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**FACTOR ANALYSIS OF THE RATIONALITY OF
ENTERPRISE POTENTIAL MANAGEMENT IN THE
COORDINATE SYSTEM OF ORGANIZATIONAL
DEVELOPMENT**

Annotation. *The article identifies and analyzes the factors that affect the rationality of enterprise management in the coordinate system of organizational development. The analysis was performed by organizing and conducting an expert survey and the application of cluster analysis. As a result of the study, the most significant factors were identified and the nature of the relationships between all analyzed factors was established. In addition, recommendations are formulated on the possibility of practical application of the results of the analysis, in particular during the formation and implementation of organizational management decisions.*

Keywords: *factors, organizational development, management rationality, enterprise potential.*

1. Introduction

The concept of “organizational development” is quite diverse. It is considered as organizational change, as a system of scientific and methodological justification for the preparation and implementation of organizational change, as a set of processes that accompany organizational change, as well as a strategy of enterprise behaviour in the market. Thus, Shcherbyna V. and Popova E. studying organizational development, come to the conclusion that “... sustainable core of organizational development is the quality of changes that occur, which is set by the socio-cultural specifics of the organization 1” [1]. Melnyk S. understands organizational development as “an organized process that disrupts the dynamic development of the organizational structure and directions for achieving a new state of dynamic equilibrium, which will be relatively stable in the updated structure” [2]. Totsky V. and Lavrenenko V. define organizational development as “a long-term, thorough, comprehensive process of change and development of the organization (enterprise) and the people working in it ...”, and also distinguish structural (creation of favourable framework conditions for achieving the goals of organizational development through changes in regulation) and personnel (measures for staff development and their incentives for change) aspects [3]. Gerasymchuk V. considers organizational development as “a large-scale, planned systematized process in the enterprise, which responds to changes in the environment – internal and external” [4]. Novak V. and Rodchenko V. define organizational development as “a process of comprehensive organizational improvement of the system, the purpose of which is to streamline the components of economic activity and transform various parts of the system to maintain long-term life and adapt to changes in the environment” [5]. Kolesnikov G. studies organizational development as a process of improving “... formal and informal aspects of organizational activities”, highlighting among the formal: organizational management structure, management processes, distribution and coordination of rights, duties, responsibilities, organization of managers’ work, etc. The informal side of organizational activities includes the improvement of knowledge, skills and experience, i.e. training, career growth with the use of effective methods of motivation and the formation of corporate culture [6]. At the same time, Schwindina G. argues that organizational development is a part of the overall strategy of the organization, and the very strategy of organizational development means a system of “direct action and long-term programmes to

initiate and implement constructive changes in organizational architecture for the success of the organization and its members” [7]. The team of authors believes that from the standpoint of a structural approach, organizational development can be presented in such a sequence as: “values, organizational culture, culture of organization, organizational climate, organizational behaviour, organizational interaction” [8]. Gorbatovska N. considering the theoretical foundations of organizational development of the enterprise in modern conditions of variable environment, defines it as “... organized process that disrupts the dynamic development of the organization and is aimed at achieving a new state of dynamic equilibrium, which will remain relatively stable in the updated structure” [9]. Amelina I. considering the theoretical foundations of organizational development of the enterprise in modern conditions of variable environment, defines it as “an organized process that disrupts the dynamic development of the organization and is aimed at achieving a new state of dynamic equilibrium, which in the updated structure will be relatively stable ...” [10]. Ladonko L. and Tikhun I. analyzing the existing approaches to defining the essence and goals of the process of organizational development, identified the place and role of strategic organizational changes for innovative development of the enterprise, and reflected the relationship and characteristic differences between organizational change and organizational development for a number of factors: level of management decisions, duration of influence, scale of actions, social orientation of the process [11].

It should be noted that despite the existence of the relationship and interdependence between organizational development and organizational change, but not all organizational change characterizes development, but organizational development always characterizes change, i.e. the very concept of development involves the process of implementing organizational change to ensure the enterprise development.

Thus, organizational development is considered as a set of concepts and models (theoretical basis) of organizational development; the process of qualitative and structural changes in the organization; practical activities to improve the organization; development strategy.

Thus, organizational development is characterized by the following properties: focus on medium and long term, focus on the process of change (development), the introduction of change methodology, staff involvement in the process, the use of various methods to achieve goals.

Studies that cover the problems of organizational development have a fairly wide range of subjects that they cover. Nevertheless, they can be divided into those that relate exclusively to theoretical aspects of organizational development [12] and those that have a deeply applied focus. To date, most studies belong to the second group. Thus, the authors who study organizational development consider it in the system of assessing the creditworthiness of enterprises as a stage of technology of financial and analytical management, a component of legitimizing the use of unmanned aerial vehicles, tools for innovation-active entrepreneurship, a tool for overcoming destructive phenomena in personnel management on the basis of empirical and expert evaluation and data analysis.

Zabrodska G. I. and Zabrodska L. D. combining different views of the essence of this concept rightly note that: “organizational development is a scientific and methodological support for the implementation of long-term

programmes of qualitative organizational change, using a set of enterprise processes that adapt to environmental conditions and internal integration, and ensure growth efficiency of functioning and achievement of the purposes of the organization, by perfection of processes of the decision of problems and updating therefore increase of potential of the enterprise is provided ..." [13]. Agreeing in general with the above interpretation, we note that organizational change is largely beyond the strategic development of the enterprise, and is often implemented at the tactical and operational levels. In addition, it should be noted that organizational change cannot be limited to scientific and methodological support for their implementation.

Organizational decisions should be considered through the prism of the theory and practice of management decisions, as organizational decisions are their subspecies. The scientific literature traditionally distinguishes the stages of technology of management decisions, namely [14]: formation (identification of the problem situation, analysis of factors that caused the problem situation, consideration of alternative solutions to the problem), choice (choice of criteria or criteria by which it is necessary to choose the best solution from a number of alternatives, analysis of existing alternatives based on the chosen criterion (criteria), adoption (documentation of the chosen decision and bringing it to the performers) and implementation (creation of conditions for decision execution, control and regulation of decision execution process). These stages are also characteristic of organizational decisions. In view of this, organizational changes are a consequence of scientific and methodological support not only for implementation, but also for the formation, selection and adoption of organizational decisions.

The rationality of managing the potential of the enterprise depends on the influence of external and internal factors, and more precisely on the influence of the interaction of the whole set of factors that create the conditions for organizational development of the enterprise. In particular, Vilhutska R. B. studied the factors influencing the formation and use of organizational structures of enterprise management, as well as built their classification according to the following characteristics: content, nature, strength of influence, connections, source and level of regulation [15]. The work of Savina G. and Skibina T. is devoted to the study of factors influencing the efficiency of enterprise management. They determine that enterprise management should be carried out within a certain block system built on the principle: "... Factors of the external macroenvironment → factors of the external microenvironment → factors of the internal environment of the enterprise..." [16]. Boykivska G. developing scientific and practical recommendations for the effective use of production potential of the enterprise generalized the classification of factors based on the peculiarities of their impact on the production potential of enterprises and identified four main classification features: source of education, origin of the factor (human, intellectual, natural, financial, legal), the object of influence (factors that affect the enterprise as a whole and individual elements) and in relation to the enterprise (internal and external) [17]. Krasnorutskyi O. proposes to classify the factors of influence on the management system on such grounds as: duration of influence (for a long time, those acting temporarily), nature of influence (intensive, extensive), content (scientific, technical, organizational, economic, socio-psychological). The author argues that these factors can affect

the system individually and in combination with others, and their combined positive effect can provide a significant increase in management efficiency [18].

Maslak O., Konovalenko O. and Bezruchko O. conducted a study of environmental factors that affect the formation, use and development of economic potential of the enterprise, and also proposed a method of calculating the index of environmental friendliness on the basis of taxonomic analysis using the set of indicators impact on the economic potential of the enterprise [19]. The study of factors influencing the cost of the infrastructure component of railway transport in the chemical industry was carried out by Kolesnikov V., who identified groups of factors: structural, functional and traction, and proposed the principle of calculating the significance factor taking into account the specifics of railway transport in the chemical industry [6]. Grechko A. and Melnikova O. determining the factors influencing the profitability of the enterprise, distinguish external and internal factors that allow to consider the profit as a managed object that can be planned and forecasting, accounting and analysis, regulation and control [20]. Utenkova K. systematized and substantiated methodological approaches to assessing the impact of certain factors on the economic security of agricultural enterprises, through the practical application of expert assessment, which the author believes is an effective source of information to solve problems that arise, but also outlines promising ways to adopt management decisions [21].

Information on the relative importance of factors that are necessary but insufficient for management decisions related to the management of the potential of the enterprise in the coordinate system of their organizational development. It is also important to know the nature of the relationships between the factors that can be obtained through cluster analysis. Cluster analysis is the division of a given sample of objects (factors) into subsets, called clusters, so that each cluster consists of similar objects and the objects in different clusters are significantly different. A cluster is a group of elements that are characterized by a common property, the main purpose of cluster analysis is to find groups of similar objects in the sample [22–24].

The generally accepted structure of cluster analysis is the selection of such stages as: preparation of initial data for cluster analysis; selection of the optimal method of cluster analysis, the method of calculating the degree of distance between the studied objects, clustering strategy; formation of clusters; visualization and interpretation of cluster analysis results. The most common methods of cluster analysis are: hierarchical methods (short-range, middle, King, Ward, long-distance); iterative grouping methods (k-means McQueen method); algorithms such as graph cutting (Terentiev correlation galaxies, Wroclaw taxonomy) [45].

To form clusters, measures of similarity and difference of data are used, which can be divided into three main types: measures of similarity of the type “distance” (in their application, objects are considered more similar to each other, the smaller is the distance between them); measures of similarity of the “connection” type (in this case, the objects are considered the more similar, the stronger is the connection between them); information statistics.

The clustering procedure ends with the explicit division of objects into clusters. After clustering, it is advisable to visualize the results by constructing a dendrogram.

In order to determine the main procedural aspects of the cluster analysis of

factors that affect the rationality of enterprise capacity management, it is advisable to review the works of scientists on the application of clustering of specific objects in the study of certain management problems. Heorhiadi N., Kniaz S., and Vilgutska R. summarizing empirical and expert research not only identified the factors influencing the formation and use of organizational structures of enterprise management, but also conducted a cluster analysis by the method of bullets, which allowed grouping factors and investigating of their relationship [25]. The application of cluster analysis by the method of k-means in assessing the quality of working life of workers is demonstrated by Volkova N. and Stukach O., who surveyed 60 respondents in the main areas and proved that the use of clustering is an effective method of analyzing employee satisfaction [26]. The same methodological approach was used by Manakova O. to group small industrial enterprises of one branch according to the selected indicators, as a result of which the author obtained three clusters and revealed the level of competition between enterprises [27]. Yakusheva O. singled out the leading place of cluster analysis by the method of k-averages in the regional model of economic development formation of small and medium business in the regions, based on the results of which the author identified groups of regions that are attractive for development and need a stimulating strategy [28]. Kotelevska N. used cluster analysis using the STATISTICA programme to assess the strategic confrontation of competing companies in the domestic pharmaceutical market, which allowed to develop strategic and operational management decisions to adapt companies to the changing environment and ensure their survival in competitive markets [29]. Golovko-Marchenko I. using the STATISTICA programme investigated the interdependence between the volume of construction work performed and capital investment using cluster analysis [30]. In order to identify the territorial similarity of the population between districts and cities, Begun S. conducted a cluster analysis using the STATISTICA programme using a hierarchical classification, which allowed to identify homogeneous groups according to certain demographic factors [31]. This is also noted in the works [32–33]. Kovalenko A., Urtenov M. and Zaikina, L. using cluster analysis to assess the financial and economic condition of small and medium-sized enterprises in the construction industry identified the causes and patterns of the emergence and development of the crisis on them [34]. Vynnychenko N. and Supruchenko A. studying the features of the use of cluster analysis in the management of receivables, one of the main advantages of the clustering process is the possibility of research not on one indicator, but on a set of factors that gives it a significant advantage over most economic and mathematical methods [35]. Pisarkova V. and Naumenko N. using clustering to assess the financial and economic performance of enterprises, note that "... cluster analysis is a powerful tool for intelligence analysis and statistical research in any subject area ..." and is a part of a systematic analysis, which allows to apply various algorithms of the cluster analysis providing qualitative interpretation of results of algorithms work on the basis of the general estimation [36]. In order to identify the relationship between the scale of production, logistics activity of enterprises and the effectiveness of their economic activity Tkachova A. formed an algorithm for grouping metallurgical enterprises based on cluster analysis by k-means using a group of indicators on a scale and noted the importance of choosing the criterion of optimality – functionality, which expresses the levels of desirability of different options for division and grouping,

taking into account the main purpose of the study, the physical and statistical nature of the information used [37]. Sokolova L., Veriasova G. and Sokolov O. note the need to follow the appropriate sequence of cluster analysis, which involves the implementation of the following stages: sampling for cluster analysis; determining the set of criteria by which clustering is carried out; determination of distance and degree of similarity (correlation coefficient, measure of distance, associativity coefficient, probabilistic similarity coefficients); conducting a hierarchical cluster procedure to create groups of similar objects, using the distance (the measurement of which is based on the principles: “nearest neighbour”, “middle link”, “centers of gravity of groups”, “far neighbour”); verification of the reliability of the obtained results of cluster analysis, which involves a comparative analysis of the quality of possible ways to distribute the selected set of objects into clusters [38].

2. The aim and objectives of the study

The aim of the article is to analyze the factors that affect the rationality of managing the potential of the enterprise in the coordinate system of organizational development. To achieve it, you must perform the following tasks:

- to carry out expert assessment of factors;
- to perform cluster analysis of factors;
- to form recommendations on the possibility of practical application of the results of the analysis.

3. Expert assessment of factors

Under the factors influencing the rationality of enterprise potential management in the coordinate system of organizational development, we understand changes in productive forces, technology, organization and socio-economic conditions of enterprise development, which act as driving forces for effective use of enterprise potential.

Based on the study of empirical data of enterprises identified factors that affect the rationality of managing the potential of the enterprise in the coordinate system of its organizational development. These factors include the following [45–54]:

- I) the presence of the concept and strategy of enterprise development;
- II) the level of personnel, logistical, organizational and other types of support;
- III) belonging of the enterprise to innovation-active business entities;
- IV) the size of the enterprise;
- V) form of ownership and type of management;
- VI) specialization of the enterprise;
- VII) affiliation of the enterprise to statutory or contractual associations;
- VIII) belonging of the enterprise to the subjects of foreign economic activity;
- IX) the level of profitability and financial stability;
- X) the level of capacity utilization.

To assess the importance of the impact of these factors on the rationality of enterprise potential management in 2019, an expert study was organized and conducted in the business environment.

Expert research is not limited to the analysis of expert assessments and

interpretation of evaluation results, but also requires a scientifically sound approach to the formation of expert groups and determination (or refinement) of the level of expertise, which guarantees the objectivity of expert evaluation results. During the selection of respondents, several criteria were put forward: the respondent could only be a person who belongs to the number of managers of a profitable enterprise; experience in a managerial position – at least five years; personal consent to participate in the survey.

Based on these criteria, 202 potential respondents were selected. Of these, 69 agreed to participate in the survey. If you choose an error of 0.15 and a confidence level of 0.95, the number of respondents to be interviewed can be calculated as follows:

who were selected according to a certain criterion; t – Student's criterion

$$k = \frac{w(1-w)}{\varepsilon_w^2} t^2 = \frac{69 \left(1 - \frac{69}{202}\right)}{0,15^2} 2^2 = 19,99 \approx 20,$$

where k – the number of respondents; ρ – the share of those respondents n for the selected level of confidence interval; ε_w^2 – average marginal error of the share.

So, on the basis of the calculation we summarize – in order that the error of survey results did not exceed admissible limits in 15%, it is necessary to interrogate 20 respondents.

To solve this problem, it is considered appropriate to characterize the ranking method and build an algorithm for determining the factors that affect the rational management of the enterprise in the coordinate system of its organizational development, and verify the consistency and reliability of expert assessments.

Respondents were asked to rate each factor on a scale from 10 to 100 points, where 10 is the minimum score, 100 is the maximum, because the factors that affect the rationality of enterprise management in the coordinate system of its organizational development are not directly measurable. Thus, respondents were asked to rank these factors in ascending order. Ranking will allow you to choose from a set of factors the most significant. During the ranking, the respondent, using the generally accepted ranking rules, arranges these factors in the order that he thinks is most rational. If the respondent is not able to determine the order of location of some factors, it is possible to assign them equivalent estimates [23; 24; 39].

The results of processing primary expert information are given in table 1.

Table 1. Points assigned by respondents to the factors

<i>Respondents</i>	<i>Factors</i>									
	I	II	III	IV	V	VI	VII	VIII	IX	X
1	90	80	80	70	60	50	50	30	20	20
2	80	90	70	60	60	60	40	30	20	10
3	80	90	80	70	70	60	50	50	40	30
4	90	80	70	70	60	50	40	30	30	20
5	90	90	80	70	70	60	50	50	40	30
6	80	70	90	60	50	50	40	30	20	20
7	80	80	90	70	60	50	40	40	30	20
8	70	90	80	60	50	40	40	30	20	10
9	90	70	80	60	60	40	50	30	20	20
10	90	90	70	60	80	50	50	50	40	40
11	90	80	80	80	60	70	40	40	30	50
12	80	80	90	70	60	60	50	40	30	30
13	90	70	70	80	60	50	40	40	20	10
14	80	70	90	60	60	40	50	30	30	20
15	90	70	60	80	80	50	40	30	20	10
16	90	90	70	80	60	60	50	40	30	30
17	80	70	90	60	60	50	40	30	30	20
18	90	70	70	80	50	60	60	40	20	10
19	80	90	70	70	60	50	40	40	30	20
20	70	60	90	80	80	40	50	30	30	20
Arithmetic mean	84	79	78,5	69,5	62,5	52	45,5	36,5	27,5	22

Quantitative methods of expert research are based on the use of logical-mathematical and statistical methods of generalization of respondents, checking the statistical significance of the results of expert evaluation, confirmation or refutation of the quality of the expert research in general.

The analysis of the matrix of scores begins with the calculation of rank scores, which vary in the range from 1 to 10 for a scale of scores from 10 to 100. The highest score corresponds to rank 1, the lowest is 10. The rank matrix is shown in the table 2. The evaluation results presented by each respondent should be considered as the implementation of some random variable from the set of allowable estimates and apply the methods of mathematical statistics to generalize them. The use of statistical methods provides the determination of the most consistent group assessment, the degree of consistency of expert opinions, the statistical significance of the examination results.

Table 2. Rank estimates of factors

Respondents	Factors									
	I	II	III	IV	V	VI	VII	VIII	IX	X
1	1	2	2	4	5	6	6	8	9	9
2	2	1	3	4	4	4	7	8	9	10
3	2	1	2	4	4	6	7	7	9	10
4	1	2	3	3	5	6	7	8	8	10
5	1	1	3	4	4	6	7	7	9	10
6	2	3	1	4	5	5	7	8	9	9
7	2	2	1	4	5	6	7	7	9	10
8	3	1	2	4	5	6	6	8	9	10
9	1	3	2	4	4	7	6	8	9	9
10	1	1	4	5	3	6	6	6	9	9
11	1	2	2	2	6	5	8	8	10	7
12	2	2	1	4	5	5	7	8	9	9
13	1	3	3	2	5	6	7	7	9	10
14	2	3	1	4	4	7	6	8	8	10
15	1	4	5	2	2	6	7	8	9	10
16	1	1	4	3	5	5	7	8	9	9
17	2	3	1	4	4	6	7	8	8	10
18	1	3	3	2	7	5	5	8	9	10
19	2	1	3	3	5	6	7	7	9	10
20	4	5	1	2	2	7	6	8	8	10
Arithmetic mean	1,65	2,2	2,35	3,4	4,45	5,8	6,65	7,65	8,85	9,55

Methods of reference points, giving preferences, coordination of rankings, multidimensional ranking of objects; analysis of hierarchies, pairwise comparisons, verification of consistency of expert opinions based on the concordance coefficient and calculation of Spearman and Kendall rank correlation coefficients, graphical interpretation of research results using membership functions are systematized and supplemented in such scientific papers [21; 40–43].

Next, let us analyze the frequency of the maximum possible estimates using the formula:

$$w_{\max i} = \frac{\rho_{\max i}}{\rho_i}, \quad (1)$$

where $\rho_{\max i}$ is the number of maximum possible estimates for the i -th factor; ρ_i is the number of all estimates for the i -th factor.

Since not all factors received from some respondents the maximum possible estimates, the frequency of the maximum possible estimates can be calculated only for factors I and II:

$$w_{\max I} = \frac{7}{20} = 0,35,$$

$$w_{\max II} = \frac{6}{20} = 0,3,$$

For other studied factors, this indicator is equal to 0.

At the next stage of processing expert data, we calculate the average significance of each factor according to the following formulas:

$$\omega_i = \frac{\sum_{j=1}^N \omega_{ij}}{\sum_{i=1}^M \sum_{j=1}^N \omega_{ij}}, \quad \omega_{ij} = \frac{\delta_{ij}}{\sum_{i=1}^M \delta_{ij}}, \quad (2)$$

where δ_{ij} is score of the i -th factor by the j -th respondent; ω_{ij} is the share of the score of the i -th factor by the j -th respondent; M is a number of factors; N is a number of respondents.

In the table 3 the results of calculations are presented by formulas (2).

Table 3. Relative values of factors

Respondents	Factors									
	I	II	III	IV	V	VI	VII	VIII	IX	X
1	0,164	0,145	0,145	0,127	0,109	0,091	0,091	0,055	0,036	0,036
2	0,154	0,173	0,135	0,115	0,115	0,115	0,077	0,058	0,038	0,019
3	0,129	0,145	0,129	0,113	0,113	0,097	0,081	0,081	0,065	0,048
4	0,167	0,148	0,130	0,130	0,111	0,093	0,074	0,056	0,056	0,037
5	0,143	0,143	0,127	0,111	0,111	0,095	0,079	0,079	0,063	0,048
6	0,157	0,137	0,176	0,118	0,098	0,098	0,078	0,059	0,039	0,039
7	0,143	0,143	0,161	0,125	0,107	0,089	0,071	0,071	0,054	0,036
8	0,143	0,184	0,163	0,122	0,102	0,082	0,082	0,061	0,041	0,020
9	0,173	0,135	0,154	0,115	0,115	0,077	0,096	0,058	0,038	0,038
10	0,145	0,145	0,113	0,097	0,129	0,081	0,081	0,081	0,065	0,065
11	0,145	0,129	0,129	0,129	0,097	0,113	0,065	0,065	0,048	0,081
12	0,136	0,136	0,153	0,119	0,102	0,102	0,085	0,068	0,051	0,051
13	0,170	0,132	0,132	0,151	0,113	0,094	0,075	0,075	0,038	0,019
14	0,151	0,132	0,170	0,113	0,113	0,075	0,094	0,057	0,057	0,038
15	0,170	0,132	0,113	0,151	0,151	0,094	0,075	0,057	0,038	0,019
16	0,150	0,150	0,117	0,133	0,100	0,100	0,083	0,067	0,050	0,050
17	0,151	0,132	0,170	0,113	0,113	0,094	0,075	0,057	0,057	0,038
18	0,164	0,127	0,127	0,145	0,091	0,109	0,109	0,073	0,036	0,018
19	0,145	0,164	0,127	0,127	0,109	0,091	0,073	0,073	0,055	0,036
20	0,127	0,109	0,164	0,145	0,145	0,073	0,091	0,055	0,055	0,036
Arithmetic mean	0,151	0,142	0,142	0,125	0,112	0,093	0,082	0,065	0,049	0,039

In addition to the average values of weight estimates for each factor, a

matrix of advantages is used to analyze the significance of the studied factors. This matrix reflects how many respondents prefer a particular factor over another. For the results presented in this paper, the matrix of advantages is given in table 4.

Table 4. Matrix of advantages of factors

<i>Factors</i>	<i>I</i>	<i>II</i>	<i>III</i>	<i>IV</i>	<i>V</i>	<i>VI</i>	<i>VII</i>	<i>VIII</i>	<i>IX</i>	<i>X</i>
<i>I</i>		12	14	20	20	20	20	20	20	20
<i>II</i>	7		11	20	20	20	20	20	20	20
<i>III</i>	10	10		17	20	20	20	20	20	20
<i>IV</i>	1	4	4		15	20	20	20	20	20
<i>V</i>	1	2	2	1		17	20	20	20	20
<i>VI</i>	0	0	0	1	3		17	20	20	20
<i>VII</i>	0	0	0	0	1	3		16	20	20
<i>VIII</i>	0	0	0	0	0	0	1		20	20
<i>IX</i>	0	0	0	0	0	0	1	0		16
<i>X</i>	0	0	0	0	0	0	1	1	1	

Based on the matrix of advantages, it is possible to assess the significance of factors from the point of view of respondents who studied the influence of factors on the rationality of enterprise potential management in the coordinate system of organizational development. If you consider the table. 4, it can be concluded that the respondents consider the most significant factors such as: the presence of the concept and strategy of enterprise development; the level of personnel, logistical, organizational and other types of support; belonging of the enterprise to innovation-active business entities.

Next, we will assess how similar the opinions of the interviewed respondents on the importance of the studied factors. This will help determine whether the results of this study should be trusted. To do this, here are a number of indicators that are used in the study of the results of the expert survey:

- 1) the scope of assessments of respondents, is calculated by the formula:

$$d_i = b_{i_{\max}} - b_{i_{\min}} \quad (3)$$

where d_i is the range of estimates for the i -th factor; $b_{i_{\max}}$ is the maximum score assigned to the i -th factor; $b_{i_{\min}}$ is the minimum score assigned to the i -th factor.

- 2) the activity of respondents in assessing each factor:

$$A_i = \frac{n_i}{N}, \quad (4)$$

where A_i is the coefficient of activity of respondents in assessing the i -th factor; n_i is the number of respondents who assessed the i -th factor; N is the total number of respondents.

Indicators of the scope of assessments and activity of respondents, as well as generalized results of calculations at the previous stages of analysis of the results of the expert survey are presented in the table 5.

Table 5. Indicators of comparative importance of factors

Indicators	Factors									
	I	II	III	IV	V	VI	VII	VIII	IX	X
1. The sum of ranks	33	44	47	68	89	116	133	153	177	191
2. Average rank	1,65	2,2	2,35	3,4	4,45	5,8	6,65	7,65	8,85	9,55
3. Average value in points	84	79	78,5	69,5	62,5	52	45,5	36,5	27,5	22
4. Frequency of maximum possible estimates	0,35	0,3	0	0	0	0	0	0	0	0
5. Average significance (normalized score)	0,151	0,142	0,142	0,125	0,112	0,093	0,082	0,065	0,049	0,039
6. Swing	20	30	30	30	30	30	40	20	20	40
7. Respondent activity rate	1	1	1	1	1	1	1	1	1	1

Thus, based on table 5, we summarize that the largest scope of estimates was observed for factors (belonging of the enterprise to statutory or contractual associations and the level of capacity utilization). This shows that respondents ambiguously assess the impact of these factors on the object under study. For the most important factors (the concept and strategy of enterprise development and the level of staffing, logistics, organizational and other types of support) there is a relatively low level of scoring, which suggests a high degree of agreement between respondents on the relative importance of these factors. After the results of the expert survey are analyzed, it is possible to conclude about the level of importance of the studied factors. In general, the level of weight of the factor is a quantitative characteristic of the significance of a certain factor among other studied factors. When processing the results of expert evaluation of the relative importance of factors, a number of indicators are determined that will allow to assess each factor. When comparing the relative importance of factors influencing the rationality of enterprise management potential, the most important factor should be considered the one with the highest value of the average score. Thus, in this case it is determined that the factors (the presence of the concept and strategy of enterprise development and the level of personnel, logistics, organizational and other types of support) are characterized by the highest level of importance. Figure 1 presents the levels of weight for each of the factors, calculated as the ratio of the actual amount of points to the maximum possible:

$$W = \frac{\sum_{i=1}^N r_{iF}}{\sum_{i=1}^N r_{i\max}}, \quad (5)$$

where r_{iF} is the actual score of the i -th factor; $r_{i\max}$ is the maximum possible score, which could be estimated factor; and i is the index of the current respondent; N is a number of respondents who took part in the survey.

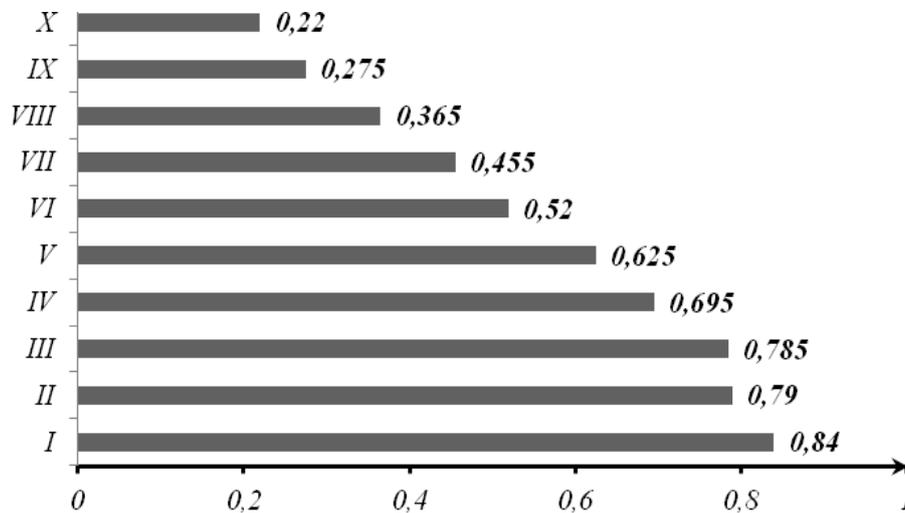


Figure 1. The value of the relative importance of factors, freq. from

After calculating and evaluating the weight of each of the factors, it is necessary to prove that the study is objective. With this aim, the assumption of a high level of agreement of respondents' opinions on the importance of a certain list of factors is substantiated. The assessment of the degree of agreement of the respondents' opinions should be carried out taking into account that the development of recommendations and generalization of the results of expert research is possible only with a high level of agreement. The assessment of the level of agreement of the respondents' opinions can be realized either by the concordance coefficient or by the rank correlation coefficient.

To assess the level of agreement of respondents' opinions, we use the concordance coefficient, which is calculated by the formula:

$$K_K = \frac{\sum_{i=1}^N \beta_i^2}{\frac{1}{12} \left[M^2 (N^3 - N) - M \sum_{j=1}^M \alpha_j \right]};$$

$$\beta_i = Ar_i - \frac{\sum_{i=1}^N Ar_i}{N};$$

$$\alpha_i = \sum_{h=1}^H (l_h^3 - l_h),$$

(6)

where H is the number of groups with the same ranks; l_h is the number of

identical ranks in each group.

Based on the table. 6 let us define the following groups with the same ranks: (2, 2); (6, 6); (9, 9); (4, 4, 4); (4, 4); (7, 7); (3, 3); (8, 8); (1, 1); (4, 4); (7, 7); (5, 5); (9, 9); (2, 2); (7, 7); (6, 6); (6, 6); (4, 4); (9, 9); (1, 1); (6, 6, 6); (9, 9); (2, 2, 2); (8, 8); (2, 2); (5, 5); (9, 9); (3, 3); (7, 7); (4, 4); (8, 8); (2, 2); (1, 1); (5, 5); (9, 9); (4, 4); (8, 8); (3, 3); (5, 5); (3, 3); (7, 7); (2, 2); (8, 8).

The number of groups is 42. Intermediate calculations regarding the concordance coefficient are presented in table 6.

Table 6. Intermediate calculations required to calculate the concordance coefficient

Respondents	Factors									
	I	II	III	IV	V	VI	VII	VIII	IX	X
1	1	2	2	4	5	6	6	8	9	9
2	2	1	3	4	4	4	7	8	9	10
3	2	1	2	4	4	6	7	7	9	10
4	1	2	3	3	5	6	7	8	8	10
5	1	1	3	4	4	6	7	7	9	10
6	2	3	1	4	5	5	7	8	9	9
7	2	2	1	4	5	6	7	7	9	10
8	3	1	2	4	5	6	6	8	9	10
9	1	3	2	4	4	7	6	8	9	9
10	1	1	4	5	3	6	6	6	9	9
11	1	2	2	2	6	5	8	8	10	7
12	2	2	1	4	5	5	7	8	9	9
13	1	3	3	2	5	6	7	7	9	10
14	2	3	1	4	4	7	6	8	8	10
15	1	4	5	2	2	6	7	8	9	10
16	1	1	4	3	5	5	7	8	9	9
17	2	3	1	4	4	6	7	8	8	10
18	1	3	3	2	7	5	5	8	9	10
19	2	1	3	3	5	6	7	7	9	10
20	4	5	1	2	2	7	6	8	8	10
Sums	33	44	47	68	89	116	133	153	177	191
The average value of the sums of ranks							105,1			
β_i	-72,1	-61,1	-58,1	-37,1	-16,1	10,9	27,9	47,9	71,9	85,9
β_i^2	5198,4	3733,2	3375,6	1376,4	259,2	118,8	778,4	2294,4	5169,6	7378,8
The sum of the squares of the deviations							49678,6			

According to the formula (6)

$$\begin{aligned} \sum_{j=1}^M \alpha_j = & (2^3 - 2) + (6^3 - 6) + (9^3 - 9) + (4^3 - 4) + (4^3 - 4) + (7^3 - 7) + (3^3 - 3) + \\ & + (8^3 - 8) + (1^3 - 1) + (4^3 - 4) + (7^3 - 7) + (5^3 - 5) + (9^3 - 9) + (2^3 - 2) + (7^3 - 7) + \\ & + (6^3 - 6) + (6^3 - 6) + (4^3 - 4) + (9^3 - 9) + (1^3 - 1) + (6^3 - 6) + (9^3 - 9) + (2^3 - 2) + \\ & + (8^3 - 8) + (2^3 - 2) + (5^3 - 5) + (9^3 - 9) + (3^3 - 3) + (7^3 - 7) + (4^3 - 4) + (8^3 - 8) + \\ & + (2^3 - 2) + (1^3 - 1) + (5^3 - 5) + (9^3 - 9) + (4^3 - 4) + (8^3 - 8) + (3^3 - 3) + (5^3 - 5) + \\ & + (3^3 - 3) + (7^3 - 7) + (2^3 - 2) + (8^3 - 8) = 16998. \end{aligned}$$

Thus, the concordance coefficient is:

$$K_k = \frac{49678,6}{\frac{1}{12} [20^2 (10^3 - 10) - 20 \times 16998]} \approx 0,8864.$$

The values of the concordance coefficient are always in the range from 0 to 1. The closer the value of this indicator to 1, the greater is the level of agreement of the respondents.

Thus, based on the calculated concordance coefficient, we conclude that the degree of consistency of respondents' opinions on the importance of the studied factors that affect the rational management of the enterprise in the coordinate system of its organizational development is high. Factors (the presence of the concept and strategy of enterprise development and the level of personnel, logistics, organizational and other types of support) are the most important.

4. Cluster analysis of factors.

To perform the task of clustering the factors that affect the rationality of enterprise capacity management, apply the method of bullets and use `clast_izomorf_trek`, which is the specification of MS Excel. In this case, the clustering of factors involves the following algorithm:

- 1) the formation of the original data matrix;
- 2) construction of a matrix of isomorphic distances, i.e. grouping of factors on the basis of structural similarity [44]. Isomorphic grouping is performed by the formula:

$$Z_{ij} = \frac{X_{ij} / \sum_{i=1}^n X_{ij}}{\sum_{j=1}^m \frac{X_{ij}}{\sum_{i=1}^n X_{ij}}}, \quad (7)$$

where X_{ij} is the value of the j -th feature for the i -th object.

The isomorphic distance between objects is determined using Euclidean metrics, because the components of the observation vector are homogeneous in terms of semantic interpretation and equally important for the classification determined by the formula [44]:

$$d_{ik} = \sqrt{\sum_{j=1}^m (Z_{ij} - Z_{kj})^2}. \quad (8)$$

- 3) on the basis of a matrix of isomorphic distances the choice of a critical point which allows to distribute the investigated factors into separate groups is carried out. The critical point is determined by the formula [44]:

$$C_l(p) = \frac{1}{K} \sum_{l=1}^G \sum_{p=1}^{P_l} C_l(p), \quad (9)$$

where $C_l(p) = \min_{q \in g_l} C_{ll}(p, q)$, $p = 1, 2, \dots, P_l$, $K = \sum_{l=1}^G P_l$; $C_{ll}(p, q)$ is the distance between the factors p and q , which belong to the l -th cluster; $C_l(p)$ is the distance between the factor p to the neighbouring factor in the cluster l ; P_l is the number of factors in the cluster l ; G is the number of clusters.

4) identification of clusters;

5) on the basis of isomorphic distances of formation of chains of factors and construction of a matrix of interchain distances;

6) construction of dendrites based on the data obtained in step 5.

The initial data are presented in the form of a matrix of observations, which contains the values of all factors that affect the rationality of managing the potential of the enterprise in the coordinate system of its organizational development defined by each expert. So, in table 7 shows the original data matrix, which is essentially table 2, written in horizontal form, which is a requirement of the specification *clast_izomorf_trek MS Excel*. The evaluation results presented by each respondent should be considered as the implementation of some random variable from the set of allowable estimates and apply to generalize the methods of mathematical statistics. The use of statistical methods provides the determination of the most consistent group assessment, the degree of consistency of expert opinions, the statistical significance of the examination results.

Table 7. The original data matrix

Sequence numbers of factors	Sequence numbers of experts									
	1	2	3	4	5	6	7	8	9	10
I	90	80	80	90	90	80	80	70	90	90
II	80	90	90	80	90	70	80	90	70	90
III	80	70	80	70	80	90	90	80	80	70
IV	70	60	70	70	70	60	70	60	60	60
V	60	60	70	60	70	50	60	50	60	80
VI	50	60	60	50	60	50	50	40	40	50
VII	50	40	50	40	50	40	40	40	50	50
VIII	30	30	50	30	50	30	40	30	30	50
IX	20	20	40	30	40	20	30	20	20	40
X	20	10	30	20	30	20	20	10	20	40
Sequence numbers of factors	Sequence numbers of experts									
	11	12	13	14	15	16	17	18	19	20
I	90	80	90	80	90	90	80	90	80	70
II	80	80	70	70	70	90	70	70	90	60
III	80	90	70	90	60	70	90	70	70	90
IV	80	70	80	60	80	80	60	80	70	80
V	60	60	60	60	80	60	60	50	60	80
VI	70	60	50	40	50	60	50	60	50	40
VII	40	50	40	50	40	50	40	60	40	50
VIII	40	40	40	30	30	40	30	40	40	30
IX	30	30	20	30	20	30	30	20	30	30
X	50	30	10	20	10	30	20	10	20	20

In order to formalize the clustering problem, each factor is interpreted as a point in a multidimensional vector space whose coordinates are the values of Z_{ij} (formula (7)).

As a result of application of the mathematical device (7)–(9) we receive a matrix of isomorphic distances (table 8).

Table 8. Matrix of isomorphic distances

Factors	I	II	III	IV	V	VI	VII	VIII	IX	X
I	0	0,032493	0,039409	0,026371	0,035016	0,031928	0,030823	0,04169	0,058969	0,099788
II	0,032493	0	0,043047	0,041611	0,043715	0,034687	0,042281	0,038568	0,052936	0,098515
III	0,039409	0,043047	0	0,043937	0,04568	0,048795	0,037946	0,054105	0,056902	0,099843
IV	0,026371	0,041611	0,043937	0	0,034831	0,034621	0,03557	0,043818	0,061562	0,104116
V	0,035016	0,043715	0,04568	0,034831	0	0,048383	0,04101	0,046873	0,049499	0,09901
VI	0,031928	0,034687	0,048795	0,034621	0,048383	0	0,043551	0,037949	0,058098	0,092241
VII	0,030823	0,042281	0,037946	0,03557	0,04101	0,043551	0	0,0438	0,057745	0,101536
VIII	0,04169	0,038568	0,054105	0,043818	0,046873	0,037949	0,0438	0	0,041577	0,086783
IX	0,058969	0,052936	0,056902	0,061562	0,049499	0,058098	0,057745	0,041577	0	0,074421
X	0,099788	0,098515	0,099843	0,104116	0,09901	0,092241	0,101536	0,086783	0,074421	0

In accordance with the above algorithm of the method of balls using formula (9) let us determine the minimum distances between the factors and the critical point. As it turned out, the following distances are minimal –

- 1) 0,026370861 between 1 and 4 factors;
- 2) 0,032492725 between 2 and 1 factors;
- 3) 0,037945991 between 3 and 7 factors;
- 4) 0,026370861 between 1 and 2 factors;
- 5) 0,034831064 between 5 and 4 factors;
- 6) 0,031928248 between 6 and 1 factors;
- 7) 0,030822566 between 7 and 1 factors;
- 8) 0,037949036 between 8 and 6 factors;
- 9) 0,041577035 between 9 and 8 factors;
- 10) 0,074421124 between 10 and 9 factors.

Of the minimum distances, the maximum is the distance between factors 10 and 9 – 0,074421124, i.e. this is the critical point. Based on a certain critical point, two clusters were formed (Figure 2), one of which is a singleton, i.e. is a set of one factor (tenth). All other factors (1 to 9) are combined into one cluster.

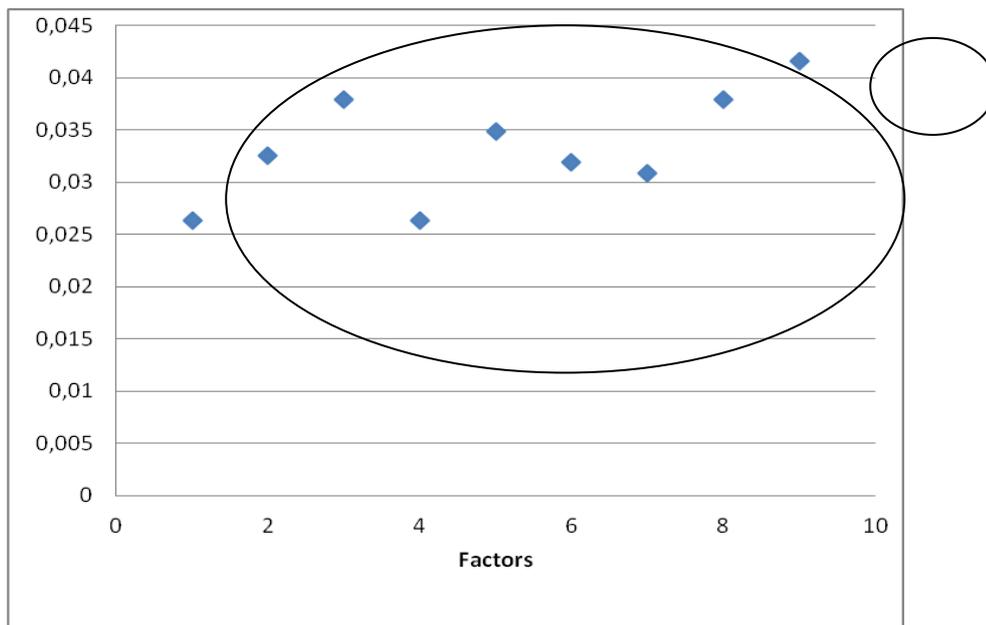


Figure 2. Clustering of factors

The next step in the method of balls is the formation of chains of factors and the construction of a matrix of interchain distances (Table 9) using the specification *clast_izomorf_trek MS Excel*. As you can see, 2 chains were formed:

- 1) [1] 0,026 [4] 0,041 [2] 0,043 [5] 0,048 [6] 0,037 [8] 0,0415 [9] 0,074 [10]
- 2) [3] 0,037 [7]

From the matrix of interchain distances we see that the minimum distance between the constructed chains is 0.030823, in particular the distance connecting the chains at points 1 and 7. As a result, there was a monolithic dendrite, in which, despite the formation of two clusters, all factors are interconnected into a single structure (Figure 2).

Table 9. Matrix of interchain distances

Chains	1	2
1	0 (0; 0)	0,030823 (1; 7)
2	0,030823 (1; 7)	0 (0; 0)
Minimum distances between chains	0,030823 (1; 2)	0,030823 (2; 1)

Thus, as a result of the study it was found that regardless of the level of capacity utilization, it is possible to achieve rationality in managing the potential of the enterprise. Nevertheless, when deciding on the management of the potential

of the enterprise in the coordinate system of organizational development factor 10 should be taken into account in combination with factor 9 (level of profitability and financial stability of the enterprise), as factors 9 and 10 are linearly related to each other (see Figure 3).

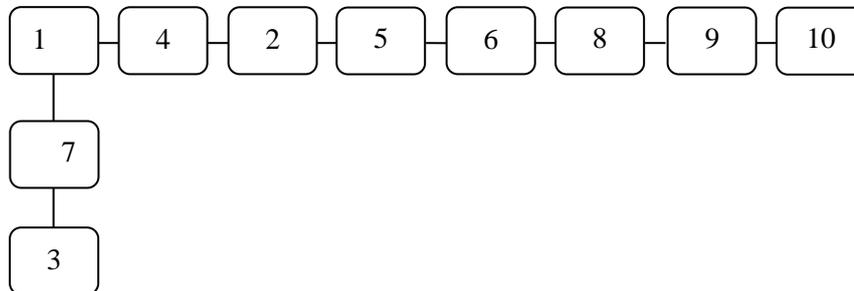


Figure 3. Dendritic factors

The logic of this connection is that it is not capacity utilization that can cause insufficient production and, as a consequence, insufficient revenue from sales of finished products and profits to cover costs, namely the conditional fixed costs of the enterprise. This model of causation is typical of large enterprises, which after 1990 lost most of their production capacity as a result of the loss of economic ties with most of the partners. As a result, there is a significant amount of conditional fixed costs, which turned these companies into unprofitable, financially vulnerable organizations [45–50].

In conditions when the enterprise is profitable and financially stable, it is an indication that despite the amount of reserves of production capacity, the management of the potential of this enterprise is rational. This is possible when the existing production capacity is characterized by a high level of energy efficiency, productivity and intellectual capacity [51–56].

From fig. 3 we also see factor 9 is linearly related to factor 8 (belonging of the enterprise to the subjects of foreign economic activity). The logic of the relationship between these factors is based on the presence of causal links between the diversification of markets for finished products, financial stability and profitability of the enterprise. In addition, the presence of foreign markets encourages exporters to permanently improve the quality of finished products and find ways to save on costs. If there are savings, product quality increases and this provides an increase in exports, it has a positive effect on the values of indicators that characterize the financial stability and profitability of the enterprise.

There is a linear relationship between factors 6 (enterprise specialization) and 8. In this case, the relationship between these factors can be explained by the fact that competition in highly specialized markets is rare. If the company goes beyond specialization and begins to offer the market a more versatile product with a wide range of consumers, then this, as a rule, involves increased competition among manufacturers. As a result, there is a risk of declining export earnings. Conversely, filling a narrow niche in export markets is a reason for optimism about the growth of profitability and financial stability of the enterprise.

The specialization of the enterprise, as it turned out during the study, is linearly related to 5 factors (form of ownership and type of management of the enterprise), and this factor in turn is linearly related to 2 factors (level of personnel, logistics, organizational and other types of support). To explain the

logic of the relationship between these factors, they should be divided into causal and consequential. Thus, factors 5 and 6 are causal for 2 consequence factors. The form of ownership and type of management determine the capabilities of the enterprise in terms of sources of formation of its liabilities asset structure. Thus, corporations belonging to public joint stock companies, which have the right to increase equity through the issue of shares, including additional issues, have incomparably greater financial opportunities compared to enterprises belonging to other types of management. With ample financial resources, such companies are able to master the production of highly specialized products and thus fill narrow market niches, which often provide a stable, predictable income over long periods of time. Actually, factor 6 is also consequential in relation to factor 5, but causal in relation to factor 2, as it determines the need for the level of personnel, logistics and other types of support.

Absolutely logical is the linear relationship between factors 2 and 4, as well as factors 4 and 1. The size of the enterprise determines the levels of its personnel, logistical, organizational and other types of support, as well as, to a large extent, the depth of the planning system of the enterprise. Empirical studies suggest that the vast majority of small enterprises, including micro-enterprises, as well as medium-sized enterprises are very rare to have developed concepts and development strategies. They are limited to certain missions and visions, which are usually quite briefly set out in the founding documents, as well as tactical operational plans that are part of the management accounting system of enterprises. Strictly speaking, this explains the relationship between factors 1 and 7. Members of statutory and contractual associations are mostly more careful in forming common concepts and development strategies. This is due to the need to reconcile mutual interests at all stages of planning joint economic activities.

As we can see from Figure 3 there is a linear relationship between factors 7 and 3 (belonging of the enterprise to innovation-active business entities). The conducted researches allow to state that the participants of large contractual associations are the most innovative and active in Ukraine. Thus, according to the Unified State Register of Public Organizations in Ukraine, there are more than a few dozen innovation-active clusters that operate on a contractual basis or as statutory associations, namely the National Innovation Cluster “New Environmental Technologies”; National Innovation Cluster “Biotechnology”; National Innovation Cluster “New Cars”; National Innovation Cluster “New Power Plants and Drives”; National Innovation Cluster “New Materials”; National Innovation Cluster “Energy for Sustainable Development”; National Innovation Cluster “Innovation Society Technologies”; National Innovation Cluster “Innovative Culture of Society”; National Innovation Cluster “New Food”; Innovation and investment cluster; Scientific and educational innovation cluster “Competitiveness”; Energy Cluster “Innovation Energy”; Innovative technological cluster “AgroBUM”; Innovative technological cluster “Agricultural Engineering”; Biomedical innovation and technology cluster “Bitek”; Innovation and technology cluster “Sorochn Fair”; Nanotechnology cluster; Mariupol IT cluster; Lviv cluster of IT and business services; Ivano-Frankivsk IT cluster; IT Cluster of Vinnytsia; Ternopil IT cluster; Khmelnytsky IT cluster; Lutsk IT cluster; Chernihiv IT cluster; Dnieper space cluster; Cherkasy IT cluster; Mykolayiv IT cluster; Technological cluster of Odessa region; Odessa IT cluster; Konotop IT cluster; Alternative energy cluster and scientific and educational

cluster (based on Kharkiv Technopolis Technopark); Kharkiv cluster of aviation and space sphere; Ukrainian Aerospace Cluster “Mechatronics”; Kharkiv cluster of nanobiotechnologies; Kharkiv cluster of armored vehicles; Kharkiv IT cluster; Kyiv IT cluster; Cluster “IT Alliance 4.0”; Cluster of Tactical Medicine at the Association of Manufacturers of Arms and Military Equipment of Ukraine; Nanotechnology cluster in the structure of the Scientific and Technical Enterprise “Agroprodovolcha”.

5. Recommendations on the possibility of practical application of the results of the analysis

Thus, on the basis of the built clusters and the established connections between factors it is possible to construct the analytical and information model of the account of factors during formation of administrative decisions concerning management of potential of the enterprise in system of coordinates of organizational development (Figure 4). The practical application of the proposed model will increase the objectivity of approved decisions in managing the potential of the enterprise, although it should be recognized that the effectiveness of its application will depend on the exhaustiveness of the factors and the relevance of information that characterizes them, which requires "traditional" scientific and methodological approaches(traditional financial tools, probabilistic methods, quantitative and qualitative financial models, portfolio analysis, tools for qualitative diagnosis, budget method, etc.), as well as such scientific and methodological approaches as Rapid Economic Justification (method of rapid economic justification of the project decision), Total Economic Impact (establishment of the general economic effect), Total Value of Opportunities, Applied Information Economics, Cost / Schedule Control Systems Criteria, Activity Based Costing (performing functional-cost analysis), IT Scorecard (using a modified balanced scorecard), Total Cost of Ownership (calculation of total cost of ownership), etc.

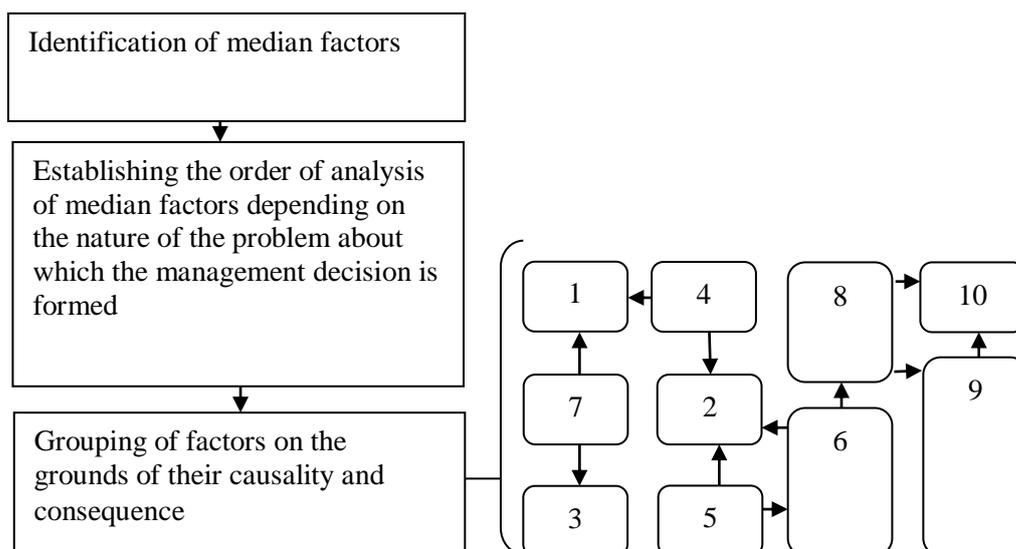


Figure 4. Analytical and information model of factor consideration during the formation of management decisions to manage the potential of the enterprise in the coordinate system of organizational development

Note: the median factors, i.e. those that in a number of factors occupy a place among the 2 factors are the factors under number 1; 2; 6; 7; and 9.

6. Conclusions

Given that enterprises operate in a changing environment, in which there are many unknown variables that affect the rationality of enterprise capacity management, the urgent task is to identify and evaluate the factors that affect the management of this object. As a result of the research it is proved that such factors include such factors as: the presence of the concept and strategy of enterprise development; the level of personnel, logistical, organizational and other types of support; belonging of the enterprise to innovation-active business entities; the size of the enterprise; form of ownership and type of management; enterprise specialization; affiliation of the enterprise to statutory or contractual associations; belonging of the enterprise to the subjects of foreign economic activity; level of profitability and financial stability; the level of capacity utilization. The identified factors are of practical importance only if they can be taken into account by managers in making and implementing management decisions. Using the method of expert assessments during 2019, these factors were assessed for their relative importance. The gradation of these factors according to the level of relative importance is important management information at the stages of making decisions about the management of the potential of the enterprise, in particular when choosing management decisions.

It is proved that in the general set of factors influencing the rationality of enterprise potential management there are those which, on the basis of their structure, are elements of different clusters. In addition, there are linear and indirect connections between them, which is important to consider when choosing the best solution from a number of alternatives. Constructed clusters and dendrites of factors influencing the rationality of enterprise potential management require permanent monitoring for their refinement and addition, especially during periods of economic transition from one phase to another, as well as due to reorganization and restructuring of enterprises.

References

1. Shcherbina, V. V., & Popova, E. P. (1996). Modern concepts of structural change in organizations, *Sociological Research*, № 1, 98–106.
2. Melnyk, S. G. (2009). Theoretical and methodological aspects of organizational development of domestic enterprises, *Bulletin of Khmelnytsky National University*, № 6, Vol. 2, 46–51.
3. Totsky, V. I., & Lavrenko, V. V. (2005). Organizational development of the enterprise. Totsky V. I, Lavrenko V. V. (ed.), Kyiv, KNEU, 38-44.
4. Gerasymchuk, V. G. (1995). Enterprise development: diagnostics, strategy, efficiency. Gerasymchuk, V. G. (ed.), Kyiv, Higher School, 266 p.
5. Novak, V. O., & Rodchenko, V. V. (2009). Organizational development of international corporations and criteria for its effectiveness. Removed from http://www.nbu.gov.ua/ejournals/PSPE/2009_4/Rodchenko_409.htm.
6. Kolesnikov, G. O. (2007). Manager's dictionary. Kolesnikov G.O. (ed.), Kyiv, Professional, 44–49.
7. Shvindina, G. O. (2016). Identification of the essence of organizational development strategy, *Intellect XXI*, № 6, 153–160.
8. Gudzinskyi, O. D., Sudomir, S. M., & Grudzinska, Yu. S. (2012). Management system of institutional transformation of the economy of Ukraine (theoretical and methodological aspect). Gudzinskyi, O.D. (ed.), Kyiv, Agrar Media Group LLC, 771 p.
9. Gorbatovska, N. V. (2012). Management of organizational development of industrial enterprises (dis. Candidate of Economic Sciences). Makeyevka Institute of

Economics and Humanities, Makeyevka, Ukraine.

10. Amelina, I. V. (2008). Conceptual bases of organizational development of enterprises in modern conditions, Project management and production development, Coll. of Scient. wor., SNU after W. Dahl, №2 (26), 65-71.

11. Ladonko, L. S., & Tikhun, I. C. (2014). Implementation of strategic changes as a key factor in ensuring the organizational development of the enterprise, Scientific Bulletin of the Chernihiv State Institute of Economics and Management. Series 1: Economics, Vol. 1, 126–135

12. Legeza, N. V. (2019). Theoretical aspects of organizational support of enterprise development, Effective economy, № 1, Removed from URL: <http://www.economy.nayka.com.ua/?op=1&z=6855>

13. Zabrodska, G. I., & Zabrodska, L. D. (2017). Organizational development of the enterprise: basics of defining definition, Young Scientist, № 4.4 (4.4), 55–59. Removed from <http://molodyvcheny.in.ua/files/journal/2017/4.4/13.pdf>

14. Kniaz, S. V., Kulyk, Y. R., & Zinkevych, D. K. (2009). Creative decisions on choosing priority areas of business systems development, Bulletin of the National University “Lviv Polytechnic”. Series “Management and Entrepreneurship in Ukraine: Stages of Formation and Problems of Development”, № 640, 298–304.

15. Vilgutska, R. B. (2013). Factors influencing organizational structures in the investment management system of the enterprise, Investments: practice and experience, 2013, № 20, 47–52.

16. Savina, G. G., & Skibina, T. I. (2016). Factors of external and internal influence on the level of efficiency of management of the enterprise of a complex of communal services, Effective economy, № 12, 16–21.

17. Boykivska, G. M. (2011). Efficiency of using the production potential of enterprises of the processing industry of the agro-industrial complex system (author's dissertation ... Candidate of Economic Sciences), Vinnytsia, Ukraine, 12–16.

18. Synytsia, S. M., & Vakun, O. V. (2017). Clustering of regions by level of economic potential, Economy and Society, Issue 12, 776 - 784.

19. Dobuliak, L. P., Kostenko, S. B., & Shevchuk, S. P. (2019). The use of agglomerative cluster-procedure for grouping the regions of Ukraine by the level of small business development, Pryazovsky economic bulletin: electronic scientific journal, 4 (15), 294–300. doi: <https://doi.org/10.32840/2522-4263/2019-4-47>

20. Grechko, A. V., & Melnikova, O. M. (2017). Research of directions of increase of profitability of the enterprises, Entrepreneurship and innovations, Vol. 3, 108–114.

21. Utenkova, K. O. (2020). Theoretical bases of formation of a technique of an expert estimation of influence of separate factors on a condition of economic safety of the agrarian enterprises, Economy and the state, № 4, 133–140. doi: 10.32702 / 2306-6806.2020.4.133

22. Modern methods and models of data processing in information systems: monograph / Besedovskyi, O. M., Zolotarova, I. O., Yevsieiev S. P., and others; for general ed. Dr. of econ. Sciences, Professor Ponomarenko, V.S. Kh.: Ed. KhNEU after S. Kuznets, 2013. 540 p.

23. Radchenko, S. G. (2015). System support for obtaining multifactor statistical models, Mathematics in the modern technical university: Collection of scientific and methodical works of the National Technical University of Ukraine “KPI”, 1, 66–71.

24. Ponomarenko, V. S., & Maliarets, L. M. Multidimensional analysis of socio-economic systems: a textbook / Ponomarenko, V. S., Maliarets, L. M. Kharkiv: Ed. KhNEU, 2009. 384 p.

25. Heorhiadi, N. G., Kniaz, S. V., & Vilgutska, R. B. (2013). Factors influencing the formation and use of organizational structures of enterprise management, Bulletin of the National University “Lviv Polytechnic”. Management and Entrepreneurship in Ukraine: Stages of Formation and Problems of Development, № 767, 17–25.

26. Volkova, N. A., & Stukach, O. V. (2005). Cluster analysis of the results of a sociological survey of employees of the enterprise, *Bulletin of Ulianovsk State Technical University*, 2 (30), 68-72.
27. Management of the enterprise in a competitive environment Sokolova, L. V. (ed.), 2010. Kharkiv, SMIT Company LLC, 190 p.
28. Yakusheva, O. V. (2017). Methodical approaches to the assessment of economic development of small and medium business in the regions of Ukraine, *Bulletin of the Azov State Technical University. Series: Economic Sciences*, Vol. 33, 145–152.
29. Bogatska, N. M. (2010). Analysis of material and technical support of the enterprise, *Economic sciences: economics of the enterprise*, № 10, 48–52.
30. Golovko-Marchenko, I. S. (2015). Theoretical and practical aspect of cluster analysis of construction companies, *Economics: the realities of time*, № (6 (22)), 102–107.
31. Runner, S. I. (2016). Application of cluster analysis to study the demographic situation in the region, *Economic Journal of Lesia Ukrainka East European National University*, № 2, 122–128.
32. Kniaz, S. (2015). The essence of eco-economic, tourism eco-information systems and the interrelation between them, *Actual Problems of Economics*, 171 (9), 280–285.
33. Kniaz, S., Zaiats, O., Shayda, O., Danko, T., Baidala, N., Merezhko, N., Kotsiumbas, O., Lema, H., Protsyk, I., & Holovina, O. (2020). Development of environmental management system by industrial enterprises. *ARCTIC*, 73 (3), 56–69. (ISSN: 0004-0843).
34. Kovalenko, A. V., Urtenov, M. Kh., & Zaikina, L. N. (2010). Cluster analysis of the financial and economic condition of enterprises in the construction industry. *Polythematic online electronic scientific journal of the Kuban State Agrarian University*, (60), 189–200.
35. Vynnychenko, N. V., & Supruchenko, A. S. (2017). Peculiarities of application of cluster analysis in receivables management, *International scientific journal "Internauka"*, № 1(2), 39–43.
36. Pisarkova, V. R., & Naumenko, N. Yu. (2019). Approaches of cluster analysis to the assessment of financial and economic activity of enterprises, *Computer modeling: analysis, management, optimization*, № 1(5), 63–69.
37. Tkachova, A. V. (2012). Cluster analysis of metallurgical enterprises on the basis of production, financial, economic and logistical indicators of activity, *Bulletin of Zaporizhzhia National University*, № 1(13), 37–44.
38. Sokolova, L. V., Veriasova, G. M., & Sokolov, O. E. (2011). The use of cluster analysis methods in the practical activities of enterprises, *Bulletin of the National University "Lviv Polytechnic". Series "Management and Entrepreneurship in Ukraine: Stages of Formation and Problems of Development"*, № 720, 240–246.
39. Bakhrushyn, V. Ye. (2011). *Methods of data analysis: a textbook for students / Bakhrushyn, V. Ye. Zaporizhzhia: CPU*, 268 p.
40. Seliverstov, R. G. (2008). Elements of the theory of fuzzy sets as a means of professionalization of expert activity in public administration, *Efficiency of public administration: coll. of Scient. wor. LRIDU NADU*, Issue. 16/17, 372–376.
41. Novosad, V. P. (2005). Analytical methods of expert evaluation in public administration, *Efficiency of public administration: coll. of Scient. wor. LRIDU NADU*, Issue. 6/7, 343–350.
42. Novosad, V. P. (2004). Method of analysis of hierarchies as a means of substantiation of management decisions, *Efficiency of public administration in the context of European integration: materials of annually. scientific-practical Conf., January 23, 2004, Lviv: LRIDU NADU, 2004, Part 1*, 180–183.
43. Novosad, V. P. (2009). Assessment of consistency of expert opinions by rank

correlation methods, Democratic governance in the context of global challenges and crisis situations: materials of scientific pract.-conf. with international participation, April 3, 2009, Lviv, Part 2, LRIDU NADU, 2009, 353–356.

44. Lapach, S. N., Chubenko, A. V., & Babich, P. N. (2002). Statistics in science and business. Kyiv, MORION, 250–262.

45. Kniaz, S. V., Druhov, O. O., Fedorchak, O. Y., & Prochorenko, V. P. (2018). Analysis of development dynamics of banking sector in Ukraine, *Financial and Credit Activity: Problems of Theory and Practice*, № 2(25), 27–35. doi: <https://doi.org/10.18371/fcaptp.v2i25.135976>

46. Heorhiadi, N., Druhov, O., Vilhutska, R., Bets, M., Stoianovskyi, A. & Folwarski, M. (2018). Organizational development in banks management systems, *Banks and Bank Systems*, № 13(3), 1–11. doi: [https://doi.org/10.21511/bbs.13\(3\).2018.01](https://doi.org/10.21511/bbs.13(3).2018.01)

47. Yuzevych, L., Yankovska, L., Sopilnyk, L., Yuzevych, V., Skrynkovskyi, R., Koman, B., Yasynska-Damri, L., Heorhiadi, N., Dzhala, R., & Yasynskyi, M. (2019). Improvement of the toolset for diagnosing underground pipelines of oil and gas enterprises considering changes in internal working pressure, *Eastern-European Journal of Enterprise Technologies*, № 6(5(102)), 23–29. doi: <http://dx.doi.org/10.15587/1729-4061.2019.184247>

48. Kniaz, S., & Heorhiadi, N. (2016). Structure, possibilities and prospects of the development of virtual economy and creative industries, *Actual Problems of Economics*, № 183(9), 346–351.

49. Popova, N., Kataiev, A., Skrynkovskyi, R., & Nevertii, A. (2019). Development of trust marketing in the digital society, *Economic Annals-XXI*, № 176(3-4), 13–25. doi: <https://doi.org/10.21003/ea.V176-02>

50. Kniaz, S., & Luchko, H. (2015). Current state and problems in derivatives market functioning in Ukraine, *Actual Problems of Economics*, 168(6), 347–354.

51. Kniaz, S. & Kosovska, V. (2015). Grounding the need for transfer system development between industrial enterprises, *Actual Problems of Economics*, № 170(8), 16–23.

52. Yuzevych, L., Skrynkovskyi, R., Yuzevych, V., Lozovan, V., Pawlowskyi, G., Yasynskyi, M., & Ogirko, I. (2019). Improving the diagnostics of underground pipelines at oil-and-gas enterprises based on determining hydrogen exponent (PH) of the soil media applying neural networks, *Eastern-European Journal of Enterprise Technologies*, № 4(5(100)), 56–64. doi: <http://dx.doi.org/10.15587/1729-4061.2019.174488>

53. Kniaz, S. (2015). Transfer potential for innovative development of industrial and trade organizations, *Actual Problems of Economics*, № 169(7), 57–64.

54. Yuzevych, V., Klyuvak, O., & Skrynkovskyi, R. (2016). Diagnostics of the system of interaction between the government and business in terms of public eprocurement, *Economic Annals-XXI*, № 160(7-8), 39–44. doi: <https://doi.org/10.21003/ea.v160-08>

55. Skrynkovskyi, R. (2008). Investment attractiveness evaluation technique for machine-building enterprises, *Actual Problems of Economics*, № 7(85), 228–240.

56. Skrynkovskyi, R. M. (2011). Methodical approaches to economic estimation of investment attractiveness of machine-building enterprises for portfolio investors, *Actual Problems of Economics*, № 118(4), 177–186.