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Assessment of the Reputation Capital Impact of a Region on its Economic Growth Parameters (on the example of the Republic of Tatarstan)

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ABSTRACT: The study of reputational capital and its impact on the development of regional/national economic systems is unfairly deprived of attention in the research space. However, it is necessary to state that in recent years the attention of scientists has begun to concentrate on this issue more and more. Mean while, the theory of the territories' reputational economy has still not received proper development and attention, which largely limits this research paradigm based on the study of intangible factors of production in the system of socio-economic development of regions or national economic systems in general.
The subject of the research is the development of the concept and methodological approaches to the study of the theory of the reputational economy with regional economic systems. This implies not only the development and justification of a set of theoretical positions but also the provision of theory with practical recommendations based not only on qualitative methods of analysis but on methods of quantitative modelling of the processes under study using a set of mathematical models.
The novelty of the research lies in the conceptual approach developed by the authors involving quantitative assessment of the region's reputation capital and its impact on the time course of macroeconomic parameters. Its implementation ensures the development of the reputational economy theory concerning regional economic systems. As a result of the study, integral indices of the reputation capital of the Republic of Tatarstan were determined, which allowed, based on the construction of a system of regression equations, to determine its contribution to the formation of GRP. The implementation of the developed approach forms a significant potential for further research in the field of forecasting and modelling the socio-economic development of regional systems.

Keywords: Eputational economy, territory reputational capital, investment activity, region, competitiveness, formalized assessment of the region's reputation.

I. INTRODUCTION

In modern conditions, the most important component that determines the characteristics of socio-economic growth is the region's reputation which with good reason can be considered as a resource that forms and determines the development possibilities of economic entities.
The reputation of a region is "its peculiar and rather valuable asset which is the objective-formed set of views about the region of stakeholders which are in one way or another connected with it (residents, investors, entrepreneurs, visitors, tourists, representatives of authorities, analysts, the media, etc.). [1]. At present, it can be considered as generally accepted that "the good reputation of a territory that has been built up over many years is a resource that can provide it with a sustainable competitive advantage promising strong partnerships. In this case, we treat "partnership" quite broadly starting from the residence of a citizen in a given territory and business contacts of regional entrepreneurs, to the region's participation in government projects, in the implementation of inter country initiatives and partnerships [1].

At the same time, it should be noted that currently there are practically no works devoted to methodological issues of a quantitative assessment of the region's reputational activity. In the overwhelming majority of works on reputation assessment, economic entities (organizations, enterprises, etc.) act as objects of research, and their image and business reputation are the subjects of the research.
When studying the literature, it was found that some methods are used to obtain a quantitative assessment of the organization's reputation.
One of the most methodologically advanced of them is the toolkit for assessing the online reputation index (Ex-index) [2].This index determines the level of reputational activity of an economic entity, based on measuring the tonality of information materials devoted to the object of research in the Internet space.
Another method that allows obtaining a quantitative assessment of the reputational activity of economic agents at the level of firms (organizations) is the method proposed by the Turkish scientists Arslan and Seker [3].
Under it, the reputational activity of an economic entity (the study was conducted on the example of universities in Turkey) is estimated based on a normalized

assessment of several factors (16 network parameters) characterizing their popularity and effectiveness in the WEB space.

So, one can cite the study of Iranian scientists [4] as another example revealing the peculiarities of the quantitative assessment of the business entities' reputation. In their study, the authors propose a system for measuring the reputation of a firm using data from social networks (Twitter, Facebook, etc.). The algorithm is based on the principle of evaluating profiles and reviews, which, according to scientists, are divided into positive, negative, neutral, and inappropriate for the company profiles. Besides, the algorithm involves the use of the frequency of mention concerning the analyzed profiles. As a result of using the method, the calculation of integral indices evaluating a positive or negative image of the studied companies is carried out.

A similar study is presented in a scientific paper by American researchers Yi Grace Ji, Cong Li, Michael North c, and Jiangmeng Liu [5].

The research of Slovak scientists Peter Dorčák, Peter Markovič, František Pollákb [6] is very interesting and informative in scientifically-methodical terms. It uses algorithms for determining the tonality of search requests on the Internet, reflecting the level of positive or negative feedback about the object being analyzed. By the example of companies in the automotive industry in Central Europe, they are ranked by the level of established reputation.

There are other works [7-9], but all of them concentrate their attention exclusively at the micro-level: the objects of their research are separately functioning enterprises and organizations.

There are very few works which purpose is to obtain a quantitative assessment of the reputation of a region or its aspects, for example, [10, 11, 16]. They usually rely on case studies, expert assessments, etc.

II. METHODS

The main purpose of this paper is to develop a methodology to obtain a quantitative assessment of the reputational activity of territories[a] followed by an analysis aimed at determining the influence of the reputation capital of a region on the parameters of its macroeconomic development (using the example of the Republic of Tatarstan).

III. RESEARCH METHODS

The algorithm developed by authors for achieving this goal is presented below.

Assessment of a region's reputational capital is based on 5 key sub-indices (Fig. 1).

The basis of the algorithm for calculating the values of sub-indices that evaluate a particular aspect of a region's reputation is the implementation of a series of iterations.

Iteration 1. Identification of the wording of search requests that reveal the image and potential of the region.

Iteration 2. Determination of the results popularity in the external environment. This stage of the study involves an assessment of the tonality of information search requests, taking into account the information source level (federal/regional media), as well as the probability of the link to follow.

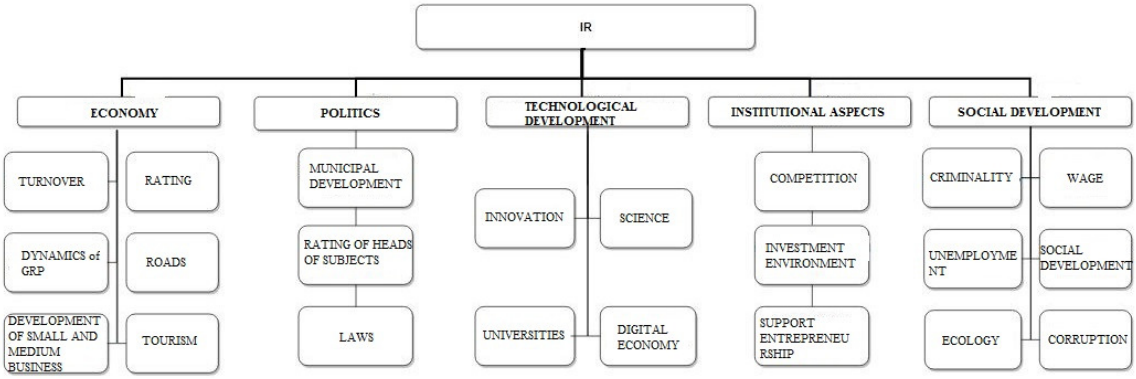

Fig. 1. The system of search requests that form the idea (image) of the reputation of a territory (region).

Table 1: An example of implementing the determination of the results popularity in the external environment.

Line number	Transition probability	Key	Information Source Level *	Actual place in result results
1 row	26.90%	+	1	1
2 row	17.10%	-	1	2
3 row	14.90%	-	1	3
4 row	8.90%	+	1	5
5 row	7.10%	+	2	7
6 row	4.70%	+	1	8
7 row	5.60%	-	1	9
8 row	5.10%	+	2	10
9 row	4.70%	+	1	12
10 row	4.70%	+	1	15

* 1 - a federal source of information; 2 - a regional source of information.

The implementation of this procedure is carried out in the context of the analyzed search engines (Google, Yandex, Mail.ru, etc.). In a structured form, the implementation process of the considered iteration can be represented as Table 1.

Iteration 3. In the context of each search engine participating in the procedure of analyzing the region's reputation capital, the coefficient "The result's popularity in the external environment (K_f) according to formula 1 is estimated.

$$Krp = \sum P_j \times Ij; \quad (1)$$

where K_{rp}-the request popularity coefficient;

j is the request number;

P_j- Probability of clicking the j-th row of the request result;

I_j- Information source level (federal/regional).

Taking into account the underlying algorithm, the range of possible values of the coefficient is from -1,994 to +1,994.

Iteration 4. Evaluation of the region's reputation capital for a search request (Determining the reputation of a result in Runet (within search engines: Google, Y and ex, Mail.ru, etc.).

The values of this indicator are calculated according to the formula 2.

$$K_{ra} = \sum T_k \times K_p \times Vi; \quad (2)$$

where

$K_{r.a}$- Reputational activity coefficient of the region according to the search request;

T_k- Tonality of the search engine;

K_p- Popularity of the request;

Vi - Search engine's share in Runet.

A tonality of the search engine is understood as a system of assessments of the analyzed subject concerning the region's reputational activity determined based on an analysis of positive and negative evaluations of the search request. The value of the coefficient T_k is determined by the formula 3.

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

where

T_{+i}- The number of positive ratings given to the search request in the analyzed search engine;

T_{-i}- The number of negative ratings given to the search request in the analyzed search engine;

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

The value 10in the denominator is determined by the number of search engine responses to the request being analyzed and included in the analytical database.

As mentioned earlier, the inclusion in the analysis of the number of responses to a request that exceeds 10 is impractical because of the low probability of users clicking on them (less than 3-5%).

The most important component involved in formula 3 is the index characterizing the search engine's share in Runet. This index acts as a kind of weighting factor and demonstrates the role of the search engine in determining the values of the region's reputation capital within a single search request.

Iteration 5. Calculation (quantitative assessment) of thesub-index characterizing a particular aspect of the region's reputation capital.

The indicator value assessment is carried out as the sum of products of weighted coefficients of the region's reputational activity. Formula-type definition of sub-indices is as follows:

$$I_{ri} = \sum Kr.a \times w_i; \quad (4)$$

where

I_{ri}- aggregated sub-index of regional reputational activity;

Kr.a - coefficient of the region's reputational activity for a search request;

w_i- share of requests in RuNet within the analyzed number of search requests. It is determined based on statistics of requests [10, 11,17].

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

Iteration 6. Calculation of the integral index of the region's reputational activity:

$$R = \sum Iri \times w_i \quad (5)$$

Where

I_{ri}- aggregated sub-index of the region's reputation activity;

w_i- the weighting factor value defined as the proportion of the number of hits on the search request to the sum of users hits on the requests analyzed in the study.

IV. RESULTS AND DISCUSSION

Figs. 2-7 show the graphical interpretation of the sub-indices and the integral index of the reputational capital of the Republic of Tatarstan for the studied period (2013-2017) in quarterly terms. At the same time, the graphical interpretation of the obtained values indicates the instability of the statistical series under study. It is also important to note that, despite the unstable nature of the studied time series, they all have trend parameters. Their study and knowledge significantly expand the research range of economic theory in the study of economic growth.

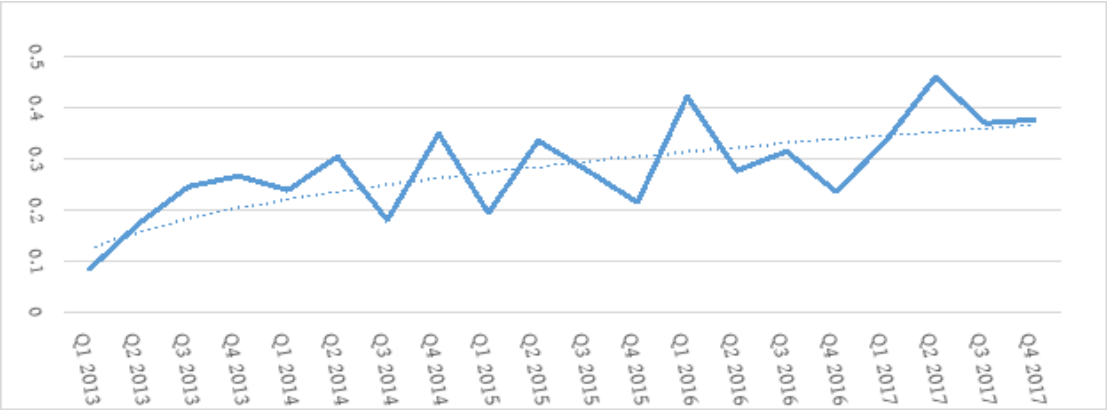

Fig. 2. The sub-index values for the economic development of the region by quarters.

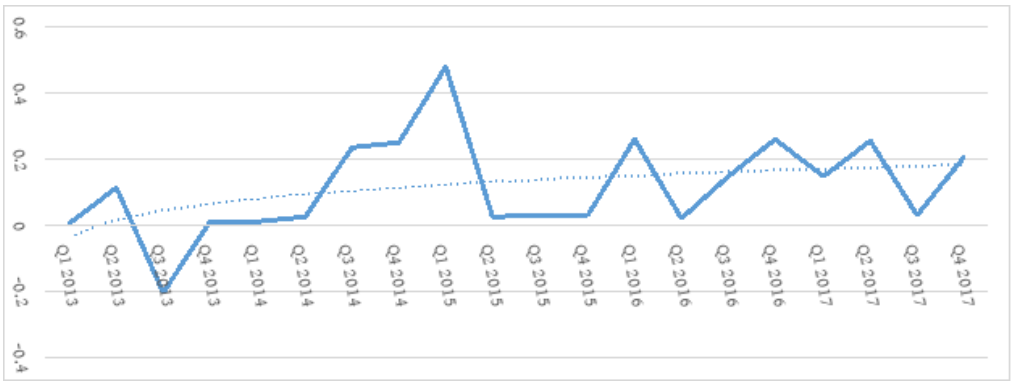

Fig. 3. The sub-index values characterizing the administrative and political development stability of the region, by quarters.

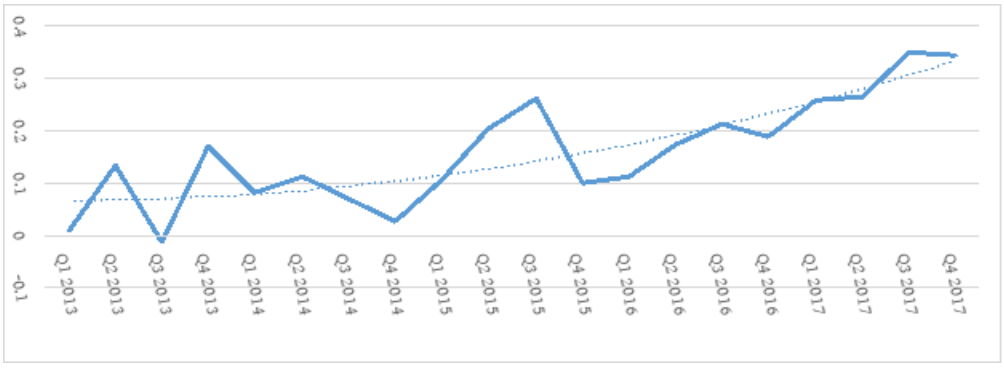

Fig. 4. The sub-index values characterizing the social development stability of the region, by quarters.

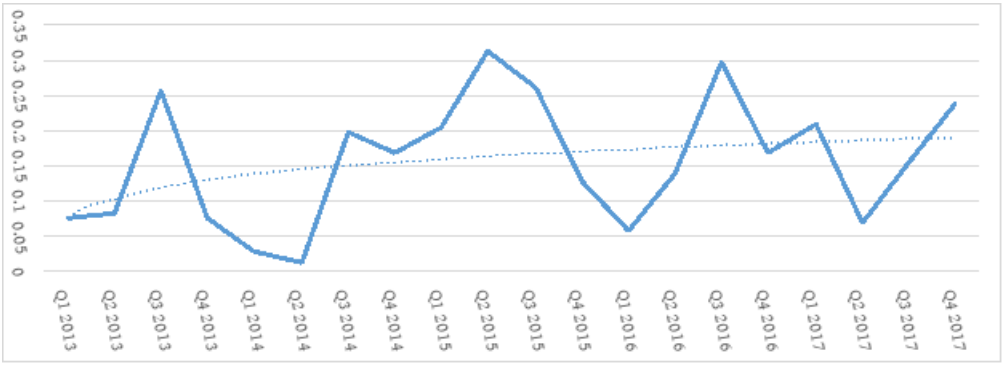

Fig. 5. the sub-index values characterizing the stability of the technological development of the region, by quarters.

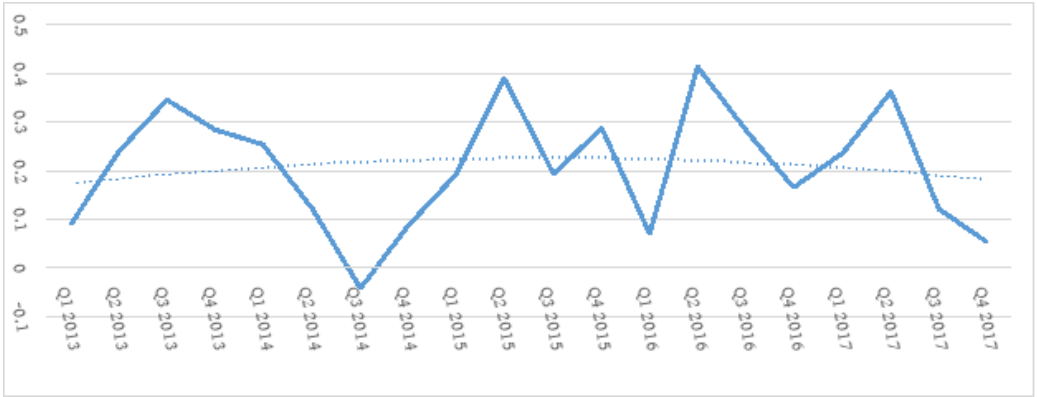

Fig. 6. the sub-index values characterizing the institutional development stability of the region, by quarters.

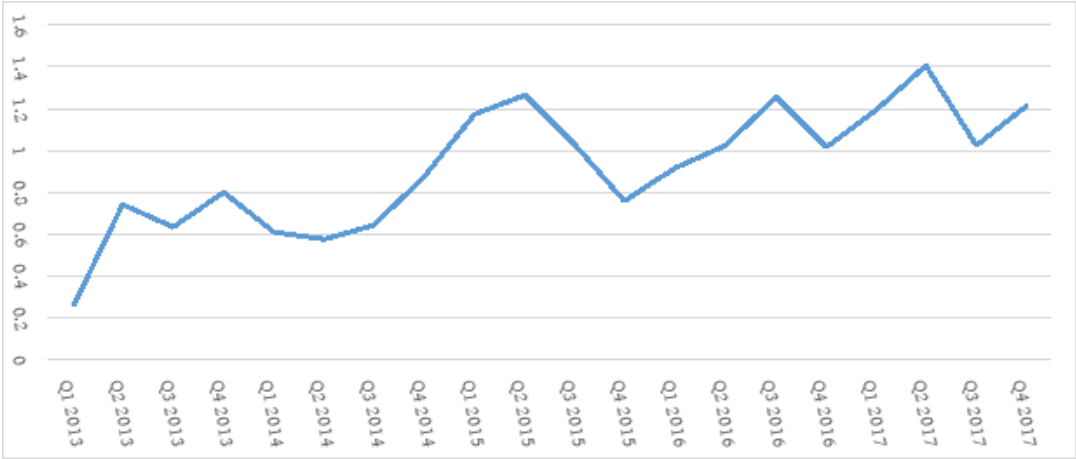

Fig. 7. The integral index values for the reputational capital of the Republic of Tatarstan by quarters.

V. SUMMARY

The most important direction in the development of the models and conclusions obtained, and justifications developed on their basis, is the assessment of the contribution of reputational capital to the time course of the gross product as an integral value of the socio-economic growth effectiveness.

Construction of isolated equations is not enough to describe the mechanism for determining the relationship between those factors. The degree of influence of reputational capital on the gross regional product can be assessed using a system of econometric equations [13-15].

It is obvious that among the factors that influence the gross regional product behavior and investments, there are several general indicators. In this study, such a set of factors were as follows:

x_1 –reputation index

x_2- the balanced financial result of organizations.

Thus, it is possible to build a system of independent equations. The main difference of this type of system from others is that each dependent variable (y_n)) is considered as a function of a predetermined set of factors, x_n. Each equation in such a system can be considered independently, therefore, the estimates of the unknown coefficients of these equations can be calculated using the classical least squares method.

In general, such a system of regression equations can be represented as follows:

$$\begin{cases} y_1 = a_{11}x_1 + a_{12}x_2 + \cdots + b_{1n}x_n + \varepsilon_1 \\ y_2 = a_{21}x_1 + a_{22}x_2 + \cdots + a_{2n}x_n + \varepsilon_2 \\ y_m = a_{m1}x_1 + a_{m2}x_2 + \cdots + a_{mn}x_n + \varepsilon_3 \end{cases},$$

where y_n is a group of endogenous factors;

$x_n$is a group of exogenous factors.

For this study, the system takes the following form:

$$y_1 = 104883{,}4064 + 29574.88x_1 + 0{,}24x_2$$

$$y_2 = 370085 + 1.25x_2$$

The adequacy of the above equations is confirmed by the obtained estimates of statistical significance (Table 2-4).

Table 2: Model regression statistics parameters.

	y_1	y_2
Multiple R	0.84	0.95
R-square	0.81	0.90
Normalized R-square	0.79	0.87

Table 3: The statistical significance of the regression equation (y_1) parameters.

	Coefficients	t-statistics	P-Value
Y-intersection	104883,4064	14,22004572	1,69711E-10
Reputation Index of RT	29574.88134	3,801708731	0,001567073
Balanced financial result	0,244758698	2.484395839	0.024428616

Table 4: The statistical significance of the regression equation y_2 parameters.

	Coefficients	t-statistics	P-Value
Y-intersection	370085,1068	11,39488	1.16E-09
GRP	1.251224665	2,797503	0,0119

Some elementary transformations of the system allow us to obtain the dependence of the form:

$$y_2 = 5{,}1y_1 + 151041{,}013x_1 - 165561{,}9828$$

y_1 - Investment in fixed assets;

y_2 - Gross regional product of the Republic of Tatarstan.

The resulting model which determines the relationship between the GRP of the Republic of Tatarstan and exogenous parameters (including the region's reputation capital index) demonstrates that the increase in the territory's reputation by 0.1 points per quarter generates an increase in the gross regional product of 15,104 million rubles per year, which is about 0.7% of GRP according to data for 2017 (2017 GRP is equal to 2114.2 billion rubles).

VI. CONCLUSIONS

In general, the implemented calculations demonstrating the influence of the territory's reputational capital on the parameters of its socio-economic development, in many ways prove the scientific perspective of using the theory of the reputational economy in practice. In this connection, its system development is extremely important, because, as was proved by the example of the Republic of Tatarstan, it expands the research scope of the theory and practice of economic growth. Moreover, the tasks solved on its basis form a whole range of areas that contribute to the development of promising areas and mechanisms for regulating state regional policy.

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Footnote

[a] Despite a fine line dividing reputation and image, the author believes that he explores the reputation of the region.