Methods of Rating the Effectiveness of Cultural Institutions in the Territorial Context

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ABSTRACT

The article implements the main tasks: development ranking of the regions in the sphere of the cultural industry and Russian regions rating creation to estimate the degree of integration and effectiveness of the cultural industry development in every region; developing of new estimates of the activities of the cultural industry and mathematical instruments for evaluating its comparative effectiveness (index number creating); developing of criteria, integrated indices, instruments, indices and application algorithm; development of a regional classification methodology, creation of a development ranking map of Russian regions in the sphere of the cultural industry and Russian regions rating creation. To evaluate the index of effectiveness, an undirected variable-scale model is proposed, which allows both a reduction in inputs and an increase in outputs for an ineffective DMU to achieve an efficient frontier. It is proposed to use a method based on information entropy to construct an aggregated index. Evaluation criteria were chosen in such a way as to comprehensively reflect the resources available to cultural institutions and to characterize the targeted results of activities according to their structural characteristics, to have comparable quantitative values, to be available in official sources. As a part of the proposed approach, the regional assessment of the cultural industry at the first level is carried out in three directions (theaters, museums, concert organizations and independent groups). The data for 78 regions of the Russian Federation were normalized and brought to a unified scale. As a result of obtaining a numeric evaluation of the integrated index of the effectiveness of the cultural industry, it is possible to classify Russian regions by allocating several groups. The task of visualization of the obtained results is solved by constructing a map of Russian regions ranking in terms of cultural institutions effectiveness. The author's method can be used by regional authorities in evaluating and planning the socio-economic development of the region and the development of the regional economy as well as in making managerial decisions in the sphere of cultural management.

Keywords: culture industry, theatres, museums, libraries, the development rating of the culture industry in Russian regions

I. INTRODUCTION

The importance of culture for all fields of activity of the state and society has long been recognized and has never been questioned. The complex sectoral structure of the cultural sphere currently undergoes significant changes in accordance with the changes in the direction of development of postindustrial society. The sphere of cultural services in the most important sphere and constructing of a new model of the culture industry functioning that meets the modern economic and social challenges is an urgent scientific task [1][p.188].

However, at the present stage of the development of society the importance of the effectiveness of cultural sphere functioning can be fully substantiated in the economic and legal aspects. There is no doubt that the development level of the culture of society determines the effectiveness of the application of progressive ideas, innovations, new technologies, etc. The analysis of the level and evaluation of the comparative effectiveness of the Russian cultural sphere functioning in the territorial context offers opportunities for the innovative development of society as a whole, the improvement of the population quality of life, solving acute social problems as well as for identifying current problems of the society development, etc.

The object of this paper is the system analysis of the effectiveness of the Russian regional cultural institutions taking into account the evaluation of cultural institutions of various types by constructing a quantitative rating. The proposed methodology is based on the appliance of modern mathematical models, in particular Data Envelopment Analysis which provides a comprehensive evaluation of cultural institutions taking into account a differentiated set of input and output indices of activity.

The main tasks studied in the paper are:

- the development of rating methodology for cultural institutions of various types based on entropy approach;

- the constructing of effectiveness rating of cultural institutions for the regions of the Russian Federation;

- the classification of Russian regions based on quantitative evaluation of the cultural industry;

- constructing a map of Russian regions ranking in terms of cultural institutions effectiveness;

- impact evaluation of the culture industry on the economic development of Russian regions.

The study uses the method of integral rating analysis and the method of multidimensional ranking indices to evaluate the cultural industry in the regional context and for constructing a rating of effectiveness of regions based on the development level of various types of institutions. For evaluation of certain types of cultural institutions, it is proposed to use mathematical models of functioning environment Data Envelopment Analysis (DEA) that allow to obtain quantitative estimates of the technical effectiveness of complex objects functioning if there are several input and output indices of their activity. For constructing an integral rating, it is proposed to use an approach based on information entropy to obtain the value of weighing coefficients of selected indices.

For obtaining a true picture in comprehensive research practice on evaluation of development and effectiveness trends in the cultural industry basic methods of data collection were used including monitoring indices of cultural development, the analysis of statistics from Federal Service of State Statistics [2] and Culture Ministry of the Russian Federation [3].

II. THEORETICAL ANALYSIS

The main problem of solving theoretical issues of evaluation the effectiveness of the cultural industry is the lack of one common approach to allocate the structure and boundaries of the cultural sphere as well as standardized methods of analysis. For solving focused problems, precise definitions are used that take into account national ideas and traditions, the development paradigm of a particular state and public formation. The concept "cultural industry" [4] was originally used by scientists of Frankfurt School to describe the rapid development of theatre, music, cinema, dance, fine art, etc. Therefore, it seems necessary to analyze these important cultural sectors.

The concepts of "cultural industries" [5]$^{p.85}$ and "mass culture" [5]$^{p.13}$ are differentiated in foreign studies. Cultural artifacts are now subject to the logic of profitability and capital accumulation with more systematic [6]$^{p.100}$. The critical potential of intellectual culture is … by conformist or "affirmative" product of the cultural industry which facilitate the adaptation of an individual to capitalism; to achieve this, various techniques are used: "standardization", "pseudo-individualization", "reaction mechanisms" [7]$^{p.94}$.

UNESCO defines cultural and creative industries as "sectors of organized activity whose main purpose is to produce or reproduce, promote, distribute and/or commercialize goods, services and activities of cultural, artistic of heritage origin" [8].

III. THE METHODOLOGY OF THE STUDY

The increasing popularity of the use of constructing instruments of an integral index for evaluation economic objects is caused by the obvious need of stakeholders (business, population, regional and municipal authorities, investors and others) [9] in comparable information on the level of effectiveness of the analyzed economic subsystem.

Constructing of rating estimates is used for monitoring, prognostics, management (monitoring of the current state of systems, detecting trends in system behavior, project planning and development of necessary control actions). The wide use of ratings as the method of evaluation by means of an aggregated index is due to the possibility of obtaining comparable results in the process of analyzing homogenous objects.

There are many methods for calculating the integrated index, which can differ from each other by analyzed factors as well as by mathematical expression of the integrated index.

For constructing of a summary rating there is a number of different approaches: expert-point methods (indices evaluate the intensity of properties of various components, determining the index validity by experts), methods of rank statistics (the transition from quantitative characteristic values to ranks is possible if these values change linearly i.e. uniformly), topometric methods (taking into account the proximity of regions according to the compared indices to the standard region, the choice of a standard), multidimensional scaling methods (allow to transit from quantitative values of features characterized by heterogeneity to qualitative analogs and make all indices commensurate) [10].

Methods for constructing rating estimates include such stages as forming a set of evaluation criteria rationing (standardization) of selected indices, choosing a mathematical model for constructing an integrated index. Each of these components of the technique involves determining parameters of the model by an expert method that makes the ranking process subjective.

The proposed rating methodology is based on a hierarchical system of evaluation indices and is a synthesis of three separate blocks corresponding to separate areas of activity of cultural institutions for each of which the evaluation is carried out: theatres, museums, concert organizations, independent groups. According to the three blocks that make up the final estimate, the rating is calculated in accordance with the index of effectiveness calculated using DEA. The final (integral) rating is a generalization of ratings by individual blocks.

DEA is a multidimensional nonparametric method of measurement of relative effectiveness of a set of objects, the so-called decision-making units (DMU) described by a set of the variables operating as inputs and outputs in the described model [11]. The DEA model allows multiple inputs and outputs at the same time. The DEA is based on the solving of a linear programming problem to maximize DMU outputs with a given number of resources (inputs) or to minimize resources (inputs) with a given level of outputs. The concept of technical effectiveness is seen as the ratio of weighted outputs variables corresponding to DMU results to weighted input variables corresponding to DMU resources used. DMU that have maximum efficiency values are selected and a piecewise linear function, the so-called efficient frontier is constructed. Those DMU that receive the highest estimates are at the frontier and become standards for other DMU in the sample.

There are currently several different types of DEA model that enable to take into account specific factors such as parameter prioritization, economies of scale, risks, etc. [12].

For evaluation of index of effectiveness, an undirected variable-scale model is proposed which enables both reduction in inputs and increase in outputs for inefficient DMU to achieve efficiency frontier. For DMU_k model is:

$$\min \frac{1-\alpha}{1+\beta} \quad (1)$$

$$\sum_{j=1}^{n} x_{ij}\lambda_j \leq (1-\alpha)x_{ik} \ (i = 1, \dots, m) \quad (2)$$

$$\sum_{j=1}^{n} y_{rj}\lambda_j \geq (1+\beta)y_{rk} \ (r = 1, \dots, s) \quad (3)$$

$$\sum_{j=1}^{n} \lambda_j = 1 \quad (4)$$

$$\alpha, \beta, \lambda_j \geq 0 \ (j = 1, \dots, n)$$

Technical index of effectiveness *TE* is defined as *(1-α^*)/(1+β^*)* where numerator *(1-α^*)* indicates the degree of decrease for inputs, denominator *(1+β^*)* indicates the increase for outputs [13].

DMU_k is considered effective when meeting the condition that the technical index of effectiveness is 1, a similar DMU_k is at the efficiency frontier. DMU_k is considered ineffective when meeting the condition that the technical index of effectiveness is less than 1 which shows how much is the share of the possible productivity of the object.

The technical effectiveness values of TE calculated for different types of cultural institutions determine the values of partial indicators at the first stage of rating in accordance with task (1)-(4).

At the second stage for constructing an aggregated index, it is proposed to use the method based on information entropy. For constructing of a summary rating there is a number of different approaches: expert-point methods (indices evaluate the intensity of properties of various components, determining the index validity by experts), methods of rank statistics (the transition from quantitative characteristic values to ranks is possible if these values change linearly), topometric methods (taking into account the proximity of regions according to the compared indices to the standard region, the choice of a standard), multidimensional scaling methods (allow to transit from quantitative values of features characterized by heterogeneity to qualitative analogs for standardization).

In information theory, entropy is a common measure of uncertainty [14]. When the difference in

values for the evaluation objects for the same index is high and entropy is small, it shows that this index provides more useful information and the relative weight of this index is higher, and vice versa [15]. Such an effect can quantify the systemic effect of emergence. This approach is used to determine the integrated index based on a set of partial indicators: the weighted sum is calculated where the weights are information entropy values for a particular partial indicator.

The procedure of information entropy evaluation includes the following stages. Let us assume that a set of indices to describe a group of homogeneous objects is the matrix *X*:

$$X = \left(x_{ij} \right)_{n \times m},$$

$i = 1, 2, \ldots, n$; $j = 1, 2, \ldots, m$;

where x_{ij} is the value of the *j*-index for the *i*-object, *n* is a number of objects, *m* is a number of indices used in rating.

The first step is to obtain the matrix *R*:

$$R = \left(r_{ij} \right)_{n \times m},$$

$$r_{ij} = \left[\frac{(x_{ij} - x_{minj}) \cdot (N-1)}{x_{maxj} - x_{minj}} \right] + 1 \qquad (5)$$

Where r_{ij} is the value of the *j*-index for the *i*-object in categorical scale (the values are rounded up to a whole number by dropping the fractional part), x_{minj} and x_{maxj}− are the range of changes in the values of the *j*-index, *n* is a number of values in the categorical scale.

The information entropy value of the *j*-index *Hj* is defined from Shannon's equation:

$$H_j = \sum_{k=1}^{N} p_{kj} ln \left(\frac{1}{p_{kj}} \right), \quad j = 1, \; 2, \ldots, \; m,$$
(6)

Where p_{kj} is the probability (relative frequency in this case at the final number of categorical values of the index in the matrix *R*) of the *k*-value for the *j*-index in the matrix *R* wherein the sum of all probabilities p_{kj} for the *j*-index is 1: $\sum_{k=1}^{N} p_{kj} = 1$.

Thus, the entropy value *Hj* depends on the frequency of *k* for the *j*-index in *R*.

The final aggregated indices E_i, $i = 1, 2, \ldots, n$ that were obtained based on *m* partial indicators for the *i*-object are calculated as follows:

$$E_i = \sum_{j=1}^{m} H_j r_{ij}. \qquad (7)$$

The normalized value of the final index E_i^* can be used:

$$E_i^* = \frac{E_i}{\max_i E_i} \cdot 100\%. \qquad (8)$$

Based on (5)-(8) for each region, the final value of the integrated rating index E^* is calculated.

IV. DATA FOR THE STUDY

Certain requirements were taken into account when forming evaluation criteria to be monitored and managed. Indices were chosen in such a way as to comprehensively reflect the resources available to cultural institutions and to characterize the target results of activity according to their structural characteristics, to have comparable quantitative values and to be available in official sources. It should be taken into account that such a set of verifiable indices is quite limited in terms of their availability in statistical sources.

As part of the proposed approach, the regional evaluation of the cultural industry at the first level is carried out in three directions (theatres, museums, concert organizations, independent groups). These directions sufficiently reflect the most important aspects of the cultural institutions activity covering a significant part of the service market within the cultural industry. The information base of the study were data on the cultural industry of Russian regions in accordance with differentiated sets of indices for certain types of cultural institutions ("Table I"). Most of these indices are relative values. It enabled to take into account the economies of scale for different regions. This will avoid estimate distortion depending on population or territory of a region. The data were normalized and brought to the unified scale.

TABLE I.   EFFECTIVENESS EVALUATION INDICES FOR VARIOUS CULTURAL INSTITUTIONS BY DEA METHOD

Model	Indices	
	Inputs	*Outputs*
Theatres	The capacity of auditoriums and theatres venues for 1 resident of the region, places/person.	The ratio of the number of events to the number of theatres in the region, units.
	The ratio of the number of theatre staff to the number of theatres in the region, person.	Receipts of funds from business and other income-generating activities for 1 resident of the region, thousands rubles/person.
	Budgetary receipts to theatres for 1 resident of the region, thousands rubles/person.	
Museums	Exposition and exhibition area and storage area for 1 resident of the region, sq. m./person.	The number of expositions, units.
	The ratio of the number of museum staff to the number of museums in the region, person.	Receipts of funds from business and other income-generating activities for 1 resident of the region, thousands rubles/person.
	Budgetary funds to museums for 1 resident of the region, thousands rubles/person.	
Concert organizations and independent groups	The capacity of main and additional auditoriums for 1 resident of the region, places/person.	The number of events held at their sites and outdoor events, units.
	The ratio of the number of concert organization staff and independent groups and independent groups to the number of concert organizations and independent groups in the region, person.	Receipts of funds from business and other income-generating activities for 1 resident of the region, thousands rubles/person.
	Budgetary funds to concert organizations for 1 resident of the region, thousands rubles/person.	

The data for 78 regions of the Russian Federation were used in the construction of rating due to the fact that the activity indices of cultural institutions for Moscow and St. Petersburg, the largest cultural centers, are anomalous for a sample of regions (when the indices are normalized, this leads to a significant loss of accuracy). In addition, the data on these indices were not available for a number of regions.

V.   THE RESULTS

The process of testing the proposed methodology for the regions of the Russian Federation, the index of effectiveness values of cultural institutions at the regional level were calculated based on DEA models that were aggregated into the final index ("Table II"). The weighting factors are information entropy values (6) for three indices of effectiveness for certain activities of the cultural industry: H_1=2.67; H_2=2.31; H_3=2.65.

TABLE II.   TECHNICAL EFFECTIVENESS EVALUATION AND THE FINAL EFFECTIVENESS RATING OF THE RUSSIAN FEDERATION

Rating Item	Region	Technical Effectiveness for Various Types of Cultural Institutions, *TE*			The Final Effectiveness Index E^*, %
		Theatres	*Museums*	*Concert Organizations and Independent Groups*	
1	The Nizhny Novgorod Region	0.812	1	1	100.00
2	The Moscow Region	0.839	0.896	1	98.55
3	The Stavropol Territory	1	0.707	0.995	95.67
4	The Omsk Region	0.766	0.767	1	89.42
5	The Sverdlovsk Region	0.762	0.74	1	89.42
6	The Kamchatka Region	1	0.426	1	89.05
7	The Kaliningrad Region	0.858	0.471	1	84.81
8	The Republic of Bashkortostan	0.448	1	0.989	84.11
9	The Chukotka Autonomous Region	1	0.243	1	83.90
10	The Novosibirsk Region	1	0.743	0.602	83.56
11	The Novgorod Region	1	0.397	0.897	83.39
12	The Perm Territory	1	0.468	0.814	82.87
13	The Kirov Region	0.805	0.5	1	82.82
14	The Pskov Region	0.82	0.476	1	82.82
15	The Rostov Region	0.749	0.456	1	80.83
16	The Vladimir Region	0.849	0.591	0.816	80.34
17	The Republic of Tatarstan	0.686	1	0.624	80.22

| Rating Item | Region | Technical Effectiveness for Various Types of Cultural Institutions, *TE* | | | The Final Effectiveness Index E^*, % |
		Theatres	*Museums*	*Concert Organizations and Independent Groups*	
18	The Republic of Sakha (Yakutia)	0.515	1	0.777	78.19
19	The Tambov Region	0.847	0.754	0.623	77.60
20	The Kemerovo Region	0.648	0.741	0.805	77.54
21	The Sakhalin Region	0.764	0.392	1	77.39
22	The Republic of Mari El	0.573	0.537	1	76.58
23	The Lipetsk Region	0.734	0.315	0.95	73.70
24	The Krasnodar Region	0.661	0.377	1	73.42
25	The Saratov Region	0.581	0.428	1	73.15
26	The Vologda Region	1	0.492	0.542	73.00
27	The Trans-Baikal Territory	0.639	1	0.438	72.31
28	The Leningrad Region	0.77	0.201	1	72.24
29	The Chechen Republic	1	0.677	0.339	71.97
30	The Tyumen Region	1	0.311	0.66	71.79
31	The Samara Region	0.808	0.175	0.948	70.53
32	The Khabarovsk Territory	0.721	0.354	0.845	69.48
33	The Irkutsk Region	0.749	0.519	0.67	68.72
34	The Kurgan Region	0.624	0.956	0.408	68.61
35	The Komi Republic	0.467	1	0.489	68.32
36	The Tula Region	0.514	1	0.473	68.32
37	The Republic of Khakassia	0.423	0.504	0.97	66.92
38	The Orenburg Region	0.604	1	0.343	66.37
39	The Arkhangelsk Region	0.68	0.256	0.886	66.04
40	The Voronezh Region	0.794	0.308	0.698	65.81
41	The Altai Territory	0.728	0.829	0.381	65.45
42	The Kostroma Region	0.971	0.449	0.457	65.34
43	The Magadan Region	0.702	0.019	1	65.10
44	The Tomsk Region	0.583	0.178	1	64.56
45	The Bryansk Region	0.937	0.402	0.416	61.38
46	The Ivanovo Region	0.72	0.181	0.818	60.63
47	The Belgorod Region	0.739	0.275	0.653	60.13
48	The Krasnoyarsk Territory	0.565	0.425	0.7	59.31
49	The Republic of Dagestan	0.158	1	0.55	58.36
50	The Udmurt Republic	0.552	0.315	0.779	57.85
51	The Penza Region	0.804	0.453	0.398	57.40
52	The Kaluga Region	0.964	0.457	0.191	57.18
53	The Yaroslavl Region	0.816	0.254	0.494	56.19
54	The Chelyabinsk Region	0.532	0.337	0.71	55.87
55	The Primorsky Territory	0.888	0.256	0.411	54.23
56	The Republic of Buryatia	0.472	0.244	0.754	54.14
57	The Republic of Karelia	0.663	0.325	0.562	53.92
58	The Amur Region	0.75	0.352	0.386	53.69
59	The Volgograd Region	0.54	0.498	0.477	53.12
60	The Kursk Region	0.719	0.463	0.262	51.19
61	The Tver Region	0.698	0.159	0.497	48.78
62	The Ulyanovsk Region	0.553	0.584	0.277	48.66
63	The Astrakhan Region	0.662	0.214	0.492	48.51
64	The Jewish Autonomous Region	1	0.177	0.109	46.89
65	The Republic of Altai	0.103	0.138	1	46.66
66	The Murmansk Region	0.511	0.19	0.525	44.52
67	The Republic of Ingushetia	0.032	1	0.272	44.51
68	The Oryol Region	0.597	0.162	0.438	42.83
69	The Smolensk Region	0.515	0.341	0.331	40.06
70	The Republic of Mordovia	0.403	0.181	0.535	38.83
71	The Ryazan Region	0.56	0.143	0.363	36.89
72	The Karachay-Cherkessia	0.083	1	0.049	36.61
73	The Chuvash Republic	0.273	0.2	0.472	34.59
74	The North Ossetia-Alania	0.498	0.033	0.227	27.52
75	The Kabardino-Balkaria	0.146	0.285	0.28	24.43
76	The Adygeya Republic	0.171	0.044	0.43	23.48
77	The Republic of Kalmykia	0.227	0.042	0.344	21.52

| 78 | The Republic of Tyva | 0.313 | 0.069 | 0.188 | 19.57 |

As leading regions with a high level of development of the cultural industry, the following regions can be indicated for designated activities: the Nizhny Novgorod Region, the Moscow Region, the Stavropol Territory, the Omsk Region, the Sverdlovsk Region, the Kamchatka Territory, the Kaliningrad Region, the Republic of Bashkortostan, the Chukotka Autonomous Region, the Novosibirsk Region, the Novgorod region, the Perm Territory, the Kirov Region, the Pskov Region, the Rostov Region, the Vladimir Region, the Republic of Tatarstan, the Republic of Sakha (Yakutia), the Tambov Region, the Kemerovo Region, the Sakhalin Region, the Republic of Mari El.

These regions because of the application of DEA methodology demonstrated the high effectiveness in the correlation of available resources and the results obtained from them, and accordingly higher values throughout the complex of certain activities of cultural institutions. In a resource-constrained environment of

the region, the number of events and the amount of funds received from business and other income-generating activities allows to conclude that the functioning of territorial cultural institutions is effective. At the same time, the indices take into account the population of the region, which makes it possible to take into account the economies of scale when evaluating the committed budgetary funds and internal material resources of the region.

As a result of obtaining a numerical evaluation of the integrated index of effectiveness of the cultural industry, it is possible to classify Russian regions by allocating several groups depending on the values of the indicator ("Table III").

TABLE III. CLASSIFICATION OF REGIONS DEPENDING ON THE LEVEL OF CULTURAL INDUSTRY DEVELOPMENT

The Level of Cultural Industry Development	The Value of the Final Index of effectiveness of Cultural Institutions of the Region, E^*, %	The Number of Regions, %
High	$E^* \geq 75$	28.21
Significant	$75 < E^* \leq 50$	48.72
Insignificant	$E^* < 50$	23.08

The problem of visualizing the obtained results is solved by constructing a ranking map of Russian regions according to the effectiveness level of cultural institutions presented in "Table IV" and "Fig. 1".

TABLE IV. THE FINAL INDEX OF EFFECTIVENESS E^*, %

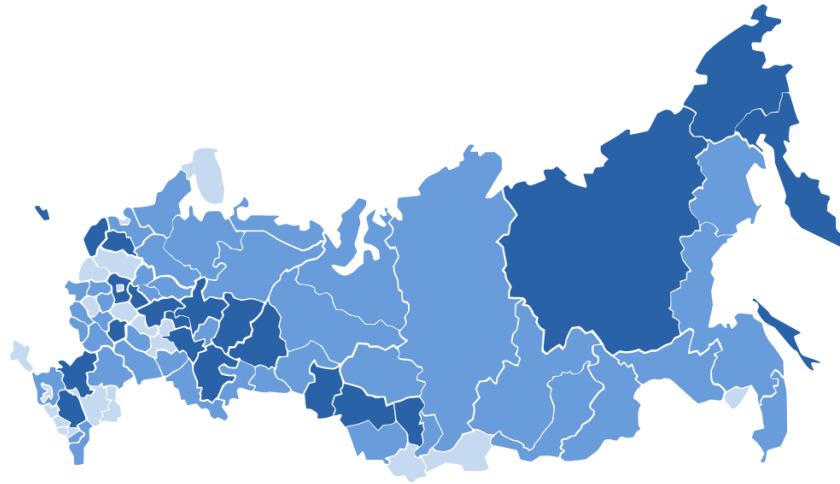|	From	To
	0.0	50.0
	51.0	74.0
	75.0	100.0

Fig. 1. The ranking map of Russian regions according to the effectiveness level of cultural institutions.

An important aspect of the study of the cultural industry is the evaluation of the relationship between the activities of cultural institutions and the economic development of the Russian Federation. The problem of correlation analysis is solved in this case with a large number of various indices traditionally used to evaluate the activities of cultural institutions of different types and a limited coverage of sample at the regional level. The integral index that comprehensively evaluates the activity of the most important types of cultural institutions in the regions makes it possible to identify the correlation dependence. The volume of gross regional product (GRP) for the constituent entities of the Russian Federation is considered in many cases as an index characterizing regional development. However, for the study of cultural sectors in 2018, the necessary information on GRP was not available at the time of preparation of the article. As an index that indirectly reflects the level of regional development, it is proposed to use the size of investments in fixed assets and use the increase in fixed asset formation in 2018 in percentage by 2017.

The analysis of the correlation between those indices does not suggest that there is a linear relationship between the activities of cultural institutions and the pace of economic development of the region during the period under review (Pearson correlation coefficient $r=-0.0829$, $p=0.470$).
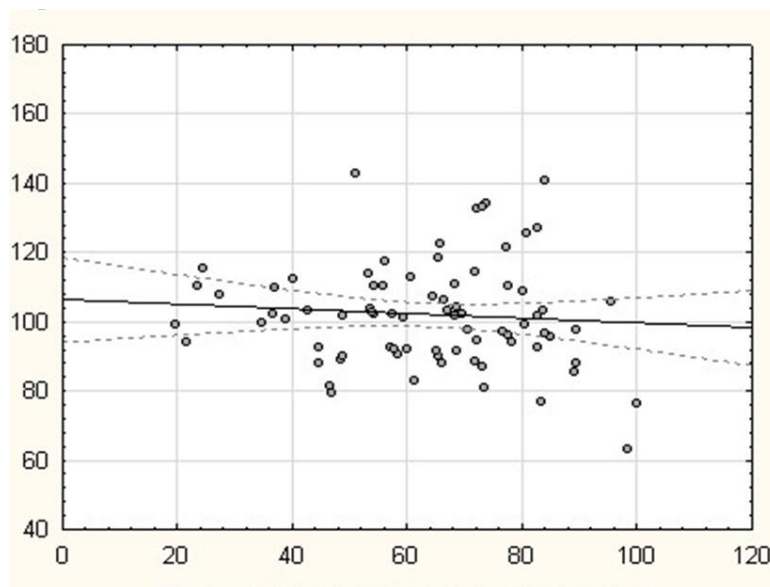

Fig. 2. Relationship between the final index of effectiveness of the cultural industry and the change in investment volume in fixed assets in 2018.

[a.] The vertical scale – Fixed Asset Formation in 2018, % by 2017, The horizontal scale – The Final Index of Effectiveness, %

"Fig. 2" is a dispersion diagram illustrating the absence of a linear relationship between the integrated index of effectiveness of cultural institutions functioning at the regional level and the change in investment volume in fixed assets in 2018.

VI. CONCLUSION

The advantage of the proposed approach to constructing a rating model for evaluating of the regions lies in the possibility of ranking a large number of objects according to a set of interconnected indices characterizing resource allocation and the results of cultural institutions functioning at the regional level. Using the information entropy function to calculate the integrated rating enables to reduce subjectivity in determining the weighing coefficient of additive models and to increase the accuracy of ranking.

The evaluation of the impact of the cultural industry functioning on the economic growth of Russia was carried out with help of a constructed aggregated index of effectiveness of regional cultural institutions functioning. There is no linear correlation between the integrated index for cultural industry evaluation and the selected indices reflecting the economic development of the region.

The results of the study confirm the need to develop effective financing strategies for cultural institutions, to trigger new methods of extra budgetary financing [16] in the face of a decrease in solvent demand for services in the cultural industry and to use additional nonfinancial indices to evaluate the effectiveness of cultural institutions. It is necessary to expand the appliance of the algorithm for evaluation the effectiveness of regional systems of the cultural industry based on DEA methodology to other components of the cultural industry. The obtained research results make it possible to introduce an effective organizational and economic mechanism for the development of the cultural industry in the regions of the Russian Federation.

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