Development of methical approaches to quantitative assessment of the region reputation

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Abstract

The research aims to investigate the development of the theory of the reputation economy in relation to regional economic systems. The research method is based on the use of tools for economic and mathematical analysis of a wide range of data characterizing the reputation activity of regional systems. As a result, a number of the Volga Federal District regions need a substantial adjustment of the state policy. In conclusion, the developed methodological approaches form an important foundation in the formation of economic and mathematical models contributing to the solution of such an important task in economic theory.
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Keywords: Reputation Economy, Region, Expectations of Economic.

Desarrollo de enfoques metódicos para la evaluación cuantitativa de la reputación de la región

Resumen

El objetivo de la investigación es investigar el desarrollo de la teoría de la economía de reputación en relación con los sistemas económicos regionales. El método de investigación se basa en el uso de herramientas para el análisis económico y matemático de una amplia gama de datos que caracterizan la actividad de reputación de los sistemas regionales. Como resultado, varias regiones del Distrito Federal del Volga necesitan un ajuste sustancial de la política estatal. En conclusión, los enfoques metodológicos desarrollados forman una base importante en la formación de modelos económicos y matemáticos que contribuyen a la solución de una tarea tan importante en la teoría económica.

Palabras clave: Reputación de la economía, región, expectativas de la economía.

1. Introduction

It should be noted that at the present time the works devoted to methodological issues of quantitative assessment of reputation activity, although rarely, but are found. At the same time, in the overwhelming majority of them, economic entities (organizations, enterprises, etc.) act in the capacity of the object of research in the context of the issues under consideration, and the subject of the research is their image and business reputation. In general, a review of methodological approaches to assessing the reputation of economic agents shows their very close character based on determining the tonality levels for information generated in the global information space and their frequencies. Almost all of them concentrate their attention exclusively on the object of research, and a firm (organization) is usually taken in the capacity of such an object (Manaman et al., 2016).

At the same time, as previously noted, an equally important methodological problem is the search for methods and the development of tools to assess the reputation of not only individual business entities, but also a system of business entities limited by territorial areas. Unfortunately, there are not so many works devoted to this topic. And there are practically no works that would suggest and disclose methodological approaches to the quantitative assessment of the reputation of territories (regions) in the research space. As a rule, the works are either limited to a qualitative analysis of the subject and objects of research, or are limited, for example, by such methods of analysis as sociological studies, expert assessments, etc. In other words, this type of analysis is significantly limited in terms of using objective research methods which include modeling, building structural and logical relationships based on factor analysis methods, processing statistical and other data that reveal information about the object under study, etc. In a word, the use of tools based on an objective examination of data using mathematical and stochastic methods of analysis significantly increases the reliability of the obtained conclusions due to the reduced level of subjectivity in conducting research and analytical assessments. In connection with the above, the authors of this paper attempt to develop and test methodological approaches to quantifying the reputation activity of the studied population of the territories (Deephouse, 2000).

2. Methodology

The authors have developed an algorithm for calculating the reputation activity index (Ira) for a territory which is presented below; it includes six main steps:

Stage 1. Development of a methodology for assessing the reputation activity of a region

Stage 2. Grouping information from web space by the level of reflection of the regional reputation background (based on information characterizing the economic situation, social development, institutional and market changes, and also mega-projects and mega-events).

Step 3. Grouping information from web space by the level of information impact (federal media space - regional media space). The basis of this step is an approach based on the fact that the information background of the national level forms more significant impulses in the system of generating the region's reputation regarding information sources of the regional / local level (Safiullin, 2016).

Step 4. Definition of the list of search queries $x_1, x_2, x_3. .. x_i. .. x_m$, related by their sense with the analyzed group of the information space (information characterizing the economic

situation, social development, institutional and opportunistic transformations, mega-projects and mega-events) and evaluation of their requested for the analyzed period of time; $p(x_i)$ is the number of requests (per month or year) (JI et al., 2017).

Step 5. Identify search engines in the web space that will measure the region's reputation index. The basis of this research stage is a mechanism that allows assessing the popularity of a particular search engine, which predetermines and justifies their choice for the implementation of research in the field of identifying news background in the web space (Arslan and Seke, 2014).

Step 6. The calculation of positive and negative content is carried out in order to determine the tonality of the search phrases in each search engine in the context of identified groups in the information space (reputation in the field of economics, social development, institutional and market changes, mega-events, etc.). For each page found by the search engine, positive or negative references to the region in terms of identified groups are counted, and the tonality of each found result is calculated. The results are recorded in the final table of data disclosing the color of the analyzed content (Table 1):

Position of the result n in the search results S	Evaluation of the result				The probability of user transition to a page with a search result P_n (S_n)
	Total number of references for the object A on the page found (positive, negative, neutral)	The number of positive references to object A on the page found	The number of negative references to object A on the page found	The tonality of the page found -100%. .. + 100%	
Information space, reflecting the parameters of the economic development of the region					
1	r	r^+	r^-	$T_{1(S,x)} = \dfrac{r^+ - r^-}{r} * 100\%$	P_1
2	r	r^+	r^-	$T_2 = . ..$	P_2
3	r	r^+	r^-	$T_3 = . ..$	P_3
4	r	r^+	r^-	...	P_4
... n	...	...	...	T_n	P_n

Table 1 - Calculation of positive and negative content in the context of the identified groups in the information space (for example, assessing the reputation of the region in its economic development)

Using the constructed algorithm (Table 1), similar estimates of positive and negative content are made in the context of identified information space groups and in the context of other components of the region's reputation activity. According to the results of the given data, the reputation of the region is assessed on the basis of 5 sub-indices:

1. A subindex reflecting information on the information background of the region in its economic development (Subindex of economic development I_e).

2. A subindex reflecting information on the information background of the region in its social development (Subindex of social development I_e).

3. A subindex characterizing the background information regarding changes in the area of administrative and political development of the region (Subindex of administrative and political development I_{ra})

4. A subindex, reflecting information on the information background of the region in the field of its technological development (Subindex of technological development I_t).

5.   A subindex that forms the image of a region in the field of its institutional development (Subindex of institutional development I_{id}).

Step 6. Calculation of the integral values of subindexes characterizing the reputation of the region (Boyd et al., 2010).

The basis of the algorithm for calculating the values of subindexes which evaluate a particular cross-section of a region's reputation is the implementation of a whole series of iterations. Iteration 1. Identification of the wording for search queries that reveal the image and the potential of a region. This stage of the study, despite it is seemingly obvious, is not so trivial. This is due to the fact that in the process of determining the image of a particular region in the assessments of the Internet community there is a need for comparative analysis. In this case, the implementation of such an analysis is possible only under certain conditions:

- Search queries for each region must be identical;

- Search queries must disclose the content of the object under study - in our case, the reputation activity of the region relative to one of the analyzed components;

- Search queries are determined based on their popularity in the web space.

Iteration 2. Determining the popularity of the query in the external environment (Dorčák et al., 2017).

Iteration 3. In the context of each search engine that participates in the procedure of analyzing the region's reputation activity, the coefficient. The popularity of a query in the external environment (K_{qp}) is calculated by formula 1.

$$K_{qp} = \sum P_j \times I_j; \text{ where} \tag{1}$$

K_{qp} - The coefficient of popularity of the request;

j is the request number;

P_j — Probability of clicking the j-th row of the query result;

I_j - Level of information source (federal / regional).

Iteration 4. Evaluation of the region's reputation activity by a search query (Determination of the reputation of a query in RuNet (within search engines: Google, Yandex, Mail.ru, etc.). Upon that, the choice of search engines is made on the basis of ranking data.

The calculation of the values for this indicator is carried out according to the formula 2.

$$K_{p.a} = \sum T_k \times K_n \times V_i; \tag{2}$$

Where

K_{ra} - Coefficient of the region's reputation activity on the search query;

T_k - Tonality of the search engine;

K_n - Popularity of the request;

V_i is the share of the search engine in runet.

The tonality of a search engine is understood as a system of assessments of the analyzed subject of the region's reputation activity determined on the basis of an analysis of positive and negative ratings on the search query. The value of the coefficient T_k is determined by the formula 3.

$$T_k = (T_{+i} - T_{-i}) / 10 \tag{3}$$

Where

T_{+i} - The number of positive ratings, data on a search query in the analyzed search engine;

T_{-i} - The number of negative ratings, data on a search query in the analyzed search engine;

i - The number of search engines involved in the study.

The value in the denominator 10 is determined by the number of search engine responses to the query being analyzed and included in the analytical database. As it was previously mentioned, the inclusion in the analysis of the number of responses to a request in excess of 10 is not advisable due to the low probability of their click by users (less than 3-5%).

Iteration 5. Calculation (quantification) of the subindex characterizing one or another component of the region's reputation activity.

The assessment of the indicator value is carried out as the sum of products of weighted coefficients for the region's reputation activity. At the same time, the weights are indicators that demonstrate the proportion of the frequency of a particular search query which represents a special ratio of the number of users accessed within the analyzed search query to the total number of queries used in the research in the search system. The formula for the definition of sub-indices is as follows:

$$I_{r_i} = \sum Cr.a \times w_i ; \tag{4}$$

Where

I_{ri} - Aggregated sub-index of regional reputation activity;

$Cr.a$ - Coefficient of the region's reputation activity on a search query;

w_i - Share of requests to the query in RuNet within the analyzed number of search queries. It is determined based on the statistics of requests.

i - The number of sub-indices participating in the study.

Step 7. The calculation of the integral index of the region's reputation activity.

$$R = \sum Iri \times w_i \tag{5}$$

Where

I_{ri} - Aggregated subindex of the region's reputation activity;

w_i - The value of the weighting factor defined as the proportion of the number of hits to the search query to the sum of users' hits to the queries analyzed in the study.

Stage 2. Rating of the regions.

The implementation of this stage involves the determination of reputation activity indices of the regions participating in the study in order to correlate the results obtained and then group the territories according to the level and functional content of their reputation in the information space of RuNet.

Stage 3. Factor analysis that assesses the influence of various groups of information data on the level of a region's reputation index.

Stage 4. Economic and mathematical analysis of the impact of the region's reputation rating on the parameters of its socio-economic development.

Stage 5. Development of a road map aimed at increasing the competitiveness of the region and strengthening its socio-economic potential based on the optimization of its reputation activity.

3. Results and discussion

In accordance with the methodological approaches presented above, the results of assessments are presented below, with reference to the objects of the study presented in table 3, figure 1.

Region	The value of the reputation activity of the region (the sum of the values of subindexes)	The number of users' requests to the region (according to WordStat)	The share of the region in the total number of users' requests to the regions of the Volga Federal District	Integral assessment of the region's reputation activity (I_{RA})
Nizhny Novgorod Region	1.121	1719511	0.14	0.16
Perm Region	0.856	1260585	0.10	0.09
Samara Region	0.887	1075667	0.09	0.08
Republic of Bashkortostan	0.769	1088680	0.09	0.07
Republic of Tatarstan	0.650	1076235	0.09	0.06
Mordovia	0.852	740285	0.06	0.05
Saratov Region	0.667	910826	0.08	0.05
Udmurtia	1.083	542873	0.05	0.05
Kirov Region	0.667	772568	0.06	0.04
Penza Region	0.751	675615	0.06	0.04
Chuvash Republic	0.728	648274	0.05	0.04
Orenburg Region	0.611	652854	0.05	0.03
Ulyanovsk Region	0.867	458026	0.04	0.03
Mari El Republic	0.573	430490	0.04	0.02

Table 3 - Integral assessment of the reputation activity in the regions of the Volga Federal District (in descending order)
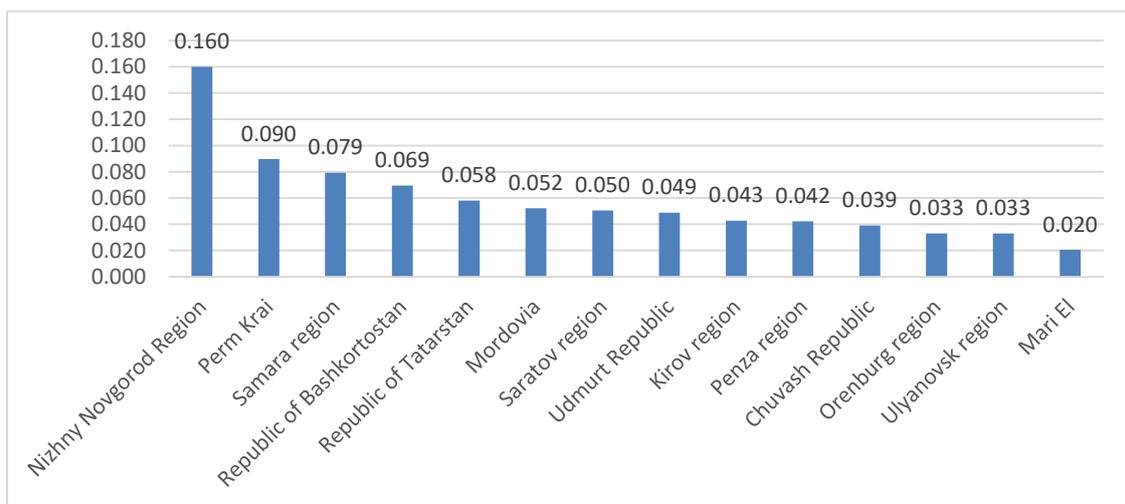

Figure 1 - Integral assessment of the reputation activity of the regions of the Volga Federal District (in descending order)

It should be noted that absolutely all regions of the Volga Federal District of the Russian Federation have hit the positive zone of the values of the reputation activity integral index, the range of which, in accordance with methodological approaches, is within the range from -1.94 to 1.94. However, as the realized assessments show, a number of the VFD regions need a substantial adjustment of the state policy in the field of strengthening the positive reputation of the territory in the global information space.

4. Summary

The developed methodological approaches form an important foundation in the formation of economic and mathematical models contributing to the solution of such an important task in economic theory as determining the level of influence of intangible assets of territories on the parameters of their social and economic development.

5. Conclusions

In general, it should be noted that this study outlines the main provisions of the theory and methods of analysis and measurement of a reputation economy. It represents the main approaches that exist in science to the study of the reputation of economic entities and determines the level of its influence on their economic development; it proposed structural and logical schemes for constructing an index of the region's reputation activity; it also developed methods for the comprehensive measurement of this index through the lens of a multi-vector assessment of its main components in the institutional and opportunistic order. The calculation of these indices for specific regional economic systems was carried out. Meanwhile, it should be noted that the developed algorithm cannot claim to be a reference model that promotes a quantitative comprehensive assessment of the region's reputation activity. Undoubtedly, as in other research fields, modeling involves a number of conditional assumptions, which in some way can reduce the value and objectivity of the results obtained. The methodological approaches developed in this study form the basis for its subsequent improvement and can intensify the scientific dialogue on the set of issues concerning a quantitative assessment of the reputation activity of the territories.

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