

Human Resources Management Using a Factual Human Capital Assessment Model

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Abstract: The research describes the factual human capital assessment model, which allows for human resources management. The authors use general scientific methods of induction, deduction, synthesis, and analysis. The human capital assessment model is based on private scientific modeling and mathematical methods. The research object is the carrier of human capital. The methodological basis of the research is the theories described in the framework of human capital, labor economics, and personality management. The information base of this research includes the results of a questionnaire, testing, and a survey of human capital carriers conducted by the authors in early 2023, as well as statistical data and research by scientists from Russia, China, Pakistan, Japan, and the USA. The neo-traditional (factual) model is opposed to the existing traditional (abstract) models of human capital assessment, which assess the bearer of human capital indirectly through statistical data and natural macroeconomic indicators. The authors establish that the neo-traditional (factual) model makes it possible to obtain data on the cost of human capital and visualize its structural components due to the decomposition of the model's components. They are presented in the form of factual sub-measurements describing certain physiological abilities, cognitive skills, and knowledge, as well as socio-psychological features of the behavior of the bearer of

human capital. According to the factual model, the cost of human capital in the Russian Federation averaged 15 million rubles.

Keywords: human resources, human capital, personality management, human capital assessment, abstract assessment model

JEL codes: C51, C81, J24, O10, O12, O15

The development of human society is at an economic, scientific, and cultural apogee. The subsequent qualitative development of society is increasingly closely linked with the ability to manage human resources, including through human capital.

Analyzing the data published by the World Bank, we can conclude that human capital plays a key role in economic development (World Bank, 2020, p. 106). In all developed economies, the share of human capital in the national wealth exceeds all other types of capital. For instance, the OECD countries have a 70% share of human capital in the structure of national wealth. In the structure of the national wealth of the Russian Federation, this indicator is also the most significant and is equal to 46% (Naikal et al., 2019, p. 10). Researchers from Russia note that a trend towards the unification of human capital and technology is now beginning to take shape. Such a trend is the most predictable within the framework of the sixth technological order (Glazyev et al., 2020). The symbiosis of human capital and technology further increases the impact of human capital on the economy; human resources management increasingly consists of the control of human capital.

Simultaneously, human capital and human resources assessment contain some controversial and unresolved issues.

Professor and Nobel Prize laureate J. Heckman notes that the minimum set of skills necessary to describe an empirically based human difference has not yet been found (Heckman et al., 2019, p. 4).

According to M. S. Mubarak, V. Chandran, and E. S. Devadason, “It is difficult to measure human capital. There are contradictory measurements of human capital in the literature” (Mubarik et al., 2018, p. 2).

Glazyev S. Yu, Academician of the Russian Academy of Sciences, and A. S. Voronov, L. S. Leontieva, and L. N. Orlova note that the issues of the formation, development, and use of human capital are considered fragmentary (Glazyev et al., 2020, p. 40).

Scientists around the world continue to seek an answer to these controversial questions. As part of this empirical study, a group of researchers from Russia will propose a new way to solve the old problems that have turned into scientific anomalies. The existing, prevailing paradigm in the field of human capital assessment is based on measurements that make it possible to assess human capital without the participation of a carrier of human capital (i.e., indirectly).

The authors call this paradigm and models traditional (abstract). When managing human resources based on traditional (abstract) models of human capital assessment, a multi-

component, unique structure of human capital hides from our view, and the ambivalence of the assessment increases.

According to the authors, the solution to the controversial issues can be found in popularizing and developing the paradigm of human capital assessment based on direct work with its bearer, conducted through individual questionnaires, testing, and surveys. The authors call this paradigm and models neotraditional (factual).

The analysis of theoretical and empirical studies and statistical data confirms the relevance of the chosen research topic.

The research aims to describe a neo-traditional (factual) human capital assessment model that makes it possible to manage human resources.

The research tasks include the following:

1. To define the content of the human capital assessment model;
2. To describe human resources management methods based on the neo-traditional (factual) human capital model.

Methods

The methodological basis of this research includes the work of foreign specialists in the field of human resources management (Boxall, 1992; Smirnov et al., 2005) and the definition of structure, specifics, and value of human capital using the following:

- Historical method (Dobrynin et al., 1999; Goldin, 2016; Mubarik et al., 2022; Shcherbakov, 2022),
- Traditional (abstract) models of human capital assessment (Kapelyushnikov, 2012; Skoblyakova et al., 2022; Voronov et al, 2022);
- Neo-traditional (factual) models (Shcherbakov, 2023a, 2023c);
- Calculation of the cognitive components of the human capital (Heckman et al., 2019; Heckman & Zhou, 2022; Piao & Managi, 2022);
- Calculation of the social component (Mubarik et al., 2018);
- Neural network (Zhao, 2022).

The research is also based on the works of Russian authors in the field of personality management, describing the physiological and socio-emotional dimensions of personality and ways of effective management (Shcherbakov et al., 2018; Shcherbakov, 2023b). The synthesis of theories of human capital, labor economics, and personality management contributed to the emergence of a factual evaluation model with which it is possible to manage human resources.

Within the framework of this empirical study, the following conceptual apparatus was defined to reduce semantic barriers: human resources represent the population of a country or region and its demographic characteristics (Smirnov et al., 2005, p. 127).

Human capital is a stock of health, personal knowledge, skills, abilities, and motivations accumulated and created by a person, which the bearer of human capital

competently applies in the labor process, increasing his or her productivity and salary (Dobrynin et al., 1999, p. 9).

The definition of the essence of human capital in the framework of the development of Russian and Western scientific thought is similar. This statement is confirmed by the position of G. Becker and K. Goldin, who define human capital as “the stock of knowledge, skills, and motivations available to each person” (Becker, 1993; Goldin, 2016, p. 1).

Within the framework of this research, human capital and human resources are directly dependent (Figure 1).

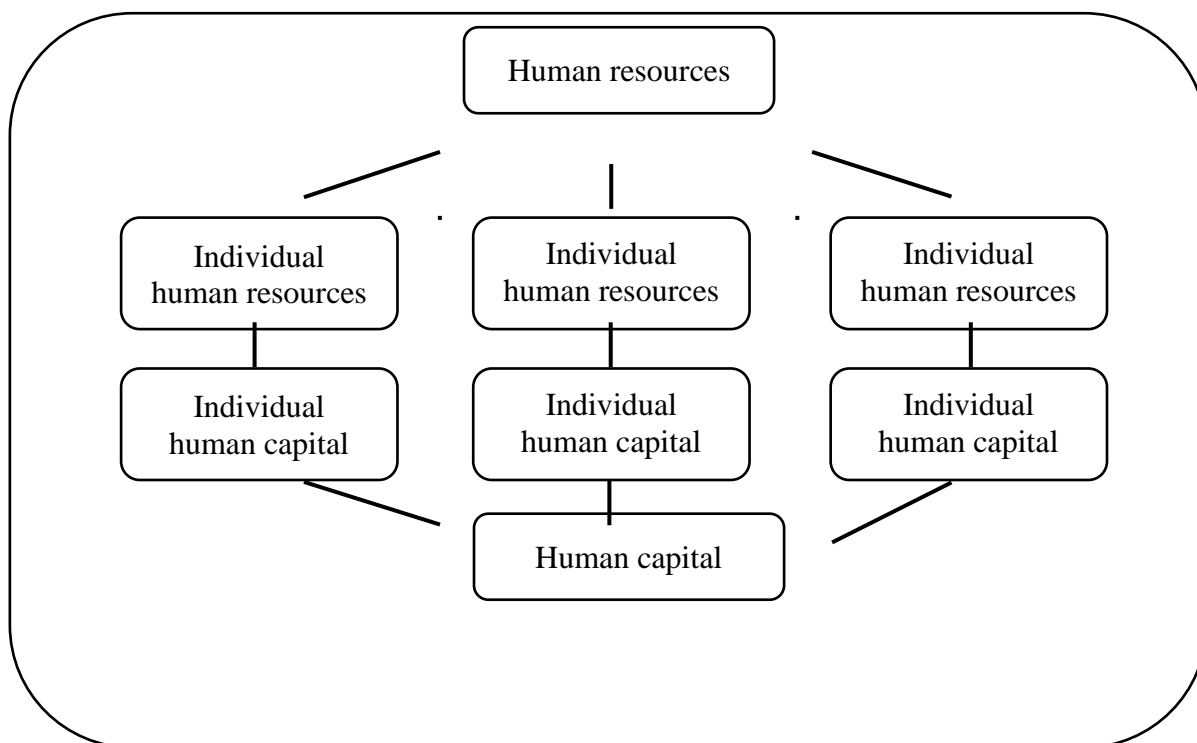


Figure 1

Human capital and human resources

Source: Developed by the authors

According to the authors, the scientific community pays great attention to human resources management and human capital assessment separately. In turn, the issues of human resources management through the use of a neo-traditional (factual) model of human capital assessment are insufficiently disclosed and represent a promising area of scientific knowledge. Therefore, the team of authors, within the framework of this applied research, popularizes the neo-traditional (factual) model of human capital assessment. This model was first proposed and developed by A. S. Shcherbakov; some elements of the model were previously published in his previous works (Shcherbakov, 2023a, 2023b, 2023c).

The research used a set of theoretical and private scientific methods, such as comparative analysis, synthesis, induction, deduction, modeling, and mathematical methods.

Results

Based on foreign and Russian research, when developing the model, the authors identified two types of human capital, which include three components.

The authors identify the following types of human capital:

1. Common human capital, which includes physiological abilities, cognitive (intellectual) knowledge and skills, and socio-emotional (non-cognitive) behavioral features obtained through general training and not alienated from a person.
2. Special human capital, which includes physiological abilities, cognitive (intellectual) knowledge and skills, socio-emotional (non-cognitive) behavioral features that cannot be fully used outside the organization.

According to the authors, human capital is a stock of health, personal knowledge, skills, abilities, and motivations accumulated and created by a person, which the bearer of human capital competently applies in the labor process, increasing his or her productivity and salary (Dobrynin et al., 1999, p. 9; Smirnov et al., 2005, p. 99).

Two types of human capital are dependent, which, according to the authors, is described by Formula (1):

$$H = \frac{H_C + H_S}{2}; H = H_C \rightarrow H_S = 0 \quad (1)$$

where:

H – human capital,

H_C – common human capital,

H_S – special human capital.

According to the authors, the components of each type of human capital are understood as follows:

- Physical skills are biological characteristics that define the characteristics of an individual. For example, body shape, height, weight, pulse rate, body mass index, health category according to the results of medical examination, and hand grip strength are assessed empirically or using a questionnaire;
- Cognitive skills are the brain's ability to assimilate and process information about the world around us. These include memory, attention, cognitive flexibility, imagination, speech, and the ability to logically reason and perceive information through the senses. Basically, these skills are determined by psychological tests. Indirectly, cognitive skills can be measured by the presence of education, its quality, state awards, and patents;
- Socio-emotional skills are skills that allow the bearer of human capital to recognize and manage their emotions and communicate effectively. Psychological and sociological tests and the method of expert assessments can determine these skills. Indirectly, social and emotional skills can be measured by the number of reprimands for disturbing the

order at work, the number of friends on social networks, and the number of corporate entertainment events attended.

The proposed neo-traditional (factual) model of human capital assessment develops the ideas of some authors (Glazyev et al., 2020; Heckman et al., 2019; Mubarik et al., 2018; Piao & Managi, 2022; Skoblyakova et al., 2022; Smirnov et al., 2005; Shcherbakov, 2023c; Voronov et al., 2022). The neo-traditional (factual) model is described by a formula calculating the common (Formula 2) and special capital (Formula 3) of the carrier of human capital:

$$H_C = MMCI_{ruble} \times Ph_C^N \times Ph_C^A \times Ph_C^{H \sim Ph} \times C_C^N \times C_C^A \times C_C^{H \sim C} \times SE_C^N \times SE_C^A \times SE_C^{H \sim SE} \times CI_C \quad (2)$$

where:

H_C – common human capital;

$MMCI_{ruble}$ – median per capita monetary income;

$Ph_C^N; \frac{A}{C}; \frac{H}{C}$ – physical skills (innate, acquired, or hybrid within common human capital);

$C_C^N; \frac{A}{C}; \frac{H}{C}$ – cognitive skills (innate, acquired, or hybrid within common human capital);

$SE_C^N; \frac{A}{C}; \frac{H}{C}$ – social and emotional skills (innate, acquired, or hybrid within common human capital);

CI_C – a common index within the framework of common human capital. It is expressed by a coefficient based on the country's human potential index and the amount of bonus indices for the presence of certain indicators significant for the individual and the country.

$$H_S = MASP_{ruble} \times Ph_S^N \times Ph_S^A \times Ph_S^{H \sim Ph} \times C_S^N \times C_S^A \times C_S^{H \sim C} \times SE_S^N \times SE_S^A \times SE_S^{H \sim SE} \times CI_S \quad (3)$$

where:

H_S – special human capital;

$MASP_{ruble}$ – monthly average salary per person calculated by the employer;

Ph_S^N – physical skills (innate, acquired, or mixed within the framework of special human capital);

C_S^N – cognitive skills (innate, acquired, or hybrid within common human capital);

SE_S^N – socio-emotional skills (innate, acquired, or hybrid within common human capital).

CI_S – a common index within the framework of special human capital. It is expressed by a coefficient based on the country's human potential index and the amount of bonus indices for the presence of certain indicators significant for the individual and the country.

The results of the human capital assessment obtained based on the neo-traditional (factual) model can be applied for the purposes of human resources management. Considering their direct dependence (Figure 1), an increase in the cost of human capital of

one employee or the arithmetic mean of the capitals of several employees will lead to an increase in the cost of human resources.

Simultaneously, human resources management based on the neo-traditional (factual) human capital assessment model can take place in two ways.

The first method of human resources management is based on the assessment of the common human capital (H_C) (Formula (2)). This method is used if a person has only the common human capital (H_C). This means that at the time of measurement, the carrier of human capital does not work in the organization or does not yet have work experience, and, accordingly, his or her special capital (H_S) cannot be measured.

The second method of human resources management is based on the assessment of the common human (H_C) and special capital (H_S) (Formula (2) and Formula (3)). At the time of measurement, the carrier of human capital works in an organization and has work experience. Accordingly, the cost of human capital will be defined as the arithmetic mean (μ) of common (H_C) and special human capital (H_S). The above methods are consistent with the relationship between types of capital identified earlier (Formula (1)).

Within the framework of this applied research, attention was paid to the first method.

To prepare data for human resources management based on the human capital assessment model, it is necessary to decompose the coefficients of formula (2) and add them to Table 1.

As part of our empirical study, the definition of common human capital (H_C) was based on 30 sub-measurements, of which 21 are economic (70%), 2 are social (6.6%), 3 are medical (10%), and 4 are psychological (13.3%).

The sub-measurements were carried out based on direct work with the carrier of human capital using the following:

1. Questionnaires (collecting data on the level of education, marital status, economic costs of treatment and bad habits, etc.);
2. Testing (physiological functional, psychological, and sociological);
3. The method of expert assessments (survey of the organization's head).

Table 1

Decomposition and visualization of the neo-traditional (factual) human capital assessment model to the level of sub-measurements

Measurement name	Sub-measurement group		Sub-measurement			
	Title	Maximum coefficient (method of calculating the factual coefficient)	Title	Factual coefficient	Diagram	Maximum coefficient

MMCI	–	–	–	35370*	–	–
Ph	Ph_C^N	2 (μ)	Ph_C^N 1	2		2
	Ph_C^A	2 (μ)	Ph_C^A 1	1.5		2
			Ph_C^A 2	1.5		2
	Ph_C^H	2 (μ)	Ph_C^H 1	1.5		2
C	C_C^N	2 (μ)	C_C^N 1	2		2
	C_C^A	2 (μ)	C_C^A 1	1.5		2
			C_C^A 2	1.5		2
			C_C^A 3	1		2
			C_C^A 4	2		2
			C_C^A 5	1		2
			C_C^A 6	1		2
			C_C^A 7	1		2
			C_C^A 8	1.5		2
	C_C^H	2 (μ)	C_C^H 1	2		2
			C_C^H 2	1		2
			C_C^H 3	1.5		2
	SE	SE_C^N	2 (μ)	SE_C^N 1	2	
SE_C^A		2 (μ)	SE_C^A 1	1.5		2
			SE_C^A 2	2		2
			SE_C^A 3	2		2
SE_C^H	2 (μ)	SE_C^H 1	2		2	
CI	CI_C (μ)	5,8 (Σ)	CI_C 1	0.822	Results	1
			CI_C 2	0.5	The cost of common human capital according to the calculations according to the formula (2): (H_C) = $35370_{ruble}^* \times 442,7^{**} = 15\ 659\ 479,1_{ruble}$	1
			CI_C 3	0.5		0.7
			CI_C 4	0.2		0.7
			CI_C 5	0.5		0.7
			CI_C 6	0.5		0.5
			CI_C 7	0.3		0.8
			CI_C 8	0.1		0.4

Note * according to the data of the Federal State Statistics Service of the Russian Federation (Rosstat); ** – according to the survey data of one of the respondents received by the authors. Source Compiled by the authors according to Formula (2) using data from Rosstat (2023) and the survey data of one of the respondents received by the authors.

Based on the analysis of the “diagram” column shown in Table 1, the authors conclude about the least developed areas of the carrier of human capital, such as C_C^A 3, C_C^A 5, C_C^A 6, C_C^A 7, and C_C^H 2. To increase the value of human capital, it is necessary to designate the identified sub-dimensions as growth zones for the carrier of human capital. Simultaneously, it is necessary to keep the remaining sub-measurements from falling. Such a strategy will ensure the growth of the organization’s human resources.

Discussion

The authors are ready to provide data to facilitate the neo-traditional (factual) assessment of human capital in other countries. Moreover, the authors are ready to take part in research on the correlation comparison of assessment results between different countries obtained using the factual human capital assessment model.

It is important to note that if all the assessed characteristics of human resources bring profit, then such a model is called the human capital assessment model. If it is impossible to prove the dependence of the estimated characteristics and their impact on income generation, then such a model will be called the human resources assessment model.

Conclusion

The goals and objectives set out in the introduction of this research were achieved. The neo-traditional (factual) model of human capital assessment was presented in the form of Formulas (1; 2; 3); an example of human resources management was presented based on the method of decomposition of the evaluation results (Table 1). The obtained research results can be used by business entities at any level for the purposes of human capital assessment and human resources management of the organization. Simultaneously, the factual model can be used as a skeleton for mathematical calculations. The filling of the model in the form of the content of sub-measurements can be adjusted directly to the needs of the assessment independently by the person conducting the factual assessment of human capital.

The factual human capital assessment model proposed in the framework of this research demonstrates the average cost of human capital equal to 15000000 rubles. These results correlate with the global practice of valuing human capital. According to R. I. Kapelyushnikov, the Corresponding member of the Russian Academy of Sciences, the cost of human capital per person was 6000000 in 2010, which will amount to 14000000 rubles in 2022 given inflation (Kapelyushnikov, 2012, p. 60).

The conducted research contributes to the development of assessment models and contributes to a more accurate assessment of human capital. Empirical research develops the paradigm of data-based management and promotes the development of the humanistic direction of economic science and meritocratic principles of society functioning.

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