interests and necessary Internet resources here, as the system of the indicators discussed above provides sufficient coverage of a target audience which has impact on the outcome of the study due to SSC RF specificity activities.

The key to this method is to calculate the integral index based on individual indicators:

S-Y — the number of pages indexed by Yandex at a given site;

S-G — the number of pages indexed by Google at a given site;

V-Y — the number of hypertext links from other web resources at a given site detected by Yandex;

V-G — the number of hypertext links from other web resources at a given site detected by Google;

R-Y — the total number of files in pdf, doc, ps, etc. detected by Yandex at a given site;

R-S — the total number of files in pdf, doc, ps, etc. detected by Google on a given site;

Sc-GS — the number of links to a site detected by Google Scholar (webometrics.krc.karelia.ru).

Indices can be divided in two groups. The number of external links characterizes the level of interest to a site. The remaining indicators characterize the development and the contents of a site and how the organization positions itself through the site.

The unit for analysis is a set of sites which in addition to the main site of the organization includes the sites of labs, conferences, other offices etc. After calculating the final values it is necessary to rank it according to the rule of Bordeaux values.

We have conducted a comprehensive webometrics study on SSC RF Internet resources to carry out their ranking by the integral indicator. Top 10 of the organizations are listed in Table 1.

On the first place of the ranking is Arctic and Antarctic Research Institute (www.aari.nw.ru). The scorecard's indicators characterizing the site of this organization has very average values but in the institute there is the information-analytical system "Protected areas of Russia" which is located on the subdomain of the main site and represents a large-scale information resource about specially protected natural areas of different status (federal, regional, local) with the access of professionals to edit and update this data. Attracting a wide range of users not only facilitates the exchange of information but also creates the objective prerequisites for the growth of awareness on the organization's work.

Table 1. **Top 10 of SSC RF webometrics ranking,** *author's*

Position	Organization	Score
1	State Scientific Center of Russian Federation Arctic and Antarctic Research Institute	324
2	State Scientific Center of Russian Federation Institute of Theoretical and Experimental Physics	310
3	State Scientific Center of All-Russian Research Institute of Aviation Materials	286
4	State Scientific Center of Russian Federation Institute of Biomedical Problems	284
5	Russian State Scientific Center of Robotics and Technical Cybernatics	268
6	Russian Agricultural Academy	261
7	Concern CSRI "Elektropribor"[1]	233
8	Institute of Physics and Power Engineering	224
9	Hydrometeorological Centre of Russia	222
10	State Scientific Center of Russian Federation Central Institute of Aerohydrodynamics	219

[1] electrical equipment (transliteration from Russian in brand name).

On the second place of the ranking is the State Scientific Center of the Russian Federation Institute of Theoretical and Experimental Physics (www.itep.ru). High indices has the site of Institute of Theoretical and Experimental Physics itself and its subdomains (ITEP Lattice Group, the e-book "Telecommunication Technologies").

The highest indicators of the main site that has over 4,000 pages and 10,000 inbound links to it (according to Yandex) as well as the largest number of references according to Google Scholar (905) has All-Russian Research Institute of Aviation Materials (www.viam.ru) located on the third place in the ranking.

Separately it should be noted that such organizations as Russian Agricultural Academy (rashn.ru) and Hydrometeorological Centre of Russia (www.meteoinfo.ru) which are on the seventh and ninth place in the ranking respectively both have sites with lots of pages and external links to them (about 50,000 pages each according to Google) however they are underrepresented in Google Scholar.

The analysis shows that the growth of webometric indicators of SSC RF promotes primarily the popularization of research results and their placement in the Internet herewith the obtained rating should not be considered optimal for the purposes of assessing the organizations' image. Webometric indicators characterizes the image of SSC RF in wide circles of Internet users while for development of own activity the image of organizations among experts will be more important.

The rating was made using a particular proven technique but in case of its modification the result can significantly change. However, even on a such surface level of image research of domestic scientific organizations a range of problems can be identified. In the first place, the lack of attention from the side of institutions administration to their own positioning online.

Image management at organizations ensures the growth of key performance indicators due to positive perception in the external environment. We performed the correlation and regression analyses to reveal the degree of mutual influence of organizations' position in the webometrics ranking and in the ratings designed on main performance indicators on the basis of SSC RF information on the implementation of their development programs.

The closest relationship was established with the indicators characterizing the publication activity of organizations. Thus, the degree of average level was set with the number of published articles indexed by Web of Science (0,533) and Scopus (0,508), the combined value of Russian Science Citation Index (0,503), the total citation of organization's publications indexed in Russian and international research systems of Science Citation (0,474).

The discovered dependence is explained by the fact that the effectiveness of SSC RF as organizations of applied science is assessed in terms of their contribution to the growth of the body of knowledge in specialized areas as reflected in the number of publications and in the growth of new technologies and products as determined by the number of created and implemented in practice results of intellectual activity.

The studies show that the majority of SSC RF has a clear vector directed towards the priority of high publication activity, and in content activities and obtained scientific results for academic structures of the Russian Academy of Sciences are quite similar. The method used in this study was compiled for the purposes of studying the webometrics characteristics of academic institutions, and it demonstrated high dependence of its results with the level of publication activity.

A significant correlative relationship of webometrics ranking was established with the values of the indicator "participation in international projects" (0,449). This is due to the necessity of active positioning of organizations in international research environment for the purposes of mutually beneficial cooperation. Here an effective image policy allows creating a favorable impression on foreign partners willing to cooperate only in the case of good business reputation of a counterparty.

The discovered mutual influence of webometrics rating and the indicator of "the number of positive and neutral references to the organization in mass media of federal and regional level" (0,396) demonstrates the compatibility of different approaches to evaluating image characteristics.

The average correlation is between the amount of funds received from different sources and the webometrics rating (0,331). This mutual influence is clearly demonstrating the role of image in the external environment for the purpose of increasing the financial results of SSC RF because of the nature of their functioning as economic which guarantee the sustainable development in the future.

The relationship between the webometrics rating and the indicator "number of requests (visits) of Website and (or) pages of organization posted on the Internet" exists but is rated as poor (0,279) indicating the lack of relevance of this indicator for the evaluation of image in the Internet environment in comparison with webometrics rating which is compiled by the results of a deeper investigation. In addition, in evaluation of organization's official website statistics is not possible to track down target users group. For example, in the case of the creation of a site as part of a corporate portal a certain quantity of visits is due to employees' use of the site as a tool in their professional activity.

Thus, the presence of correlations between individual main performance indicators of SSC RF and webometrics ratings shows its importance for improving organizations' management and their image policy.

Conclusions. The study demonstrates the need to develop scientific and methodological tools for evaluation and management of image of scientific organizations including those with a special status.

The authors found out that due to the lack of possibility for formalization of image characteristics they can be assessed only by indirect methods using available information sources.

Compilation of webometrics rating of organizations has been recognized as the most effective and comprehensive method which in this case does not preclude the use of other available tools to achieve the same objectives.

Interpretation of the data allows identifying the ways of improving the image policy of SSC RF that, first of all, includes measures to promote research to a wide range of users online.

The proposed approach to evaluation of institutions' image can ensure greater reliability of the results and its applicability in management of SSC RF should be substantially expanded.

The authors also discovered the lack of comprehensive research aimed at creating ratings of scientific organizations, both in Russia and abroad. In the context of increasing role of scientific activity for the development of certain economic areas and the transparency of information and positions of individual research organizations should be clearly defined by competent professionals. This will expand global scientific and technological cooperation on mutually beneficial conditions and will increase the trust of contractors to each other in the performance of international research projects.

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