

DOI: 10.12731/2218-7405-2013-8-31

TOOL SUPPORT OF DECISION-MAKING AT SELECTION AND PERFORMANCE APPRAISAL TAKING INTO ACCOUNT MOTIVATION

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The purpose of work consists in development of methods of information and algorithmic support of decision-making at an assessment and personnel selection taking into account motivation. The methods of a multicriteria assessment of alternatives and expert technologies are used as researching tools. The main result of the presented work is creation of the mathematical model that allows estimating a motivational orientation in the actions of the staff and job applicants. The scope of results of the work is the sphere of theoretical and applied questions of human resource management of the organizations.

Keywords: Decision making; motivation; selection and performance appraisal of the personal, methods of information and algorithmic support of decision-making.

ИНСТРУМЕНТАЛЬНАЯ ПОДДЕРЖКА ПРИНЯТИЯ РЕШЕНИЙ ПРИ ОТБОРЕ И ОЦЕНКЕ ПЕРСОНАЛА С УЧЕТОМ МОТИВАЦИИ

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Цель работы состоит в разработке методов информационной и алгоритмической поддержки принятия решений при оценке и отборе персонала с учетом мотивации. В качестве инструментария использованы методы многокритериальной оценки альтернатив и экспертные технологии. Основным результатом дан-

ной работы является построение математической модели, позволяющей оценить мотивационную направленность в действиях персонала и претендентов на работу. Областью применения результатов работы является сфера теоретических и прикладных вопросов управления персоналом организаций.

Ключевые слова: принятие решений, мотивация, отбор и оценка персонала, методы информационной и алгоритмической поддержки принятия решений.

Introduction

In modern theories of personnel management considerable attention is paid to the problems of selection and assessment of employees as the choice of the latter and their subsequent arrangement at certain positions are capable of producing an essential impact on the overall performance of the whole organization [1, 4].

At present at an assessment or selection of employees according to modern concepts of the personnel management the following two groups of indicators are considered:

– formal indicators of employees or applicants' activities, including the information on education, labor activity, biographic data. The analysis of this group of indicators allows to receive information on experience, possession of skills, education, etc.;

– properties of employees' identity. Within this big group of indicators there have to be considered both social, and psychological parameters characterizing employees or applicants for positions. Consideration of properties of the personality allows both to estimate predisposition of respondents to performance of a certain kind of activity, and to make the conclusion about his/her compatibility in labor collective.

Taking into consideration these two groups of factors allows to ensure high enough quality of personnel selection and performance appraisal procedures. Nevertheless, in the majority of Russian organizations they still pay insufficient attention to questions the analysis of the personnel identity properties at selection or assessment of activity results. Even if they consider personality properties, often the research has

no integral character and thus isn't paid due attention to the problem of the personnel motivation when performing official duties. Thus, the purpose of the work consisting of the development of methods of information and algorithmic support of decision-making at an assessment and selection of the personnel taking into account motivation, is actual.

Models and criteria of organizations' employees motivation

From the point of view of external influence motivation is a process of stimulation of the work collective or separate employees to certain actions aimed at achieving by them the result set [1, 4]. Motivational influences can be initiated by a person itself in the form of response to the influence of the environment, which has no motivational orientation, expressed in the pursuit to reach the goal with a certain set of means [1, 4].

F. Taylor and A. Fayol in their works pointed out to the necessity of using motivation as the component of personnel management indispensable for company's success achievement [5, 6]. However, detailed study of motivation began a bit later with use in organizations' management of the provisions of "human relations" school, and then "behavioral sciences" [1, 4].

The motivation theories developed by A. Maslow, D. McGregor, D. McClelland, V. Vroom, F. Herzberg and others had differences and differently explained and recommended how to correctly work with the personnel, however, in their research all these scientists admitted the most important fact of the necessity to use the methods directed at the study of these aspects of employees' identity properties.

Motivation is often considered from the point of view of the ways applied to increase the overall performance of employees. In our opinion, motivation theories can be also applied in the course of selection and assessment of employees. For example, with their help it is possible to define how far coincide the expectations of the employee from a position for which he applies with real conditions of work performance. It is also possible to solve the inverse problem when they study the expectations of several employees in order to select the one, who is the most suitable for the given position in

the given organization. The existing discrepancy between theoretical importance of motivation and its practical application is explained by the fact that provisions of many theories and the concepts developed within human resource management, and concerning such questions as style of the management, study of conflict situations, motivational influences, etc., have descriptive character and operate with qualitative indicators and characteristics. In relation to these concepts mechanisms of ordinary mathematics don't suit as they can't be precisely measured in any units. Therefore in practice heads of organizations' divisions and personnel departments staff can only by indirect indicators or intuitively estimate the efficiency of the decisions made by them at the appointment or assessment of employees, as well as their motivations.

Thus, there emerges an objective need for the development and the suggestion of the methods, allowing to receive quantitative values of the parameters characterizing motivational influences and structure of the employee's needs with sufficient degree of reliability.

Receiving of the quantitative assessment, allowing to interpret the employee's needs structure, in our opinion, can be executed by means of use of the apparatus of indistinct logic as it suits well for the work with qualitative indicators, which motivation theories operate with. There also can be applied methods of multicriteria alternatives assessment and expert assessment [2, 3].

As the object for the use of mathematical apparatus we have chosen the modified motivation theory "Hierarchy of needs according to A. Maslow" as it, in our opinion, reveals very well the types of needs of a person. Besides, it correlates well with other known motivation theories by Alderfer, McClelland and Herzberg [1, 4].

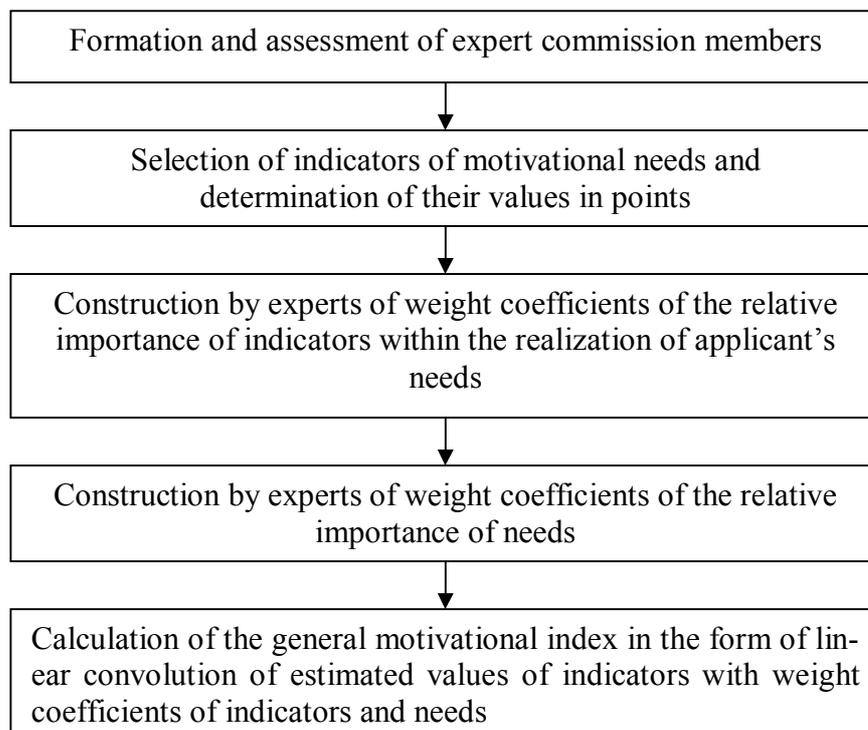
Modification of basic provisions of A. Maslow's theory is that different types of needs of a person are manifested not consistently but simultaneously. That is the need for prestigious work in a person can be manifested simultaneously with the need of safety and physiological needs.

As an assessment criteria there will be used the needs from A. Maslow's classical theory: physiological needs, safety, social belonging (social needs), prestigiousness of activity (recognition and self-esteem), self-actualization.

Wherein the force of the manifestation of this or that need will depend on a concrete person, and the possibility of its satisfaction to a great extent will be determined by the concrete organization and the type of activity in it.

Procedure for the calculation of comprehensive quantitative assessment of motivation

The quantitative assessment of a motivational index of employees can be determined according to the procedure as shown in the picture.



Pic. Scheme of the procedure for the calculation of a comprehensive assessment of motivation

At the first stage it is necessary to determine the structure of an expert commission, which will assess how vividly for each concrete position this or that need should be expressed. It is desirable to select the experts from the following persons:

- organization's personnel department staff;

- the immediate supervisor of a considered position;
- staff recruitment expert-analyst from employment agency.

As generally experts possess different qualifications and skills, each of them should be assigned weight for the calculation of their competence. Wherein it is necessary to avoid situations, when one expert from the working group assesses another one. In spite of the fact that this method exists, it has an essential shortcoming, in case of bad or on the contrary good personal relations between experts they with high degree of probability will give each other biasedly overestimated or underestimated estimates. In our opinion, the simplest and, at the same time objective methods of assessment of experts are the following:

1. The qualification and documentary method based on the analysis of biographical details of the expert – education, work in various positions, etc.
2. Method of experts' testing, which consists of experts' answers to test questions, which allow to receive information on their qualifications.
3. The mixed method based on the application of a qualification and documentary method and testing.

Primary points Me_i received as a result of experts' assessment are transferred to total points Ste_i , by means of a ratio described either by functional dependence, or in a directive way by the established scale of transfer (1).

$$Ste_i = F(Me_i) \quad (1)$$

After the calculation of the total estimates gathered by experts Ste_i , it is necessary to execute their rationing, concerning the sum of the estimates received by all experts (2). The result of rationing becomes the weight coefficient W_i of i^{th} expert.

$$W_i = \frac{Ste_i}{\sum_{j=1}^n Ste_j} \quad (2)$$

In case the considered technique is used for the determination of an index of motivation of an estimated individual, the expert will be only one – the examinee. However, his/her work will begin with the third stage.

At the second stage it is necessary to determine the structure of criteria of indicators used for the subsequent assessment. This stage is performed by experts of the organization or the third-party analysts possessing the corresponding knowledge of cases in point.

The indicator is understood as a factor used for satisfaction of a need. Within motivational model the following indicators can be suggested: salary, social package, position, psychological climate, unhealthy work conditions, acquisition of new knowledge, popularity acquisition in society, etc. For example, for the salary indicator there can be used the scale specified in the table.

Table

Scale of transfer of the salary size in points

№	Interval of the salary size, thousand Rubles.	Points
1	0 ÷ 10	1
2	10.1 ÷ 17	2
3	17.1 ÷ 23	3
...
10	80.1 ÷ and more	10

However, the final structure of indicators is determined with the help of experts – the staff of the organization and the involved third-party experts. In different organizations it can vary. The same indicator can be used with different extent of participation for the satisfaction of various needs. For each indicator the determine the size in points B_{ind_i} characterizing its value within the whole model. The highest possible point and gradation in scales are established by experts, however, the maximum possible value of points for all indicators within the model must be identical.

At the third stage for each need Cr_n experts Ex_m determine the rank of participation k_{mx} of indicators Ind_x in its satisfaction by means of the method of team ranking (3). Calculations are made taking into account experts' weights.

Cr_n	Ind_1	...	Ind_x
Ex_1	$w_1 \times k_{11}$	...	$w_m \times (x - k_{m1})$
...
Ex_m	$w_m \times k_{m1}$	...	$w_m \times k_{mx}$
S_{Ind_i}	$\sum_{i=1}^m w_i \times k_{i1}$	...	$\sum_{i=1}^m w_i \times k_{ix}$

(3)

Following the results of calculation of scores S_{Ind_i} of expert estimates (3) on each indicator, within the studied need Cr_n , they do the sorting by increase. The element Ind_i with the minimum score of points, is the most important indicator for the need, and the element with the maximum score – the least important indicator. In accordance with the number in the received sequence Ind_i they calculate the weight of the indicator $\alpha_{ind_i(Cr_n)}$ (4) for n^{th} need.

$$\alpha_{ind_i(Cr_n)} = 2 \times \frac{x - R_{ind_i} + 1}{x(x + 1)}, \quad (4)$$

where x – number of indicators;

R_{ind_i} – indicator's number in the ordered array S_{ind_i} .

At the fourth stage they carry out the procedure similar to the third stage, but in relation to the needs (criteria) Cr_n making motivational structure of an individual according to A. Maslow. Experts Ex_m are offered to specify the rank r_{mn} of the criterion Cr_n in the motivational structure (5).

Mot	Cr_1	...	Cr_n
Ex_1	$w_1 \times r_{11}$	...	$w_1 \times r_{1n}$
...
Ex_m	$w_m \times r_{m1}$	...	$w_m \times r_{mn}$
S_{Cr_i}	$\sum_{i=1}^m w_i \times r_{i1}$	...	$\sum_{i=1}^m w_i \times r_{in}$

(5)

Following the results of the calculation of scores S_{Cr_i} of expert estimates (4) on each need (criterion), they carry out their sorting by increase. The Cr_i element with the minimum value of points, is the most important, priority need, and the element with the maximum sum – the least important need. Then the weight of requirements

β_{Cr_i} (6) is calculated, which allows to create the motivational structure of a position in the organization under study.

$$\beta_{Cr_i} = 2 \times \frac{n - R_{Cr_i} + 1}{n(n+1)}, \quad (6)$$

where n – quantity of needs;

R_{Cr_i} – number of a need for the ordered array S_{Cr_i} .

At the fifth stage the motivation index on separate requirements (7), and also the general index of motivation (8) are calculated.

$$Mot_{Cr_i} = \sum_{j=1}^x B_{ind_j} \times \alpha_{ind_j} \quad (7)$$

$$Mot_{\Sigma} = \sum_{i=1}^n Mot_{Cr_i} \quad (8)$$

Values of the general index of motivation, and also the indexes calculated by separate criteria, will allow to receive the information on the motivational orientation in the organization's staff activity or determine the motivational policy of the organization.

Results of the research and their discussion

The given article paid the main attention to the technique of the calculation of the motivation general index, which characterizes the motivational activity of the studied respondents. It is possible to specify two main directions of the application of the said technique:

1) obtaining information on the structure of motivational influences, which from the point of view of the organization's staff and third-party analysts should be used in relation to the given workplace. The results of the motivation general index calculations, and also the indexes by the separate scales received as a result of the examination of experts from the organization itself and third-party experts can be compared to the results of the interview of applicants for the positions or estimated employees. In this case it is possible to determine the respondents, whose needs to the greatest extent correspond to the motivational policy of the organization;

2) comparison of motivation of applicants or estimated employees. In this case examinees will act as experts, giving an assessment of the extent of participation of the suggested indicators in the satisfaction of their needs. Besides, they will have to define the importance of motivational needs, in relation to themselves. Wherein, the calculation of motivational indicators should be made for each respondent separately. The one who will receive the highest value of the motivational index more than others will be motivated to work performance.

Conclusion

It should be noted that the results received during the examination by respondents according to the suggested technique, should be considered in the context with the analysis of their qualifications, and also the results of the study of their social and psychological properties of the personality. Only in this case it is possible to receive complete and correct information concerning the employee under study or the applicant, as the choice only with taking into account the motivational element of the applicant without the analysis of his/her qualifications and psychological properties of the personality with rather high degree of probability can be wrong.

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