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SOME QUESTIONS OF THE EVALUATION OF TECHNOPARK

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Уханова І.О. Деякі питання розробки методичної бази оцінки діяльності технопарків

У статті запропоновані методичні засади щодо критеріїв оцінки технопаркових структур. Критерії успішного функціонування технопарку пропонується поділяти на три групи: якісні критерії, кількісні критерії та критерії ризикованості діяльності технопарку. Запропонована методика визначає розрахунок інтегральної оцінки ефективності технопарку та дає змогу оцінити доцільність його співфінансування з державного бюджету.

Ключові слова: технопарк, інноваційні структури, якісні критерії ефективності, кількісні критерії ефективності, критерії ризикованості, ефективність інвестиційного проекту

Уханова И.О. Некоторые вопросы оценки деятельности технопарков

В статье предложены методические основы критериев оценки технопарковых структур. Критерии успешного функционирования технопарка предлагается делить на три группы: качественные критерии, количественные критерии и рискованные критерии деятельности технопарка. Предложенная методика определяет расчет интегрального показателя оценки эффективности технопарка и дает возможность оценить целесообразность его совместного финансирования из государственного бюджета.

Ключевые слова: технопарк, инновационные структуры, качественные критерии эффективности, количественные критерии эффективности, рискованные критерии, эффективность инвестиционного проекта

Ukhanova I.O. Some questions of the evaluation of technopark

The article contained methodological basis of evaluation criteria technopark structures. Criteria for successful operation of technopark is proposed to share into three groups: qualitative criteria, quantitative criteria and risk criteria of technopark. The proposed method determines the calculation of the integral index of evaluation of the effectiveness of technopark and provides an opportunity to assess the feasibility of its financing from the state budget.

Keywords: technopark, innovative structure, qualitative performance criteria, quantitative performance criteria, risk criteria effectiveness of the investment project

The growth in the degree of wealth of a country, its economic development today, in the first instance, directly connected with the creation, formation, development and effective functioning of knowledge-based industries in the industrial structure, the formation and development of innovative types of industries, based on current trends of economic development, which are responsible for the establishment and operation of new forms of organization of the innovation sphere, among which are considered to be highly effective integrated education that enable effective communication of scientific-technical and production capacity, accelerate the development of innovative processes and enhance their performance. The main innovative integrated structures include industrial parks, which promote the development of innovative potential of the country. For the formation of this type were the most effective, it is necessary not only to encourage their establishment and operation, the important point is to assess the effectiveness of the created technology parks, especially those whose projects have a direct budgetary financing.

Analysis of recent researches and publications

A significant contribution into development problems of innovative development of Ukrainian economy defining the role of technoparks in its provision and effectiveness of their activities made domestic economists. V.M. Geets [1], E.V. Lazareva [4], A.A. Mazur [5], V.P. Solov'ev [6], L.I. Fedulova [8] etc. Questions of an assessment of efficiency of technoparks' activity are devoted by works of N.A. Kulagina, I.B. Kulagina [3], I.B. Chudftvoy [9] etc. The development of the above scientists is scientific and methodological rationale for the formation and development of technoparks as modern forms of integration of science and business. However, the question of the formation of scientific-methodical bases of an estimation of efficiency of industrial parks, especially those that are financed from the state budget, remains poorly defined.

The aim of this article is to study of the methodological principles regarding the criteria for evaluating the effectiveness of technopark structures.

The main part

In the crisis situation in Ukraine, particularly important is the feasibility and effectiveness of use of

budget funds allocated for the development of innovation infrastructure, including the development of technopark structures.

In the concept of successful functioning of the industrial Park can distinguish four main components (fig. 1):

- successful commercial operation;
- successful technical operation;
- successful achievement of targets for which the technopark was created;
- successful risk management of technopark.

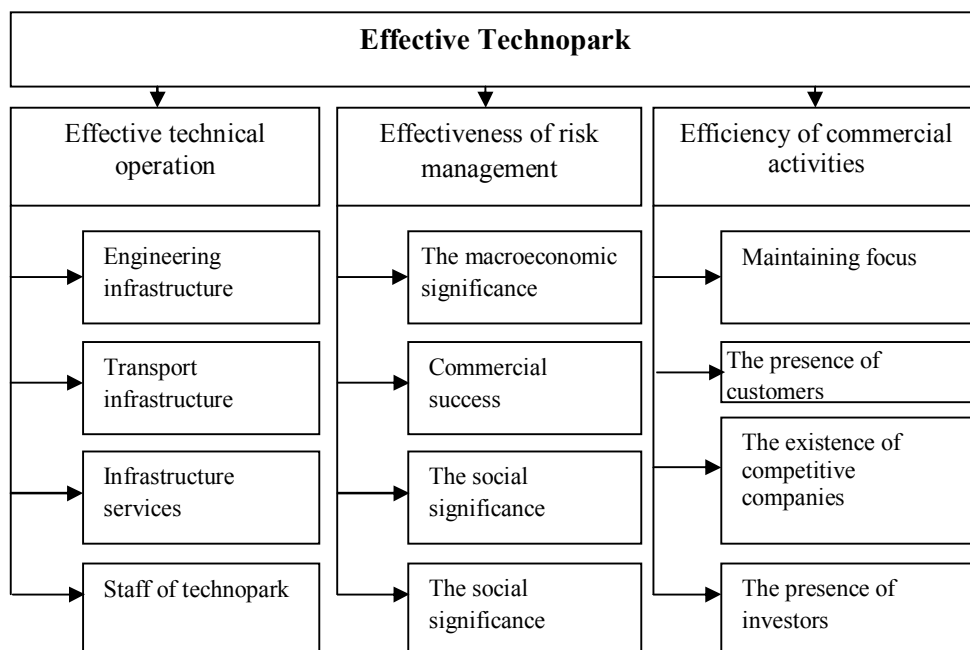


Fig. 1. The successful concept of a technopark [7]

The criteria for successful functioning of the technopark, thus, it is proposed to subdivide into three groups (fig. 2).

To assess the quality criteria of efficiency of functioning of the Technopark there are three sub-groups of criteria:

1) Criteria for the conservation focus of technopark. Within this group of criteria is intended to provide answers to questions about the relevance of the current areas of work of the Technopark that were stated in the project of its creation.

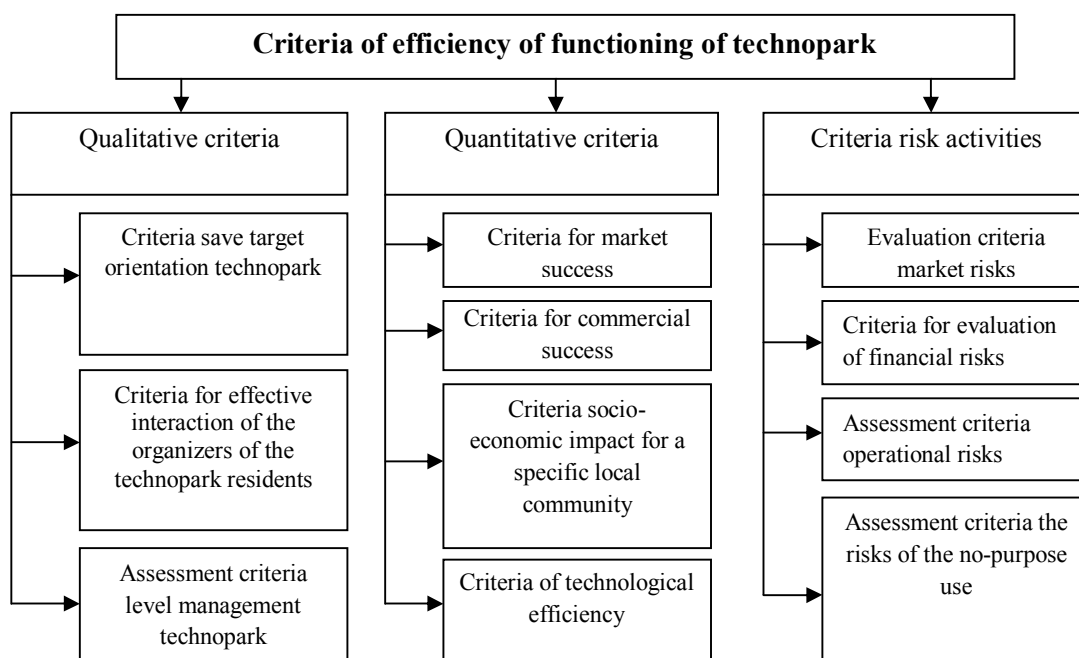


Fig. 2. Criteria of functioning efficiency of Technopark

Source: developed by the author

The main areas of assessment are:

- the sector nature of the technopark;
- product and technological direction of the technopark;
- scale innovative projects in technopark.

Analysis of the structure of projects in technopark and the direction of its resident companies allows us to draw conclusions about the compliance of the actual sector of technopark stated in the project of its creation.

Grocery-technological orientation of technopark subjects to assessment from the point of view of its conformity to the relevant enterprises in the region the results of innovation. To confirm actual product and technological direction of the technopark, as well as sector focus, you need to analyze the structure of projects in the technopark and areas of work of its resident companies for compliance stated in the project.

Scale innovative projects in technopark, allow you to get an idea about how the final value of the developments and their investment capacity. It is necessary to analyze whether these projects to the extent and in the amount as stated in the project. You should also evaluate the current level of development of these projects in the technopark.

2) Efficiency criteria of interaction the technopark's organizers and the residents and participants. Effective communications help to achieve the planned indicators of development of Technopark. In the field of relations with clients is the revenue from sales of products, services and technologies. From the point of view of the innovative companies, the occupancy of the space and potential of companies to investors, to meet the volume of investments and their payback schedule. For authorities – compliance with the creation of new jobs, innovation, growth in gross domestic product at the expense and performance of innovative companies.

Efficiency criteria of interaction of the organizers of the Technopark participants include:

- willingness of customers to purchase the products and services of technopark;
- readiness of innovative companies, creative teams to operate in technopark;
- willingness of investors to finance innovative projects of the companies of technopark;
- willingness of public authorities to implement legislative and financial support of the project;
- willingness of investors to finance the project deployment of technopark.

The willingness of customers to purchase the products and services of technopark is one of the key criteria of its success, this criterion is characterized by the following parameters: the presence of customers in the areas of work of the technopark in the amount and scope comparable to those given in the project of creation of technopark; the presence of registered demand from customers for products and services; the presence of customers who finance the development of a technopark in the amount and scope comparable

to those given in the project of creation of technopark. If during the operation of the technopark the parameters of demand for its products and services are not reduced relative to the stated in the project levels, this indicates a market success and high market potential directions of innovative development of technopark.

The willingness of innovative companies, creative teams to carry out its activities within the parks. Using this criterion assesses the demand from innovative companies that meet the requirements of the Technopark, in its area, power and services. In the project of Technopark provides a list of potential residents. The actual task of evaluating the success of technopark on this criterion is to compare actual patterns of residents specified in the project list.

The willingness of investors to finance innovative projects of the companies of technopark detects the operating success of technopark, return on investment, as well as its attractiveness for innovative companies. To analyze the success of technopark here we need to assess the volume of investment, the dynamics of attracting investors, the level of investment. This requires the following information: roster of investors, to provide funding for innovative projects carried out by residents of technopark, a comparative assessment of total investment in the activities of resident companies in comparison with indicators planned in the project and ect.

The willingness of public authorities to implement legislative and financial support for the project is determined by the presence of legislative initiatives of public authorities to support the activities of the technopark initiatives in the provision of state guarantees, as well as financial participation in infrastructure development of the technopark. In order to assess the actual level of support from technopark authorities, it is necessary to analyze the authorities' participation in the construction of technopark indicating the amount of the participation; exemptions and special conditions for companies operating at technopark, the presence of the state order for innovative developments produced by the resident companies of technopark.

During analysis the efficiency technopark's activity is necessary to estimate the amount of the investment, receiving them according to schedules, to obtain confirmation of the intentions of investors to continue financing the project of creation of Technopark and projects that will be implemented by the companies-residents.

3) Assessment criteria level control system of the industrial Park. In practice it is quite difficult to make an objective assessment of the effectiveness of the control system. This concept is in most cases vague and does not contain specific indicators. Therefore, to evaluate the level of development of a control system often used method of assessing the degree formal the management procedures. This approach is constructed, for example, the standards of the quality management system ISO 9001:2000, application of this approach for the qualitative

assessment of the management system of the technopark.

As criteria for assessing the level of management system of Technopark, the following:

- willingness regulations on the provision of services to the companies-residents of technopark of the company, the management technopark;
- willingness of the rules of interaction of the company operating the technopark with state authorities;
- willingness of the rules of interaction of the management company of technopark companies consumers;
- willingness of the rules of interaction with investors;
- willingness of the admission regulations of companies and projects in technopark;
- willingness regulations control over the targeted use of resources technopark;
- willingness regulations overseeing the work of the resident companies and investor protection.

To assess the quantitative performance criteria of a technopark can distinguish four sub criteria:

1) The criteria of market success of the technology Park. Within this group considers a number of criteria related to the position of the technopark in the markets. Technopark is present in several markets: the markets for innovative products and services, labour markets, markets, financial resources. Based on this, three criteria are introduced that characterize the market success of the technopark:

- the level of demand for the products of innovative companies;
- the success of attracting labor resources;
- the success of attracting financial resources.

The success of technopark as the concentration of innovative potential of companies depends on demand for the products of these companies. The importance of this criterion is that in case of insufficient compared with the estimated level of demand for the products and services of technopark face the risk of lack of demand. In order to objectively assess the level of demand for the products and services of technopark should provide information about the meaning of the indicators: actual capacity utilization of the technopark; the dynamics of sales volume with the launch of the technopark; the volume of orders for the products.

The success of attracting labour resources. This criterion reflects: the security infrastructure of the technopark human resources, security companies' resident employees with required qualifications in the necessary volume. In order to assess the success of raising resources of technopark, it is necessary to calculate the following indicators: the closing level of vacancies by category of staff in technopark; the level of satisfaction of resident companies in the workers; the average wage in the technopark to groups of employees; comparison of the average level of wages included in the calculation of the project of creation of technopark is actually achieved.

The success of attracting financial resources. This criterion reflects the success of technopark at the investment market. A key condition for the successful functioning of the technopark is interest from investors to the companies-residents to technopark. In this regard, an important measure for the technopark is the level of coverage and investment needs of the resident companies. It is equally important to compare the total investment included in the calculation of the project of technopark, and the actual volume of investment in it.

2) Criteria commercial success of the technopark. The commercial success of the technopark lies in its ability to provide cash flows, which ensure the fulfillment of the stated rate of return, return on investment, net present value, and the like. To assess the commercial success of Technopark is necessary to ensure the collection of factual information to calculate the following indicators: volume of investment; annual operating income; the annual net profit; cash flow (annual and accumulated).

Next, you need to compare planned values of investment performance with the actual values and to evaluate trends.

3) Criteria socio-economic impact of the technopark for the region. The socio-economic impact of the Technopark is to determine the following indicators: budget efficiency of the investment; the aggregate macroeconomic effect; the number of new jobs.

By the end, the evaluation criteria socio-economic efficiency of the technopark for the region will be: achieved budget and cash flow; budget efficiency index; indicator macroeconomic effect; created jobs in technopark and innovative companies-residents of technopark.

4) Success criteria the technical functioning of the Technopark determine the degree of its actual supply of resources, services, factors limiting the possibilities of development of technopark, which may include: lack of free capacities for electricity supply, heat supply, water supply, and the like, delays in the construction of road infrastructure. Low level of readiness of the infrastructure of the technopark to stress from working in it companies-residents leads to malfunction, inadequate resource support residents, the inability to enter the design capacity.

Risk assessment criteria activities of technopark. For risk assessment of activity of technopark in the proposed four sub criteria:

1) Criteria of assessing the market risks. Most important to technopark market risks are reduced demand for the products of the technopark and the declining interest in the technopark by innovative companies. Reduced demand for products and technologies that are issued by companies-residents of technopark makes the management of the technology Park to begin its conversion to change the structure of the activities. The reduced interest in technopark by innovative companies leads to low fill capacity and foregone income from their provision and delivery of services to residents.

2) Criteria for evaluation of financial risks. Financial risks the activities of the technopark can be defined as downside risks to the recovery of investments in technopark, risks of loss of investors funding the development of resident companies, the risks of financial failure of projects. Downside risks to ROI is very likely for such projects, despite their complexity, therefore, should be elaborated scenarios of project implementation, the analysis of its sensitivity to risks that are formulated benchmarks for the work of the Technopark and the regulations of the track. The risk of loss of investors funding the development of resident companies can have significant negative consequences, both for them and for the management company of technopark, and, ultimately, investors of the project of creation of technopark. Risk of financial failure of the projects implemented by the resident, causing the outflow of investors and lowering the reputation of not only resident companies, but the technopark.

3) Assessment criteria operational risks. In relation to the stage of a technopark, it is necessary to consider the operational risks, among which are: the risks reduce the attractiveness of the technology for human resources; risk of accidents causing environmental pollution; risk of theft of technology and development; risks of equipment failure and service systems.

4) Criteria for assessing the risks of improper using. The final category of risks that arise in the technopark, there is a risk of inappropriate use of space and facilities of technopark. Inappropriate use of space and facilities for technoparks, which receive state support, is unacceptable.

The proposed method specifies the algorithm for calculating the integral evaluation of the effectiveness of the technopark; financed from the state budget, as well as the calculation of efficiency evaluation based on qualitative, quantitative criteria and criteria the riskiness of the activities of the technopark.

Performance evaluation based on qualitative criteria is calculated by the following formula:

$$\varphi_1 = \frac{\sum_{i=1}^{K_{1i}} \sigma_{1i}}{K_{10\varphi} - K_{1\text{HP}}} \times 100\%, \quad (1)$$

where $K_{10\varphi}$ – total number of quality criteria;

K_{1i} – qualitative criterion;

σ_{1i} – score of the i quality criterion;

$K_{1\text{HP}}$ – number of criteria that are unacceptable to this investment project.

Performance evaluation based on quantitative criteria is calculated by the following formula:

$$\varphi_2 = \frac{\sum_{i=1}^{K_{2i}} \sigma_{2i}}{K_{20\varphi}} \times 100\%, \quad (2)$$

where $K_{20\varphi}$ – total number of listed criteria;

K_{2i} – quantitative criterion;

σ_{2i} – score of the i quantitative criterion.

Performance evaluation based on the criteria of risk is calculated by the following formula:

$$\varphi_3 = \frac{\sum_{i=1}^{K_{3i}} \sigma_{3i}}{K_{30\varphi}} \times 100\%, \quad (3)$$

where $K_{30\varphi}$ – total number of risk criteria;

K_{3i} – risk criterion;

σ_{3i} – score of the i criterion of the riskiness.

Valid scores on each of the qualitative criteria, quantitative criteria, risk criteria and requirements for determining scores for each of the criteria must be determined in advance.

The calculation of the integral evaluation. Integrated assessment (E_{imm}) is defined as the weighted sum of performance evaluations based on qualitative and quantitative criteria by the following formula:

$$E_{imm} = \varphi_1 * 0,3 + \varphi_2 * 0,4 + \varphi_3 * 0,3, \quad (4)$$

where E_{imm} – integral evaluation;

φ_1 – effectiveness evaluation based on qualitative criteria;

φ_2 – performance evaluation based on quantitative criteria,

φ_3 – performance evaluation criteria-based risk;

0,3; 0,4; 0,3 – weighted coefficients of performance evaluations based on qualitative, quantitative and macroeconomic criteria defined by the expert method.

According to the results of the estimation of an integral numeric value can be in the range:

1) from 65% to 100%, indicating a high efficiency of the project of creation of technopark and the feasibility of co-financing from the state budget;

2) from 50% to 65%, which indicates the average efficiency of the investment project on creation of technopark and the expediency of revising the volume of co-financing from the state budget;

3) below 50%, indicating a low efficiency of the investment project on creation of Technopark and the expediency to abandon its co-funding from the state budget.

Conclusions

The effect of the operation of technoparks is multidimensional and consists of a common set of interrelated results that generate qualitatively new level of development of production and society. This effect manifests itself in the creation of advanced knowledge-intensive industries, companies and agglomerations, the development and wide introduction of new technologies, the promotion of economically underdeveloped areas, the emergence of new jobs and the increase of highly qualified specialists.

Proposed criteria basis and methodological basis of evaluation of technopark's functioning efficiency created by the attraction of budgetary funds, the hallmark of which is the system of accounting of qualitative and quantitative criteria and criteria for assessing the riskiness of the activities of technopark structures. So, quality criteria allow analyzing macroeconomic, infrastructural, socio-political aspects and giving an opinion on the conformity of the actual results of activity of technopark stated.

Quantitative allow you to analyze the market, commercial and socio-economic efficiency. Risk assessment criteria to assess the level and to identify trends for the near future. It should be noted that the trends of risk will be correlated with the trends of the main indicators of the technopark. This will be a

logical relationship between the levels of risks under the condition of not achieving the target values of indicators and, after a certain time lag, risk events

associated with developed facts of failure to achieve the required values of the performance indicators.

This mechanism allows predicting the effectiveness of a technopark in future periods.

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