THE OPTIMIZATION ALGORITHM FOR THE DIRECTIONS OF INFLUENCE OF RISK FACTORS ON THE SYSTEM THAT MANAGES THE POTENTIAL OF MACHINE-BUILDING ENTERPRISES

Визначено напрями впливу факторів ризику на систему управління фінансовим потенціалом машинобудівних підприємств. Їх застосування дозволяє забезпечити підприємства повною і достовірною інформацією щодо системи груп складових аналізу, необхідною для прийняття оптимальних управлінських рішень. При цьому стає можливим удосконалити систему виробничо-технологічного управління завдяки використанню комплексних методів, орієнтованих на аналіз усього спектра найважливіших параметрів функціонування підприємства й підтримку на належному функціональному рівні його фінансового потенціалу.

Проведено порівняння локальних пріоритетів експертів відносно елементів другого та третього рівнів ієрархічної моделі вибору методу нейтралізації на узгодженість. Критерієм оцінки локальних пріоритетів експертів є відношення узгодженості, яке показує ступінь порушення чисельної транзитивної узгодженості. Отримано випадкову узгодженість локальних пріоритетів матриць різного порядку.

Запропоновано алгоритм стратегії оптимізації фінансового потенціалу машинобудівних підприємств з урахуванням впливу факторів, що зумовлюють ризик. Він базується на стратегічних завданнях і принципах, передбачає тактичну системну сукупність методів, інструментів та конкретних заходів реалізації політики оптимізації фінансового потенціалу. Характеризується алгоритм різними параметрами-індикаторами, які враховують ризиково-орієнтовану спрямованість оптимізації фінансового потенціалу підприємств. У ході реалізації стратегія повинна коригуватися і бути гнучкою залежно від ситуації з метою отримання найбільш позитивного результату

Ключові слова: алгоритм оптимізації, технологія формування, управлінські впливи, система розвитку, фінансовий потенціал, ризиково-орієнтована спрямованість

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1. Introduction

The current period of Ukraine's economy development introduces qualitatively new technological requirements to formation of managerial influences in the system of development of machine-building enterprise financial potential. The managerial conditions of formation of market adaptive relations feature relevant dynamics of the external sphere, declining solvency of population, intensification of competition, growth of the economic risk level and tense financial and technical situation at most machine-building enterprises. This, in turn, requires the search for technological means of survival and ensuring an effective strategic development.

That is why the system of development of financial potential of machine-building enterprises is one of the most important management systems. This system makes it possible to identify shortcomings in the work of enterprises and the causes of their occurrence and the most rational ways of allocation of financial resources based on obtained results and work out concrete recommendations for optimization of

activities. This is explained by the fact that the market conditions of economic management require the skill of assessment of the state of both own enterprise and existing likely competitors and monitor the enterprise financial and economic condition. Financial and economic condition of the subjects of the real economy sector in current conditions reflects deterioration of efficiency of financial management caused by crisis in the country. This necessitates an integrated application and development of modern tools for assessing financial potential of enterprises in post-crisis conditions. That is why introduction of algorithms and the formation technology involves the search for ways of further intensification of activities, introduction of radical changes in the approaches to the organization and management of business, application of the newest methods, technologies and instruments of enterprise adaptation to the environment.

Thus, the problems of study of theoretical, methodological and practical aspects of optimizing financial potential of machine-building enterprises, application of innovative methods of economic maneuvering with financial resources of the enterprise on the basis of the market economy laws, improvement of the methods of permanent measurement and substantiation of evaluation of the system of managing the financial potential of enterprises are becoming acute. Solution of the identified problems determines introduction of an effective dominant-innovative system for managing the financial potential of machine-building enterprises taking into account influence of risk factors. It is impossible without development of fundamentally new algorithms and mechanisms of determining the lines of optimization of the management system in conditions of uncertainty and dynamism of the external economic and financial environment.

2. Literature review and problem statement

To date, under conditions of unstable political and economic situation, relevance of considering managerial impact is increasing significantly. This necessitates a detailed study of the technology of formation of managerial impacts in the system of development of financial potential of machine-building enterprises. Today, the financial potential is identified with the financial resources that the company can dispose for current and future expenditures. These resources take part in production and economic activities and are involved in financing of certain strategic lines of enterprise development. However, these two concepts are not identical although they are close in content. Financial resources can be considered as the use of a part of the financial potential, that is, as a money income and accumulation obtained by the enterprise from the use of available resources. The financial potential should be considered as ability of available resources to bring in return to the company at a certain instant.

The opinions of scientists somewhat differ concerning the technological basis due to which managerial impact should be realized in the system of development of financial potential of enterprises. It was determined that the general technological basis foresees the future state of action of analysis of the past and current management of the financial potential [1] as well as the process of formation of managerial measures based on the study of trends in financial development of the potential [2]. It was determined in [3] that the management process is a scientifically grounded assumption of probability of development of managerial events or phenomena on a basis of statistical, social, economic and other studies of development of the system of financial potential of enterprises [4]. Formation of managerial impacts uses the past experience and assumptions about the future study object [5]. Intuition of a scientist who creates predictive influences is considered in work [6] as the basis for development of the financial potential. There is an opinion that optimization of the financial potential should be based on the study and generalization of the state and development of the object in the past [7]. Also, the financial potential is a criterion that determines ability of an enterprise to adapt to the changes in economic conditions [8]. It plays a significant role in the ability of an enterprise to generate required volumes of positive money flows [9], be attractive for investment and liquid and financially reliable [10]. While paying tribute to the scientific and practical significance of the aforementioned works, it should be emphasized that the certain range of problems of a conceptual and methodical nature was not sufficiently developed. Further studies will be required: the methodology of formation of managerial impacts in the system of development of the financial potential of machine-building enterprises, its task of development and improvement of permanent instrumental measures and actions.

3. The aim and objectives of the study

This study objective was development of a system for managing the financial potential of machine-building enterprises taking into account possible risks. It should provide definition of coherence of the hierarchical model of choice of a method for neutralization of managerial risks to ensure effective optimization of the financial potential of enterprises.

To achieve the objective, the following tasks were set:
– to form a meaningful statement of the directions of influence of risk factors on the system of management of machine-building enterprise financial potential;
– to solve the problem of minimizing probable consequences of influence of risk factors on the system of management of machine-building enterprise financial potential.

4. Description of directions of formation of the system of development of the financial potential of machine-building enterprises

To take into account individuality of a particular situation where optimization of financial potential is associated with risk, the rating method for assessing the lines of formation of managerial impacts in the system of development of the financial potential is more appropriate [1]. Its main advantage consists in the ability to select coefficients proceeding from the specific goal of analysis [2]. The system of rating assessment consists of the following elements: a system of estimation coefficients of the scale of weight of these coefficients (if necessary), a scale for assessing values of the obtained indicators, a formula for calculating the final rating.

The rating method is most suitable for assessing lines of optimization of financial potential of machine-building enterprises taking into account the impact of managerial factors in conditions of development of market relations. There are several reasons for this. Firstly, analysis of large data arrays is not necessary for application of this method, so the estimate minimally depends on the width of the informational loop.

Secondly, when using the rating method, ranking of the result according to a certain scale occurs immediately. Thirdly, the rating method requires that the user possesses mathematical knowledge only within the framework of elementary financial calculations. This is important because the risk is mainly assessed by economists, not mathematicians [3]. The area of unstable state of optimization of financial potential of machine-building enterprises features an increased risk. At the same time, the level of losses does not exceed the amount of profit of payments (that is, the part that remains after all payments to the budget, payment of interest on loan, fines, etc.). The area of critical state corresponds to the critical level of managerial risk at which there may be losses within the limits of gross profit (that is, the total amount of the profit obtained prior to all deductions). The area of crisis corresponds to the area of inadmissible risk which characterizes the possibility of not covering all costs associated with activities. When the degree of risk in the absolute expression is determined, a comprehensive method of assessing financial risks is used.

Hence, development of a universal methodology for determining lines of optimizing the financial potential of machine-building enterprises with taking into account influence of the risk factors should take into account one important feature of decision-making. It relates to the fact that each head independently chooses one or another approach to optimization proceeding from the peculiarities and nature of activities of his enterprise and the circumstances under which a managerial decision is made on a particular event or activity. Such subjectivity forms uncertainty in the management system formation.

5. Solving the problem of lines of forming the system for developing machine-building enterprise financial potential

Two groups of instruments are distinguished in the system of methods for optimizing financial potential of machine-building enterprises taking into account influence of risk factors: internal mechanisms of risk neutralization and other methods of internal risk neutralization. Internal mechanisms of risk neutralization form a system of the methods minimizing negative consequences. They are chosen and implemented within the enterprise itself. The main object of application of internal neutralization mechanisms includes all types of permissible risks, a significant part of risks of the critical group and catastrophic risks that are not subject to insurance if accepted by the enterprise because of an objective necessity. In present-day conditions, internal mechanisms of neutralization cover the bulk of risks of machine-building enterprises [4].

Proceeding from the chosen problem statement, the method of hierarchy analysis can be regarded an acceptable method of risk neutralization. Therefore, the first stage contemplates choice of the method of risk neutralization at the machine-building enterprises as an aim of application of the hierarchy analysis method.

It is clear that the indicated specificity of the problem requires involvement of experts, so it is advisable

that the second stage reflected the criteria chosen by the enterprise experts regarding the method of neutralization. Regarding the third stage of the hierarchical model, it should provide a list of methods for neutralizing the enterprise risks.

Taking into account the above, introduction of the scale of Saaty pairwise comparisons (Fig. 1) for the problem of presentation of the results of quantitative estimates under consideration is substantiated.

In accordance with the third stage of the hierarchy analysis method, subjective pairwise comparisons of the elements of the second and third levels of the dominant hierarchical model of choice of the method of machine-building enterprise risk neutralization were made. In this case, it is expedient to do this because despite the fact that subjectivism leads to uncertainty formation, it is an integral part of the actual object description. However, transition from such uncertainty to quantitative estimates is possible, in particular, in the way that provides determination of the priority vector. To determine the priority vector for each of the elements of the second and third levels of the hierarchical model, subjective judgments of the experts expressed numerically on the scale of relative importance are normalized using formula (1):

$$x_i = \frac{\sqrt[n]{\Pi_{i=1}^{n} a_{ij}}}{\sum_{i=1}^{n} \sqrt[n]{\Pi_{i=1}^{n} a_{ij}}}, \tag{1}$$

where x_i is the i-th component of the normalized priority vector; a_{ij} is the i-th and the j-th elements of the matrix of pairwise comparisons; i is the serial number of the matrix of pairwise comparisons $i \in [1, n]$; j is the ordinal row number of the matrix of pairwise comparisons, $j \in [1, n]$; n is the number of elements to be compared.

The expert judgments regarding the dominance of one element of the second level of hierarchy over the other, that is, one criterion to which the methods of neutralizing financial risks must correspond to others and the processing results are given in Fig. 2.

That is, in terms of importance of choosing the method of risk neutralization at machine-building enterprises, the criteria were ordered as follows:
1) financial strategy;
2) money expenses for use;
3) timetable;
4) influence of external factors;
5) information availability;
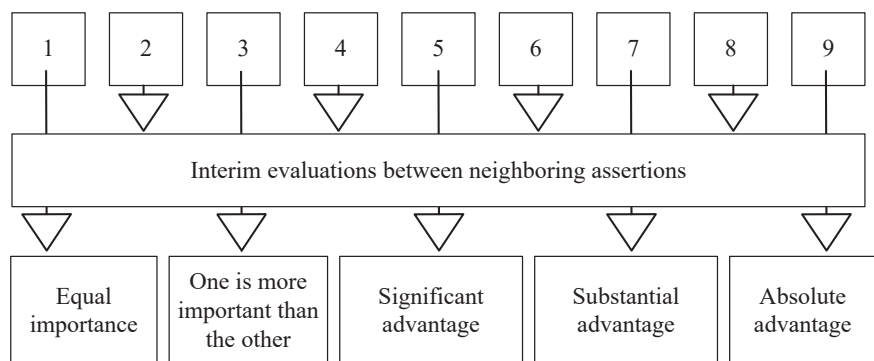6) reliability;
7) efficiency;
8) influence of internal factors.

Fig. 1. The Thomas Saaty pairwise comparison scale [5]

A	A1	A2	A3	A4	A5	A6	A7	A8	Vector
A1	1	1/2	1/5	1/2	1/3	1/7	1/9	1/3	0.03
A2	2	1	1/5	1/4	1/2	1/7	1/7	1/3	0.03
A3	5	5	1	7	5	4	1/3	2	0.21
A4	2	4	1/7	1	2	3	1/7	5	0.1
A5	3	2	1/5	1/2	1	1/4	1/9	1/2	0.04
A6	7	7	1/4	1/3	4	1	1/7	3	0.1
A7	9	7	3	7	9	7	1	7	0.43
A8	3	3	1/2	1/5	2	1/3	1/7	1	0.06

Fig. 2. The matrix of pairwise comparisons of elements of the second level of the hierarchical model of choice of the financial risk neutralization method

The financial strategy of enterprises is the dominant criterion since the vector directionality of the criteria and the methods of neutralization of financial risks is optimal at the seventh element of the second hierarchy level. This provides an opportunity to improve efficiency of making sound managerial decisions in the financial sphere of the company's activities and present its stable positions in the target markets in the long run. The study has made it possible to find out that financial strategy can be considered as the main condition for the enterprise's way out of the crisis state since the choice of a concrete variant of the management strategy depends on many external (the sixth element of the second hierarchy level) and internal (the second element of the second hierarchy level) factors.

The third stage of the study consisted in formation of a matrix of pairwise comparisons of elements of the third hierarchy level of choosing the method of neutralizing financial risks. At the same time, the method of risk neutralization of highest priority was found for each criterion and conformity to each criterion of a certain risk neutralization method was obtained (Table 1).

Table 1

The priority neutralization methods for experts for each criterion [4, 5]

The method choice criterion	The method of financial risk neutralization
Financial strategy	The method of risk avoidance
Money expenditures for use	The method of diversification
Efficiency	The method of diversification
Information availability	The method of limitation
Timetable	The method of risk avoidance
Reliability	The method of limitation
Effect of internal factors	The method of self-insurance
Effect of external factors	The method of risk distribution

At the fourth stage, local priorities of the experts regarding the elements of the second and third levels of the hierarchical model of choosing the method of neutralization are checked for consistency. The criterion for assessing the local priorities of experts represents the ratio of coherence which shows the degree of violation of numerical transitive coherence [5] and is calculated by formula:

$$OC = \frac{IY}{Y_r},\qquad(2)$$

where OC is the ratio of coherence of local priorities in the matrix of pairwise comparisons; IY is the index of coherence

of local priorities in the matrix of pairwise comparisons; Y_r is random coherence of the local priorities in the matrix of a corresponding order.

It was taken into account that the value of the ratio of coherence of local priorities in the matrix of pairwise comparisons is permissible if it belongs to the interval from 0 to 0.2. If the value of this indicator exceeds the permissible limit, then the decisions made are characterized by inaccuracy and low quality.

The index of coherence of the local priorities in the matrix of pairwise comparisons [6] is calculated by the following formula:

$$IY = \frac{Y_{max} - n}{n - 1},\qquad(3)$$

where IY is the index of coherence of the local priorities in the matrix of pairwise comparisons; Y_{max} is the greatest value of the matrix of pairwise comparisons; n is the number of compared elements.

The greatest value in the matrix of pairwise comparisons [7] is found by the formula:

$$Y_{max} = \sum_{j=1}^{n}\left(\sum_{j=1}^{n} a_{ij} \cdot w_i\right),\qquad(4)$$

where a_{ij} is the i-th, j-th element in the matrix of pairwise comparisons; w_i is the i-th component of the normalized priority vector.

The random coherence of the local priorities in matrices of different orders is given in Table 2.

Table 2

The random coherence of the local priorities in matrices

Matrix size	1	2	3	4	5	6	7	8	9	10
Random coherence	0.06	0.04	0.96	0.73	0.13	1.15	1.24	1.43	1.39	1.56

All values of coherence of the local priorities in the matrices of pairwise comparisons of the elements of the second and third levels of the hierarchical model are in the range from 0 to 2 which indicates the objective choice of priority connections of the criteria of influence on enterprises. As regards machine-building, it was impossible to solve the optimization problem since application of diagnostics to functional areas of the enterprise activities did not allow us to take preventive measures to avoid unwanted crisis situations. It became the basis for the task of improvement of the algorithm of the strategy of optimizing the financial potential of machine-building enterprises taking into account influence of the risk factors. The obtained algorithm allows one to provide a comprehensive understanding of the general enterprise state and determine ratio of the enterprise capital distribution taking into account regularity of the enterprise economic development.

Data for calculating coherence of local priorities in the matrices of pairwise comparisons of elements of the second and third levels of the hierarchical model and the calculation results are given in Table 3.

Table 3

Coherence of the experts' local priorities with respect
to the elements of the second and third levels
of the hierarchical model

Hierarchy element	Y_{max}	IY	Y_r	OC
Level 2 of hierarchy	9.4634	0.209	1.41	0.1482
Level 3 of hierarchy				
Financial strategy	6.6776	0.1355	1.24	0.1092
Money expences for use	6.5205	0.1041	1.24	0.0839
Efficiency	6.6096	0.1219	1.24	0.0983
Information availability	6.567	0.1134	1.24	0.0914
Timetable	6.629	0.1258	1.24	0.1014
Reliability	6.8602	0.136	1.24	0.1097
Effect of internal factors	6.4827	0.0965	1.24	0.0778
Effect of external factors	6.6158	0.1231	1.24	0.0993

At the fifth stage, a matrix of global priorities of experts concerning the methods of financial risk neutralization is formulated in accordance with the method of hierarchy analysis (Fig. 3) and the local priorities of experts regarding the methods of neutralization is multiplied by priority of the corresponding criterion.

It can be asserted based on the results obtained, that the methods of risk neutralization at machine-building enterprises are in the following order of their importance:

1) the method of self-insurance;
2) the method of limitation;
3) the method of diversification;
4) the method of hedging;
5) the method of risk avoidance;
6) the method of risk distribution.

Thus, the self-insurance method is the optimal method of risk neutralization. The method of risks distribution is most unfavorable method. To confirm objectivity and validity of the obtained results, it is expedient to perform the sixth stage which consists in checking for consistency the whole hierarchical model of choice of the method of financial risks neutralization.

A / B	A1	A2	A3	A4	A5	A6	A7	A8	Vector	Rank
B1	0.50	0.04	0.05	0.05	0.43	0.05	0.15	0.07	0.1393	5
B2	0.12	0.07	0.03	0.49	0.24	0.40	0.23	0.07	0.1983	2
B3	0.03	0.39	0.38	0.25	0.1	0.06	0.11	0.09	0.1737	3
B4	0.06	0.29	0.32	0.11	0.08	0.11	0.04	0.19	0.1636	4
B5	0.15	0.08	0.06	0.03	0.03	0.16	0.08	0.47	0.1219	6
B6	0.14	0.13	0.16	0.07	0.12	0.22	0.39	0.11	0.2032	1

Fig. 3. The matrix of experts' global priorities

In this case, the consistency ratio should be within 0 and 0.1. Since the excess of the limits has rendered impossible to the quantitative assessment of the degree of homogeneity of the selected groups, essential grouping features were selected. For this purpose, the formula [8] was used:

$$OC_{hierarchy} = \frac{\sum_{i=1}^{n} IY_i \cdot w_i}{\sum_{i=1}^{n} Y_i^b \cdot w_i}, \qquad (5)$$

where the $OC_{hierarchy}$ is the ratio of the hierarchy's consistency; IY_i is the index of consistency of the matrix of pairwise comparisons according to the i-th criterion; w_i is the normalized component of the vector of priorities of the i-th criterion; Y_i^b is the random coherence of the local priorities of the matrix of a corresponding order; i is the serial number of the criterion and is [1, n]; n is the number of compared elements.

The output data for calculating consistency of the whole hierarchical model of choice of the method for neutralization of financial risks are given in Table 4.

Table 4

Coherence of the hierarchical model of choice of the method
of risk neutralization at the machine-building enterprises

Criterion	IY	Y_r	Vector
Financial strategy	0.0992	1.41	0.03
Money expenses for use	0.0839	1.41	0.03
Efficiency	0.0983	1.41	0.21
Information availability	0.0914	1.41	0.1
Timetable	0.1014	1.41	0.04
Reliability	0.1097	1.41	0.1
Effect of internal factors	0.0778	1.41	0.43
Effect of external factors	0.0993	1.41	0.06

It is clear from the obtained results that significance of consistency of the whole hierarchical model of choice of the method of risk neutralization is in the range from 0 to 0.1 or is equal to 0.0638. Thus, the problem of minimizing probable consequences of the risk factor effects on the system of management of the financial potential of machine-building enterprises meets requirements to promptness of the procedure of fundamental analysis diagnostics of the enterprise activity level. It makes it possible to significantly reduce the length of evaluation procedures. In addition, the algorithm of calculation rises the degree of reliability of assessment of the financial state of enterprises. With the help of the developed model which is constructed based on expert-defined factors of generalized influence of factors on the corresponding systemic risk situations (the extent and nature of relationship of the factors affecting the enterprise's internal environment, the extent and nature of the influence of macro-environment factors on micro-environment factors), it is possible to develop scenarios of the management strategy in absence of influence of negative factors on the basis of the derived functional dependences of influence of external factors on the enterprise financial state.

6. Implementation of results obtained in the study of the lines of development of the machine-building enterprise financial potential

Strategic diagnostics of the lines of optimization of the financial potential of machine-building enterprises enables making of grounded strategic decisions. Assessment of the enterprise financial potential and the market situation makes

it possible to identify specific strategic goals and tasks [9, 10]. The specified tasks may be realized through the system of formation of financial policies, development of programs, calculation of resources allocated to the programs (budgets) [11]. Development and implementation of the financial policy measures makes it possible to choose the most optimal mechanisms and methods of achievement of the set goals from the whole variety enables a more clear definition of a single concept of enterprise development in the long-term and short-term prospects [12, 13].

Development of the programs for optimization of the financial potential involves creation of a planning document including a set of measures related to resources, performers and terms of the planned work and containing source data for budget formation. The level of implementation of the strategic financial goals is the object of the system for monitoring implementation of the lines of the financial potential optimization.

Continuous monitoring makes it possible to take corrective measures and use necessary mechanisms in the process of goal realization (Fig. 4).

Implementation of the phases of the mechanism of optimization of the lines of influence of risk factors on the system of management of the machine-building enterprise financial potential is aimed at formation and distribution of financial resources, ensuring financial security and improving quality of financial activities [14].

A comprehensive account of the financial potential of enterprises, objective assessment of the nature of internal and external factors, risk strategy ensures correspondence of financial and economic opportunities of the enterprise to the conditions prevailing in the market of goods, works and services [15, 16].

The algorithm of the strategy of optimization of the financial potential of machine-building enterprises taking into account the influence of risk factors is given Fig. 5.

With the help of the offered algorithm, it is possible to form financial strategy that will enable achievement of the set goals, attain advantage over competitors and improve market financial value of the enterprise. According to the algorithm of the strategy of optimizing financial potential taking into account influence of risk factors, macro-environment, micro-environment and immediate environment influence enterprises [17].

After analyzing the indicators of impact of these factors on the enterprise, it is necessary to form options for possible financial strategies and conduct rating. After that, it is necessary to adopt an appropriate financial strategy developed taking into account the enterprise financial potential. In order to obtain the most positive result, the strategy must be adjustable and flexible in implementation depending on a situation [18, 19].

All stages of the strategy implementation must be monitored, especially in conditions of crisis, constant shortage of financial resources and influence of risk factors. The proposed algorithm makes it possible to adjust the strategy in accordance with changes in the external and internal environment, reduce the risk of financial activity of enterprises. The degree of effectiveness of the strategy implementation depends on correctness of its development, completeness of accounting and evaluation of factors affecting the enterprise and sufficiency of the enterprise's own funds.
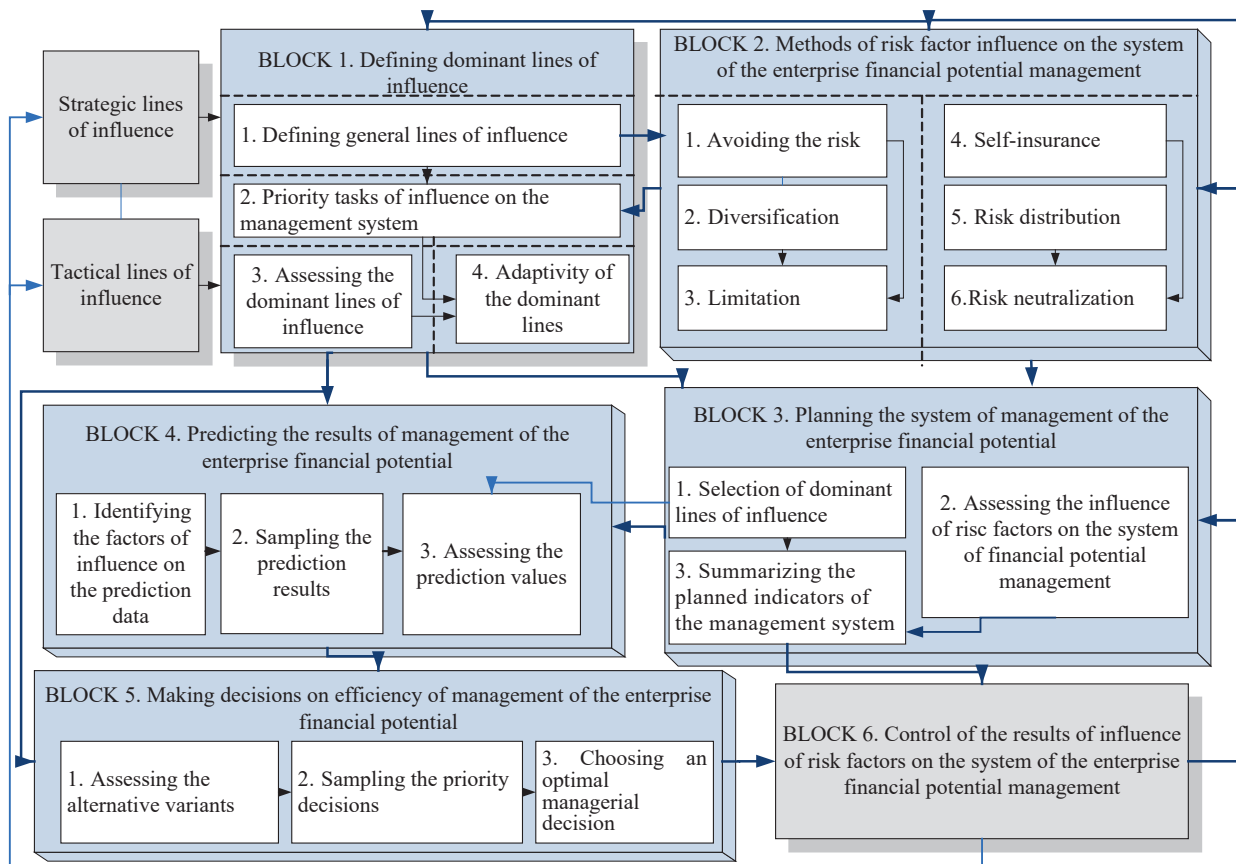

Fig. 4. Mechanism of optimization of the lines of influence of risk factors on the system of management of the machine-building enterprise financial potential
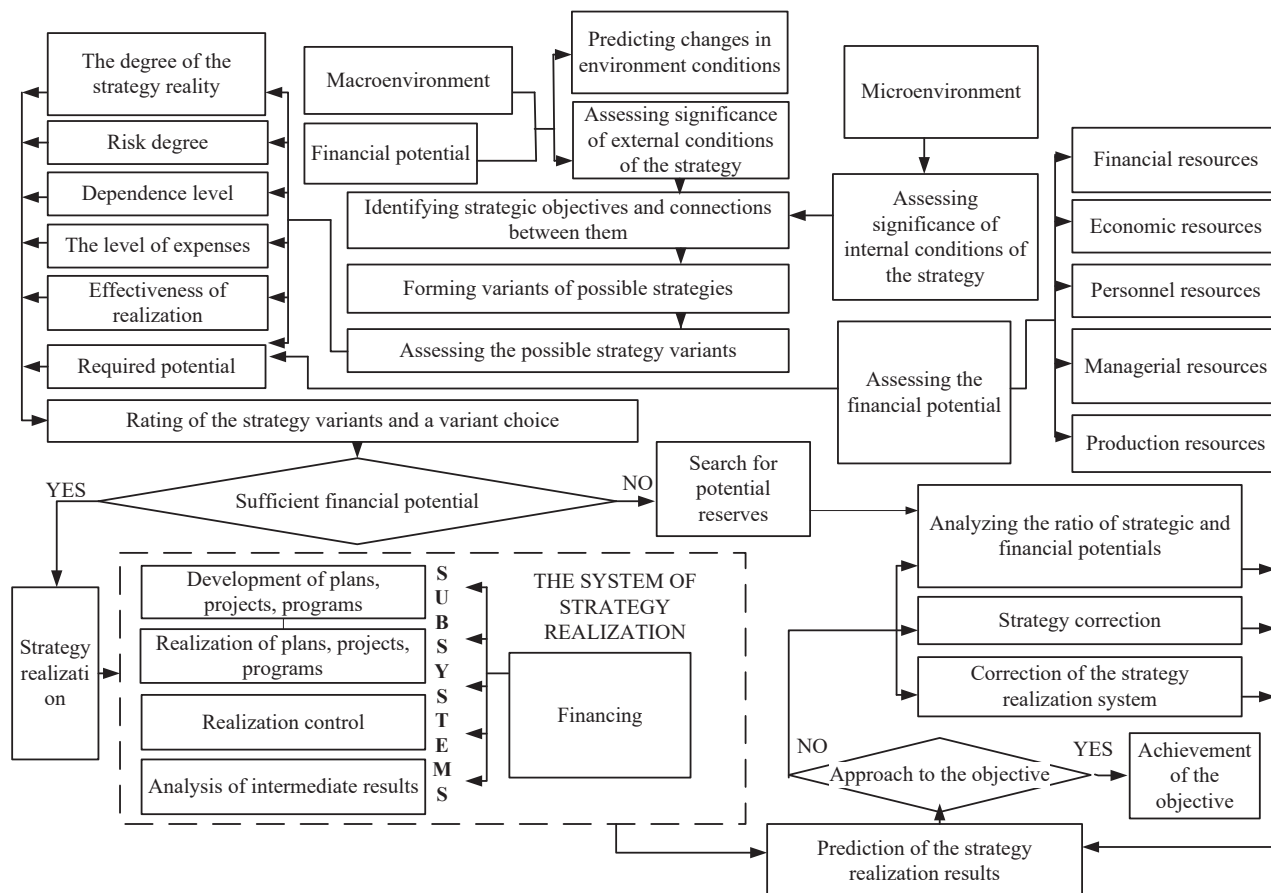
Fig. 5. Algorithm for the strategy of optimization of the financial potential of machine-building enterprises taking into account the influence of risk factors

7. Discussion of results obtained in the study of the lines of formation of the system of development of machine-building enterprise financial potential

Advantage of the conducted studies consists in the fact that they enable solution of the problem of optimization of the lines of influence of risk factors on the system of management of financial potential of machine-building enterprises. Calculations have shown that the method of self-insurance is the most favorable of all methods of risk neutralization at machine-building enterprises. This is due to the fact of its correspondence to almost all criteria proposed by financial management specialists.

The proposed algorithm makes it possible to reduce the multi-step problem of financial potential management with an account of risks to solution of a finite sequence of one-step optimization problems. It should be noted that according to the financial strategy chosen by the enterprise, the developed neutralization algorithm provides an opportunity to get rid of the negative impact of financial risks on its activities.

Disadvantages of the study include the fact that the risks taken into account in the model are just deterministic values. This causes difficulties in determining the magnitude of possible losses associated with exposure to risks. Moreover, in real conditions of an enterprise's production activities, situations are possible where risks are probable because the enterprise can also apply the limitation method which was given the second position by financial management specialists according to the existing selection criteria. The developed algorithm can be used by machine-building enterprises

if the method of self-insurance applied in practice will not give desired results of risk neutralization.

Thus, further development of this study may consist in accounting the risks of a stochastic nature. In this case, it will be appropriate to account deterministic influence of risk factors in the model of multilevel management of the system of enterprise financial potential.

In the future, the study results can become the basis for development of a system of technical management of the system of enterprise financial potential taking into account the deterministic influence of risk factors. This will make it possible to eliminate shortcomings of each chosen method and increase quality of neutralization of negative influence of risks on the lines of financial potential optimization.

8. Conclusions

1. It has been determined that the necessity of optimization of the impact of risk factors on the financial potential management system at the level of each enterprise is an initial step in development of any programs and forecasts of development. The strategy of effective use of the financial potential and dynamics can only be built based on assessment of the current state of all its elements. The offered algorithm of quantitative estimation of enterprise risks and definition on this basis of their level, the degree of admissibility or threat to current functioning is a necessary management tool since the strategic orientation of the lines of influence of the risk factors

on the management system makes it possible to work out decisive rules of scenarios of the management strategy depending on the indicators of the enterprise activity components and determine the criterion of effectiveness of financial potential management which has a complex nature. Due to this, integrated changes in choosing the most acceptable version of the enterprise management strategy can be taken into account. In the process of determining the lines of influence of risk factors on the financial potential management system, account should be taken of the influence of environmental conditions on the choice of objectives and means of their achievement and the corresponding impact of the conditions of the internal environment on the marginal financial capabilities of the enterprise. These regularities make it possible to determine in general terms the conditions for formation of a strategy of management of the enterprise financial potential. Compliance with these conditions will largely depend on the capabilities of the enterprise and the lines of its development. Available capabilities make it possible to determine where and in which areas the enterprise has the best conditions for development and where there are the areas hazardous to running its business.

2. To minimize the probable effects of risk factors on the machine-building enterprise financial potential management system, the algorithm of the strategy of optimizing the financial potential has been improved taking into account influence of risk factors. In the course of the study, a conclusion was made on feasibility of the generated algorithm based on the expert-defined generalized influence of risk factors on the corresponding system situations. Such situations include the extent and nature of relationship of the factors affecting the internal environment of the enterprise and the nature of influence of macro-environment factors on the micro-environment factors. Consequently, it is possible to develop scenarios of the management strategy in absence of influence of negative factors based on the constructed functional dependences and levels of the hierarchical model of influence of external risk factors on the enterprise financial potential. This becomes possible because a certain management algorithm is considered as a component (the most active part) of the control system which provides an effect on the factors on which the result of the controlled object activity depends. Its application is provided by determining the optimal relationship between hierarchical variables, modifying and improving the proportions between which it is possible to achieve a large variety of states and options for constructing a management system to achieve the goal.

References

1. Babenko V. O. Modeling of factors influencing innovation activities of agricultural enterprises of Ukraine // Scientific Bulletin of Polissia. 2017. Vol. 2, Issue 1 (9). P. 115–121. doi: https://doi.org/10.25140/2410-9576-2017-2-1(9)-115-121

2. Cascio W., Boudreau J. Investing in people – financial impact of human resource initiatives. Pearson Education, Inc., 2010. P. 185–199.

3. Drucker P. F. The discipline of innovation // Harvard Business Review. 1985. P. 72–76.

4. Fitzenz J. The New HR analytics – predicting the economic value of your company's human capital investments. AMACOM Div American Mgmt Assn, 2010. 368 p.

5. Frambach R. T., Schillewaert N. Organizational innovation adoption: a multi-level framework of determinants and opportunities for future research // Journal of Business Research. 2002. Vol. 55, Issue 2. P. 163–176. doi: https://doi.org/10.1016/s0148-2963(00)00152-1

6. Human Resource Management and Corporate Performance in the UK / Guest D. E., Michie J., Conway N., Sheehan M. // British Journal of Industrial Relations. 2003. Vol. 41, Issue 2. P. 291–314. doi: https://doi.org/10.1111/1467-8543.00273

7. Padmore T., Schuetze H., Gibson H. Modeling systems of innovation: An enterprise-centered view // Research Policy. 1998. Vol. 26, Issue 6. P. 605–624. doi: https://doi.org/10.1016/s0048-7333(97)00039-5

8. Measuring innovation best practices: Improvement of an innovation index integrating threshold and synergy effects / Rejeb H. B., Morel-Guimarães L., Boly V., Assiélou N. G. // Technovation. 2008. Vol. 28, Issue 12. P. 838–854. doi: https://doi.org/10.1016/j.technovation.2008.08.005

9. Investing in People and Ideas. EDI's Strategy for the Future. The World Bank. Washington, 1994.

10. Development of the model of minimax adaptive management of innovative processes at an enterprise with consideration of risks / Babenko V., Romanenkov Y., Yakymova L., Nakisko A. // Eastern-European Journal of Enterprise Technologies. 2017. Vol. 5, Issue 4 (89). P. 49–56. doi: https://doi.org/10.15587/1729-4061.2017.112076

11. Jayaprakash R. Personnel management. APH Publishing, 2004. 115 p.

12. Lawler E. E. Strategic Pay. San Francisco: Jossey-Bass, 1990. 343 p.

13. LeBel P. The role of creative innovation in economic growth: Some international comparisons // Journal of Asian Economics. 2008. Vol. 19, Issue 4. P. 334–347. doi: https://doi.org/10.1016/j.asieco.2008.04.005

14. Program Management // Program Management for Improved Business Results. 2014. P. 3–26. doi: https://doi.org/10.1002/9781118904367.ch1

15. Monappa A. Personnel management. Tata McGraw-Hill Education, 1996. 428 p.

16. Silverberg G., Verspagen B. A percolation model of innovation in complex technology spaces // Journal of Economic Dynamics and Control. 2005. Vol. 29, Issue 1-2. P. 225–244. doi: https://doi.org/10.1016/j.jedc.2003.05.005

17. Smith S., Mazin R. The HR answer book – an indispensable guide for managers and human resources professionals. AMACOM, 2011. 288 p.

18. Teece D. J. Business Models, Business Strategy and Innovation // Long Range Planning. 2010. Vol. 43, Issue 2-3. P. 172–194. doi: https://doi.org/10.1016/j.lrp.2009.07.003

19. Theory and practice of controlling at enterprises in international business / Malyarets L., Draskovic M., Babenko V., Kochuyeva Z., Dorokhov O. // Economic Annals-XXI. 2017. Vol. 165, Issue 5-6. P. 90–96. doi: https://doi.org/10.21003/ea.v165-19