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Methodology and Practical Test of Human Capital Assessment of Ukrainian Oil and Gas Enterprises in the Context of Sustainable Development

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Abstract: This paper proposes and tests a methodology for evaluating the human capital of oil and gas industry enterprises. The methodology is based on previously developed mathematical and test tools, with enhancements to support decision-making in human capital development. The proposed methodology facilitates a comprehensive mathematical analysis of assessment results and provides analytical and graphical justifications for the approaches, methods, and models used in shaping personal development trajectories. These trajectories are tailored to the needs of individuals as bearers of human capital and consider its role in achieving sustainable development goals. Given the purpose of this study—to analyze the state and development opportunities of human capital in oil and gas enterprises using the authors' assessment methodology—the presented approach aims to provide a comprehensive framework for evaluating and enhancing human capital in this key sector. This study includes a survey of employees of three groups of enterprises: NAFTOGAZ Group (Kyiv, Ukraine), Ukrainian private oil and gas companies, and enterprises of other sectors of Ukraine's economy. A comparative analysis carried out via mathematical tools enabled a detailed evaluation of the collected data. The study conclusions highlight within-group and intergroup comparative characteristics of respondents based on calculated values and deviations in their intellectual attributes. These findings allow us to formulate a set of recommendations regarding the appropriateness of corrective actions and also validate the reliability and objectivity of the proposed human capital assessment methodology. This methodology may potentially help in strategic decision-making in the development of the gas and oil industry and allows for planning the changes in human capital necessary to ensure sustainable development.

Keywords: human capital; intelligence; evaluation methodology; development; oil and gas companies; sustainable development

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1. Introduction

Regardless of the form of ownership and type of activity, business operating conditions are characterized by the need to solve many tasks related to adapting to changes in the

external environment and building sustainable competitive advantages through internal organizational factors. Considering the predominant role of the intellectual components in the modern economy and the definition of intelligence as a person's ability to learn and use knowledge to achieve goals, one of the primary objectives for economic entities should be the provision of human capital [1], whose knowledge, skills, and personal characteristics will meet the needs of intellectualized economic activity [2,3]. Two main strategies may address this challenge: the recruitment, selection, and acquisition of required human capital representatives from the labor market [4], or internal development of the desired human capital quality [5] by creating conducive conditions for growth. In both cases, preliminary identification of the state of human capital is necessary for further decision-making about the involvement and construction of appropriate development trajectories [6,7]. These trajectories should focus on addressing gaps and enhancing intellectual capabilities identified during the evaluation process [5,8].

For this purpose, it is necessary to improve the methodology for evaluating human capital, which would involve developing an intelligence-oriented approach. Considering the strategic importance of developing human capital in industries critical to socio-economic stability [9], it is advisable to test the proposed theoretical and methodological framework by involving personnel from enterprises in these key sectors in the evaluation process.

The economic category "human capital" has been and continues to be widely used in the scientific literature [4–11]. Scientists' attention is typically focused on enhancing theoretical approaches and developing practical recommendations for effective utilization of human capital, with the aim of improving the efficiency of business entities across various sectors and areas of economic activity [9,10,12–14]. A significant area of focus in scientific research is the evaluation of human capital. The primary goal of such evaluations is to establish its quantitative and qualitative characteristics [15–21]: on the one hand, to identify the extent of its participation in the processes of economic activity, and on the other hand, to determine reserves and directions of economic growth [22–26]. It is also worth noting that recovery (through restructuring or self-restructuring) of those enterprises in crisis is often impossible without improving human capital management processes [27]. An analysis of scientific and practical publications addressing human capital assessment reveals a predominant emphasis on objective indicators [28–30]. These indicators typically reflect the costs associated with the formation and maintenance of human capital or evaluate the income (both current and future) that individuals derive from it [6,8,11,29]. Studies on the assessment of human capital at the national level occupy a prominent place in the scientific literature. These studies are typically focused on developing and refining methods to identify factors influencing human capital, its developmental pathways, and its role in shaping the competitiveness of a nation [30–36]. For instance, [37,38] analyzed the macroeconomic aspects of human capital, utilizing integral indicators, while other researchers [39] investigated the impact of cooperation between companies in various areas, particularly in research and development, on changes in the level of human capital. While evaluating and analyzing human capital at the global and national levels is crucial for shaping state policies, it is important to recognize the need for tailored approaches at the level of individual business entities. Implementing these methodologies in organizational contexts requires improved evaluation techniques. These methods should generate actionable insights, guiding decisions on human capital management and offering recommendations on mechanisms, models, and approaches for designing individual development trajectories for company personnel.

The outlined issues are most relevant for strategic subjects of the national economy, such as the domestic oil and gas industry. The results of the work of oil and gas enterprises significantly affect the economic and energy security of the state, and the human capital

concentrated in the enterprises of the industry is a powerful potential for its effective development, the assessment of whose condition should become an effective tool in making management decisions [40,41]. Many scientists have devoted their research to the problems of human capital management of oil and gas enterprises [42–47], but the issues of methodology development and direct comprehensive assessment of human capital of oil and gas enterprises remain relevant.

An in-depth analysis of the above-mentioned scientific sources, which are related to the study of human capital of enterprises and organizations, demonstrates the interest of the authors both in the theoretical concepts of the formation and development of human capital and in the applied aspects of its use for obtaining economically efficient results of economic activity. In particular, Marvel et al. developed a typology of human capital [2], which can be considered one of the approaches to its assessment based on the analysis of people's behavior.

Questions related to the assessment of the value of human capital and its reflection in the reporting of enterprises, the assessment of knowledge and its impact on business, the value of the resource of human capital, and the identification of qualitative parameters of the effectiveness of human capital are presented by the authors and groups of authors in works [3,13,18,19,24]. Scientists Ahn and Chang [13] concluded that knowledge and its evaluation are important for business development because they create opportunities for evaluating human capital, its motivation, and further development. A separate block of human capital research is related to its participation in the creation of intangible assets and intellectual products. In particular, Patrick, in his publication [9], focused on the issues of transformation of intangible assets into a competitive advantage and emphasized the necessity and mechanisms of transformation of corporate knowledge, know-how, and intellectual property into corporate value. Kianto et al. [14], using empirical studies, proved the key role of human capital in the indirect effect of intellectual capital on innovation efficiency.

Addressing issues of human resource management, some researchers have emphasized the need to expand management functions by incorporating insights from human capital analysis, particularly regarding available competencies. For example, Albrecht et al. [12] advocated for the integration of procedures such as socialization, performance management, training, and development into human resource management policies and practices. Bohlouli et al. [16] claimed that effective human resource management requires precise assessment and documentation of existing competencies, as well as an evaluation of competency gaps. Similarly, Clardy [17] underscored the importance of competency research and highlighted the need for practical tools to address these challenges. The author suggested using surveys to study competencies while noting the lack of standardized approaches. Rodriguez et al. [25] emphasized the utility of the competency approach across various aspects of human resource management. They argued that analyzing competencies enables more targeted recruitment, development, performance management, and strategic planning. Additionally, Heravi et al. [34] examined organizational, professional, behavioral, and empowerment factors influencing human resource development in state-owned enterprises. The study provides recommendations for managerial strategies to effectively influence these processes. Based on expert interviews in the field of human resource planning, supported by content analysis, descriptive research techniques, and the correlation method, the researchers concluded that the empowerment factor has the most significant impact on human resource development [34].

Most of the scientific research in the field of human capital aims to enhance the efficiency of individual businesses [2,3,7,10,15], economic sectors [33–35,40,41,43–48], and the national economy as a whole [5,6,23,24,30,42]. Highlighting the oil and gas industry as a strategic sector of the national economy, the authors of [46] claimed that adopting

advanced personnel training technologies and real-time monitoring can help identify potential risks. Moreover, the implementation of innovative human resource management strategies is essential for organizations in this sector. Addressing the global issue of carbon emissions, the authors of [47] demonstrated, through empirical studies, a negative correlation between investments in human capital and carbon emissions. Their findings suggest that investments in human capital can reduce emissions by enhancing cognitive capabilities. Issues and solutions for improving human capital management evaluation at the national level were explored in a joint Ukrainian-Polish study [29], where the authors proposed a methodology incorporating subjective assessments of satisfaction with quality-of-life factors. The practical relevance of their proposals lies in their potential application in developing strategic documents for managing human resource development.

Evaluating the studies above and other scientific works referenced in this study, we conclude that researchers have addressed a broad spectrum of issues related to human capital, including its assessment and the management of its formation, utilization, and development processes. However, despite the diversity of theoretical frameworks and practical recommendations, insufficient attention is currently given to assessing human capital as an intelligence carrier. There is a notable lack of methodologies capable of evaluating personal intellectual characteristics (abilities) to guide decisions on adjusting individual development trajectories. In this context, the primary goal of this study is to develop a methodology for assessing human capital as an intelligence carrier, alongside its practical application, taking into account the peculiarities of the domestic oil and gas industry. This will allow for an objective analysis of the intellectual characteristics of employees and the formation of individual trajectories of their development. The use of an improved methodology will contribute to increasing the efficiency of human capital management in a strategically important sector of the economy, as well as provide analytical and graphical justification for the necessary corrective actions to optimize the human resource potential of enterprises.

2. Materials and Methods

The first stage of studying the state and possibilities of planning the development of human capital (HC) of oil and gas enterprises was carried out by Malynovska et al. [48]. This study represents the second, more in-depth and larger-scale evaluation stage using the tools proposed by Malynovska et al. The key differences from the previous stages are outlined below:

1. The size of the sample was significantly increased (by 4.5 times; 90 people were interviewed);
2. A different approach was applied in the formation of the respondents' sample, which involved dividing them into three groups (employees of state-owned enterprises that are part of the NAFTOGAS Group, oil and gas enterprises of the private sector, and enterprises of other sectors of the economy);
3. The mathematical toolkit for the analysis of the obtained results has been expanded, which makes it possible to formulate more conclusions and recommendations for improving the management of human capital development processes.

Investigating scientific approaches to the assessment of collective and individual HC of an enterprise, we agree with the position of Horovy [49] and Kis et al. [50], that an individual's HC is a function of his individual intelligence (II):

$$HC = F(II) \quad (1)$$

In the work (Kis et al., 2019 [50]), it was established that a person's II is determined by creative CrA (), social (ScA), and status (StA) abilities, i.e.,

$$II = u(CrA, ScA, StA) \tag{2}$$

where u is an unknown function of three variables that increases as each of them increases.

In the work [48] based on [50], a number of assumptions were formulated that we will use for this study, in particular $CrA \in [0; max_{CrA}]$, where max_{CrA} is the largest possible value of the creative ability of an individual; $ScA \in [0; max_{ScA}]$, where max_{ScA} is the largest possible value of the social ability of an individual; and $StA \in [0; max_{StA}]$, where max_{StA} is the largest possible value of the status ability of an individual.

It is advisable to divide the interval of change of each type of ability into three subintervals, which define different states of $CrA, ScA,$ and StA.

The parameter ScA can exist in three states: selfish intelligence (EgI), at $ScA \in \left[0; \frac{max_{ScA}}{3}\right]$; rational intelligence $(EgI - AI)$, at $ScA \in \left[\frac{max_{ScA}}{3}; \frac{2*max_{ScA}}{3}\right]$; and altruistic intelligence (AI), at $ScA \in \left[\frac{2*max_{ScA}}{3}; max_{ScA}\right]$. The parameter CrA can exist in the following three states: ordinary intelligence (OI), at $CrA \in \left[0; \frac{max_{CrA}}{3}\right]$; extraordinary intelligence (NI), at $CrA \in \left[\frac{max_{CrA}}{3}; \frac{2*max_{CrA}}{3}\right]$; and elite intelligence (EI), at $CrA \in \left[\frac{2*max_{CrA}}{3}; max_{CrA}\right]$. The parameter StA can exist in the following three states: the performer's intelligence (IP), at $StA \in \left[0; \frac{max_{StA}}{3}\right]$; intelligence of the manager (IM), at $StA \in \left[\frac{max_{StA}}{3}; \frac{2*max_{StA}}{3}\right]$; and intelligence of the leader (IL), at $StA \in \left[\frac{2*max_{StA}}{3}; max_{StA}\right]$ [48,50].

Since, according to [48], the simplest version of the unknown u function can be the Euclidean (natural) norm in the three-dimensional real space, which is defined as the module of the vector $(x, y, z) \in R^3$, then with this choice of u function, the normalized measure of individual intelligence can be calculated as follows:

$$II = \sqrt{\frac{CrA^2 + ScA^2 + StA^2}{3}} \tag{3}$$

Ref. [48] also defines the vector of imbalance of the intellectual characteristics of the individual ($\vec{ur}$) (4) and the corresponding indicator ($\vec{ur}$) (5):

$$\vec{ur} = \frac{(max_{CrA} - CrA; max_{ScA} - ScA; max_{StA} - StA)}{\sqrt{3}} \tag{4}$$

$$ur = max\frac{(max_{CrA} - CrA; max_{ScA} - ScA; max_{StA} - StA)}{\sqrt{3}} \tag{5}$$

Given the low probability of a person achieving the ideal version of intellectual characteristics of a person, the authors of [48] believed that a sufficient condition for the $CrA, ScA,$ and StA indicators is compliance with two-thirds of their maximum value $(\frac{2}{3}max_{CrA};\ \frac{2}{3}max_{ScA};\ \frac{2}{3}max_{StA})$. Taking into account this assumption, the corrected imbalance vector ($\vec{cur}$) has the following form:

$$\vec{cur} = \frac{\left(CrA - \frac{2}{3}max_{CrA}; ScA - \frac{2}{3}max_{ScA};\ StA - \frac{2}{3}max_{StA}\right)}{\sqrt{3}} \tag{6}$$

A person corresponds to the ideal variant when all the components of the imbalance vector $\vec{cur}$ are positive. A certain ability of a person requires improvement when the component of the imbalance vector $\vec{cur}$ corresponding to this ability is negative.

Considering the need for a clear and unambiguous interpretation of the obtained results of the analysis, it is worth noting that the vector of imbalance of the intellectual

characteristics of the individual ($\vec{ur}$) indicates the direction in which there is the greatest deviation of the intellectual characteristics of the individual. It is obtained as a point-by-point difference between the maximum values of creative, social, and statutory ability of people in this sample and the corresponding indicators of these types of ability for a specific individual. In other words, the value of each of its coordinates indicates how much the individual lacks the best value of this indicator in the selected sample. Since, in our model, intellectual characteristics are described by three dimensions (CrA, ScA, StA), if this vector is displayed in a three-dimensional Cartesian coordinate system, it will indicate the direction in which there is a maximum imbalance. Accordingly, the coordinate axis to which the end of the vector of imbalance of intellectual characteristics of the individual will be located closest ($\vec{ur}$) will show the worst developed type of ability of a specific individual in this sample. The further the end of this vector of imbalance is placed from the origin of the coordinates, the worse this ability is developed in the individual.

The corrected imbalance vector ($\vec{cur}$) is introduced for describing respondents whose intellectual characteristics are close to the best within the studied sample. When calculating it from the best indicators of creative, social, and statutory abilities of individuals in this sample, two-thirds were found, and the corresponding values of the abilities of a specific respondent were subtracted from the obtained values. In an ideal case, the vector $\vec{cur}$ should be placed in the first octant of the three-dimensional Cartesian coordinate system because under this condition, all the abilities of the given respondent are close to the maximum in the studied sample. In this case, "close" means that they differ by a factor of no more than 2/3 downwards from the best indicators of the creative, social, and statutory abilities of the individual in this group. In other words, all the components of the corrected imbalance $\vec{cur}$ vector must be positive, and failure to fulfill this condition indicates the need to improve (correct) that ability of the individual (creative, social, or status) for which the $\vec{cur}$ value is negative or equal to zero.

In order to analyze the state and opportunities for planning the development of human capital in the oil and gas industry, it was decided to conduct a survey among the employees of oil and gas enterprises of the public and private sectors, which, during the 30 years of Ukraine's independence, have traditionally had different approaches to human resource management. In addition, as a third group for analysis, it was decided to analyze enterprises of other sectors of the economy (this group included a number of machine-building, chemical, service, and other enterprises that are counterparties of oil and gas enterprises). Introducing this group will allow us to assess the human capital of the oil and gas industry in the context of the national labor market, compare such capital of oil and gas enterprises with that of other Ukrainian enterprises, and identify gaps or advantages in the levels of creative-, social-, and status-related abilities of personnel.

Note that the group of state-owned enterprises forms NAFTOGAS Group, which includes the Joint-Stock Company, "National Joint-Stock Company Naftogaz of Ukraine" (NJSC "Naftogaz of Ukraine", Kyiv, Ukraine) and a number of other legal entities, information on the financial condition, results of operations, and cash flows that NJSC "Naftogaz of Ukraine" includes in the consolidated annual financial reporting; legal entities, the sole founder and shareholder of which is NJSC "Naftogaz of Ukraine"; and legal entities whose controlling stake belongs to NJSC "Naftogaz of Ukraine".

Processing the results of the survey of 90 people made it possible to form three identical groups of generalized answers of respondents from among the staff:

- Oil and gas enterprises—NAFTOGAS Group (Table 1);
- Oil and gas enterprises of the private sector, including business entities with foreign capital (Table 2);
- Enterprises of other branches of the economy (Table 3).

Table 1. Summarized answers of respondents from the personnel of oil and gas enterprises of NAFTOGAS Group.

Respondent (R_j), Where j Is the Serial Number of the Respondent	*CrA*	*ScA*	*StA*	*II*		$\vec{ur}$			$\vec{cur}$	
R1	0.46	0.65	0.58	0.57	0.28	0.15	0.19	−0.03	0.12	0.07
R2	0.49	0.62	0.61	0.58	0.25	0.18	0.16	0.00	0.09	0.10
R3	0.71	0.51	0.63	0.62	0.03	0.29	0.14	0.22	−0.02	0.12
R4	0.53	0.49	0.57	0.53	0.21	0.31	0.20	0.04	−0.04	0.06
R5	0.65	0.67	0.55	0.63	0.09	0.13	0.22	0.16	0.14	0.04
R6	0.58	0.71	0.48	0.60	0.16	0.09	0.29	0.09	0.18	−0.03
R7	0.54	0.75	0.71	0.67	0.20	0.05	0.06	0.05	0.22	0.20
R8	0.48	0.77	0.69	0.66	0.26	0.03	0.08	−0.01	0.24	0.18
R9	0.73	0.69	0.63	0.68	0.01	0.11	0.14	0.24	0.16	0.12
R10	0.71	0.68	0.62	0.67	0.03	0.12	0.15	0.22	0.15	0.11
R11	0.47	0.7	0.71	0.64	0.27	0.10	0.06	−0.02	0.17	0.20
R12	0.53	0.75	0.62	0.64	0.21	0.05	0.15	0.04	0.22	0.11
R13	0.59	0.65	0.7	0.65	0.15	0.15	0.07	0.10	0.12	0.19
R14	0.65	0.65	0.73	0.68	0.09	0.15	0.04	0.16	0.12	0.22
R15	0.55	0.58	0.62	0.58	0.19	0.22	0.15	0.06	0.05	0.11
R16	0.66	0.77	0.52	0.66	0.08	0.03	0.25	0.17	0.24	0.01
R17	0.48	0.8	0.58	0.63	0.26	0.00	0.19	−0.01	0.27	0.07
R18	0.52	0.48	0.62	0.54	0.22	0.32	0.15	0.03	−0.05	0.11
R19	0.71	0.65	0.48	0.62	0.03	0.15	0.29	0.22	0.12	−0.03
R20	0.74	0.7	0.59	0.68	0.00	0.10	0.18	0.25	0.17	0.08
R21	0.73	0.6	0.52	0.62	0.01	0.20	0.25	0.24	0.07	0.01
R22	0.47	0.7	0.75	0.65	0.27	0.10	0.02	−0.02	0.17	0.24
R23	0.47	0.78	0.52	0.61	0.27	0.02	0.25	−0.02	0.25	0.01
R24	0.59	0.55	0.7	0.62	0.15	0.25	0.07	0.10	0.02	0.19
R25	0.66	0.75	0.77	0.73	0.08	0.05	0.00	0.17	0.22	0.26
R26	0.48	0.58	0.72	0.60	0.26	0.22	0.05	−0.01	0.05	0.21
R27	0.66	0.65	0.52	0.61	0.08	0.15	0.25	0.17	0.12	0.01
R28	0.55	0.78	0.68	0.68	0.19	0.02	0.09	0.06	0.25	0.17
R29	0.58	0.49	0.52	0.53	0.16	0.31	0.25	0.09	−0.04	0.01
R30	0.71	0.68	0.49	0.63	0.03	0.12	0.28	0.22	0.15	−0.02
Average value	0.59	0.66	0.61	0.63	0.15	0.14	0.16	0.10	0.13	0.10
Dispersion	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01
Mode	0.71	0.65	0.52	0.62	0.03	0.15	0.25	0.22	0.12	0.01
Median	0.58	0.68	0.62	0.63	0.16	0.13	0.15	0.09	0.14	0.11
Kurtosis	−1.46	−0.57	−1.14	0.01	−1.46	−0.57	−1.14	−1.46	−0.57	−1.14
Asymmetry	0.18	−0.51	0.08	−0.33	−0.18	0.51	−0.08	0.18	−0.51	0.08

Table 2. Summarized answers of respondents from among the personnel of oil and gas enterprises of the private sector, including economic entities with foreign capital.

Respondent (R_j), Where j Is the Serial Number of the Respondent	*CrA*	*ScA*	*StA*	*II*		$\vec{ur}$			$\vec{cur}$	
R1	0.51	0.63	0.69	0.61	0.27	0.17	0.10	−0.01	0.10	0.16
R2	0.55	0.58	0.72	0.62	0.23	0.22	0.07	0.03	0.05	0.19
R3	0.77	0.49	0.68	0.66	0.01	0.31	0.11	0.25	−0.04	0.15
R4	0.54	0.55	0.6	0.56	0.24	0.25	0.19	0.02	0.02	0.07
R5	0.68	0.69	0.65	0.67	0.10	0.11	0.14	0.16	0.16	0.12
R6	0.59	0.7	0.58	0.63	0.19	0.10	0.21	0.07	0.17	0.05
R7	0.59	0.76	0.69	0.68	0.19	0.04	0.10	0.07	0.23	0.16
R8	0.48	0.78	0.72	0.67	0.30	0.02	0.07	−0.04	0.25	0.19
R9	0.78	0.66	0.73	0.73	0.00	0.14	0.06	0.26	0.13	0.20
R10	0.69	0.69	0.75	0.71	0.09	0.11	0.04	0.17	0.16	0.22
R11	0.57	0.7	0.69	0.66	0.21	0.10	0.10	0.05	0.17	0.16
R12	0.63	0.73	0.66	0.67	0.15	0.07	0.13	0.11	0.20	0.13
R13	0.5	0.68	0.75	0.65	0.28	0.12	0.04	−0.02	0.15	0.22
R14	0.68	0.59	0.73	0.67	0.10	0.21	0.06	0.16	0.06	0.20
R15	0.65	0.55	0.64	0.61	0.13	0.25	0.15	0.13	0.02	0.11
R16	0.66	0.78	0.59	0.68	0.12	0.02	0.20	0.14	0.25	0.06
R17	0.49	0.59	0.62	0.57	0.29	0.21	0.17	−0.03	0.06	0.09
R18	0.56	0.8	0.72	0.70	0.22	0.00	0.07	0.04	0.27	0.19
R19	0.67	0.7	0.66	0.68	0.11	0.10	0.13	0.15	0.17	0.13
R20	0.74	0.73	0.69	0.72	0.04	0.07	0.10	0.22	0.20	0.16
R21	0.68	0.65	0.58	0.64	0.10	0.15	0.21	0.16	0.12	0.05
R22	0.57	0.72	0.75	0.68	0.21	0.08	0.04	0.05	0.19	0.22

Table 2. *Cont.*

Respondent (R_j), Where j Is the Serial Number of the Respondent	*CrA*	*ScA*	*StA*	*II*		$\vec{ur}$			$\vec{cur}$	
R23	0.6	0.75	0.63	0.66	0.18	0.05	0.16	0.08	0.22	0.10
R24	0.59	0.6	0.72	0.64	0.19	0.20	0.07	0.07	0.07	0.19
R25	0.68	0.68	0.75	0.70	0.10	0.12	0.04	0.16	0.15	0.22
R26	0.5	0.65	0.68	0.62	0.28	0.15	0.11	−0.02	0.12	0.15
R27	0.68	0.59	0.62	0.63	0.10	0.21	0.17	0.16	0.06	0.09
R28	0.59	0.79	0.78	0.73	0.19	0.01	0.01	0.07	0.26	0.25
R29	0.6	0.59	0.63	0.61	0.18	0.21	0.16	0.08	0.06	0.10
R30	0.75	0.78	0.79	0.77	0.03	0.02	0.00	0.23	0.25	0.26
Average value	0.62	0.67	0.68	0.66	0.16	0.13	0.11	0.10	0.14	0.16
Dispersion	0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.00
Mode	0.68	0.59	0.69	0.67	0.10	0.21	0.10	0.16	0.06	0.16
Median	0.60	0.69	0.69	0.67	0.18	0.12	0.10	0.08	0.15	0.16
Kurtosis	−0.82	−0.75	−0.94	0.14	−0.82	−0.75	−0.94	−0.82	−0.75	−0.94
Asymmetry	0.15	−0.28	−0.13	0.03	−0.15	0.28	0.13	0.15	−0.28	−0.13

Table 3. Summarized answers of respondents from the personnel of enterprises in other sectors of the economy.

Respondent (R_j), Where j Is the Serial Number of the Respondent	*CrA*	*ScA*	*StA*	*II*		$\vec{ur}$			$\vec{cur}$	
R1	0.68	0.69	0.65	0.67	0.10	0.11	0.12	0.16	0.16	0.14
R2	0.59	0.7	0.58	0.63	0.19	0.10	0.19	0.07	0.17	0.07
R3	0.59	0.76	0.69	0.68	0.19	0.04	0.08	0.07	0.23	0.18
R4	0.48	0.78	0.72	0.67	0.30	0.02	0.05	−0.04	0.25	0.21
R5	0.78	0.66	0.73	0.73	0.00	0.14	0.04	0.26	0.13	0.22
R6	0.49	0.62	0.61	0.58	0.29	0.18	0.16	−0.03	0.09	0.10
R7	0.71	0.51	0.63	0.62	0.07	0.29	0.14	0.19	−0.02	0.12
R8	0.53	0.49	0.57	0.53	0.25	0.31	0.20	0.01	−0.04	0.06
R9	0.65	0.67	0.55	0.63	0.13	0.13	0.22	0.13	0.14	0.04
R10	0.58	0.71	0.48	0.60	0.20	0.09	0.29	0.06	0.18	−0.03
R11	0.49	0.59	0.62	0.57	0.29	0.21	0.15	−0.03	0.06	0.11
R12	0.56	0.8	0.72	0.70	0.22	0.00	0.05	0.04	0.27	0.21
R13	0.67	0.7	0.66	0.68	0.11	0.10	0.11	0.15	0.17	0.15
R14	0.74	0.73	0.69	0.72	0.04	0.07	0.08	0.22	0.20	0.18
R15	0.68	0.65	0.58	0.64	0.10	0.15	0.19	0.16	0.12	0.07
R16	0.47	0.78	0.52	0.61	0.31	0.02	0.25	−0.05	0.25	0.01
R17	0.59	0.55	0.7	0.62	0.19	0.25	0.07	0.07	0.02	0.19
R18	0.66	0.75	0.77	0.73	0.12	0.05	0.00	0.14	0.22	0.26
R19	0.48	0.58	0.72	0.60	0.30	0.22	0.05	−0.04	0.05	0.21
R20	0.66	0.65	0.52	0.61	0.12	0.15	0.25	0.14	0.12	0.01
R21	0.57	0.7	0.69	0.66	0.21	0.10	0.08	0.05	0.17	0.18
R22	0.63	0.73	0.66	0.67	0.15	0.07	0.11	0.11	0.20	0.15
R23	0.5	0.68	0.75	0.65	0.28	0.12	0.02	−0.02	0.15	0.24
R24	0.68	0.59	0.73	0.67	0.10	0.21	0.04	0.16	0.06	0.22
R25	0.65	0.55	0.64	0.61	0.13	0.25	0.13	0.13	0.02	0.13
R26	0.53	0.75	0.62	0.64	0.25	0.05	0.15	0.01	0.22	0.11
R27	0.59	0.65	0.7	0.65	0.19	0.15	0.07	0.07	0.12	0.19
R28	0.65	0.65	0.73	0.68	0.13	0.15	0.04	0.13	0.12	0.22
R29	0.66	0.75	0.77	0.73	0.12	0.05	0.00	0.14	0.22	0.26
R30	0.48	0.58	0.72	0.60	0.30	0.22	0.05	−0.04	0.05	0.21
Average value	0.60	0.67	0.66	0.65	0.18	0.13	0.11	0.08	0.13	0.14
Dispersion	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01
Mode	0.59	0.65	0.72	0.67	0.19	0.15	0.05	0.07	0.12	0.21
Median	0.59	0.68	0.68	0.64	0.19	0.13	0.10	0.07	0.14	0.16
Kurtosis	−0.91	−0.63	−0.52	−0.30	−0.91	−0.63	−0.52	−0.91	−0.63	−0.52
Asymmetry	0.03	−0.41	−0.59	−0.10	−0.03	0.41	0.59	0.03	−0.41	−0.59

For a more thorough analysis of the obtained data and for their comparison, it is advisable to introduce additional mathematical tools. Therefore, in each of Tables 1–3, the following indicators were calculated:

1. The average value (sample average), which is determined by the following formula:

$$\overline{X} = \frac{\sum_{i=1}^{n} x_i}{n} \quad (7)$$

where x_i is the value of the corresponding indicator for the i-th respondent and n is the sample size (we have n = 30);

2. Dispersion, which is determined by the following formula:

$$D = \frac{\sum_{i=1}^{n} (x_i)^2}{n} - (\overline{x})^2 \quad (8)$$

3. Mode—the value that occurs most often in the set of observations;
4. Median—the value located in the middle of a series of values arranged in ascending or descending order;
5. Kurtosis, which is defined as the ratio of the central moment of the fourth order to the square of the variance and is calculated according to the following formula:

$$\gamma_2 = \frac{\mu_4}{\sigma_4} \quad (9)$$

where μ_4 is the central moment of the fourth order and
σ is the mean square deviation.
The central moment of the fourth order is calculated by the following formula:

$$\mu_4 = \sum_{i=1}^{n} (x_i - \overline{x})^4 \quad (10)$$

while the mean square deviation is calculated as follows:

$$\sigma = \sqrt{D} \quad (11)$$

6. Asymmetry, which is defined as the ratio of the central moment of the third order to the cube of the root mean square deviation and is calculated according to the following formula:

$$As = \frac{\mu^2}{\sigma^2} \quad (12)$$

where μ_3 is the central moment of the third order.
The μ_3 parameter is calculated with the formula below:

$$\mu_3 = \sum_{i=1}^{n} (x_i - \overline{x})^3 \quad (13)$$

3. Results and Discussion

3.1. Results of Human Capital Assessment of Oil and Gas Enterprises

One of the key results of the second stage of studying individual human capital is the identification of abilities (creative, social, or status) that respondents need to improve. The abilities requiring enhancement for respondents from the NAFTOGAS Group oil and gas enterprises are listed in Table 4; those from private-sector oil and gas enterprises, including entities with foreign capital, are in Table 5; and personnel from enterprises in other sectors of the economy are in Table 6.

Table 4. List of abilities that need to be improved for respondents from among the personnel of oil and gas enterprises of NAFTOGAS Group.

Respondent (R_j), Where j Is the Serial Number of the Respondent	Needs Correction		
	Creative (CrA)	Social (ScA)	Status (StA)
R1	+	−	−
R2	+	−	−
R3	−	+	−
R4	−	+	−
R5	−	−	−
R6	−	−	+
R7	−	−	−
R8	+	−	−
R9	−	−	−
R10	−	−	−
R11	+	−	−
R12	−	−	−
R13	−	−	−
R14	−	−	−
R15	−	−	−
R16	−	−	−
R17	+	−	−
R18	−	+	−
R19	−	−	+
R20	−	−	−
R21	−	−	−
R22	+	−	−
R23	+	−	−
R24	−	−	−
R25	−	−	−
R26	+	−	−
R27	−	−	−
R28	−	−	−
R29	−	+	−
R30	−	−	+

Table 5. List of skills that need to be improved for respondents from among the personnel of oil and gas enterprises of the private sector, including business entities with foreign capital.

Respondent (R_j), Where j Is the Serial Number of the Respondent	Needs Correction		
	Creative (CrA)	Social (ScA)	Status (StA)
R1	+	−	−
R2	−	−	−
R3	−	+	−
R4	−	−	−
R5	−	−	−
R6	−	−	−
R7	−	−	−
R8	+	−	−
R9	−	−	−
R10	−	−	−
R11	−	−	−
R12	−	−	−
R13	+	−	−
R14	−	−	−
R15	−	−	−
R16	−	−	−
R17	+	−	−
R18	−	−	−
R19	−	−	−
R20	−	−	−

Table 5. *Cont.*

Respondent (R_j), Where j Is the Serial Number of the Respondent	Needs Correction		
	Creative (CrA)	Social (ScA)	Status (StA)
R21	−	−	−
R22	−	−	−
R23	−	−	−
R24	−	−	−
R25	−	−	−
R26	+	−	−
R27	−	−	−
R28	−	−	−
R29	−	−	−

Table 6. A list of skills that need to be improved for respondents from among the personnel of enterprises in other sectors of the economy.

Respondent (R_j), Where j Is the Serial Number of the Respondent	Needs Correction		
	Creative (CrA)	Social (ScA)	Status (StA)
R1	−	−	−
R2	−	−	−
R3	−	−	−
R4	+	−	−
R5	−	−	−
R6	+	−	−
R7	−	+	−
R8	−	+	−
R9	−	−	−
R10	−	−	+
R11	+	−	−
R12	−	−	−
R13	−	−	−
R14	−	−	−
R15	−	−	−
R16	+	−	−
R17	−	−	−
R18	−	−	−
R19	+	−	−
R20	−	−	−
R21	−	−	−
R22	−	−	−
R23	+	−	−
R24	−	−	−
R25	−	−	−
R26	−	−	−
R27	−	−	−
R28	−	−	−
R29	−	−	−

The selection of abilities to improve for each respondent within their respective group was determined based on the negative value of the corresponding coordinate in the corrected imbalance vector. A negative value indicates that this characteristic of the respondent is more than two-thirds below the optimal value observed in their group.

3.2. Analysis and Graphical Interpretation of the Results of the Assessment of Human Capital of Oil and Gas Enterprises

The analysis of the results of the second stage of the study of human capital of employees of NAFTOGAS Group oil and gas enterprises showed the following:

1. The highest average indicator was recorded for the parameter of a person's individual intelligence as social ability (0.66), and the lowest for creative ability (0.59).
2. The respondents of this group have the following CrA, ScA, and StA characteristics:
   - CrA parameter: 0.74 is the maximum value; 0.46 is the minimum value; 76.7% of respondents demonstrated an average level; 23.3% demonstrated a high level;
   - ScA parameter: 0.80 is the highest value; 0.48 is the lowest value; 60.0% of respondents demonstrated an average level; 40.0% demonstrated a high level;
   - StA parameter: 0.73 is the highest value; 0.48 is the lowest value; 73.3% of respondents demonstrated an average level; 26.7% demonstrated a high level.
3. The average value of the normalized measure of individual intelligence, II, is 0.63.
4. According to the results of the analysis of the values of the coordinates of the vector of imbalance of the intellectual characteristics of the personality $\vec{ur}$ (Figure 1), the following was established:
   - According to the parameter CrA, the maximum value of imbalance is equal to 0.28; minimum—0.00; average—0.15;
   - According to the parameter ScA, the maximum value of imbalance is equal to 0.32; minimum—0.00; average—0.14;
   - According to the parameter StA, the maximum value of imbalance is equal to 0.29; minimum—0.00; average—0.16.
5. According to the results of the analysis of the $\vec{cur}$ coordinate, the following was established:
   - A total of 50.0% of respondents need correction for one of the abilities, while there is no employee who needs correction for two or three abilities at once (Table 4);
   - Approx. 26.7% of respondents demonstrated a corrected imbalance in creative ability, 13.3% in social ability, and 10.0% in status ability;
   - The highest $\vec{cur}$ indicator is -0.03 for the CrA parameter, -0.05 for the ScA parameter, and -0.03 for the StA parameter.

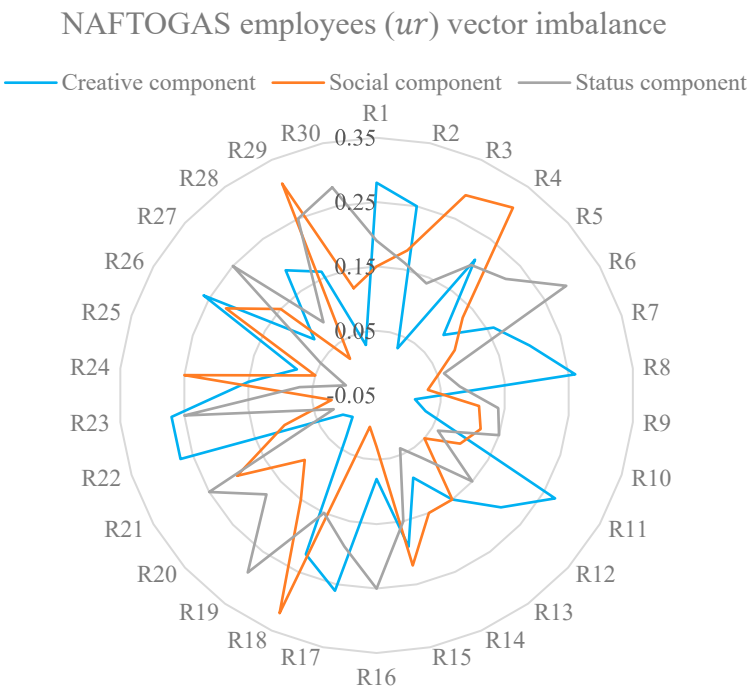

Figure 1. The value of the coordinates of the $\vec{ur}$ vector of imbalance of the intellectual characteristics of the personalities of employees of oil and gas enterprises of the NAFTOGAS Group.

The values of the coefficient of asymmetry for creative and status abilities are greater than zero, indicating that the oil and gas enterprises of the NAFTOGAS Group are predominantly staffed by individuals whose abilities in these areas exceed the corresponding average value. At the same time, the coefficient of asymmetry for social ability is negative, meaning that for most people, social ability is below the corresponding average value.

Thus, the results of the assessment of employees of NAFTOGAS Group enterprises indicate that although all the respondents demonstrated a high or average level of creative, social, or status abilities, half of the respondents require improvement in one of these abilities—primarily creative abilities, followed by social and status abilities to a lesser extent.

The analysis of the research results on the human capital of employees from private-sector oil and gas enterprises, including business entities with foreign capital, revealed the following:

1. The highest average indicator was recorded for the parameter of a person's individual intelligence as status ability (0.68), and the lowest for creative ability (0.62).
2. The respondents of this group have the following CrA, ScA, and StA characteristics:
   - CrA parameter: 0.78 is the maximum value; 0.48 is the minimum value; 90% of respondents demonstrated an average level; 10% demonstrated a high level;
   - ScA parameter: 0.80 is the highest value; 0.49 is the lowest value; 56.7% of respondents demonstrated an average level; 43.3% demonstrated a high level;
   - StA parameter: 0.79 is the highest value; 0.58 is the lowest value; 60.0% of respondents demonstrated an average level; 40.0% demonstrated a high level.
3. The average value of the normalized measure of individual intelligence, II, is 0.66.
4. According to the results of the analysis of the values of the coordinates of the vector of imbalance of the intellectual characteristics of the personality $\vec{ur}$ (Figure 2), the following was established:
   - According to the parameter CrA, the maximum value of imbalance is equal to 0.30; minimum—0.00; average—0.16;
   - According to the parameter ScA, the maximum value of imbalance is equal to 0.31; minimum—0.00; average—0.13;
   - According to the parameter StA, the maximum value of imbalance is equal to 0.21; minimum—0.00; average—0.11.
5. Based on the results of the analysis of the $\vec{cur}$ coordinate values, the following was established:
   - A total of 20.0% of respondents need adjustment for one of the abilities, while there is no employee who needs adjustment for two or three abilities at once (Table 5);
   - Approx. 16.7% of respondents demonstrated a corrected imbalance in creative ability, 3.3% in social ability, and none in status ability;
   - The highest $\vec{cur}$ indicator is -0.04, according to the CrA and ScA parameters, and according to the StA parameter, the corrected imbalance vector acquires exclusively positive values.

The value of the coefficient of asymmetry for CrA is greater than zero, that is, among the employees of the analyzed group of enterprises, there are people whose creative ability indicator is greater than the corresponding average value, but the coefficients of asymmetry for social and status abilities are negative, that is, the ScA and StA indicators of most respondents are lower than the corresponding average value.

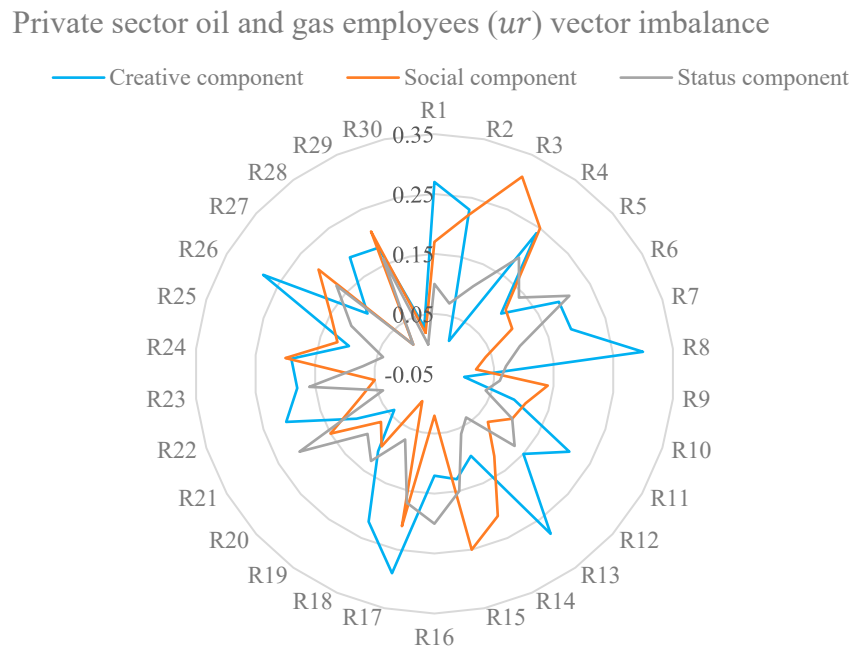

Figure 2. The value of the coordinates of the $\vec{ur}$ vector of imbalance of the intellectual characteristics of the personality of employees of oil and gas enterprises of the private sector, including business entities with foreign capital.

In general, all the employees of oil and gas enterprises of the private sector, including economic entities with foreign capital, demonstrated a high or average level of creative, social, or status abilities, and only one-fifth of respondents need to adjust one of the abilities, mainly creative.

The analysis of the results of the study of the human capital of employees of enterprises in other sectors of the economy made it possible to draw the following conclusions:

1. The highest average indicator was recorded for the parameter of a person's individual intelligence as social ability (0.67), and the lowest for creative ability (0.60).
2. The respondents of this group have the following CrA, ScA, and StA characteristics:
   - CrA parameter: 0.78 is the maximum value; 0.47 is the minimum value; 90% of respondents demonstrated an average level; 10% demonstrated a high level;
   - ScA parameter: 0.80 is the highest value; 0.49 is the lowest value; 60% of respondents demonstrated an average level; 40% demonstrated a high level;
   - StA parameter: 0.77 is the highest value; 0.48 is the lowest value; 60.0% of respondents demonstrated an average level; 40.0% demonstrated a high level.
3. The average value of the normalized measure of individual intelligence, II, is 0.65.
4. According to the results of the analysis of the values of the coordinates of the vector of imbalance of the intellectual characteristics of the personality $\vec{ur}$ (Figure 3), the following was established:
   - According to the parameter CrA, the maximum value of imbalance is equal to 0.31; minimum—0.00; average—0.18;
   - According to the parameter ScA, the maximum value of imbalance is equal to 0.31; minimum—0.00; average—0.13;
   - According to the parameter StA, the maximum value of imbalance is equal to 0.29; minimum—0.00; average—0.11.
5. According to the results of the analysis of the $\vec{cur}$ coordinate values, the following was established:

- A total of 33.3% of respondents need correction for one of the abilities, although there are no employees at the enterprises who need correction for two or three abilities at once (Table 6);
- Approx. 23.3% of respondents demonstrated a corrected imbalance in creative ability, 6.7% in social ability, and 3.3% in status ability;
- The highest indicator of the corrected imbalance $\vec{cur}$ vector is -0.05 for the CrA parameter, -0.04 for the ScA parameter, and -0.03 for the StA parameter, demonstrating exclusively positive values.

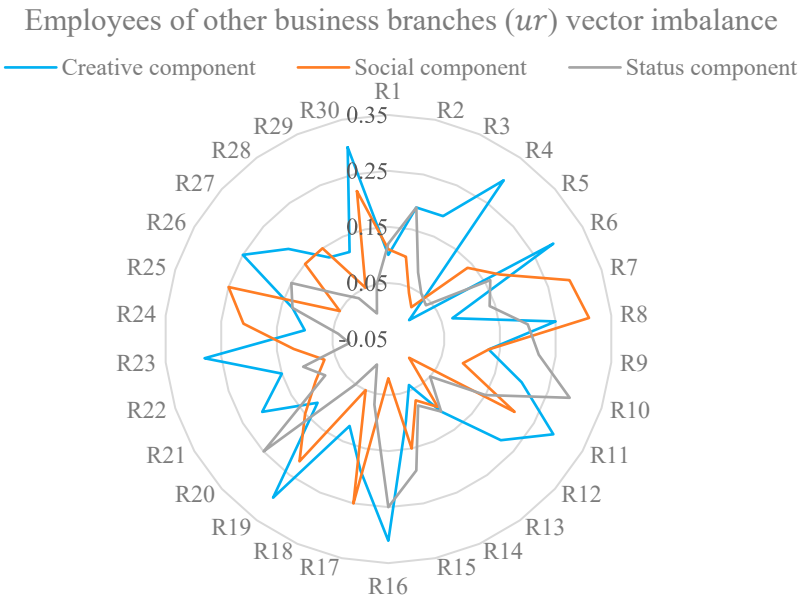

Figure 3. The value of the coordinates of the $\vec{ur}$ vector of imbalance of the intellectual characteristics of the personality of employees of enterprises of other branches of the economy.

The value of the asymmetry coefficient for CrA is greater than zero, i.e., most respondents have a creative ability that exceeds the corresponding average value, but the asymmetry coefficients for social and status abilities are negative, i.e., most respondents' ScA and StA indicators are smaller than the corresponding average value.

In general, all the employees of enterprises in other sectors of the economy demonstrate a high or average level of creative, social, or status abilities, although one-third of them need to adjust one of the abilities, creative to a greater extent than social and status.

3.3. Comparison of the State of Human Capital of Enterprises

Summarizing the results related to the statistical characteristics of the data obtained as a result of the survey (Tables 1–6) and analyzing the obtained numerical characteristics for the CrA, ScA, StA, $\vec{ur}$, and $\vec{cur}$ parameters of personnel of all three groups of enterprises, several important conclusions can be drawn:

1. A comparison of the variance and sample mean for the three abilities across the three groups reveals that, in all cases, the samples exhibit a low variance of 0.01, with a corresponding standard deviation of 0.1 across all the groups. It is noteworthy that employees of private-sector oil and gas enterprises, including entities with foreign capital, demonstrate the highest average levels of creative, social, and status abilities, with values of 0.62, 0.67, and 0.68, respectively. The average values of these indicators are slightly lower among the employees of the NAFTOGAS Group oil and gas enterprises, at 0.59, 0.66, and 0.61, respectively. A similar trend is observed among personnel from enterprises in other sectors of the economy, where the average values

for creative, social, and status abilities are 0.6, 0.67, and 0.66, respectively. Considering the low variance, it can be concluded that employees of private-sector oil and gas enterprises, including entities with foreign capital, possess a higher level of status ability compared to employees from enterprises in other sectors of the economy.

2. The analysis of the mode and median values for creative, social, and status abilities across the three groups of employees indicates notable trends. Among the employees of oil and gas enterprises in the NAFTOGAS Group, individuals with a high level of creative ability (0.71) are most frequently observed. Conversely, in enterprises from other sectors of the economy, employees with a high level of status ability (0.72) are more prevalent. Social ability is comparable across these two groups, with the most common value being 0.65. Notably, a significant proportion of NAFTOGAS Group employees exhibit low status ability (0.52), while employees in other sectors often demonstrate low creative ability (0.59).

Despite these differences, the median values for all three abilities across the groups are nearly indistinguishable. For NAFTOGAS Group employees, the medians are 0.58, 0.68, and 0.62, respectively; for employees of private-sector oil and gas enterprises (including those with foreign capital), the values are 0.6, 0.69, and 0.69; and for employees of enterprises in other sectors, the values are 0.59, 0.68, and 0.68. These results suggest a high degree of uniformity in the "average" employee profile across enterprise categories.

The coefficients of kurtosis and asymmetry for the three abilities within these groups yield the following observations: (a) the distribution of creative ability values among the NAFTOGAS Group and private-sector oil and gas employees is slightly right-skewed, with asymmetry coefficients of 0.18 and 0.15, respectively. This indicates a predominance of higher creative ability values relative to the sample average. In contrast, the asymmetry coefficient for employees in other sectors is nearly zero (0.03), suggesting a balanced distribution of creative ability values around the mean. For social and status abilities, negative asymmetry coefficients indicate a predominance of employees with lower-than-average values of these abilities across all the groups. (b) The kurtosis coefficients for all the abilities in all the groups are negative, ranging from -0.52 to -1.46, indicating flatter distributions compared to a normal distribution. This implies that the distributions of creative, social, and status abilities exhibit broader peaks and lower heights.

The median normalized measure of individual intelligence (II) is highest among private-sector oil and gas employees (0.67), slightly lower among employees in other sectors (0.64), and lowest among NAFTOGAS Group employees (0.63). The coefficient of asymmetry for NAFTOGAS Group employees is -0.33, indicating a prevalence of individuals with below-average II values. The kurtosis coefficient for this group is close to zero (0.01), aligning the distribution closely with a normal curve. Among private-sector oil and gas employees, the asymmetry coefficient is near zero (0.03), signifying an even distribution of II values around the mean, with a kurtosis coefficient of 0.14 indicating a slightly sharper peak compared to a normal curve. For employees in other sectors, the asymmetry coefficient is -0.10, showing a slight left skew, while the kurtosis coefficient of -0.30 denotes a flatter distribution.

The analysis of the coefficients of kurtosis and asymmetry for the vector of imbalance and the corrected vector of imbalance within the three groups reveals the following:

1. The first component of the imbalance vector (creative ability) is negative for NAFTOGAS Group (-0.18) and private-sector oil and gas employees (-0.15), indicating a prevalence of individuals whose creative ability imbalance is below average. In contrast, for employees in other sectors, the asymmetry is near zero (-0.03), reflecting an even distribution of creative ability imbalances relative to the average.

2. The second component of the imbalance vector (social ability) shows positive asymmetry across all the groups (0.51 for NAFTOGAS Group, 0.28 for private-sector oil and gas employees, and 0.41 for other sectors). This reflects dominance of individuals with above-average social ability imbalances.
3. The third component of the imbalance vector (status ability) displays varied patterns. Among NAFTOGAS Group employees, the asymmetry coefficient is −0.08, indicating a predominance of below-average status ability imbalances. For private-sector oil and gas employees, the coefficient is 0.13, showing a slight prevalence of above-average status ability imbalances. Among employees in other sectors, the asymmetry reaches its highest value, indicating a significant prevalence of above-average status ability imbalances.
4. The kurtosis coefficients for the imbalance vector and the corrected imbalance vector are consistently negative across all the groups, ranging from −0.52 to −1.46. This indicates flatter distributions of imbalance values compared to a normal curve, characterized by lower, broader peaks.

Finally, the overall averages, intragroup variances, and intergroup variances for creative, social, and status abilities across all respondents in the three groups are presented in Table 7.

Table 7. The overall average, intragroup variance, and intergroup variance for creative, social, and status abilities of all respondents (staff of oil and gas enterprises of NAFTOGAS Group; oil and gas enterprises of the private sector, including economic entities with foreign capital; and enterprises of other sectors of the economy).

Indicator	Ability		
	Creative (CrA)	Social (ScA)	Status (StA)
Overall average	0.60	0.67	0.65
Variance within groups	0.01	0.01	0.01
Variance between groups	0.00	0.00	0.00

The collected data show that the intergroup variance is equal to zero in all cases. In other words, the place of work (oil and gas enterprises of the NAFTOGAS Group; oil and gas enterprises of the private sector, including business entities with foreign capital; and enterprises of other branches of the economy), according to the obtained data, has practically no effect on the intellectual characteristics of the personnel measured in this paper. Thus, the presented results of the assessment of the human capital of enterprises and their comparison indicate that for each group of business entities, it is necessary to take different corrective measures, in accordance with the needs of the development of intellectual, status, and social abilities. Such an approach will allow the most effective use of the resources provided for the development of personnel and, unlike others, will provide a quick return effect in the form of increased labor productivity and the ability to achieve a balance between economic growth, social welfare, and environmental safety by developing those abilities that are necessary for the employee.

4. Conclusions

Summing up the analysis of the obtained vector characteristics for the personnel of three groups of the enterprise, the following should be noted:

1. A comparison of the variance and sample mean of the imbalance vector and the corrected imbalance vector across the three groups reveals that, in all cases, these samples exhibit a low variance of 0.01 and a standard deviation of 0.1.

2. The highest average value of the components of the imbalance vector for creative ability is 0.18 among workers in other sectors of the economy. That is, it is these workers who should pay attention to the creative ability that deviates the most from the highest indicator in their group.
3. The average values of the components of the imbalance vector for social and status ability has the highest indicators among the personnel of the NAFTOGAS Group oil and gas enterprises and are equal to 0.14 and 0.16, respectively. This definitely indicates that this group is characterized by a large spread in the level of development of the mentioned abilities among the employees.
4. The average values of the components of the corrected imbalance vector for social and status abilities are highest among employees of enterprises in other sectors of the economy, at 0.13 and 0.14, respectively. In contrast, the highest average value for creative ability is observed among employees of oil and gas enterprises within the NAFTOGAS Group, at 0.10. This indicates that employees with lower levels of social and status abilities are predominant in enterprises from other sectors of the economy, while workers with lower creative ability levels are more common in oil and gas enterprises of the NAFTOGAS Group.
5. The analysis of trend indicators for the imbalance vector and the corrected imbalance vector turns out to be interesting. The largest mode value for the first component of the imbalance vector is 0.19 among employees of enterprises in other sectors of the economy, that is, in this group, employees whose creative ability indicator is unbalanced by 0.19 relative to the maximum values are most often found. At the same time, the trend for the first component of the corrected imbalance vector is the largest among employees of oil and gas enterprises of the NAFTOGAS Group, among whom it is 0.22, i.e., among the respondents of this group, employees with the specified value of the first component of the imbalance vector are most often found. In other words, oil and gas enterprises of NAFTOGAS Group have the most employees who lack 0.22 units to two-thirds of the best value of the creativity indicator.
6. The highest value of the mode of the second component of the imbalance vector is observed in the personnel of oil and gas enterprises of the private sector, including economic entities with foreign capital (equal to 0.21). In these enterprises, employees with a social capacity of 0.21 are most often found, which differs from the ideal value.
7. For the corrected imbalance vector, the mode of the second component is 0.12 and is reached among two groups—personnel of oil and gas enterprises of the NAFTOGAS Group and enterprises of other sectors of the economy. In these two groups, you will most often come across employees whose social ability differs by 0.12 from two-thirds of the best values in the respective groups.
8. The median values of the imbalance vector are observably high for the first two components among employees of enterprises in other sectors of the economy at 0.19 and 0.15, respectively, and the third component is the highest among employees of oil and gas enterprises of the NAFTOGAS Group and is equal to 0.15. The lowest median values of the same vector are observed for the third component—they are equal to 0.10 for employees of enterprises in other sectors of the economy. That is, the status ability of an employee of the golden mean in this area is only 0.1 less than the ideal. In other words, half of the employees have a status ability that differs from the ideal by less than 0.1.
9. The smallest (and therefore the most favorable, as they represent the least deviation from the ideal) median values of the corrected imbalance vector are 0.07, 0.14, and 0.11, achieved, respectively, by employees of enterprises in other sectors of the economy and by employees of oil and gas enterprises within the NAFTOGAS Group.

10. Zero values of the variance between groups for the personnel of each of the three groups of enterprises indicate that the place of work does not affect the intellectual characteristics of the personnel measured by the authors.
11. Based on the comparison of indicators across the studied groups, we recommend that top managers focus on strengthening the development of the following abilities among employees (in particular, through the use of individual and group training tools):
    - Creative ability—for employees of oil and gas enterprises of the NAFTOGAS Group;
    - Social ability—for human resources of oil and gas enterprises of the private sector;
    - Status ability—for personnel in other sectors of the economy.
12. Taking into account the theoretical approach proposed by the authors for assessing an enterprise's human capital, the results of empirical research demonstrating its current state, challenges, and development prospects, as well as the comparative characteristics of different personnel groups, the prospects for practical use and further research will include the following:
    - The widespread application of the authors' proposed methodology for assessing and making decisions regarding human capital development trajectories in oil and gas enterprises, as well as other industries. In addition, by using the proposed methodology in terms of intragroup and intergroup comparisons of assessment results and values of such generalizing indicators as mode, median, variance, imbalance vector, and adjusted imbalance vector, practicing managers will be able to increase the effectiveness of implementing team building processes to achieve sustainable development goals.
    - Further refinement of the forms and methods for assessing human capital and interpreting the obtained results.
    - Expanding the integration of scientific approaches to human capital assessment and development with the concept of sustainable development at the enterprise, industry, and societal levels.

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