

METHODS FOR ASSESSING A COMPETITIVE SPECIALIST

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ABSTRACT

It is proposed to break a vicious circle of negative development of industry enterprises (Knall circle) by qualitative growth of human resources of each organization. For that purpose, it is sug-

gested to improve methods for assessing competence of specialists. The proposed mechanism takes into account integral and particular criteria, and is designed to achieve a multiplier effect of development factors interaction.

Keywords: railway, industry enterprises, Knall underdevelopment circles, human capital, competence assessment, competitiveness of a specialist.

Background. In any country, one can find such moments of its development, when certain equally dependent regularities and circumstances explain the current status of a variety of subjects and spheres of human activity. It is to be supposed that incomplete market reforms, shortcomings of the transition period, mismatched material and technical and technological base of the alleged innovations find their ambiguous projections not only in the transport sector.

Similar facts and issues are interconnected and form so-called «Knall underdevelopment circles» [1]. Here is one of them: a complex economic situation of enterprises reduces their cost-effectiveness, which in turn leads to financial problems and as a result, insufficient funding of educational, scientific and social programs; reduction in the financing of innovation leads to a reduction in the competitiveness of industry enterprises; customer needs are not provided and thereby their effectiveness reduces. The circle is closed. Such circles lead to the economic degradation of enterprises, sector and the entire economy of the country.

Internal and external challenges, as described above, require that management of companies and industries should seek other resources of transformation, allowing starting the mechanism of progressive development, e.g. of building Knall anti-circles.

One such opportunity is seen in improving the procedures of organizational management: the creation of a repository, educational and scientific-industrial cluster, forming an enterprise as part of self-regulatory organizations [2].

The second possibility is to implement the ideology of human resources development [3, 4]: competent industry experts ensure the quality of transport services, timely renewal of technical equipment and production technology, which leads to increased competitiveness, extension of transport market segments, the influx of additional funds to solve productive and economic and social programs. For this purpose, additional vocational training of specialists of the enterprise is widely use [5]. The circle has closed again, but it gave the increase in capacity of each organization in all sectors of activity options.

Objective. The objective of the author is to demonstrate methods, applied for assessing a competitive specialist.

Methods. The author uses general scientific methods, economic approach, statistical method, evaluation.

Results. If you follow the designated management paradigm, it gives you a reason to go from still being implemented at the industry enterprises the concepts of «human resource management», «personnel management» to the concept of human capital development. The gist of it seems to be as follows.

Along with material resources and financial capital, the driving force of the organization is human capital, which is considered as covering intellectual property of the enterprise, skills of personnel, their creativity.

The concept of human resource management determines the relationship of the head with employees at the level of accounting and control of parameters of their activities (qualification, labor discipline, implementation of performance indicators). Within this framework, clearly oriented corporate culture was used, followed by a predominance of priorities of power, unity of command and administrative style of the management.

In the transition to the concepts of human resource management, human capital development the old culture in the production is replaced by the culture of tasks or roles, leadership style changes from administrative to a more democratic (the role of the expert in management significantly increases). It promotes the involvement of staff in organization problem solving, multiplies its intellectual potential, and increases the degree of responsibility of employees for their work.

In the concept of human capital management person is at the center of attention. The employee sees its development, self-improvement, recognition in productive activities, identifying his achievements with achievements of the organization. The company for the employee is the second (in Japan often the first) family. The company, investing in education, intellectual development, professional competence, gets the corresponding impact in all areas: industrial, scientific (innovation development), social.

The idea of the concept of human resource management has long been tested in a variety of research and practice of organizational management. For example, in [6] it is proposed to carry out the selection of personnel of railway transport on the level of competences. And this is not the first case of its kind.

The emerging practice formulates the problem of formalized competence assessment. There is a varied teaching material for assess-

ment of competencies of the modern professional. As a rule, they are based on materials of certification and psychological diagnosis of personality. It does not always enable to adequately assess the contribution of the employee in solving internal and external problems of the organization, determine its potential of proactive development.

In [7] a method is proposed that provides an integrated indicator of competence, it is determined on the basis of the factor model by summing the number of private indicators, weighted according to their importance for the worker:

$$Z_{ij} = 0,4x_1 + 0,2x_2 + 0,1x_3 + 0,3x_4. \quad (1)$$

(1) denotes: i – number of specialists; j – number of positions occupied by the i -th specialist or to which he applies; x_1 – professional competence; x_2 – corporate competence; x_3 – general cultural competence; x_4 – market competence.

The coefficients (multipliers) 0,4; 0,2; 0,1; 0,3 describe the importance levels of appropriate competence. Multipliers are offered to be determined by experts on the basis of verbal and communicative method on a scale: «very bad», «bad», «satisfactory», «good», «very good». Quantitative evaluation is carried out by the expert in the range from 0 to 1. For different specialists multipliers have the same values, which do not reflect the different importance of determined specific competences.

Instrumental mathematical shortcomings of this method are:

- Integrated approach (in this case some effects absorb others and problems of staff development «hide» for each other);
- Additivity of proposed ratio for the numerical comparison of options;
- Subjective peer review of criterion's weightings.

But the presence of such defects does not hinder the improvement of the method. For this it is offered to carry out a number of procedures.

1. With verbal communicative method, based on experience and intuition of the head and with account of the tasks facing the organization, a list of specific competences is specified. For managers at various levels, they will be different both in composition and weight: for top management creativity is important, also possessing leadership skills and strategic thinking, for managers-executives it is more important to possess discipline, precision and accuracy, at the same time creativity, which violates the established technology, and the order of work, on the contrary, in this case, is not welcomed.

2. In order to overcome the subjectivity of experts in the calculation of multipliers there are two ways [8]:

a) To use the method of paired comparisons. In this embodiment, the expert makes his assessment of each pair of competence, and then begins the procedure of statistical analysis of the data, averaging expert opinion, that is, absorbing noise (errors) of their opinions (hypotheses). This way does not contain analytical (calculation) issues. They are described in detail in many textbooks – see, e.g. [8]. However, the method

is based on subjective preferences of the experts, so if there are statistical surveys, carrying concealed information, other approach becomes preferable.

b) To adopt regression assessment methods. In this case, the integral component of the type (1) is viewed in a general form:

$$Z = a_1x_1 + a_2x_2 + a_3x_3 + a_4x_4. \quad (2)$$

An experiment is carried out (tests to verify the selected competencies are carried out and / or expert opinion is fixed). There are various ways of obtaining the data: one person is investigated by different tests (experts) or some similar specialists with one test (expert), or these procedures are combined, the result of which is an analogue of Table 1.

The data shown in Table 1 were obtained by the author for the described model by the results of the analysis of estimates by the group of experts of Rostov branch of NIIS.

The fields of the table (values x_j) were filled on the basis of application of known assessment test of management capabilities of leaders and experts [9] and original tests, drawn up by the author. Integral competence Z_{in} was revealed by verbally-communicative method based on the opinion of management of the branch.

According to the table 1 regression dependence of the form (2) is constructed. Qualifying average is shown in the process of solving the problem of identification of coefficients of the model. For this purpose, using the traditional method of least squares [10], that is, the problem was solved:

$$J = \text{Min } \sum (Z_{in} - Z_{ij})^2. \quad (3)$$

Values of Z_{in} for the ratio (3) were obtained by the formula (2) and values of columns 2-5 of the table 1. The unknown coefficients a_j are calculated from the relevant requirements of the equality to zero of relevant partial derivatives:

$$\partial J / \partial a_j = 0. \quad (4)$$

The calculations gave the following results: $a_1 = 0,50$; $a_2 = 0,30$; $a_3 = 0,15$; $a_4 = 0,05$. That is, the dependence (2) takes the form:
 $Z = 0,50x_1 + 0,30x_2 + 0,15x_3 + 0,05x_4.$

This means that in this particular situation (and it was about introduction of hump automation systems) professional competence, according to experts, is crucial (relatively speaking, 50% success rate), corporate competence (the ability to work in a team, to understand the problems of colleagues) provides almost a third of the success, and general cultural, and especially the market competences do not play a significant role.

3. Dependencies and relations (1), (2) suggest the presence of only additive effect and the lack of synergy. It seems that this is a very approximate model of the described process with extremely severe restrictions. It is necessary to expand the limits of applicability of the method, including the possibility of taking into account the multiplier effects [11]. Indeed, the head is efficient; specialist is highly skilled, if you can talk about them, that they possess the property (competence) x_1 , and property x_2 , etc. This phraseological structure in mathematics (in contrast to the synthesis of logic chains with the help of



Table 1

Statistical results of the analysis of competences of experts

I	x_1	x_2	x_3	x_4	Z_{int}
1	0,3	0,2	0,3	0,7	0,3
2	0,5	0,7	0,4	0,1	0,5
3	0,4	0,3	0,2	0,2	0,25
4	0,5	0,4	0,3	0,3	0,45
5	0,6	0,3	0,4	0,4	0,45

Table 2

Data for the selection of experts on competence competition

I	x_1	x_2	x_3	x_4
1	0,4	0,5	0,4	0,6
2	0,5	0,6	0,5	0,7
3	0,3	0,6	0,7	0,9
4	0,4	0,7	0,8	0,6

the conjunction «or») is modeled not by additive, but by multiplicative relationship:

$$Z = Ax_1^{a1} \times x_2^{a2} \times x_3^{a3} \times x_4^{a4}. \quad (5)$$

To go to the logic of demonstrated calculations (relative to linear expressed function – formulas (2) – (4)) is possible after taking the logarithm of (5) and renaming variables.

4. The following introduced procedure is designed to update the role of individual (partial) competences and avoid the absorption of effects of some factors by others. For this purpose, in addition to the integral indicator expressed by relation (5) (or (2)) it is proposed to introduce a system of constraints:

$$x_i \geq x_{ir}. \quad (6)$$

These limits define the minimum level of competence under which it can be said that the expert succeeded. Then the selection procedure of the specialist on competencies will be based on relationships:

$$\text{Max } Z, \text{ upon condition } x_i \geq x_{ir}. \quad (7)$$

For example, suppose a model (7) has the form:

$$Z = x_1^{0,5} \times x_2^{0,1} \times x_3^{0,1} \times x_4^{0,3}; x_1 \geq 0,4; x_2 \geq 0,5; x_3 \geq 0,3; x_4 \geq 0,6, \quad (8)$$

and monitoring results of four experts gave the results shown in Table 2.

Specialist under the number 3 cannot participate in further competition due to the fact that his first competence does not meet restrictions ($x_1 = 0,3 \leq 0,4$), established by the model (8), while the integral index has a value $Z_3 = 0,49$, not the worst in the composition of other analyzed candidates: $Z_1 = 0,46$; $Z_2 = 0,56$; $Z_4 = 0,51$.

The maximum value in this row is 0,56, and therefore the second specialist respectively to a predetermined pattern has advantages over the others.

Conclusions. The necessity and the possibility of development of the industry by improving the human resources of the organization and the role in this problem of competence assessment procedures of the specialists are justified. The analysis of existing methods of competence assessment is given and an improved mechanism is offered that takes into account the integral and particular criteria, a multiplier effect of the interaction of factors of an organization development.

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РЕТРОСПЕКТИВА 256

*ИК-приборы для флота
и авиации.*

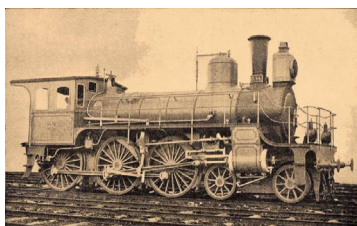


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*Для одних – физик, для
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*В начале прошлого века
начальников учили водить
паровоз.*



КОЛЕСО ИСТОРИИ • HISTORY WHEEL

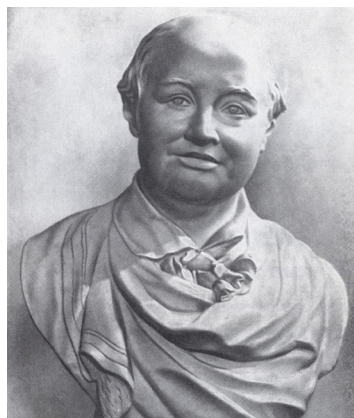


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*Most appreciated as a physicist
by some persons, and as a poet
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to drive locomotives... at the
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