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Human Capital in Sustainable Development and Macro-level Criteria

Victor Medennikov[1,*], *Tatiana* Kokuytseva[2], and *Oksana* Ovchinnikova[2]

[1]Computing Center of the Federal Information Center "Informatics and Management" RAS, Vavilov st. 40, 119333 Moscow, Russia
[2]People's Friendship University of Russia (RUDN University), 6 Miklukho-Maklaya Str., Moscow, 117198, Russian Federation

Abstract. In the light of the ongoing digital transformation in the world, there has been a significant increase in scientific and practical interest in the problem of human capital (HC) in recent years. This interest bases on the understanding of its key role in the socio-economic life and development of society with a radical change in the technological order at all its hierarchical levels: national, industry, regional, corporate and individual. On the upper levels (national, sectoral, regional) HC is characterized by demographic indicators, characteristics of the level and quality of education, health, living standards, cultural development, degree of scientific and technological scope of the society, degree of mobility when moving from areas with relatively low standard of living in places with higher, etc. The paper proposes a powerful evaluating tool for improving and increasing the human capital measurement, which can serve for increasing the social welfare of society, and transferring the most effective innovative solutions to the economy. The tool is based on mathematical modelling and correlations among HC and non-HC variables.

1 Introduction

In the light of the ongoing digital transformation in the world, there has been a significant increase in scientific and practical interest in the problem of human capital (HC) in recent years. This interest bases on the understanding of its key role in the socio-economic life and development of society with a radical change in the technological order at all its hierarchical levels: national, industry, regional, corporate and individual. On the upper levels (national, sectoral, regional) HC is characterized by demographic indicators, characteristics of the level and quality of education, health, living standards, cultural development, degree of scientific and technological scope of the society, degree of mobility when moving from areas with relatively low standard of living in places with higher, etc. At the firm level, the HC reflects the professional abilities of employees, the degree of realization of their educational and cultural potential, and the state of health. At the level of an individual, HC is a person's

* Corresponding author: dommed@mail.ru

accumulated knowledge and skills, life experience in the different branches of activities, which help to realize his or her abilities and acquire the revenue from own basis.

1.1 Justification of the system of criteria for evaluating human capital at the macro level

According to the analysis of the system of factors that have the greatest impact on the quality of human capital assessment at the macro level and the concept of unified information Internet space for scientific and educational resources (EIIPNOR) with potential, still unrecognized, Internet technologies, it becomes urgent to develop a methodology for assessing human capital at the macro level. Basis should be newly discovered new qualities of ICT. To do this, it is necessary to include the most important indicators of the activity of educational institutions that affect the quality of human capital by achieving goals in the appropriate assessment criterion. Those are training highly qualified specialists and scientists, conducting scientific research with the design of their products in a generally accepted format, which should also lead to an increase in human capital.

2 Materials and method

The effectiveness of achieving these goals is influenced by many other factors, in addition to the EIIPNOR indicators. For example, these are the level of training of applicants, their motivation to acquire knowledge, the situation of science itself and the environment for its implementation, financial and moral aspects in the form of the prestige of the work of scientists, professional literacy of the management of the Ministry of Education and Science and line ministries. Also these are the state of the "social order" of society and the country's economy for the profile of training specialists; the amount of funding for educational institutions. However, all these qualitative indicators are rather difficult to confirm by numerical data, especially by functional mathematical dependencies.

In this case, as a general criterion of the methodology, we will take the effectiveness of the use of informational scientific and educational resources (INOR) of educational institutions represented in the Internet space. The integral criterion should take into account the data from the self-examination report, according to the basic requirements of the Ministry of Education and Science, Rosobrnadzor to the content of the websites of educational institutions, the degree of demand for INOR in society and the economy, the degree of influence on the quality of teaching and training of highly qualified specialists and scientists in them. As noted in the initial sections of the work, there is a need for reflection in the methodology and assessment of sites using sitemetric methods that take into account the image and reputation of educational institutions. An analysis of the sites of industrial and educational institutions made it possible to identify new trends in the provision of services in the Internet space in the form of all kinds of electronic trading platforms and labor exchanges. It is obvious that these information services, as follows from the modern understanding of HC, also have an impact on the growth of human capital. The choice of distance learning and retraining as a particular criterion included in the integral criterion of the method is obvious, as well as the possibility of obtaining qualified advice on the issues of interest, which is extremely important with a significant change in the entire technological order in the world. The need to take into account in the methodology the degree of use of applied software and databases and their quality are justified in the basic principles of assessing human capital [1].

Information resources (IR) included in the requirements of the Ministry of Education and Science, Rosobrnadzor, and having the greatest impact on the attainability of the goals of universities, we will call secondary information educational resources (VIOR). Indicators from the EIIPNOR list, reflecting information on seven types of INOR: developments, publications, consulting activities in the form of the number of consultants in a particular area of knowledge, regulatory information, distance learning, applied software packages, databases are called primary information scientific and educational resources (PINOR).

The ontological classification of INOR is associated with modern trends and capabilities of Internet technologies, when Internet service providers provide those for storing and processing site content in structured databases controlled by powerful database management systems (DBMS). The database content can be stored both in the form of an information catalog and in the form of a full-format presentation. We will call this a form of IR storage. On the other hand, the storage of site content not in a DBMS, as it happens in most cases now, is called an unordered view. When stored in a DBMS, it is an ordered presentation with the ability to navigate, for example, based on the SRSTI topic, by organization, industry and region, by authors and their qualifications, by keywords, etc. We will call this the level of IR integration.

Such an ontological standardization of the presentation of information resources in EIIPNOR makes it possible to develop an independent methodology for assessing human capital at the macro level, as well as a methodology for a comprehensive assessment of all the activities of educational institutions. With the introduction of standard sites in universities, the assessment technique becomes automated and low-cost.

This assessment method, in particular, when included in indicators of regional development, will also reflect the degree of readiness of educational institutions to influence regional digital transformation. Standardization of the presentation of IR under certain conditions leads to a unified assessment methodology [2, 3, 4, 5, 6].

In this case, the efficiency of using information scientific and educational resources for assessing human capital is understood, based on the theory of operations research methods, the effectiveness in achieving a certain goal. To assess the HC on the basis of the announced methodology, we will single out the following as the goal of forming the EIIPNOR:

• relevance, completeness, objectivity, reliability, and consistency of the collected and stored information;

• adequacy, efficiency, comfort and ease of searching and obtaining the necessary information;

• a variety of tools for implementing different modes of information processing in the form of statistical methods, mathematical modeling, big data, artificial intelligence;

• comprehensibility, availability of data for a wide range of users (potential applicants undergoing training and retraining, teaching staff, government officials, business representatives, scientists, all segments of the population, etc.).

2.1 Mathematical model of the methodology for assessing human capital at the macro level

Let us formalize both the verbal description of the system of factors that most affect the quality of human capital assessment, and the system of criteria for assessing human capital at the macro level. The first version of the foundations of the methodology is given in [7], significantly modified in this work specifically for the purpose of assessing human capital. For a mathematical description of the technique, we introduce the following expressions.

i — PINOR integration level code, $i \in I$;

l — PINOR form of storage code, $l \in L$;

n — PINOR specification code, $n \in N$;

m — educational office number, $m \in M$;

h —VIOR representation code,$h \in H$;

t — time moments of calculations (during EIIPNOR realization the computation can be done in every moment);

P_j^{tm} — partial criterium of HC estimation by the efficiency of IR use of m-th High School by j-th indicator at moment t, $j \in J$;

P^{tm} — general criterium of HC estimation by the efficiency of IR use of m-th High School at moment t;

α_i^1 — weigh coefficient of the integration level of PINOR;

α_l^2 — weigh coefficient l -th form of storage of PINOR;

α_n^3 — weigh coefficient of n–th specification of PINOR representation;

β_j — weigh coefficient of partial criterium of HC estimation of the efficiency of PINOR use by j-th indicator;

$v_{i\,ln\,0}^{tm}$ — volume characteristic of PINOR of i-th integration level of l-th form of storage, n–th representation form on the level of m-th High School at moment t;

$vf_{i\,ln\,f}^{tm}$ — volume characteristic of PINOR of i-th integration level of l-th form of storage, n—th representation form on the level of f-th faculty of m-th High School at moment t

$vk_{i\,ln\,k}^{tm}$ — volume characteristic of PINOR of i-th integration level, l-th form of storage of P, n–th representation form on the level of k-th department of m-th High School at moment t;

λ_{iln}^{tm} — the level of PINOR estimation of i-th integration level, l-th form of storage, n–th representation form of m-th High School at moment t;

$\lambda_{iln}^{tm}= (v_{i\,ln\,0}^{tm}+\sum_f vf_{i\,ln\,f}^{tm}+\sum_k vk_{i\,ln\,k}^{tm})/\max_m (v_{i\,ln\,0}^{tm}+\sum_f vf_{i\,ln\,f}^{tm}+\sum_k vk_{i\,ln\,k}^{tm})$;

d_{rm}^{t2} — volume characteristic of r-th indicator of partial criterium of HC evaluation by sitemetric methods в m-th High School at moment t, $r \in R$;

q_{rm}^{t2} — volume characteristic of r-th criterium of partial criterium of HC evaluation by sitemetric methods в m-th High School at moment t;

ω_r^2 — weight coefficient of r-th indicator of partial criterium of HC evaluation by sitemetric methods;

$q_{rm}^{t2} = d_{rm}^{t2}/\max_m d_{rm}^{t2}$;

d_{sm}^{t3} — volume characteristic of s-th indicator of partial criterium of HC evaluation by the conditions of ETP in m-th High School in moment t;

ω_s^3 — weigh coefficient s-th indicator of partial criterium of HC evaluation by the conditions of ETP;

d_{gm}^{t4} — volume characteristic of g-th indicator of partial criterium of HC evaluation by the conditions of EBT in m-th High School in moment t;

ω_g^4 — weigh coefficient of g-th indicator of partial criterium of HC evaluation by the conditions of EBT, $g \in G$;

d_{hm}^{t5} — volume characteristic of h-th indicator of partial criterium of HC evaluation by the conditions of VIOR in m-th High School in moment t, $k \in K$;

q_{hm}^{t5} — volume characteristic of h-th indicator of partial criterium of HC evaluation by the conditions of VIOR in m-th High School in moment t;

ω_{hm}^5 — weigh coefficient h-th indicator of partial criterium of HC evaluation by the conditions of VIOR in m-th High School, $k \in K$;

$$q_{hm}^{t5} = d_{hm}^{t5} / \max_m d_{hm}^{t5};$$

So, we obtain: $P^{tm} = \sum_j \beta_j \cdot P_j^{tm}$, where $P_1^{tm} = \sum_{i,l,n}^{\sum} \lambda_{iln}^{tm_i^{1^{2^3}}\, l\, n}$,$P_2^{tm} = \sum_k \omega_k^2 q_{km}^{t2}$,

$P_3^{tm} = \sum_s \omega_s^3 d_{gm}^{t3}$, $P_4^{tm} = \sum_g \omega_g^4 d_{gm}^{t4}$, $P_5^{tm} = \sum_h \omega_h^5 q_{hm}^{t5}$.

The weight coefficients of the characteristics of the criterion for assessing human capital according to the types of VIOR presentation should be determined on the basis of a large set of various means mentioned above: expert assessment; analysis of the verbal opinions of experts in the field of education quality assessment, reflected in the relevant articles. Methods for calculating assessments of the activities of educational institutions on the basis of their rating, with the exception of a questionnaire of teachers, failed. However, we will try to find these weight coefficients using several other methods.

2.1.1 Method of obtaining weights characteristics based on functional analysis

Let it be:

m – High school number, $m \in M$;

h – number of a characteristic indicator of HC estimation by the VIOR representation forms, $h \in H$;

r_{0m} – HC estimation by the PINOR representation of m-th High School,$r_{0m} \in R_0$;

r_{mh} – characteristic estimation of h-th VIOR of m-th High School;

s_h – correlation coefficient between r_{0m} and r_{mh};

$\overline{s}_h = s_h / \sum s_h$ – normed correlation coefficient between r_{0m} and r_{mh};.

In this case the variable ω_{hm}^5, defining the weight of h-th characteristic VIOR indicator of m-th High School, is equal to $\overline{s}_h$.

2.1.2 Method of obtaining weights of VIOR characteristic indicator according to the Kendall concordation coefficient

Let it be:

m – High school number, $m \in M$;

h – number of a characteristic indicator of HC estimation by the VIOR representation forms, $h \in H$;

r_{0m} – HC estimation by the PINOR representation of m-th High School,$r_{0m} \in R_0$;

r_{mh} – characteristic estimation of h-th VIOR of m-th High School;

k_h – Kendall concordation coefficient for r_{0m} and r_{mh};

$\overline{k}_h = k_h / \sum k_h$– normed concordation coefficient.

In this case the numberω_{hm}^5, defining the weight of h-th VIOR characteristic number of m-th High School, is named $\overline{k}_h$.

2.1.3 Method for determining the weights of the characteristic indicator of VIOR based on a probabilistic estimation model

To apply this method, we will follow the works [8, 9].

When using this method, it is assumed that there are some "true" estimates of the studied indicators, and expert estimates randomly deviate from the "true" estimates, while these deviations are a realization of a random variable with a mathematical expectation equal to the "true" estimate.

It is also assumed that these random variables are distributed in accordance with the normal law. In this case, the probability that the given random variable is not higher than x equals $F(x) = \Phi(\frac{x - x_i}{\sigma_i})$, where xi – expected value of the i-th indicator, σ_i^2 – dispersion of i-th indicator, and $\Phi(u) = \frac{1}{\sqrt{2\pi}}\int_{-\infty}^{u} e^{-\frac{z^2}{2}}\, dz$ is a function of normal distribution with expected value 0 and dispersion equal to 1.

In this method we will consider $\sigma_1 = \sigma_2 = \ldots = \sigma_N = \sigma$.

In this case, the probability that expert will estimate i more than j, is $\Phi(\frac{x_i\text{-}x_j}{\sigma})$.

Then, if cij are given and reflect that i is better than j, we have the system of equations for finding all xi estimations:

$$c_{ij} = \Phi(\frac{x_i\text{-}x_j}{\sigma}) \qquad (1)$$

If we denote as dij those sole values, which give $c_{ij} = \Phi(d_{ij})$, then, due to monotonicity of Φ(), we will get the system of equations $x_i - x_j = \sigma d_{ij}$.

Considering $\sigma = 1$, and adding all dij by j and dividing by total N, we can conclude, that $\frac{1}{N}\sum_{j=1}^{N} d_{ij}$ defines «true» values xi, but the expert estimations will be defined as $\Phi(\frac{1}{N}\sum_{j=1}^{N} d_{ij})$.

Let it be:

m – High school number, $m \in M$;

h – number of a characteristic indicator of HC estimation by the VIOR representation forms, $h \in H$;

r_{0m} – HC estimation by the PINOR representation of m-th High School, $r_{0m} \in R_0$;

r_{mh} – characteristic number of h-th VIOR m-th High School;

${r_{mij}}^{+}$– number of characteristics of vector {r1i,r2i,…,rMi}, which values becomes bigger than corresponding characteristics of vector {r1j,r2j,…,rMj};

${r_{mij}}^{-}$– number of characteristics of vector {r1i,r2i,…,rMi}, which values are lesser than corresponding characteristics of vector {r1j,r2j,…,rMj};

${r_{mij}}^{=}$– number of characteristics of vector {r1i,r2i,…,rMi}, which are equal to {r1j,r2j,…,rMj}.

The estimations of cij, that give the probability, that i better than j are $({r_{mij}}^{+} + 0{,}5 \cdot r_{mj}^{=})/M$ for cij and for cji.

2.1.4 Method for determining the weights of the characteristic indicator of VIOR based on the competence matrix estimation

Let it be:

m – High school number,$m \in M$;

h – number of a characteristic indicator of HC estimation by the VIOR representation forms, $h \in H$;

r_{mh} – characteristic estimation of h-th VIOR of m-th High School;

In this case for a given matrix R={rmh} (size M*H) those vectors are computed iteratively:

$$r^t = \frac{1}{\lambda^t} R \cdot R' r^{t-1},\ q^t = \frac{1}{\lambda^t} R' \cdot R q^{t-1} \qquad (2)$$

where the dash symbol indicates the transposed matrix to the matrix R, expressed by the matrix elements.

Under the condition of "indecomposability" of the matrix R, the condition of which is satisfied in our case, the iterations converge rather quickly to some limit vectors and, where q is the eigenvector of the maximum eigenvalue of the matrix.

In this case, equality is fulfilled, which leads to group estimates of r assessment indicators equal to the individual estimates of experts R on the basis of weighing them with the calculated competency coefficients q.

In this case, the value that determines the weight of the h-th characteristic indicator of the VIOR of the m-th educational institution is taken equal to the h-th indicator of the found limit vector.

Now it is already possible to renormalize the column vectors Rj, each of which defines a group of expert evaluations j of the evaluation indicators of the matrix R, as a result of which the zero value of the expert scale will move to the point of the arithmetic mean, and the variance after dividing the arithmetic mean by the standard deviation of this vector will be equal to 1. With such an operation, the product will be the matrix of the correlation coefficients of the vectors Rj, and the maximum eigenvalue turns into the variance of the principal factor q.

The presented method reflects one of the approaches of the theory of quantitative factor analysis.

3 Results of calculations by methods of mathematical statistics of weights of characteristics of criteria for assessing human capital

On the basis of the presented four methods of mathematical statistics and expert (based on the opinions of university teachers) determination of the weights of the characteristics of the private criterion for assessing human capital by types of presentation of VIOR, general assessments of the HC of universities were obtained, as well as general ratings of agricultural universities (Table 1), the results of which showed high consistency of all ratings, giving a wide scope for further use of any of the considered methods, depending on the availability of information, as well as combinations of them, for example, average ratings and ratings. Due to the further use of the method of calculating Kendall's concordance coefficient to establish a relationship between the ratings of universities with regional ratings, we will use this method, respectively, the data from the column obtained by this method (Table 1). In tab. 1 the structure of the information is presented as (overall rating / rating).

Table 1. General estimations of HC and High School ratings.

High school	Correlation	Concordation coefficient	Probabilistic model	Competence Matrix.	Expert estimations	Total Rating
Kuban State Agrarian University	42.10/1	36.89/1	37.12/1	37.22/1	44.76/1	1
Orel State Agrarian University	39.41/2	34.41/2	34.24/2	34.22/2	33.22/2	2
Krasnoyarsk State Agrarian University	31.31/4	31.42/3	31.22/3	31.44/3	29.48/3	3
RSAU-Moscow Agricultural Academy	37.62/3	28.31/4	28.31/4	28.29/4	28.34/4	4
Kemerovo State Agrarian University	28.84/5	26.81/5	26.89/5	26.87/5	27.46/5	5
Belgorod State Agrarian University	28.79/6	26.69/6	26.77/6	26.64/6	23.24/6	6
Kazan State Agrarian University	26.69/9	26.32/7	26.22/7	26.23/7	22.23/7	7

High school	Correlation	Concordation coefficient	Probabilistic model	Competence Matrix.	Expert estimations	Total Rating
Novosibirsk State Agrarian University	28.11/7	25.91/8	26.12/8	25.89/8	21.89/8	8
Saratov State Agrarian University	27.59/8	25.61/9	25.69/9	25.58/9	21,69/9	9
Volgograd State Agrarian University	25.71/10	24.89/10	25.21/10	24.89/10	21,01/10	10
Vyatka State Agrarian University	25.31/11	24.41/11	24.29/11	24.53/11	20.25/11	11
Vologda State Milk Industry Academy	24.71/13	23.79/12	23.79/12	23.87/12	19.33/12	12
Bryansk State Agrarian University	23.29/14	22.61/13	22.66/13	22.69/13	18.89/13	13
Velikie Luki State Agricultural Academy	22.41/15	22.41/14	22.39/14	22.49/14	18.34/14	14
Michurinsky State Agrarian University	25.11/12	22.21/15	22.21/15	22.42/15	17.89/15	15
Penza State Agricultural Academy	21,81/17	21.91/16	21.89/16	22.11/16	17.69/16	16
Buryat State Agricultural Academy	21.22/18	21.81/17	21.79/17	21.89/17	17.48/17	17
Perm State Agricultural Academy	21.81/16	21.41/18	21.65/18	21.72/18	17.31/18	18
Bashkir State Agrarian University	20.32/24	21.21/19	21.22/19	21.33/19	16.78/19	19
Saint Petersburg State Agrarian University	19.91/25	21.11/20	21.20/20	21.19/20	16.45/20	20
Kursk State Agricultural Academy	20.78/20	21.09/21	21.00/21	21.14/21	15.89/21	21
Nizhny Novgorod State Agricultural Academy	20.83/22	20.89/22	20.95/22	21.01/22	15.11/22	22
Chuvash State Agricultural Academy	20.81/21	20.79/23	20.90/23	20.79/23	15.49/23	23
Omsk State Agrarian University	21.11/19	20.59/24	20.55/24	20.42/24	15.29/24	24
Stavropol State Agrarian University	17.62/35	20.32/25	20.23/25	20.33/25	14.58/25	25
Altai State Agrarian University	20.42/23	19.69/26	19.79/26	19.89/26	14.43/26	26
Donskoy State Agrarian University	18.31/30	19.49/27	19.59/27	19.56/27	14.22/27	27
Moscow Veterinary and Biotech Academy	19.11/29	19.21/28	19.32/28	19.22/28	14.21/28	28
Irkutsk State Agrarian University	19.23/28	18.81/29	18.43/29	18.78/29	14.11/29	29
Kurgan State Agricultural Academy	19.28/27	18.80/30	18.79/30	18.77/30	13.79/30	30
Ulyanovsk State Agricultural Academy	15.79/38	17.89/31	18.27/31	18.11/31	13.58/31	31
Orenburg State Agrarian University	19.44/26	17.79/32	17.89/32	17.88/32	13.47/32	32
Samara State Agricultural Academy	17.62/34	17.61/33	17.79/33	17.69/33	13.34/33	33
Yaroslavl State Agricultural Academy	17.73/33	17.49/34	17.46/34	17.49/34	12.89/34	34

High school	Correlation	Concordation coefficient	Probabilistic model	Competence Matrix.	Expert estimations	Total Rating
Primorskaya State Agricultural Academy	17.89/31	17.41/35	17.29/35	17.39/35	12.76/35	35
Far East State Agrarian University	16.21/37	17.21/36	17.15/36	17.29/36	12.56/36	36
State University of Land Use	15.59/40	17.12/37	17.09/37	17.23/37	12.43/37	37
Ryazan State Agrotechnological University	17.77/32	16.99/38	17.05/38	17.21/38	12.31/38	38
Yakutsk State Agricultural Academy	16.11/36	16.89/39	17.03/39	16.89/40	12.03/39	39
Ural State Agrarian University	15.61/41	16.81/40	16.69/41	17.09/39	11.89/40	40
Ivanovo State Agricultural Academy	15.51/42	16.59/41	16.79/40	16.67/41	11.76/41	41
Kostroma State Agricultural Academy	15.71/39	16.21/42	16.43/42	16.32/42	11.34/42	42
Voronezh State Agrarian University	15.09/44	15.79/43	16.22/43	16.21/43	11.29/43	43
South Ural State Agrarian University	15.31/43	15.69/44	16.11/44	15.56/44	11.19/44	44
Izhevsk State Agricultural Academy	14.99/45	14.88/45	15.78/45	15.45/45	11.05/45	45
State Agrarian University Northern Trans-Urals	14.69/46	14.87/46	15.24/46	14.79/46	10.79/46	46
St. Petersburg State Academy of Veterinary Medicine	10.79/50	14.77/47	14.89/47	14.69/47	9.79/47	47
Russian State Agrarian Correspondence University	12.61/48	14.33/48	14.54/48	14.57/48	9.45/48	48
Kazan State Academy of Veterinary Medicine	13.81/47	14.19/49	14.52/49	14.43/49	9.39/49	49
Kabardino-Balkarian State Agrarian University	11.51/49	12.08/50	12.39/50	12.39/50	9.32/50	50
Gorsky State Agrarian University	8.21/52	11.78/51	11.89/51	11.77/51	8.78/51	51
Smolensk State Agricultural Academy	8.41/51	10.87/52	11.34/52	10.69/52	7.65/52	52
Tver State Agricultural Academy	7.41/53	9.26/53	9.43/53	9.76/53	5.89/53	53
Dagestan State Agrarian University	5.59/54	5.59/54	5.34/54	5.45/54	4.45/54	54

4 Conclusion

Research of the content of the websites of universities showed a very low completeness of filling the websites with information. So, the sites have only about 55.4% of all the necessary data. And the completeness of scientific information is only 18.3%, which once again shows the underestimation of the scientific activities of educational institutions by the state. As a result, the overall assessments (tab. 11) of the human capital of no one, even the best university, do not reach the level of 40%. For example, the Kuban State Agrarian Universtiy has an overall rating of 39.09%.

Table 2. General estimates (in%) of HC on the efficiency of using regional INOR and ratings of agricultural universities.

High School	Grade	Rating	High School	Grade	Rating
Kuban State Agrarian University	39.09	1	Buryat State Agricultural Academy	22.48	28
Oryol State Agrarian University	38.31	2	Altai State Agrarian University	22.19	29
RSAU-Moscow Agricultural Academy	32.49	3	Ivanovo State Agricultural Academy	21.29	30
Krasnoyarsk State Agrarian University	30.79	4	Kursk State Agricultural Academy	21.21	31
Novosibirsk State Agrarian University	30.55	5	Kurgan State Agricultural Academy	21.11	32
Kemerovo State Agrarian University	30.26	6	State University of Land Use	20.79	33
Bryansk State Agrarian University	29.37	7	Izhevsk State Agricultural Academy	20.66	34
Belgorod State Agrarian University	29.23	8	Primorskaya State Agricultural Academy	20.28	35
Kazan State Agrarian University	28.31	9	Samara State Agricultural Academy	19.69	36
Saratov State Agrarian University	27.51	10	Orenburg State Agrarian University	19.59	37
Moscow Veterinary and Biotech Academy	26.39	11	Yaroslavl State Agricultural Academy	19.49	38
Penza State Agricultural Academy	26.28	12	Voronezh State Agrarian University	19.12	39
Volgograd State Agrarian University	26.21	13	Ryazan State Agrotechnological University	19.11	40
Bashkir State Agrarian University	25.57	14	Far Eastern State Agrarian University	18.89	41
St. Petersburg State Agrarian University	25.22	15	Irkutsk State Agrarian University	18.79	42
Vyatka State Agrarian University	24.59	16	Kazan State Academy of Veterinary Medicine	18.69	43
Omsk State Agrarian University	24.49	17	St. Petersburg State Academy of Veterinary Medicine	18.49	44
Vologda State Milk Industry Academy	24.42	18	South Ural GAU	18.38	45
Don State Agrarian University	24.31	19	Kabardino-Balkarian State Agrarian University	17.55	46
Michurinsky State Agrarian University	24.19	20	Yakutsk State Agricultural Academy	17.19	47
Stavropol State Agrarian University	24.12	21	Kostroma State Agricultural Academy	16.67	48
Ural State Agrarian University	23.79	22	State Agrarian University of the Northern Trans-Urals	16.59	49
Velikie Luki State Agricultural Academy	23.69	23	Gorsky State Agrarian University	15.89	50
Nizhny Novgorod State Agricultural Academy	23.49	24	Russian State Agrarian Correspondence University	15.52	51
Chuvash State Agricultural Academy	23.31	25	Smolensk State Agricultural Academy	15.41	52
Ulyanovsk State Agricultural Academy	23.21	26	Dagestan State Agrarian University	12.43	53
Perm State Agricultural Academy	22.79	27	Tver State Agricultural Academy	5.78	54

Ignoring the possibilities of the formation of EIIPNOR by the state has led to the fact that universities do not particularly care about filling sites with scientific and educational resources, following only the instructions of the Ministry of Education and Science of the Russian Federation and Rosobrnadzor. The presentation of these resources on the sites is supported only by the enthusiasm of individual performers. Even if some individual types of INOR are present on the websites, the absence of a DBMS in the development environment leads to the fact that the number of INOR types at the university level does not coincide, and significantly, with the number at the faculty and department levels. Based on the requirements of the Ministry of Education and Science and Rosobrnadzor, the management of universities believes that the main audience of their websites are employees of supervisory agencies, applicants and students, while completely ignoring the needs of commodity producers, scientists, management of companies and the population.

To demonstrate the low information content (quality) of INOR in tab. 2 and tab. 3 presents the relevant information at the university level.

Table 3. Quality and quantity of INOR on High School sites.

Types of % of sites with the INOR	% of sites with the INOR	Unordered list	Digital catalogue	Unordered full-size view	Streamlined full-length electronic presentation
Development	85	3684	391	337	248
Publications	89	18649	408	344	0
Database	11	530	45	0	0
Software	2	828	2	25	0
Distance learning	12	1195	0	0	3
Consultants	25	216	43	9	0
Regulatory information	55	65	0	328	19

This year marks the 100th anniversary of the outstanding Soviet scientist A.I. Kitov, who together with Academician V.M. Glushkov, back in the 60s of the last century, proposed to the leadership of the USSR a project of the National Automated System for the Collection and Processing of Information for Accounting, Planning and Management of the National Economy in the USSR (OGAS) [10]. OGAS was intended to carry out operational accounting and control over any object in the country, so that in the future it was possible to effectively plan and forecast the development of society, including human capital.

The rejection of this project led to the emergence of a huge number of heterogeneous and functionally incompatible information systems at most organizations in the country. The ongoing trend thus set will constrain the quality implementation of the Digital Economy Program and lead to a decrease in human capital.

The Common Information Internet Space of the country's digital interaction considered in the work is the implementation of the OGAS project in the digital economy. Why, then, the ideas of the OGAS do not find support from the country's leadership, although their implementation promises multiple efficiency in the implementation of the Digital Economy Program? Why, within the framework of this Program, the country continues to apply the methods and means of task-oriented design of information systems (IS), which developed in previous times and are more familiar to many leaders and specialists, following the words of W. Churchill “Generals always start a war with the old methods”?

The reason for this was once stated by Zh. Alferov: “The main problem of Russian science is its lack of demand by the economy and society”. Calculations according to the presented method for assessing human capital confirmed this conclusion, and in 2020. confirmed by the Accounts Chamber.

The proposed EIIPNOR digital platform, organically included in the Unified Internet Information Space of the country's digital interaction, will be a powerful tool for improving and increasing the quality of human capital, increasing the social welfare of society, and transferring the most effective innovative solutions to the economy.

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