

Formation of personnel intellectual activity development mechanism in the context of society digitalization

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Abstract. The aim of the article is to develop theoretical, methodological and applied foundations for the formation of personnel intellectual activity development mechanism in the context of society digitalization. The relevance of the study is confirmed by the dominance of the intellectual factor in organization functioning as a key one in achieving the goals of activity in the prism of digitalization. The conceptual-categorical apparatus of intellectualization process was further developed in the article, in particular, the essence of the concept “intellectual activity” was revealed from new positions. The expediency of an individual’s intellectual activity concept interpretation as voluntary was justified, based on knowledge and experience, a focused, philosophical, economically and professionally motivated ability of a person to create new knowledge, new information, i.e. generate novelty for organization and personal growth, bring knowledge, intellectual products to life effectively and efficiently, commercialize them skillfully, receiving income from an innovative product. It has been established that in order to activate the function of personnel intellectual activity development, certain prerequisites are needed that motivate personnel to intellectual-knowledge and innovative activity: psychologically-cognitive, cognitive-intellectual, emotional-motivational, material-value, and social-communicative. The conceptual provisions of the process of formation of a mechanism for the development of intellectual activity of personnel are developed. An algorithm has been formed to form a mechanism for personnel intellectual activity development with the determination of the integral level parameter of employee intellectual activity. The proposed integral level of intellectual activity is recommended to be evaluated according to the following key criteria: the level of intellectual cooperation with the external environment - collaboration, the level of intellectual load fulfillment, the level of new professional knowledge use, the level of publication effectiveness, and the innovation level of the intellectual knowledge product. The key vector of the proposed mechanism is the relationship that develops between individuals (teams) in the process of intellectual-knowledge, informational, innovative, material and managerial product development, as well as economic and legal relation development between intellectual capital carriers and an organization. In this sense, each intellectually active individual is regarded as a worldview mature, internally motivated and disciplined personality; a self-organized management engine; a creator of the relationship between intellectual freedom and responsibility in the management system.

Key words: intelligence, intellectual activity, intellectualization, knowledge product, innovative product, personnel, digital economy, publication performance, motivation, algorithm, digitalization.

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Introduction

The current stage of society development has changed the idea of future social growth sources, the role of an individual, his intellect and civilizational development knowledge. The concepts of “knowledge economy”, “digital economy”, “economy intellectualization”, “high technologies”, “high technology of GDP”, “innovative production”, “big data”, “industrial Internet”, “artificial intelligence”, “the components of robotics and sensory system” are the key ones not only in scientific and specialized literature, but also in regulatory legal acts of states. The processes of intellectualization and digitalization are associated with the evolution of technological structures and the formation of new paradigms for the global digital development of society. Intellectualization in combination with technological progress entails the replacement of labor and routine tasks with artificial intelligence, and robots. In such a situation, the demand for experts with significantly wider competencies, that is, those who will complement information and communication technologies, is increased sharply. Based on this, it can be noted that it was the dominance of the intellectual factor as the key factor for organization competitive advantage development, the achievement of their managerial, economic, social, capitalization effectiveness that determined the relevance of the study, its goals and objectives.

Materials and methods

The aim of the article is to develop theoretical, methodological and applied foundations for the formation of personnel intellectual activity development mechanism in the context of society digitalization.

The object of research is the process of personnel intellectual activity development in the context of society digitalization. The subject of the study is the theoretical, methodological and scientific-practical foundations of intellectual activity development mechanism.

The information base of the study is the work of domestic and foreign scholars on the formation and use of knowledge, intellectual potential, knowledge economy, digital economy, regulatory legal acts of the Russian Federation, Internet resources and other reference and information resources.

The methodological basis of the study is the combination of principles, techniques, theoretical, special and interdisciplinary methods of scientific research. To achieve this goal, the following methods were used: systematic; concretization, generalization, formalization; the methods of grouping and systematization; the methods of analysis and synthesis; statistical analysis; structural logical analysis method; empirical research method; simulation method; morphological analysis; graphic method.

Results

Theoretical and methodological foundations of intellectual activity study in a knowledge-intensive economy, the issues of society intellectualization, intellectual creativity and creative intellectual work of organization employees are studied in the works of a number of scholars: R. Akoff, V. Bazilevich, D. Bell, D.A. Rubvalter, L.I. Lukichev, V.A. Filinov, E.E. Golovchanskaya, A.D. Vorobiev, A.V. Yakovleva, V.V. Buryak, A.A. Kuzubov, A.V. Rodionov and other authors [1-22]. Intellectual activity is one of research categories in the psychology, pedagogy, economy, and management [23,24]. One of the main definitions of intellectualization conceptual-categorical apparatus is the “intellectual activity” of an individual. From this perspective the consideration and development of basic approaches, creating the conditions for personnel intellectual activity development, is relevant. The thing is about the intellectual activity of personnel during search, update and intellectual problem solution - managerial, economic, technological, product, innovative, social, and personal interaction problems. Such intellectual activity is aimed at an organization competitive advantage achievement [25].

Having analyzed the opinions of scholars on the issue under study [24,26,27,28], we can distinguish several positions regarding the interpretation of intellectual activity concept:

1. Intellectual activity is a personality trait, a trait of a holistic personality, can be reduced neither to general mental abilities, nor to motivational factors of mental activity.
2. Intellectual activity is interpreted as a change in creative work effectiveness value aimed at a specific problem solution within the framework of the goal and time constraints. Intellectual activity

can be aimed at consumer value obtaining or satisfying the interests of an employee, and in fact, mental labor turns into intellectual when it acquires a creative, innovative character.

3. Intellectual activity is considered as a knowledge-based, conscious, oriented ability to collect, accumulate and process large flows of information.

From our point of view, the intellectual activity of personnel can be interpreted as voluntary, based on knowledge and experience, focused, worldview, economically and professionally motivated human ability to create new knowledge, new information - i.e. generate novelty for a university and personal growth, translate the created knowledge, intellectual products into life effectively and efficiently, commercialize them skillfully, receiving income from an innovative product.

The development of intellectual activity means the necessary condition creation for the staff to implement personal and professional potentials. Personnel acts as an active subject in a three-dimensional coordinate system: time, space, talent (intelligence). In this case, the basis of his intellectual activity, his primary determinants are the internal, certain aspirations and motivation structures inherent to personality. The environment in which personnel operates must be flexible for intellectual growth. The fundamental principles of such growth are as follows:

- each employee is considered as an autonomous "self-actualized individual", continuously realizing his potential capabilities and abilities;
- the absence of coercion to impose intellectual enrichment, competencies, knowledge or experience that every employee should master, because the significance of any intellectual achievement should be determined by subjective perception and goal-setting;
- the synergy of intellectual achievements is recognized as the highest priority of efficiency in intelligence formation;
- the inadmissibility of centralized or authoritarian control and demotivation system use of the intellectualization process and its participants;
- the priority of intellectual enrichment is determined by self-actualization and the level of subsystem, system competitive advantage increase, the levels of management or a university as a whole;
- remuneration for the creation of intellectual knowledge assets and the added value from their commercialization are differentiated in accordance with the intellectual contribution of the intellectual carriers and their teams;
- The ownership of intellectual knowledge assets is identified and assigned to the intellectual carriers and subsystems (systems) of their creation.

The formation of a mechanism for the development of personnel intellectual activity should be directed to personal and professional activation based on a number of psychologically and economically sound conceptual provisions, in particular:

1) intellectualization development and its conditions are characterized by the intellectual-knowledge environment. That is why self-regulation and "freedom of creativity with a sense of responsibility for a common cause" are of particular importance;

2) the growth of activity should occur in conditions of comfort and atmosphere of partnership, integration, cooperation, emotional sincerity, interest in individual and overall results, mutual perception, and lack of biased judgments from top management;

3) the intellectualization process is structured by functional management in compliance with priority and mutual completeness according to the expected target effective indicators;

4) the system coordinator of intellectualization, the head of a structural unit or a project should not perform only the function of "control". His mission is the ability to predict and construct possible synergetic and emergent effects from individual intellectual achievements, advising the process participants and its regulation;

5) an individual employee gets the opportunity to choose "intellectual alternatives" within the framework of a professional load, a position, a unit or a group;

6) the key criterion for the development of intellectual activity should be its ability to maximize potential and stimulate the intellectual and creative professional abilities of staff.

The reasons and prerequisites prompting an employee to intellectual-knowledge activity are completely different motives as the researchers note [29-31, 35-39]. Based on the analysis of

theoretical developments of this aspect, a motive structure was formed, which is represented by several groups:

- psychological – cognitive (the motives related to self-development, self-realization, the development of cognitive needs, and desire to take initiative);
- cognitive-intellectual (research interest, a penchant for cognition, a developed cognitive need, the desire to be creative, analyze material and solve logical problems, structure large amounts of information, and the interest in mental activity);
- emotionally motivational (the motives of respect and recognition, success and achievement, the ability to express your individuality, initiative, and determination)
- material and value (the desire to have a prestigious well-paid job, receiving of grants, scholarships, subsidies, financing of commercial funds for research and development)
- socio-communicative (the motives associated with the desire to serve others and the ability to benefit society, a sense of duty).

Based on the study, we propose to present the process of an algorithm development to manage the effectiveness of personnel intellectual activity as the objective function of management.

The algorithm includes a set of stages with the description of the constituent elements and the processes of their implementation. The objects of intellectual activity development can be the following:

- management personnel - for vertical-horizontal effects, leadership and stimulating influence development on the controlled management system;
- professionally oriented personnel - to generate new ideas, products, processes, technologies and to intensify the implementation of operational tasks;
- Guiding and managed systems - to get complex, synergistic and emergent effects for the entire university.

At the next stages, depending on set goals, the laws, principles and key provisions of a company are determined, according to which the intellectual activity of the staff will be enhanced, methods are selected, the volume and cost of resources necessary for its increase are determined. Based on the results of a systematic implementation of personnel intellectual activity development, the diagnostic of this process effectiveness, assessment and interpretation of its effectiveness are carried out, taking into account the properties of intellectual effects (Figure 1).

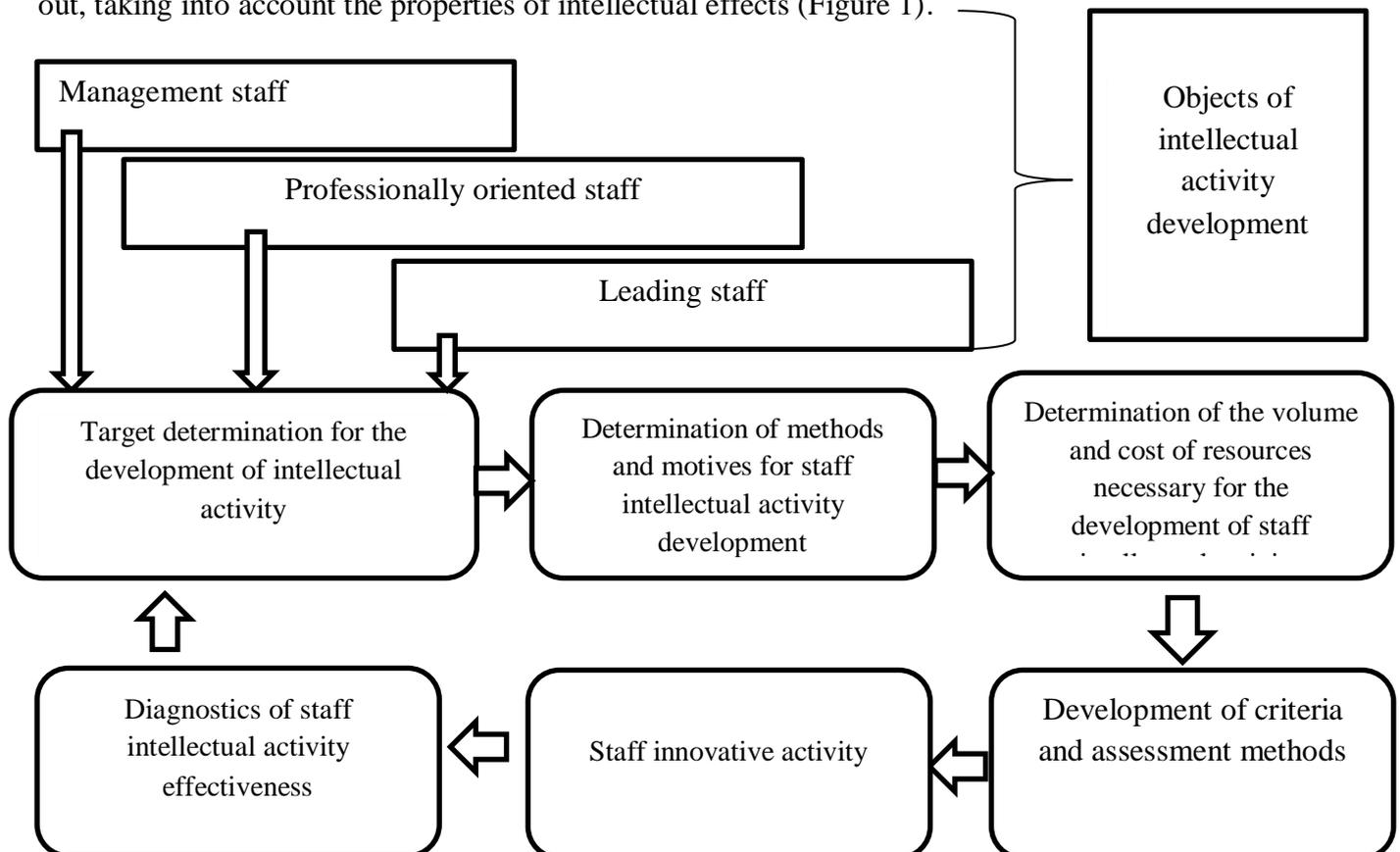


Figure 1 – Control algorithm of personnel intellectual activity development

The developed process of personnel intellectual activity development mechanism as the target function of personnel intellectual activity development is universal for each employee based on the results of his intellectual and knowledge achievements [32].

Let's consider the process of staff intellectual activity integral indicator determination - IA, consisting of three stages.

The integral indicator of employee's intellectual activity (IA) is represented by the process-effective indicators (intellectual cooperation with the environment - collaborations [33], the fulfillment of intellectual workload, the use of new professional knowledge, publication effectiveness, product innovativeness) that demonstrate a high level of intelligence development and highlight systematic and comprehensive results.

The integral indicator of organization personnel intellectual activity (IA) includes a number of private indicators - key evaluation criteria. They presented below the recommended indicators that diagnose an effective measure of intellectualization achievement - an integral indicator of staff intellectual activity (IA):

1. The level of intellectual cooperation with the external environment - collaboration.
2. Intelligent workload level.
3. The level of new professional knowledge use.
4. The level of publication performance.
5. The innovation level of the intellectual knowledge product.

At the first stage, it is necessary to determine each of the indicators that diagnose an effective measure of intellectualization achievement - an integral indicator of staff intellectual activity - IA.

1. The level of intellectual cooperation with the external environment - collaboration (I_{czs}) (formula 2).

$$\frac{\sum_{i=1}^j \frac{CZ_{czsi}}{M_p}}{j} \quad (2)$$

CZ_{czsi} - the number of employees who autonomously cooperate with the subjects of external environment in i intellectual and knowledge areas;

M_p - the total number of cooperation areas with the external environment subjects in i intellectual-knowledge areas;

j - the number of cooperation areas with the external environment subjects during the analyzed period.

The criterion of value is an increase.

The indicator reflects the ability of employees to collaborate with environmental actors in a number of intellectual and knowledge areas independently, in relation to the entire set of cooperation areas with the environmental actors during a certain period.

2. Intelligent workload performance level (I_{iuz}) (formula 3).

$$\frac{\sum_{i=1}^x \frac{IZ_{iuzi}}{UZ}}{x} \quad (3)$$

IZ_{iuzi} - the number of completed i intellectual professional tasks (processes);

UZ - the total number of completed professional tasks (processes);

x - the number of planned intellectual professional tasks (processes) during the analyzed period.

The criterion of value is an increase.

The indicator reflects the ability of an employee to perform a certain amount of planned intellectual professional tasks (processes) in relation to the entire set of completed professional tasks (processes) during the analyzed period.

3. The level of new professional knowledge (I_{npz}) use (formula 4).

$$\frac{\sum_{i=1}^m \frac{VZ_{npzi}}{ZZ}}{m} \quad (4)$$

VZ_{npzi} - the number of new i professional knowledge acquired by employees in the process of mastering new courses, and programs;

ZZ - the total amount of knowledge used by employees (for a certain period, for example 5 years);

m - the number of employees planned for the development of new professional knowledge during a certain period.

The criterion of value is an increase.

The indicator reflects the use of new professional knowledge by employees from the total amount of new knowledge owned by employees.

4. Publication performance level (I_{pp}) (formula 5).

$$I_{pp} = \frac{P_1 + P_2 + P_3 + P_4 + P_5 + P_6 + \dots + P_{n+1}}{OS} \quad (5)$$

P_1 - the number of publications in publications indexed in the Web of Science Core Collection Web of Science Core Collection (WoS) – Q1, Q2, Q3, Q4;

P_2 – the number of publications in publications without a quartile, but included in the Web of Science Core Collection (WoS);

P_3 – the number of publications in publications indexed by Scopus and not indexed by Web of Science;

P_4 – the number of publications in RSCI Web of Science journals not indexed by Core Collection of Web of Science and Scopus;

P_5 the number of publications in journals from the list of HAC, not included in the abovementioned paragraphs;

P_6 – the number of monographs [34];

P_n – the amount of other scientific products characteristic of the organization;

OS – the total number of employees in the organization performing intellectual professional tasks.

The value criterion – $I_{pp} > 1$.

Based on the fact that each employee is obliged to publish at least one scientific work per year, the ratio $I_{pp} > 1$, must be fulfilled, then the effectiveness can be considered as absolute.

The level of organization performance is calculated for 100 AS.

5. The innovation level of the intellectual knowledge product (I_{icmi}) (formula 6).

$$\frac{\sum_{i=1}^h \frac{IC_{icmi}}{CM}}{h} \quad (6)$$

IC_{icmi} - the number of (implemented) used i -intellectual knowledge products (RID);

CM - the total number of created intellectual knowledge products for a certain period;

h - the number of created and supported innovative intellectual knowledge products for the analyzed period.

The criterion of value is an increase.

The indicator reflects the innovativeness of the latest intellectual and knowledge product use in a certain period.

The second stage is the calculation of the weighting coefficients of each particular indicator weight using expert estimates and the Fishburn rule (k_{1-5}). After calculation of the proposed particular indicators, it is necessary to reduce them to a standardized (by max value) generalizing key criterion. At the same time, it is necessary to take into account the significance of the indicator influence on the general value of the key criterion IA, which can be determined taking into account the features of the processes of intellectualization and the effective value.

Determining the weighting coefficient of the indicator within the key criterion IA, we suggest using the Fishburn rule, according to which all the detailed particular indicators within the framework of a separate key criterion should be arranged in a sequence of importance decrease.

Let j be the index number within the i -th key criterion IA. The detailed indicators are placed in importance decrease order (according to expert estimates) (formula 7).

$$rj1 > rj2 > rj3 > \dots > rjn_j \quad (7)$$

where rji – the serial number of the j -th indicator of the i th key criterion in a series of importance,

n_j – the total number of indicators of the i -th key criterion IA.

After this placement, it is possible to determine the weight coefficient (k_{ji}) of each detailed indicator within the key criterion IA (formula 8):

$$k_{ji} = 2(n_j - rji + 1) / (n_j + 1) \times n_j \quad (8)$$

The third stage is the determination of the effective measure of intellectualization achievement level - an integral indicator of staff intellectual activity (IA) on the basis of five indicators of intellectualization effectiveness (formula 9).

$$IA = I_{czs} * k_1 + I_{iuz} * k_2 + I_{npz} * k_3 + I_{pp} * k_4 + I_{icm} * k_5 \quad (9)$$

Given the independence of detailed indicator weight within the key criterion IA, let's reflect the total value of the i -th key criterion in the form of an additive convolution of its detailed criteria - indicators (formula 10):

$$IA_i = \sum_{j=1}^n IA_{ji} \times k_{ji} \quad (10)$$

Where IA_{ji} - the total value of the i -th key criterion IA.

Since the boundaries of detailed indicator values and their weighting coefficients are in the interval $[0, 1]$, the possible values of the key criteria IA will also not go beyond this threshold.

Conclusions and discussions

The scientific novelty of the study is the developed methodology of a mechanism construction for the development of staff intellectual activity. A mechanism has been formed for the development of staff intellectual activity, which, unlike the existing ones, is based on highlighting the ideological level of staff intellectual activity in the management system; highlighting the constitutive properties of an intellectually active employee; the formation of a flexible environment for an employee's intellectual growth and the grouping of his intellectual and personal qualities and competencies, which are priority in the process of management system intellectualization (worldview-value, cognitive, socio-behavioral, spiritual-emotional, technical and technological); actualization of the causes, prerequisites and motives that motivate staff to intellectual-knowledge and innovative activities (psychologically-cognitive, cognitive-intellectual, emotional-motivational, material-value, and social-communicative).

The conceptual and categorical apparatus of intellectualization process was further developed, in particular, the essence of “intellectual activity” concept was revealed from new positions.

Given the development of processes of intellectualization in order to assess their effectiveness, a parameter of the integral level of intellectual activity of employees is developed - a comprehensive indicator that characterizes the degree of achievement in the development of organization intellectualization through the prism of intellectual knowledge asset creation and use. It is proposed to determine the indicator on the basis of a quantitative expert assessment based on a system of qualitative and quantitative indicators (criteria) taking into account their weight coefficients. The proposed integral level of intellectual activity is recommended to be evaluated according to the following key criteria: the level of intellectual cooperation with the external environment - collaboration, the level of intellectual load fulfillment, the level of new professional knowledge use, the level of publication effectiveness, the level of an intellectual knowledge product innovation. The introduction of new diagnostic and effective assessment and analytical indicators regarding the process of intellectualization requires the construction of a new format for accounting and reporting, which, in contrast to existing facilities, will provide the opportunity to obtain verified information about the intellectual knowledge assets of organizations and staff intellectual potential and activity.

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