Formation of tools for assessing the level of innovative development of an enterprise

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Abstract. The purpose of the study is to develop tools for assessing the level of innovative development of an enterprise in order to improve the management of its innovation activities. Radical increase of the role of innovations in modern conditions predetermines the activation of innovative activity of enterprises on the basis of increasing production efficiency, implementing promising research and development projects and implementing innovative programs. The situation in the world economy demonstrates that the innovative component of enterprise development is the main source of growth and contributes to the level of competitiveness of the organization. As a result of the generalization of the experience of research in the field of innovative development, a system of economic indicators that maximally characterizes the innovation activity carried out by enterprises is formed, which is the basis for developing tools for assessing the level of innovation development of the enterprise, a toolkit for assessing the level of innovative development of an enterprise using the proposed system of economic indicators, to increase the level of innovative development of the enterprise and to assess their cost-effectiveness.

1 Introduction

Innovative activity is determined by the composition of its elements, their interrelations and the ability to work as a unified system for the implementation of innovations. To increase the effectiveness of innovation, it is possible to identify its elements, measure them, determine the relationships between them and develop a tool for assessing the level of innovative development of the enterprise.

The essence of the current stage of development of both the national economy as a whole and the innovative activity of individual enterprises reflects a category such as "innovative development" that has been widely and widely covered in recent years in domestic and foreign literature. Innovations at the enterprise contribute to increasing the efficiency of its production and marketing activities. The intensity of the implementation of innovation activity has a direct impact on the company's economic performance: labor productivity is

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increasing, capital productivity, profit increases, costs are reduced, and the organization's share on the market is growing [1].

The use of the method of system analysis made it possible to identify the basic components of the management model of innovative enterprise development, such as indicators of innovation potential, innovation activity and innovation climate. The investigated indicators of innovation activity are characterized by a combination of different coefficients. The number of coefficients varies depending on the tasks assigned and on the type of the innovation performance evaluation model.

The innovation potential is explored as the enterprise's ability to achieve the set innovative goals with available financial, personnel, scientific, technical, organizational, managerial, information-methodological and marketing resources.

2 Materials and Methods

Innovative potential characterizes the factors of the internal environment of the enterprise, necessary for the implementation of innovations. The developed structure of innovative potential is presented in Table 1, which includes all six evaluation potentials, consisting of each of a set of three most important for the purposes of assessing innovative development of parameters [2].

Table 1. Proposed structure of the indicator of innovation potential.

Financial potential 1. Current liquidity ratio 2. The ratio of borrowed and own funds 3. The share of borrowed funds aimed at research
Personnel potential 1. Proportion of personnel employed in research 2. The share of employees who have been retrained in the total number of employees 3. The level of motivation of staff to conduct innovative activities
Scientific and technological potential 1. The ratio of the property used for research 2. The ratio of intellectual property 3. The rate of implementation of new technology
Organizational and management capacity 1. The system of management of innovative activity 2. Level of development of innovative communications 3. Main goals and criteria of the organization's success in the field of innovation
Marketing potential 1. Availability of special units engaged in marketing of new products 2. Communication of the organization with suppliers, consumers and manufacturers of new products 3. Share of the budget for advertising innovative products
Information and methodological potential 1. Level of information and analytical activity of the enterprise 2. The presence of the unit responsible for the collection, storage and processing of information 3. Availability of privacy

An analysis of the structure of indicators of innovation potential revealed that these indicators have both qualitative and quantitative characteristics. When assessing the innovative potential in the thesis work, individual indicators are presented in the form of relative scores and expertly assigned weight coefficients, depending on the significance of each parameter.

The innovation potential (IP) is studied in the work as a sum of all six evaluation potentials with valid weighting factors:

$$IP = k_{fp} \times FP + k_{kp} \times KP + k_{ntp} \times NTP + k_{oup} \times OUP + k_{mp} \times MP + k_{imp} \times IMP \quad (1)$$

where *FP*, *KP*, *NTP*, *OUP*, *MP*, *IMP* – financial, personnel, scientific and technological, organizational and managerial, marketing and information-methodical potentials, respectively;

k_{fp} , k_{kp} , k_{ntp} , k_{oup} , k_{mp} , k_{imp} – coefficients of weight of financial, personnel, scientific and technological, organizational and managerial potentials, marketing potential and information and methodical potential, respectively.

The weight characteristic of the significance of each potential is in the range from 0 to 1. Each estimated potential, in turn, is conditionally represented in the formula:

$$\text{Estimated potential} = \frac{\text{point1} + \text{point2} + \text{pointN}}{N} \quad (2)$$

where point 1, point 2,... point N – the scores of single indicators; N is the number of unit indicators in each group of estimated potentials. Estimates assigned to each unit indicator, estimated indicators and, as a result, innovative capacity, are in the range from 1 to 3:

3 - a state that perfectly satisfies the normative model of achieving an innovative goal, is classified as a strength of innovation potential;

2 - a state requiring some limited changes to bring to the normative model of the innovation potential;

1 - the state requires serious radical changes, is classified as a weak point of the innovative potential.

Studies show that in order to determine the level of innovative development of an enterprise, it is not enough only to assess innovative capacity. This is due to the fact that environmental factors also influence the organization. It follows that the innovative climate is one of the main elements of the methodology for assessing the innovative development of the company. An innovative climate is the state of the external environment of an organization that facilitates or counteracts the achievement of an innovative goal. The innovative climate is divided into the microclimate and the macroclimate, that is, the components of the microenvironment and the macro environment of the enterprise [3].

3 Results

The components of the innovative macroclimate of the company are divided into four main areas.

1. Social, natural-geographical and communication sphere (social tension, access to raw materials, fuel, energy and material resources, transport, access to information resources).

2. Technological and scientific and technical sphere (market of technologies and scientific and technical information, the presence of scientific research institutes, consulting, engineering, venture and other firms).

3. Economic and financial sphere (taxes, incentives for R & D, investment climate at the federal level, availability of investors interested in innovative developments). 4. Political and legal sphere (federal and regional plans and programs, legislative framework governing R & D). The components of the company's innovative microclimate are also divided into four main zones.

1. Business area, market segment: the speed of innovation in this segment of the market, the level of competition, relations with consumers, suppliers and partners.

2. Investment zone - investment in the development of new technologies.

3. Zone of new technologies and scientific and technical information resources.

4. The zone of labor resources - the labor market of specialists, managers, highly skilled workers.

The level of the innovation climate is estimated in the same way as the innovative potential. The values of the company's innovation climate will also be in the range from 1 to 3: 3 - the state of this parameter of the external environment positively influences innovation activity, which allows to fully use the available innovative potential. This state is considered as an opportunity for the enterprise; 2 - the state of this parameter is unreliable - no threats yet, but it is necessary to monitor its dynamics; 1 - the state of this component of the external environment adversely affects the innovation potential. This condition is defined as a threat to the organization.

In addition to assessing the state of the potential and climate, for the purpose of analyzing the company's innovation development, an evaluation of innovation activity is needed that shows the result of using the enterprise's resources in the presence of external factors. Innovative activity is the intensity of the implementation of innovative activities by enterprises.

Indicators of innovative activity of the enterprise are characterized, according to the author's studies, by a set of coefficients, such as:

- coefficient of innovation implementation
- coefficient of innovative growth
- coefficient of innovative expectations
- coefficient of implementation of innovative ideas
- coefficient of output at the stage of introduction to the market and growth stage

The proposed coefficients characterize the result of the use (or insufficient use) of resources at the disposal of the organization. As for innovation activity, all the components of this indicator are in the range from 0 to 1, and the index of innovation activity is calculated as the arithmetic mean of its components.

$$IA = \frac{K_{ii} + K_{ig} + K_{ie} + K_{iii} + K_g}{N} \quad (3)$$

where N is the number of coefficients in the indicator of innovation activity. An assessment of the level of innovative development of an enterprise is carried out with the purpose of selecting the most promising areas of activity and further selecting an innovation strategy (Figure 1).

The level of innovative development of an enterprise is determined by a joint examination of the internal and external environment of the organization, that is, when analyzing the innovation potential and the innovation climate. For this evaluation, the SWOT-analysis method is widely used, which provides the possibility of applying an operational diagnostic analysis of the state of the organization and its environment.

When comparing the indicators of potential and climate, four possible variants of the level of innovative development are formed.

1. Low level of innovative development is a bad condition of the internal environment (potential) and a threatening external climate; moreover, a low level is a comparison of the average level of innovation potential with a low level of innovation climate.

2. The crisis level of innovative development is characterized by a low level of potential, but high or medium level of the innovation climate. It should be emphasized that the company should pay the most attention to the crisis level of innovative development, because with an unfavorable change in the external environment, the organization will not be able to increase its innovative potential and will lower to a low level of innovative development.

3. The average level of innovation development is average values of climate and capacity indicators, and high innovative potential and unfavorable innovation climate are also related to the average level, since the impact of environmental threats can lower the level of

innovation potential to an average level

4. . High level is a high estimation of innovative potential and innovative climate. In addition, the level of innovative development can be considered high with a high level of innovation potential and an average assessment of the innovation climate, as well as an average level of potential and a favorable innovative climate.

Fig. 1. Toolkit for assessing the level of innovation development of the enterprise.

Determining the level of innovative development of the enterprise is the basis for elaborating a further innovation strategy. The innovative strategy of the organization is determined depending on the level of innovative development on which the enterprise is located. Since the work has four possible variants of innovation levels, it is appropriate to distinguish four different options for choosing a strategy, which determine four directions for further innovative development of the enterprise [4].

The leadership strategy corresponds to the high level of innovative development of the organization. With this strategy, the enterprise must continue to pursue its goal, since neither innovation potential nor the innovative climate causes any fear at the moment. Leadership strategy is most preferable in the situation of a high level of innovative development, as the organization can carry out intensive R & D, preserve and strengthen technological leadership, since it has the optimal amount of financial, human, technological and other types of resources. In addition, favorable conditions for an innovative climate will help the company maintain technological leadership and continuously improve the level of innovative capacity. The conservation strategy corresponds to average climate and capacity indicators, as well as to high innovative potential and an unfavorable innovative climate. With the conservation strategy, various measures should be used to maintain high and improve the average level of innovative capacity. The presented version of the strategy presupposes the implementation of such measures as rationalization, the search for profitable spheres of effort. In addition, it would be highly advisable to organize a risky project on the condition of a high level of scientific and technical potential. These measures will allow the organization to avoid threats from the external environment and to support the innovation potential at the same level. The reinforcement strategy corresponds to the crisis level of innovative development. It is characterized by a low level of innovative capacity and a high or medium innovative climate.

The crisis level of innovation development is most dangerous for the enterprise than the average, because at the middle level, as noted above, it is about factors of the internal environment that are influenced, in contrast to external factors. If at present the enterprise does not manage to influence the innovation potential in order to strengthen it, then at some point there may be a situation when the organization will move to a low level of innovative development that requires radical changes [5]. With the strategy of strengthening the enterprise, it is necessary to strengthen the innovative potential in a favorable climate. Strengthening of innovative potential can occur due to the increase of its components. The financial component of the innovation potential can be increased by attracting additional investments that will become more accessible in a favorable climate. In addition, it is advisable to improve the pricing policy, improve product quality, improve technology.

The strategy of radical transformation is characterized by an average or low level of innovative potential and an unfavorable innovative climate. In this case, the company needs radical changes for further competitive functioning. It is advisable to carry out such activities as merging with another organization or reorganization of the enterprise. The extreme measure of this strategy will be the closure of the organization. The strategic direction of development of enterprises implementing innovations is the development of a set of goals, objectives, methods for achieving them, aimed at enhancing innovation through influencing the organization's innovative indicators. To develop an effective mechanism for managing the development of the enterprise, a model of innovative development is proposed, containing several basic stages.

The first stage is the formation of a system of economic indicators for assessing the level of innovative development, taking into account the interrelations between the factors of the internal and external environment of the enterprise, i.e. indicators of innovation potential, innovation climate and innovation activity [6]. The second stage is a tool for assessing the level of innovative development of an enterprise. This assessment is carried out on the basis of a comparison of the indicators of innovation potential and the innovation climate. The third stage is the selection of an innovative enterprise strategy. Innovative strategy is chosen depending on the innovative level at which the organization is located. The above stages constitute the basis for the model of innovative development developed by the author (Figure 3) [7].

Fig. 3. Model of innovative development of the enterprise.

4 Discussions

The developed model of increasing the efficiency of innovative development of an enterprise due to the complexity of the problem under consideration is presented in the form of the following elements: innovation activity, innovation potential and innovative climate. For the purpose of effective management of innovative development of enterprises, four main objectives and corresponding practical methods have been identified, the totality of which is the focus of innovative perspectives. Innovative prospects make it possible to identify basic innovative strategies, such as: leadership strategy, conservation strategy, strengthening strategy, the strategy of radical transformation.

5 Conclusion

It should be noted that the theoretical limit of the innovative activity of an enterprise is the state under which the integral coefficient of innovation activity is equal to one. In practice, the enterprise is in constant search of ideal innovative activity. Application of the above-mentioned strategies in the future will allow increasing the level of innovative activity of the enterprise due to internal and external reserves, due to innovative potential and innovative climate. Thus, the innovative activity of the organization can be strengthened through the implementation of innovation development programs that cover all necessary measures to attract investment, improve the staffing, products, technology, organizational structure and management systems.

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