QUALIMETRIC ASSESSMENT OF ENTERPRISE’S PERSONNEL INNOVATIVE POTENTIAL

Abstract. Introduction. Personnel innovative potential (PIP) qualimetric assessment issue is important due to the fact of insufficient attention to the problem of its level quantitative measuring based on performance which characterizes employees’ innovation skills and capabilities.

Purpose of the research is development of methodology for personnel innovation potential qualimetric assessment depending on availability of staff innovative skills and capabilities.

The methods of algorithmic modeling, expert review based on a binary scale, statistical analysis, matrix method are used in this paper.

Results. Necessity of personnel innovative potential assessment using quality control methods is grounded. The algorithm and methodological approaches to the qualimetric assessment of personnel innovative potential depending on availability of personnel innovative skills and capabilities are developed. The system of performances to assess the innovative skills and capabilities of employees and the mechanism of their calculation are formed. A criteria matrix of personnel innovation potential integral level assessment was developed.

Conclusion. The set of organizational and methodological developments allowed forming the method of personnel innovative potential qualimetric assessment. It is used to assess the level of personnel innovation potential in a separate company, to make comparative analysis with its level at other enterprises and identify measures to optimize the employees’ innovative skills and capabilities.

Key words: enterprise; personnel; innovative potential; qualimetric assessment.

JEL Classification: C52, M21, M54

M. V. Adamenko
PhD (Economics), Associate Professor, Kryvyi Rih National University, Ukraine
11, XXII Partizydu Str., Kryvyi Rih, 50027, Ukraine
adamenko@ua.fm
assessment of personnel innovative potential is carried out using the fuzzy logic method [8] where the involvement and using of employees in innovative activity is quantitatively evaluated, and the level of personnel potential is characterized in the form of numerical limits which corresponds to a linguistic expressions «high level», «average level», «low level».

Paying tribute to the works of the above mentioned scientists, we may note that in Ukraine very little attention for personnel innovative potential is given; therefore this research is conducted mainly on the basis of the Russian developments.

In modern innovation studies the issue of personnel innovative potential quantititative assessment depending on the availability of innovative skills and capabilities of employees who can be assessed only qualitatively remains unsolved. The attention is also not enough paid to the development of universal methods and techniques by which managers and all stakeholders would be able to determine the level of personnel innovation potential in comparison to the industrial branch or competitors and investigate the possibilities for its change.

Thus, the recent research analysis and the range of unresolved issues regarding the quantitative assessment of personnel innovative potential give the reasons to talk about the lack of the problem scientific disclosure, hence, the need to its careful study.

The purpose of research is to develop the method of personnel innovative potential qualimetric assessment depending on availability of staff innovative skills and capabilities.

Result. In the basis of qualimetric assessment of personnel innovative potential, there is a factor-criteria modeling that allows decomposing certain quality performances for a number of simple properties-criteria, to measure and evaluate them using ball-rank scale. In determining these properties we should consider the following: 1) each employee has the subjective properties, has his own abilities, conscious activity, values and needs that significantly affect his potential applied in innovation studies, and constantly change it; 2) each employee taking part in the innovation process is not isolated, but interacts with other employees and co-exists in a social and economic environment.

On the one hand, it complicates the selection of innovative potential of the individual employee as the object of assessment, on the other hand, it allows to expand it highlighting the organizational and labor, communication, adaptive and entrepreneurial individual properties; 3) the innovative sphere is characterized by volatility, uncertainty, dynamism which leads to the necessity of distinguishing employees innovation abilities as investigated properties of qualimetric assessment and consider them together with innovative abilities of employees development.

Qualimetric assessment of personnel innovative potential we proposed to carry out by such algorithm. (Figure).

At the first stage, the objects of personnel innovative potential qualimetric assessment are defined. They are innovative skills and abilities of individual employee which together determine his level. These innovative abilities and opportunities are considered by personnel innovative potential types: natural, organizational and labor, intellectual, creative, communicative, adaptive, entrepreneurial, motivational.

The second stage of the proposed technique personnel innovative potential qualimetric assessment is to develop the system of performances and criteria for employees' innovative skills and abilities evaluation. In construction the system of performances and criteria such approach was used: 1) only quality performances-properties were selected by professionals (experts) which can be measured quantitatively with the application of scoring; 2) development the system of personnel performances-properties was done dividing them by the types of personnel innovative potential; 3) defining the criteria of qualimetric assessment was done according to the presence or absence of certain features in the employee.

The system of performances to assess innovative abilities of employees was developed within the personnel innovation potential. It is given in Table 1.

This system can be supplemented by other performances-properties of employee that characterize his innovative ability.

The system of performances to assess the innovative capabilities of employees is formed similarly to that shown in Table 1. It includes performance-properties of employee which separately characterize his capabilities to use in innovative activity physical and mental abilities, specific feelings, memory, intuition, features of mentality, mind, disposition, abilities, etc. Therefore, innovative ability of employee meets the opportunity to use it in the field of innovation.

Also, it should be noted that in order to assess the innovative capacity of the personnel, not all the performances listed in the Table 1 can be used, but only those that are most characteristic for the innovative activities of the certain enterprise.

With the developed performance system by a group of experts who are elected from among the managers of enterprises and professionals in the field of innovations, the importance of each assessment parameter of innovative skills and capabilities of employees (the third stage of the proposed method) are set. This expert determination is made within each type of innovative potential of personnel in such a way: 1) each expert carries out the rank assessment of parameters within a particular type of potential; and 2) by calculating the arithmetic mean is determined by the average rank of the individual performance; and 3) by calculating the proportion of middle-ran-
king individual performance of the amount determined by the importance performance rank.

To make qualimetric assessment of personnel innovative potential, it is also necessary to hold an expert determination of the employees' cumulative innovation skills and capabilities significance according to each its type (fourth stage). It is conducted in the same manner as the expert assessment of significance in the preliminary stage of the proposed methodology.

The fifth stage is the expert assessment of the existing indicators of personnel innovative potential by a binary scale. The essence of this assessment is as follows. Expert Group establishes the presence or absence of an innovation skill and ability of the individual worker. To do this, each expert receives a check-list for each employee whose innovative ability and potential is to be evaluated. In the check-list, there is a list of performance-properties of employee which are rated based on a binary scale: performance is set to «0» if there is a lack of innovative skills or abilities; to «1» if there are some innovation skills or abilities. It must be taken into account that innovative abilities are not certain abilities of a person, but only individual psychological characteristics of employees who expressed their willingness to take up knowledge, abilities, skills and successful performance of innovation activity in enterprises. Consequently, innovative capabilities are not every capabilities, but specific conditions, favorable circumstances, resources, sources, etc., resulting into implementation of innovative abilities of employees.

Result of the expert assessment system of indicators of personnel innovative potential is the determination of the weighted average value of each performance-properties of employee, which describes his innovative abilities and capabilities.

At the sixth stage of qualimetric assessment, calculating of the average values of the innovative abilities and capabilities of each employee occurs, which corresponds to a certain type of personnel innovative potential.

\[
Z_s = \sum_{i=1}^{n} z_i \cdot d_{i}.
\]

where

- \(Z_s\) – weighted average value of the innovative ability of the employee within the \(s\)-value of personnel innovative potential;
- \(s\) – separate type of personnel innovative potential;
- \(z_i\) – \(i\)-value of performance-property of the employee which characterizes his innovative abilities within \(s\)-value of personnel innovative potential;
- \(d_{i}\) – \(i\)-value significance of performance-property of the employee which characterizes his innovative abilities within the \(s\)-value of personnel innovative potential.

Result of the expert assessment system of indicators of personnel innovative potential is the determination of the weighted average value of each performance-properties of employee, which describes his innovative abilities and capabilities.

According to the rate of weighted average values of abilities and capabilities of the employees, the executives are able to identify tendencies in personnel innovative potential within its species certain in order to identify existing problems and ways of its formation improving.

Based on the results of the performed calculations, at the seventh stage, according to proposed methodology, the qualitative assessment calculation of total innovation abilities and capabilities of the individual employees is carried out:

\[
Z_p = \sum_{p=1}^{P} \left( \sum_{s=1}^{S} Z_s \cdot d_{z} \right)\]

\[
M_p = \sum_{p=1}^{P} \left( \sum_{s=1}^{S} M_s \cdot d_{m} \right).
\]

where

- \(Z_p\) – cumulative innovation ability of the employee;
- \(d_{z}\) – importance of abilities of \(s\)-value of personnel innovative potential in characterization of total innovation abilities of the employee;
- \(M_p\) – cumulative innovation capability of the employee;
- \(d_{m}\) – importance of capabilities of \(s\)-value of personnel innovative potential in characterization of total innovation capabilities of the employee.

Based on the results of the performed calculations, at the seventh stage, according to proposed methodology, the qualitative assessment calculation of total innovation abilities and capabilities of the individual employees is carried out:

\[
Z = \sum_{p=1}^{P} \left( \sum_{s=1}^{S} Z_s \cdot d_{z} \right)
\]

\[
M = \sum_{p=1}^{P} \left( \sum_{s=1}^{S} M_s \cdot d_{m} \right).
\]

where \(Z\) – cumulative innovation ability of the employee; \(M\) – cumulative innovation capability of the personnel; \(P\) – number of the employees, innovative ability and capabilities evaluated (\(p = 1, P\)).

Calculation of \(Z\) and \(M\) allows assessing in complex the level of personnel innovative potential, regarding
it as the integration of innovative skills and capabilities of all employees who take or want to take part in the innovation process. Besides, it is necessary to consider compliance of innovative capabilities with innovative abilities of employees, because often not all workers who are endowed with certain abilities have the opportunity to participate in innovation activity, and vice versa, some employees with some innovative capabilities are unable to generate ideas, think creatively etc.

Based on the calculation of Z and \( M \) integral calculus of personnel innovation potential (the eighth stage), it is carried out:

\[
IL_{PIP} = \sqrt{Z \cdot M}
\]

where \( IL_{PIP} \) – integral level of personnel innovation potential. \( IL_{PIP} \) value is between 0 and 1. Accordingly, the more there is its approaching to 1, the higher the level of personnel innovative potential is. Conversely, the closer is \( IL_{PIP} \) approaching to 0, the lower is this level.

To improve the interpretation quality of personnel innovation potential integrated level assessment results, we offer a criteria matrix (the ninth stage). Its development is based on the determination of the numerical limits of the total innovative abilities (Z) and capabilities (M) of the personnel and the basis of the personnel innovative potential appropriate level establishment in form of linguistic expressions «high», «average» and «low» (Table 2).

Further you need to assess goal achievements of qualimetric assessment of personnel innovative potential (the tenth stage), it is carried out:

- developing of balanced policy on professional and personal mastering of staff;
- carrying out advocacy on the need of innovation development and introduction at the enterprise;
- training of the personnel on the basics of art, rationalization and invention, as well as the methods of creative problems solving;
- overcoming (reducing) personnel behavior inertia at introducing innovation and implementation a set of measures for its rehabilitation;
- enabling the fulfillment of employees, management promoting of staff at all production units to involve and participate in innovative projects;
- development and distribution of information provision in innovation, creating a fund of innovative ideas, and recognition the value of innovations;
- development of autonomy and management support for research units, creative and project teams in executing innovations;
- development of material and moral incentives of innovation and active participation of employees in the innovations implementation.

Conclusions. Thus, first developed by us method of qualitative assessment of personnel innovative potential is based on the usage of performances which enables to assess the presence of the innovative abilities and capabilities of employees, combining the use of statistical and expert assessment methods aimed at determining the integrated level of personnel innovation potential and allows to optimize it according to the requirements of the enterprise management at a certain stage of its development.

References


References (in language original)


Received 23.02.2014

References (in language original)

6. Lega, K. A. Formirovanie mekhanizma upravleniya innovatsionnym potenzialom personala korporatsii: dis... kand. ekon. nauk: 08.00.05 / Konstantin Aleksandrovich Lega. – Chelybinsk, 2008. – 194 s.
8. Hadasевич, N. R. Formirovanie innovatsionnogo potenziala personala organizatsii: dis... kand. ekon. nauk: 08.00.05 / Naira Rajikova. – Chelybinsk, 2008. – 152 s.