USING THE PATTERN METHOD FOR THE COMPREHENSIVE ORGANIZATION OF RECRUITMENT AND SELECTION OF PERSONNEL

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ABSTRACT

This article presents the PATTERN system analysis technique used for scientific and technical analysis and forecasting the development and use of complex systems resources. The methodology is considered from the point of view of its application in the economic systems of strategic planning of the company in personnel matters of recruitment.

The basic principles that are the key points in the formation of an effective staffing system in terms of the strategic goals of the company are stated. The algorithm of formation of the personnel policy of the company is considered, from the position of the

economic concept of human capital, as the quintessence of all the combined economic and labour opportunities of the company personnel.

The proposed methodology of system analysis is adapted to be applied to provide opportunities for the application of sound management decisions in matters of personnel policy of the company, as well as strengthening human capital.

Keywords: Organization, PATTERN, Personnel, Recruitment, Stuff, Selection

1. INTRODUCTION

The key principle of staff recruitment and staffing can be considered "we need a person in the right place at the right time". The activities of any company depend on qualified personnel and the constant need for their acquisition. Economic growth and the effectiveness of the company, determine its competitiveness, all this is a consequence of the effective work of employees. The important tasks of assessing the quality of personnel selection are to increase the efficiency of the company's functioning by achieving high-end results of operations, based on the rational use of multi-criteria evaluation.

The processes of searching, selecting and hiring personnel are key components of the overall process of human resource management, which in turn is the most important component of the formation and augmentation of the human capital of a company [1-3].

The very concept of human capital includes a combination of such elements as knowledge, abilities, health, skills, abilities and abilities of the company employees. A careful approach to the formation and implementation of personnel policy is directly reflected in the company's ability to accumulate and increase human capital [4-5].

That is why the process for the system analysis of complex processes of personnel policy and the processes of recruitment and selection of personnel should consider the application of the PATTERN methodology.

2. METHODOLOGY

2.1. Organization of the Recruitment Process and Staffing as a Backbone of the Company

The process of selecting high-quality personnel that meet the requirements of the company is a systematic and integrated approach. The effectiveness of the hiring and staffing system itself depends on its competent integration into the company management process, which in turn is determined by the fulfilment of a number of conditions:

The procedure for the selection and hiring of the organization's personnel can be represented as a selection process from among the applicants for those specialists who are best suited to vacant places and working conditions. The final point leading to the hiring of the necessary specialist is at the intersection of the interests of the company and a particular candidate. Only then can we talk about effective hiring, when a future employee can realize his professional experience and personal potential and do it for the benefit of the company. And the smaller the delta of interests, the greater the likelihood of successful and productive cooperation [6-7].

Oleksandr Balan, Hennadii Moskalyk, Khrystyna Peredalo, Olena Hurman, Illia Samarchenko, Frol Revin

In the aggregate, the recruitment process is carried out through the study of the professional and psychological qualities of the candidates, and the identification of the best of several applicants for a vacant position and the exclusion of those who will be deemed unable to perform the professional activities required for this workplace (vacant position). In general, it can be represented in the form of a circuit in Fig. 1 and Fig. 2.

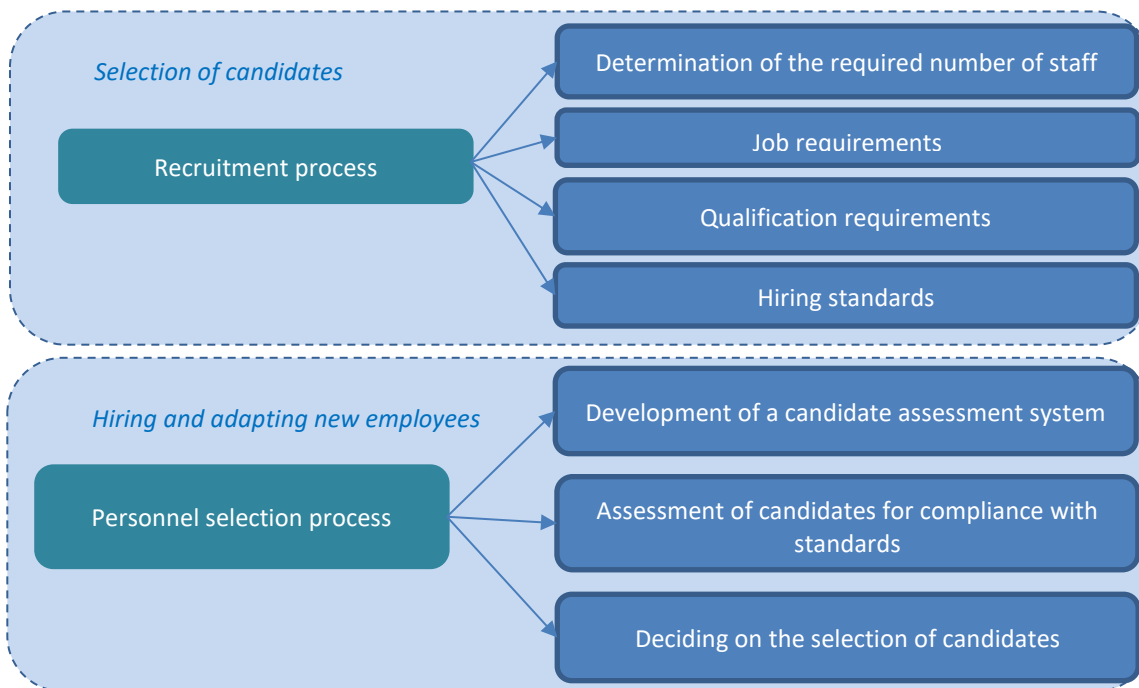**Figure 1** Recruitment and staffing process scheme

Figure 2 Phased algorithm for the recruitment and selection of personnel

A competent ratio of the number and quality of personnel will contribute to the achievement of goals and the implementation of the strategic objectives of the company. To achieve this, it

is necessary to take into account both internal and external factors that can influence the emergence of personnel needs. External factors do not depend on the activities of the company, but given external trends and changes (the situation on the labour market, technological development, changes in legislation), the company will be able to avoid mistakes in developing a policy for the selection and hiring of personnel. On the other hand, the company has a direct impact on internal factors. For example, given the financial resources, goals of the company, human resources, it is possible to determine the level and characteristics of personnel policy [8-9]. Together, many factors affecting the system of hiring and selection of company personnel leads to the emergence of the need for its system analysis and forecasting.

2.2. Basic Principles of PATTERN System Analysis Methodology

The PATTERN method is a system analysis technique in which the order, methods of forming and assessing the priorities of the elements of goal structures - called "target trees" are defined [10-11]. The scope of this technique in the area of difficult to solve problems with great uncertainty in forecasting and planning for their implementation. "Goal trees" allow you to select the elements of goal structures with the maximum problematics and importance, as well as select the most important elements for the implementation of goals.

At its core, the PATTERN methodology allows you to determine the timing of solving strategic problems and determine the usefulness of the measures taken, which can help to improve the quality of decisions by overcoming a narrowly focused approach to their adoption, rejecting intuitive and strong-willed decisions, as well as from activities that cannot be performed on time.

The main advantage of the methodology presented is the ability to analyze complex problem situations, to distribute the importance of a huge amount of data in any field of activity, to study the mutual relationship of constant and variable factors on which decisions are based and affect. The algorithm of work, according to the specified technique, is presented in Fig. 3.
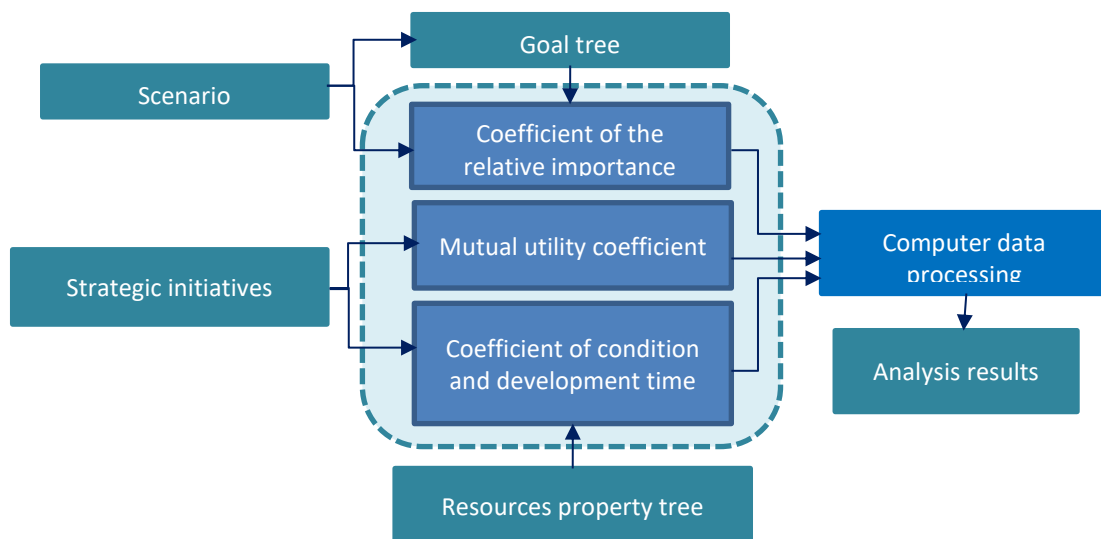

Figure 3 Visualization of the methodology PATTERN

A feature of the PATTERN methodology is the combination of several systems analysis methods, which include writing a "script" and building a "goal tree," which, in relation to socio-economic processes, may look like:

- development of a "scenario", which is a strategic forecast of the economic situation for the forecast period;

Oleksandr Balan, Hennadii Moskalyk, Khrystyna Peredalo, Olena Hurman, Illia Samarchenko, Frol Revin

- development of a "goal tree" [12-13];
- assessment of the components of the "goal tree" by determining the coefficients;
- processing of evaluation results and presentation of results.

The initial stage involves writing a script - a combination of situational analysis and normative forecasting. The scenario assumes a detailed description of the situation under study, after which a logical sequence of events is established in order to show how, based on the current state of things, the future state of the object of study will gradually unfold.

The stage of constructing the "Tree of Goals" (presented in Fig. 4) occurs from top to bottom in the hierarchy according to the accepted scenario [14-15]. The selected expert groups, analyzing the levels of architecture in detail, go through them one by one, are presented in Table 1.
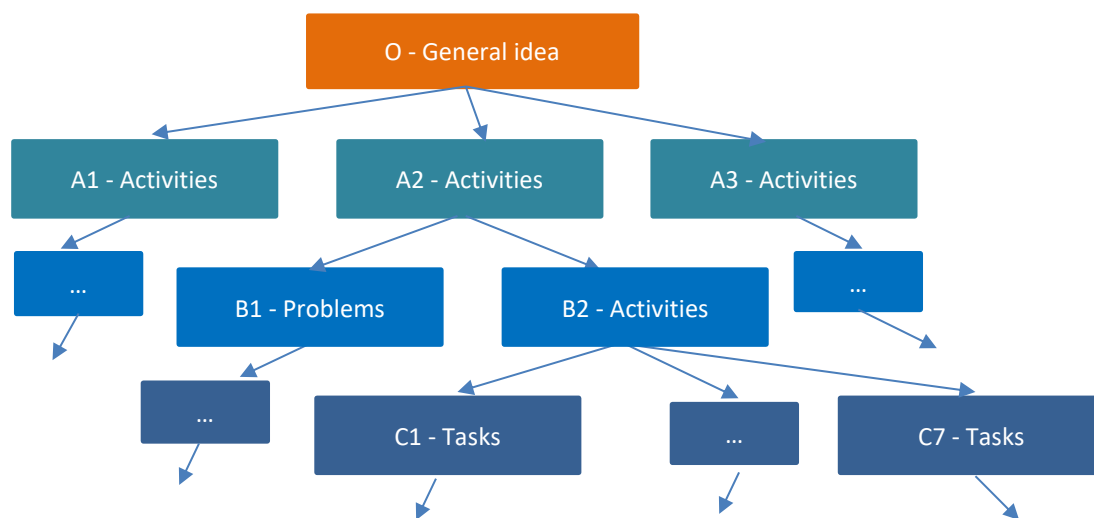

Figure 4 General view of the selective segment of the "Tree of goals"

Table 1 Eight levels of a tree of goals of PATTERN methodology

No.	Level	Number of items in the hierarchy level
1	O - General idea	1
2	A - Activities	3
3	B - Problems	6
4	C - Tasks	46
5	D - Circuit diagrams	…
6	E - Functional systems	…
7	F - Functional subsystems	…
8	G - Technical problems	…

At the same time, the compliance with the decomposition condition is monitored so that the children provide the structural position of the parent. All elements of the PATTERN system included in the "Target Tree" must be carefully evaluated for their relative importance. Indeed, if you look at the table of levels, then it is noticeable that specifics are growing from top to bottom both in scale and in relation to the timeline from the present moment.

The PATTERN methodology defines three groups of evaluation criteria:

- relative importance,
- mutual utility,
- state and terms of development ("state - term").

Relative importance assessment. All elements of the structures included in the "Tree of Goals" are evaluated for their relative importance. An assessment of the relative importance, taking into account several criteria kx, as well as their weight coefficients qx, is carried out by the normalization method. Using several coefficients (criteria) of relative importance and taking into account their weight coefficients, a correspondence matrix is compiled.

The matrix represented by Table 2 includes the elements subordinate to the node and the criteria adopted during their evaluation. In the table, the relative weight of the estimated element (according to the desired criterion) is sjx; rij is the coefficient of the relative importance of the ith level of the jth element.

Table 2 Component evaluation based on weighting criteria

Criterion	Criterion weight	Level element						
		A	**B**	**C**	**…**	**j**	**…**	**n**
k1	q1	Sa1	Sb1	Sc1	…	Sj1	…	Sn1
k2	q2	Sa2	Sb2	Sc2	…	Sj2	…	Sn2
k3	q3	Sa3	Sb3	Sc3	…	Sj3	…	Sn3
…	…	…	…	…	…	…	…	…
kx	qx	Sax	Sbx	Scx	…	Sjx	…	Snx
…	…	…	…	…	…	…	…	…
km	qm	Sam	Sbm	Scm	…	Sjm	…	Snm
		ria	rib	ric	…	rij	…	rin

It is necessary to achieve uniformity of results. For this, two normalization conditions must be fulfilled in the procedure: normalization of the weighting coefficients of the criteria: $\sum_{x=1}^{m} q_x = 1$ and normalization of the estimates of the relative importance of the estimated elements for each criterion $\sum_{j=1}^{n} s_{jx} = 1$

The resulting estimates of the relative importance of the ith level of the jth element are calculated by the formula:

$$r_{ij} = \sum_{j=1}^{m} q_x\, s_{jx} \tag{1}$$

After processing the estimates, it is necessary to verify the correctness of the resulting estimates: $\Sigma rij = 1 ni = a$. As a result, the researchers synthesize the logical basis for allocating resources (budget, logistics, personnel, etc.) to the elements of the "Target Tree" using the values of the estimated and calculated weight coefficients.

To accept to organize the evaluation procedure in the format of two or three rounds. After each round is held, experts get acquainted with the results of each other's ratings. If expert opinions appear that differ significantly from other opinions, then experts should substantiate their point of view on the objectivity of assessments, and also allows some experts to be encouraged to revisit their assessments.

The general coefficient of the relative importance of a particular problem at any level is calculated by multiplying the coefficients up the tree trunk (or from top to bottom to the level under consideration, for example, down to the level for E of a certain primary system, down to level G for a specific functional subsystem, etc. d.). The simplest formula for the overall coefficient of relative importance R for a particular functional subsystem will then be:

$$R = \prod_{i=A}^{G} r_i \qquad (2)$$

The mutual utility assessment in the PATTERN methodology rating system helps to concretize the assessment of relative importance. But going over completely the interconnections of all the elements of the corresponding level of the "goal tree" and evaluating their mutual usefulness, a very laborious and economically disadvantageous procedure appears. Therefore, applying the methodology from the point of view of considering personnel search and selection procedures, as well as the formation and accumulation of human capital of a company, the mutual utility assessment can be interpreted as an assessment of interconnectedness without calculating the coefficient of communication strength.

Assessment of the status and timing of development ("state – term"). The coefficient "state – time" was determined in the PATTERN methodology to assess the possible terms of the completion of the project and the development status of its terms. These coefficients were determined to assess the implementation capabilities of individual developments, taking into account the overall project implementation cycle.

The coefficient "condition – term" can be determined by the formula below:

$$r'_S = \frac{\int_0^x f(x)dx}{\int_0^s f(x)dx} \qquad (3)$$

where $\int_0^s f(x)dx$ – the total consumption of resources for implementation; $\int_0^x f(x)dx$ – expenses that are necessary to complete the development.

3. EXPERIMENT AND ANALYSIS OF THE RESULTS

As the basis of the experimental base, the theoretical situation of the relationship between the processes of recruitment and selection of personnel on the formation and multiplication of human capital of the company will be considered. Human capital is a dynamic concept, but its composition necessarily includes such components as knowledge and skills, motivation, abilities, health. Based on this, a simplified goal tree is compiled (Fig. 5):

O – Strengthening the economic position of the company

A1 – The increase in the value of human capital

B1 – Improving the recruitment system

B2 – Improving the personnel selection system

C1 – Increase knowledge and skills

C2 – Health Increase

C3 – Ability Development
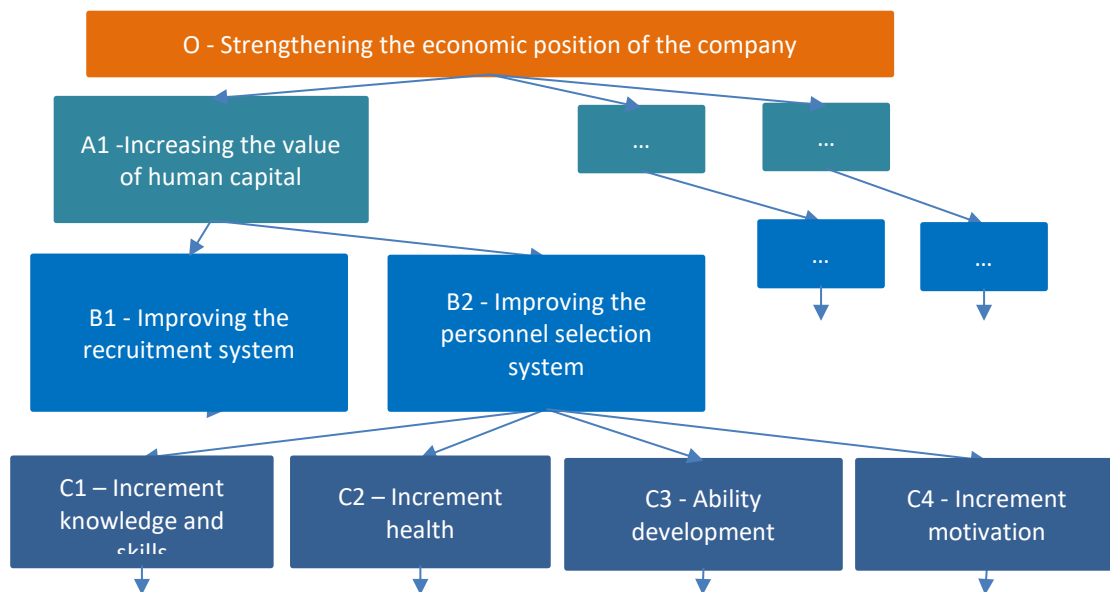
C4 – Increase Motivation

Figure 5 Decomposition of goals Strengthening the economic position of the company

The strategic goal of the first level will be "Strengthening the economic position of the company", this will be the general idea of the whole tree. At the same time, at the second level, several economic indicators that will provide a higher-level structural position will act as events, among which the event "A1 - Increasing the cost of human capital" will be highlighted.

Considering this branch at the third level - tasks, each component will have several tasks, in this case: "B1 - Improving the personnel selection system" and "B2 - Improving the personnel selection system".

The fourth level-specificic tasks, will already contain components providing the structural position of each of the elements of the third level, we will consider those for task B2, these will be "C1 - Increment of knowledge and skills", "C2 - Increase of health", "C3 - Development of abilities", "C4 - Increase Motivation."

In order not to overload the model with data and not complicate the calculations of the experiment, we restrict ourselves to the four levels of the model and lower the levels from the fifth to the eighth.

And so the process of forming the staff of our company was divided into two key tasks:

• "B1 - Improving the personnel selection system" at this stage, the work is aimed at selecting potential candidates on the labour market (this stage will have its own set of tasks of the fourth and subsequent levels,

• "B2 - Improving the personnel selection system" - at this stage, candidates undergo interviews, evaluate them, and make decisions on further employment.

We focus on task B2 and consider the stage of selecting personnel from selected candidates, but from the point of view of achieving the general idea of "Strengthening the economic position of the company".

Each of the candidates has a key set of competencies, among which we highlight six key:

• Self-organization

• Education

• Learning

- adaptability
- Communicative
- Stress resistance

The stage of expert assessment of the weight of each criterion, as well as the influence of each of the elements of the goal tree on the overall goal, will be carried out among five experts who will independently evaluate each other. Summary assessments of all experts are presented in Table 3.

Table 3 Expert summary for each item

Criterion	Level element					
	B1	**B2**	**C1**	**C2**	**C3**	**C4**
Self-organization	0,58	0,42	0,37	0,15	0,31	0,17
Education	0,22	0,78	0,35	0,20	0,40	0,05
Learnability	0,48	0,52	0,48	0,07	0,30	0,15
Adaptability	0,63	0,37	0,25	0,20	0,17	0,38
Communicative	0,52	0,48	0,25	0,08	0,42	0,25
Stress resistance	0,34	0,66	0,12	0,45	0,08	0,35
Total	2,77	3,23	1,82	1,15	1,68	1,35

The matrix of coefficients of relative utility should be built separately for each level, in our case there will be two matrices, for level two B1-B2, Table 4 and level three C1-C4, Table 5.

Table 4 Matrix of coefficients of relative importance for level B1-B2

Criterion	Criterion weight	Level element	
		B1 - Improving the recruitment system	**B2 - Improving the personnel selection system**
Self-organization	0,24	0,14	0,10
Education	0,28	0,06	0,22
Learnability	0,18	0,09	0,09
Adaptability	0,05	0,03	0,02
Communicative	0,15	0,08	0,07
Stress resistance	0,10	0,03	0,07
Coefficient of relative importance		0,4307	0,5693

Table 5 Matrix of coefficients of relative importance for level C1-C4

Criterion	Criterion weight	Level element			
		C1 - Increase knowledge and skills	**C2 - Health Increase**	**C3 - Ability Development**	**C4 - Increase Motivation**
Self-organization	0,18	0,07	0,03	0,06	0,03
Education	0,33	0,12	0,07	0,13	0,02
Learnability	0,18	0,09	0,01	0,05	0,03
Adaptability	0,05	0,01	0,01	0,01	0,02
Communicative	0,14	0,04	0,01	0,06	0,04
Stress resistance	0,12	0,01	0,05	0,01	0,04
Coefficient of relative importance		0,33	0,18	0,32	0,17

An analysis of the data shows that in order to achieve the set goal at the level of "A1 - Increase in the cost of human capital", utility ratios were distributed in the ratio shown in Fig. 6, and for "B2 - Improvement of the personnel selection system" - in Fig.7.
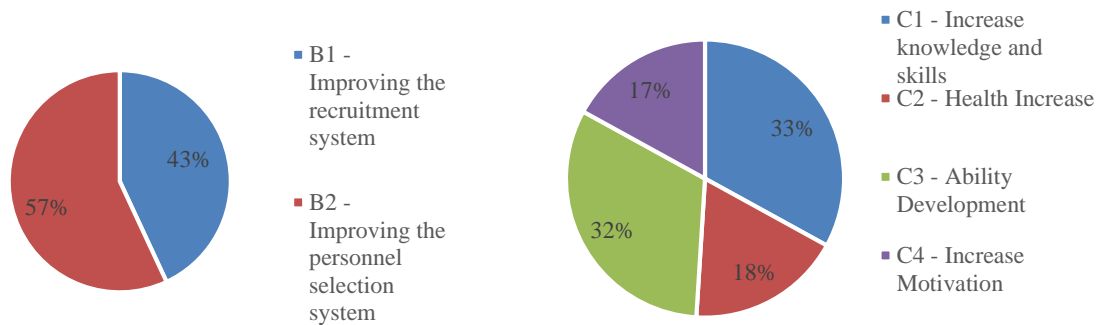

Figure 6 Graph of the distribution of importance factors for "A1 – The increase in the value of human capital"

Figure 7 Graph of the distribution of importance factors for "B2 – Improving the personnel selection system"

The analysis shows that the most significant impact on the goals set is exerted by "C1 – Increase of knowledge and skills" – 33% and "C3 – Development of abilities" – 32%. In this analysis, a limited number of factors, levels were used, when applying the methodology for large projects with several hundred different indicators, the number of compiled matrices increases proportionally (one matrix per level). Nevertheless, the conducted experiment clearly demonstrates the capabilities of the described system analysis methodology PATTERN; it is a flexible, highly adaptive system that allows you to fully use its potential to solve practical problems.

4. CONCLUSIONS

The PATTERN technique can be a very valuable tool for analyzing difficult-to-solve problems that have great uncertainty in the course of development, in particular complex economic systems that take into account many different factors that have a potentially strong influence on the strategic goals of the company. The PATTERN methodology can be successfully used to comprehensively organize the recruitment and selection of personnel, taking into account both external factors such as the state of the labour market and internal factors such as the potential for accumulating the human capital of the company.

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