Assessment of Creative Potential of Staff at Service Organizations on the Basis of "Creative Al Pari"

Galina Belyaeva, Olga Voronova*, Natalia Ponomareva, Tatyana Khnykina

Peter the Great St. Petersburg Polytechnic University, Institute of Industrial Management, Economics and Trade, Graduate School of Service and Trade, Russia, 195251, St.Petersburg, Polytechnicheskaya, 29

Federal State Budget Educational Institution of Higher Education "Voronezh State University of Engineering Technologies" (FSBEI HE "VSUET"), 394036, Russia, Voronezh, Revolution Av., 19

Abstract. This paper considers the concept of professional creativity as the ability of staff to express intended creativity in given conditions in order to achieve certain goals. The article also examines methodological features of assessment of professional creativity which makes up the basis of creative potential at an organization in the conditions of digitalization. The authors conclude that it is necessary to improve the existing analytical tools to boost the efficiency of staff management. Key parameters of professional creativity assessment are substantiated: flexibility, originality, curiosity, interdisciplinary erudition, systems thinking, cross-industry communication. The research suggests an assessment methodology of "creative al pari" (compatibility of creative potential with a profile of professional creativity) on the basis of key parameters that include four following stages: preparation of k-assignments and profiles of professional creativity at certain positions; evaluation of k-assignments performed by staff members and development of their professional creativity portrait; selection of candidates for their future inclusion in staff reserve in accordance with their grades or for hiring ones due to minimum deviations from standard figures defined for the vacancy. This paper discovers specific features of the individual "creative al pari" assessment, based on utility function, as well as the "creative al pari" assessment in the organization. The latter, in its turn, allows to establish an absolute, conditional or critical discrepancy between creative potential of staff and a profile of professional creativity at the organization. As a result of the research, the authors make a conclusion about the possible areas to apply the developed technique. They include: recruitment process, formation of staff reserve, recertification or training in service organizations.

Introduction

In the conditions of digitalization and high degree of uncertainty within business environment change, obtaining additional competitive advantages by organizations, including telecommunication ones, is linked with realization of creative potential of staff, forming its intellectual capital [1, 2]. In this context, the organizations management is greatly interested in professional creativity which requires active participation of management and is associated with the intended generation of ideas. As a rule, these ideas are subsequently implemented in the form of specific innovations or contribute to the development of effective management decisions via their new perception of determinants and/or the original application of standard or new tools.

Domestic and foreign authors suggest different approaches and methods to creativity management, development of creative environment [3], creativity and staff encouragement [4]. They also prove the need for creative thinking and the use of digitalization opportunities even for employees whose activities are not related to innovation. However, the content analysis of publications indicates that methodological procedures ensuring the implementation of an integrated approach to assessing the compliance of creative potential of staff with the level of their work functions and actions have not yet been developed or have not been properly disseminated.

According to A.A. Aletdinova, A.V. Koritsky and G.I. Kurchaeva [5] who share the A.I. Kochetkova's [6] point of view, the respondents related to the "human capital" group show the highest creativity level, while the ones related to the "staff" group show the lowest creativity level. We do not share this position, believing that members of staff have a high level of creative potential and are able to intendedly express it in given conditions (controlled creativity). On the other hand, creativity expression in terms of digital economy is explained by the active position of staff and their desire to change things [7-9].

* corresponding author: ilina.olga@list.ru
Methods

This article considers the process of analysis of creative potential indicators, determining the level of its development and identifying the reasons for its lack of effectiveness to achieve the goals and objectives of the organization. In the process of analysis, we used groups of methods for assessing labor potential by the nature of indicators being evaluated as well as by the content of assessment and its subject, by the process during which the assessment of creative potential is carried out.

Results

The author's position is based on the fact that not all employees have professional creativity, which is the ability to show intended creativity in specific conditions. In our opinion, the use of traditional methods by G. Guilford, E. P. Torrence, S. Mednik, is not quite accurate in terms of staff policy, as they are focused on assessing creativity of an individual, which can be expressed by a musical or artistic talents, that do not correspond to the strategic goals of organizations development. In addition, the results of certain studies show that creativity "manifests itself in different ways with different employees", while the specificity of individual positions includes the lack of "ability to express creativity" [10].

At the same time, unlike innovation activity, there is no creative one. The result of creativity is an idea or behavior (as a special case of conscious / unconscious transformation and implementation of the idea). The result of innovation is "the actual effect obtained as after the completion of innovative activity" [11]. In accordance with GOST R 56273.6-2016 there are two equivalent types of creative ideas [12]: ideas that identify needs (needs to find a solution to the problem) - manifestation of divergent thinking; ideas that offer a solution (response to a request for needs satisfaction) - manifestation of convergent thinking.

Assessment of the idea's novelty is partially comparable to the assessment of solutions to the inventive tasks, that traditionally uses five levels:

1. task and means of solution are within the same specialty;
2. task and means of solution are within the same industry;
3. task and means of solution are in different industries;
4. solution tools are based on rare (little known) effects and phenomena;
5. means of solution are beyond existing science.

Taking all the above into account, we offer to assess the creative potential level of staff by six key parameters:

- curiosity (characterizes an active position in obtaining new knowledge (experience));
- interdisciplinary erudition (characterizes broad awareness in various fields of knowledge and forms the fundamental basis of intended creativity);
- systems thinking (allows to reveal complex interrelation of system elements in statics and dynamics, and also to estimate possibility of interaction with other systems) [13-14];
- cross-industry communication (provides understanding of processes and technologies in adjacent and/or non-adjacent fields and industries).

The first three parameters are consistent with the traditional approaches proposed by G. Guilford and E. P. Torrens [15]. The last three parameters are offered to use for the first time assessment and characterize opportunities for intended and effective manifestation of creativity by staff members in their professional activities. In accordance with the atlas of new professions, systems thinking and cross-industry (inter-sectoral) communication are included in the list of supra-professional skills required for the effective performance [16].

In order to improve the efficiency of HR policy, we have developed a methodology for the "creative al pari" assessment (compatibility of creative potential with a profile of professional creativity), which consists of the following stages:

- development of k-tasks to assess the level of the respondent's professional creativity;
- development of professional creativity profiles for different positions;
- assessment of results and formation of professional creativity portrait;
- selection of candidates for the formation of staff reserve;
- selection of candidates for vacant positions.

Let us consider the content of each stage in a more detailed way.

Traditional creativity assessment methods, as a rule, are focused on the evaluation of personal qualities, which are quite unquestionably manifested in professional activity. First of all, as evaluation tools most of the methods use tests that can generate a certain (desired) image and, thus falsify the results, if test takers are informed about the purpose of the test, its name or the content of questions and answers. Answers to the tests when hiring may not be quite adequate, because the subjects naturally want to get the desired position and a higher income. Secondly, the conditions under which testing is carried out are not comparable to day-to-day life or working conditions. Therefore, we consider it more acceptable to assess creative potential from a professional point of view via the use of complex tasks (k-tasks), the solution of which should maximize the potential of subjects, including the creative one.

In order to effectively apply linear programming methods, the number of k-tasks should correspond to the number of
key parameters of professional creativity (in our case \( m = 6 \)). Thus, the identity will be executed for each task:

\[
\sum_{j=1}^{m} (\gamma_j x_j) = \omega \sum_{j=1}^{m} y_j
\]

(1)

where \( \gamma_j \) - is the significance of the j-key parameter of professional creativity for the task (the range of values from 0 to 1.0);

\( x_j \) - the actual level of the j-key parameter of professional creativity of an applicant;

\( j \) – key parameter of professional creativity, \( j = (1, m) \), \( m = 6 \);

\( \omega \) - the actual level of k-task performance by an applicant, range of values from 0 to 10.

In order to improve the objectivity of evaluation results, experts should determine the significance of key professional creativity parameters for each task while developing k-tasks for each group of positions. In order to ensure high level of confidence in the assessment results, it is recommended that values \( \gamma_j \) be set to the maximum level \( k_{ij} \) and possible range of values \( y_j \). This approach will minimize the mutual (arithmetic) influence of parameter values on each other (that is, the coverage of the minimum actual values of some parameters by exceeding the normalized level of other parameters).

The profile of professional creativity qualitatively characterizes the necessary level of key creativity parameters, taking into account their importance for each group of positions. The optimal values of the key professional creativity parameters \( k_{ij} \) are determined (established) by experts, taking into account the requirements of professional standards and the development strategy of an organization. In addition, for the key parameters of professional creativity experts set significance coefficients, which also allow to assess the creativity level of individual positions for each of the parameters and compare them with each other.

The required level of professional creativity at each position is determined by the formula:

\[
\text{IP}_i = \sum_{j=1}^{n} k_{ij}
\]

(2)

where \( \text{IP}_i \) - required level of professional creativity of the i-position;

\( i \) - position (group of positions), \( i = (1, m) \);

\( j \) – key parameter of professional creativity, \( j = (1, m) \) (corresponds to the number of estimated parameters);

\( k_{ij} \) – normalized value of the professional creativity j-parameter at the i-position (value range from 0 to 10 points).

The normalized value represents the optimal level of key professional creativity parameter for a specific group of positions (or a position).

Thus, the professional creativity profile of a position is a row matrix, while \( \sum_{i=1}^{n} \text{IP}_i \) represents the complex indicator characterizing the required professional creativity level of all staff.

On the one hand, solution of k-tasks by the staff members should take place in conditions that are as close as possible to the working conditions, for example, staff is supposed to have access to sources of additional information. On the other hand, strict time limits should not be used. In this regard, we share the position of the authors [17], who believe that creation and maintenance of a relaxed and free environment is a necessary condition for creativity. In addition, the authors notice incorrectness of applying strict time limits, generating rivalry and establishing a single criterion for the correctness of the solution.

This approach is based on the results of studies that have confirmed that in adults the processes of motivation, including achievement, competition and social approval, have a negative impact on self-actualization of an individual and prevent manifestation of creativity. In addition, Grigorenko E. A. and Kochubey B. I. during the evaluation of creativity found that in the early stages of solving tasks divergent thinking gets activated, and in the later ones – convergent thinking [18].

When assessing the results of the task, a general (complex) assessment is given - \( \omega \). The actual level of k-tasks performance by staff members is estimated by experts in the range from 0 to 10.

To assess the level of key creativity parameters and to formulate the professional creativity profile, it is necessary to solve a system of equations.

\[
y_{11} x_1 + y_{12} x_2 + y_{13} x_3 + y_{14} x_4 + y_{15} x_5 + y_{16} x_6 = \omega_1;
y_{21} x_1 + y_{22} x_2 + y_{23} x_3 + y_{24} x_4 + y_{25} x_5 + y_{26} x_6 = \omega_2;
y_{31} x_1 + y_{32} x_2 + y_{33} x_3 + y_{34} x_4 + y_{35} x_5 + y_{36} x_6 = \omega_3;
y_{41} x_1 + y_{42} x_2 + y_{43} x_3 + y_{44} x_4 + y_{45} x_5 + y_{46} x_6 = \omega_4;
y_{51} x_1 + y_{52} x_2 + y_{53} x_3 + y_{54} x_4 + y_{55} x_5 + y_{56} x_6 = \omega_5;
y_{61} x_1 + y_{62} x_2 + y_{63} x_3 + y_{64} x_4 + y_{65} x_5 + y_{66} x_6 = \omega_6.
\]

In general, the system of equations can be represented as follows:

\[
\sum_{j=1}^{m} (y_j x_j) = \omega_i
\]

(3)

where \( f \) - k-is the task for creativity evaluation, \( f = (1, z) \), \( z=6 \).

Determination of the competence degree for each indicator.

Suppose \( y_j^{(k)} \) - significance of j-index in i-task according to k-expert, \( j = 1, 2, \ldots n \); \( i = 1, 2, \ldots m \); \( k = 1, 2, \ldots K \). The
relation between \( n, m \) and \( K \) is arbitrary. Normalization condition: \( \sum_{j} y_{ij}^{(l)} = 1 \) for all \( i \). Suppose \( \omega_{ij}^{(k)} \) - score for the performance of \( i \)-task set by \( k \)-expert. It is necessary to determine \( X_{j}^{(k)} \) - degree of competence on \( j \)-indicator, according to \( k \)-expert.

We will proceed from the linear model, i.e. assume that the overall competence of a subject on \( j \)-index is equal to the average competence shown by him in the performance of all tasks. Let us denote \( y_{ij}^{(k)} \) - competence of a subject on \( j \)-indicator manifested by him in the performance of \( i \)-task, according to \( k \)-expert. Proportional dependence is obvious \( y_{ij}^{(k)} = \omega_{ij}^{(k)} \cdot w_{j} \). Hence, by virtue of the adopted model,

\[
X_{j}^{(k)} = \frac{\sum_{i} y_{ij}^{(k)} \cdot w_{j}}{\sum_{i} y_{ij}}.
\]  

(4)

Division by sum of weights will allow to bring indicators of competencies to the standard of 10 points.

In order to get the value of average competence over the set of all experts, let us assume that all experts are equally competent, then \( \bar{X}_{j} = \frac{1}{K} \sum_{k} X_{j}^{(k)} \) - average competence is equal to the arithmetic mean of estimates of all experts.

To carry out the selection of candidates for staff reserve, we recommend the use of collective selection methods, particularly, the Born and Copland rule. Depending on the size of quantitative needs of the staff reserve formation, one of the applicants or several (the best) applicants might be selected.

Practical assessment of professional competence of applicants (test subjects) is aimed at finding staff members that best correspond to the normalized values of key professional creativity parameters and, as a consequence, provide the greatest value of "creative al pari". In this context, when comparing different employees (subjects), the highest priority is to choose a profile with a minimum level of deviations from the normalized values (with the maximum "creative al pari"). That is

- Level 1 - structural compliance - \( X_{ij} \rightarrow x_{ij} \);
- Level 2 - comprehensive compliance - \( \sum_{i} x_{ij} \rightarrow 1 \).

At this stage, we recommend using the modified utility function as a tool to assess "creative Alpari" and to select alternatives for the purpose of making adequate staff decisions. Since key parameters have the same units of measurement and standardized values have been established for them in the previous stages, taking into account their significance, the use of a linear utility function is sufficient to assess "creative al pari".

The utility function has different forms for the criteria to be maximized and minimized [19]:

with \( M_{ij} \rightarrow \max \):

\[
P_{M} = \begin{cases} 
1, & M_{ij} > M_{ij}^{\max} \\
\frac{M_{ij} - M_{ij}^{\min}}{M_{ij}^{\max} - M_{ij}^{\min}}, & M_{ij}^{\min} \leq M_{ij} \leq M_{ij}^{\max} \\
S \times \frac{M_{ij}^{\max} - M_{ij}^{\min}}{M_{ij}^{\max} - M_{ij}^{\min}}, & M_{ij} > M_{ij}^{\max}
\end{cases}
\]

(5)

with \( M_{ij} \rightarrow \min \):

\[
P_{M} = \begin{cases} 
1, & M_{ij} < M_{ij}^{\min} \\
\frac{M_{ij}^{\max} - M_{ij}}{M_{ij}^{\max} - M_{ij}^{\min}}, & M_{ij}^{\min} \leq M_{ij} \leq M_{ij}^{\max} \\
S \times (1 - \frac{M_{ij}^{\max} - M_{ij}}{M_{ij}^{\max} - M_{ij}^{\min}}), & M_{ij} > M_{ij}^{\max}
\end{cases}
\]

(6)

where \( M_{ij}^{\max} \) - evaluation of k-object by i-criterion;
\( M_{ij}^{\min}; M_{ij}^{\max} \) - the most desirable and the least desirable value of i-criterion;
\( S \) – penalty coefficient for determining the utility level of alternatives;
Pkl – utility level of k-alternative by i-criterion.

We make a number of assumptions in order to modify the utility function for the evaluation of "creative al pari":

- all parameters of professional creativity should strive for maximum value;
- there is no need to use the penalty coefficient \( S \);
- discrepancy to the minimum level of normalized values of professional creativity parameters is recognized equal to zero;

Thus, it is recommended to evaluate "creative al pari" frame by the formula:
where \( X_{hj} \) – evaluation of h-applicant by j-parameter of professional creativity;

\( k_{j}^{max} \); \( k_{j}^{min} \) - the most desirable and the least desirable value of professional creativity j-parameter of i-position;

\( K_{Ahj} \) – “creative al pari” of h-applicant by professional creativity j-parameter, varies in the range from 0 to 1. The higher the values of \( KA \), the higher the applicant compliance level. Thus, "creative al pari" frame is \( \sum K_{Ahj} \) not more than 6.

\( \sum (K_{Ahj}) = 6 \) – full compliance of an applicant to all normalized values of professional creativity parameters for a position. There are no negative deviations from the normalized level of key creativity parameters. In this case, it is advisable to analyze \( X_{hj} \) in order to find the opportunities for a more effective use of the applicant's creative potential;

\( \sum (K_{Ahj}) = (5.4-6.0) \) – insignificant deviations. In this case, the applicant is included in staff reserve in order to improve one's specific skills and later be employed for a desired position;

\( \sum (K_{Ahj}) = (3.0-5.4) \) – significant deviations. In this case, the applicant is included in staff reserve for the subsequent assessment of employment opportunities for positions that require a lower level of professional creativity;

\( \sum (K_{Ahj}) < 3.0 \) – significant discrepancy, the applicant does not have a proper level of professional creativity, the chances for employment in the organization are not considered.

Professional creativity profile takes into account a set of parameters, i.e. for the choice of alternatives, criterion is \( \sum (K_{Ahj}) \). Since \( \min X_{hj} > k_{j}^{max} K_{Ahj} = 1 \), positive deviations that characterize a higher level of professional creativity in certain key parameters are not taken into account when assessing "creative al pari". To detect staff members with a high creativity level, it is necessary to check the fulfillment of the condition:

\[
\frac{1}{\sum K_{Ahj}} \geq \sum (K_{Ahj})
\]

Under this condition, it is advisable to consider the possibility of employment to another position, which requires a higher level of professional creativity.

Discussions

Evaluation procedures suggested in this research are rather relevant in terms of improving the performance at service organizations, due to the fact that the developed technique can be used in the following situations:

- when hiring (to assess the degree of applicant's abilities compliance to the requirements of a vacant position);
- when forming staff reserve;
- when certificating staff (for a comparative assessment of various workers);
- when analyzing the professional training results (to assess the level of creative potential activization).

Conclusions

To sum up, the proposed approach, in contrast to traditional methods of creativity assessment, is focused on assessing professional creativity as the most valuable component of intellectual (creative) potential, which ensures the competiveness of an organization in the conditions of digitalization. The developed evaluation procedures on the basis of k-tasks allow to determine the level of key professional creativity parameters of the organization's staff: flexibility; originality; curiosity; interdisciplinary erudition; systems thinking; cross-industry communication. Involvement of experts at certain stages of assessment can significantly expand the scope of "creative al pari", for instance, via the formulation of professional creativity profiles for different positions.

List of references

1. A. Fedorova. Anti-crisis management of the organization’s personnel. - Yekaterinburg: Publishing House of the Ural University, 2017. - 164 p.
2. A. I. Kochetkova. Introduction to Organizational Behavior and Organizational Modeling: / Kochetkova A. I., 5th ed. – M.: Delo Publ., 2011. – 942 p.
3. Aletdinova A. A. Methods of Assessing the Abilities of the Individual to an Entrepreneur's Innovative Activity / A. A. Aletdinova A. V. Koritsky, G. I. Kurcheeva // Kreativnaya Ekonomika - Creative Economy. 2011. No. 1. P. 99-104.
4. Amabile T. V. How Team Leaders Show Support—or Not // HBS Working Knowledge. – Available at: http://hbswk.hbs.edu/cgi-bin/print?id=4155.
5. Atlas of New Professions. – Available at: http://atlas100.ru/future.
6. Bagaeva, I. Iliashenko, O., Borremans, A. Theoretical and methodological aspects of the competence approach to the evaluation of the organization's personnel. 2018. 193, article number 05060.
7. Cherkesova L. L. Modern Methods of Creativity Assessment/ L. L. Cherkesova / / Almanach Sovremennoy Nauki i Obrazovaniya - Almanac of modern science and education. 2012. № 12 (67), part 1. P. 139-142.
8. GOST R 56273.6-2016/ CEN/TS 16555-6:2014. Innovation management. Part 6. Creativity management. http://docs.cntd.ru/document/1200142684 (accessed: 22.09.2019).
9. GOST R 56273.6-2016/ CEN/TS 16555-6:2014. Innovation management. Part 6. Creativity Management. Available at: http://docs.cntd.ru/document/1200142684.
10. GOST R 56273.7–2015/ CEN/TS 16555-7:2015. Innovation management. Part 7. Assessment of innovation management. Available at: http://docs.cntd.ru/document/1200142685.
11. Grigorenko E. A. Analysis of the Process of Nomination and Verification of Hypotheses by Twins / E. A. Grigorenko, B. I. Kochubej / / Novyi Issledovaniya Psychologii - New Research in Psychology. 1989. No. 2. P. 15-20.
12. Gudkov P. A. Methods of Comparative Analysis: / P. A. Guskov; ed. by A. M. Bershadsky; Penza state University Publ. Penza, 2008. 72 p.
13. Kalinina, O. V., Zaychenko, I. M., Gutman, S. S. Concept of creating innovative mechanism of human resource development in Russia. 2017-January, pp. 2708-2719. Available at: https://www.scopus.com/inward/record.uri?eid=2-s2.0-85048670076&partnerID=40&md5=c1844935b7ecfd85fd045f8f62f05a0f0.
14. Pirogova O. Plotnikov and V. Impact of capital structure on company of its value growth estimation / SHS Web of Conferences, vol. 35, 2017 3rd International Conference on Industrial Engineering (ICIE-2017)/ Article Number 01053.
15. Plotnikov V., Pirogova O. Key Competencies as an Enterprise Value Management Tool // Proceedings of the 31st International Business Information Management Association Conference (IBIMA) "Innovation Management and Education Excellence through Vision", 25-26 April 2018. Milan, Italy. R. 1716-1721. ISBN: 978-0-9995551-0-2.
16. Plotnikov V., Pirogova O., Vertakova Y. Model for Assessing the Human Capital of an Enterprise // IOP Conference Series: Earth and Environmental Science. 2019. Vol. 272. Article 032225. Available at: https://doi.org/10.1088/1755-1315/272/3/032225.
17. Rudskaiia, I., Rodionov, D. The concept of total innovation management as a mechanism to enhance the competitiveness of the national innovation system. 2018. pp. 246-251. Available at: https://www.scopus.com/inward/record.uri?eid=2-s2.0-85055571082&doi=10.1145%2f2320348.2320349&partnerID=40&md5=491498598e95a1a83b5345b5b544bb83
18. Valebnikova, O. A., Kalinina, O. V., Vilken, V. V. Human capital management by approaches of corporate governance in regional economy. 2018. pp. 5766-5771. Available at: https://www.scopus.com/inward/record.uri?eid=2-s2.0-85060726657&partnerID=40&md5=961fbd26fe6d51d801e6a87058ca61ac.
19. Vetrenko, P. P., Chernysheva E. A., Levitina, I. Y., Voronkova, O. V., Mikheeva, D. G. Encouraging Employees to Increase the Labor Intellectualization Level as a Factor of Evolution of the Intellectual Capital. 2017. 20 (4). pp. 568-577.
20. Wenger George. On Systems Thinking in Business. Available at: https://cyberleninka.ru/article/v/o-sistennom-myslitelii-v-biznese.