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The Balanced Scorecard for Estimation of Science and Technology Parks

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Abstract: This article is the result of the complex theoretical and methodological investigation devoted to estimation of science and technology parks activity. The author's view on this problem includes two points of measuring such structures which are meso- and micro- level. In the first case science and technology parks are considered in impact on a regional economy, in the second one they are investigated as subjects of micro economy which will be profitable. The author proposes to use the Balanced Scorecard for better estimation of science and technology parks. It allows considering all features of integrative elements of an innovative infrastructure and offering affordable decision for their activity improving.

Key words: The Balanced Scorecard · Science and technology park · Estimation · The financial component · The client component · The component of internal business processes · The component of intellectual capital

INTRODUCTION

Studies of contemporary socio-economic condition of Russia reveal necessity of transition to innovative development so far as it is the only possibility to make the economy competitive and enter into the world community as equals. One of the factors of innovative transformation of the economy is formation of an appropriate institutional environment. It is a system of development institutions in which science and technology parks take an important place. These parks ensure establishment of mechanisms for the implementation of the key players of the innovation cycle, i.e. carry out the functions of structure linking research, innovation and market innovation in science-technological sphere.

There is a contemporary economics necessity of examination and critical rethinking of global experience, designing of new theoretical approaches to the management system of the science and technology park whose development should be based on existing concepts and methodologies.

Scientists and experts offer a variety of methodological approaches to evaluating the effectiveness of science and technology parks which are based on individual effects of activity and on a relationship between them.

Molina Arturo [1] and others considered different models of science and technology parks but didn't propose system of indicators for their strategies estimation.

Schwartz Michael [2] used two main characteristics of science and technology parks which are incubation time and incubation age.

Maxwell Andrew and Lévesque Moren [3] have shown that technology incubators which usually include into science and technology parks can be asset by system of indicators for flows of knowledge and money. Author proposes that it isn't full systems for science and technology parks measurement.

Kartsev D.A. [4] in his work consider two groups of performance indicators of the science and technology parks describing it as a standard commercial enterprise and as a specific component of the innovation infrastructure of regions. The first group contains a typical system of indicators: income, profitability, financial stability. The second group includes specific indicators of science and technology parks which characterize the number of residents, the size, characteristics and effects of their activities.

Simonenkov V.P. [5] highlights the economic, scientific, technical, regional and socio-psychological effects of the activities of science and technology parks.

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A basis of evaluation of their effectiveness is profitability and a return of investments realized by residents of innovative projects.

According to Miner R.G. [6] the impact of science and technology parks can be estimated using the integral indicator of the effect of a similar net present value, which is a measure of the differences of the results of innovative cost for the billing period with discounting.

In author's opinion science and technology parks can be considered from meso- and micro-economic point of view in contemporary research works: in the first case the role of the structure at the regional level and its impact on the development of the territory are revealed, in the second case the science and technology park is analyzed as the subject of economics and law with all inherent system properties.

The author offer to carry out designing of methodology of organization and operation of the science and technology park from microeconomic position basing on a conceptual framework of corporate management which is a synthetic multi-disciplinary area and includes both classical aspects of management and specific rules and guidelines that set standards for corporate relations in various spheres of activity.

MATERIALS AND METHODS

Balanced Scorecard (BSC) is advanced methodology based on causal links between the strategic goals that reflect their parameters and factors of obtaining the expected results and aimed to assessing the activities of enterprises and achieving stable and sustainable outcomes.

The unified system of assessment indicators based on data from the traditional model of accounting cannot provide science and technology park management by indicators that characterize not only the economic performance during the reporting period but the prospects for further growth.

BSC considers the objectives and strategy of the company through the prism of a comprehensive system of evaluation of its activities providing the organization management by tool for strategic management criteria which allow to participate in identifying new opportunities and to regulate the acquisition of assets for future growth.

The experience of companies that have implemented BSC has shown that it can be used not only to formulate a strategy but also to manage the process of its implementation.

BSC provides a framework for translating of general strategy of the company in terms of the operational process in which the figures are formed depending on the mission and strategy of the companies on the basis of four balanced options: the financial component, the client component, the component of internal business processes, the component of intellectual capital.

As part of the BSC strategic goals are developed basing on the current vision and strategy for each of them formed the relevant financial and nonfinancial indicators which determined by the target and actual values strategic actions with a timetable of implementation, budget and delineation of responsibilities.

A Main Part: The contemporary researches have shown the need for planning and evaluation of the science and technology park with meso-and micro-economic position. The author developed the methodological foundations of the science and technology park BSC in two ways:

- The science and technology park as the core of the innovation cluster which has the potential for synergies between the participants and the implementation of complementary strategies including more efficient using of existing knowledge in the cluster and the formation of new internal networking;
- The science and technology park as a commercial structure including the property system designed for implementation in high technology and profit.

The modeling of the strategic maps of the science and technology park includes the following activities:

- Formulating of its mission in accordance with the methodological foundations of its operation;
- Comparing of the classic components of BSC with the proposed mission resulted in a proposed strategic objectives of the functioning of the science and technology park in the financial aspect, the client component, the component of internal business processes and intellectual capital;
- In accordance with the objectives have been formulated tasks for each component of the BSC including the predominantly meso-level indicators. This choose is due to the emergence from the operation of the science and technology park the

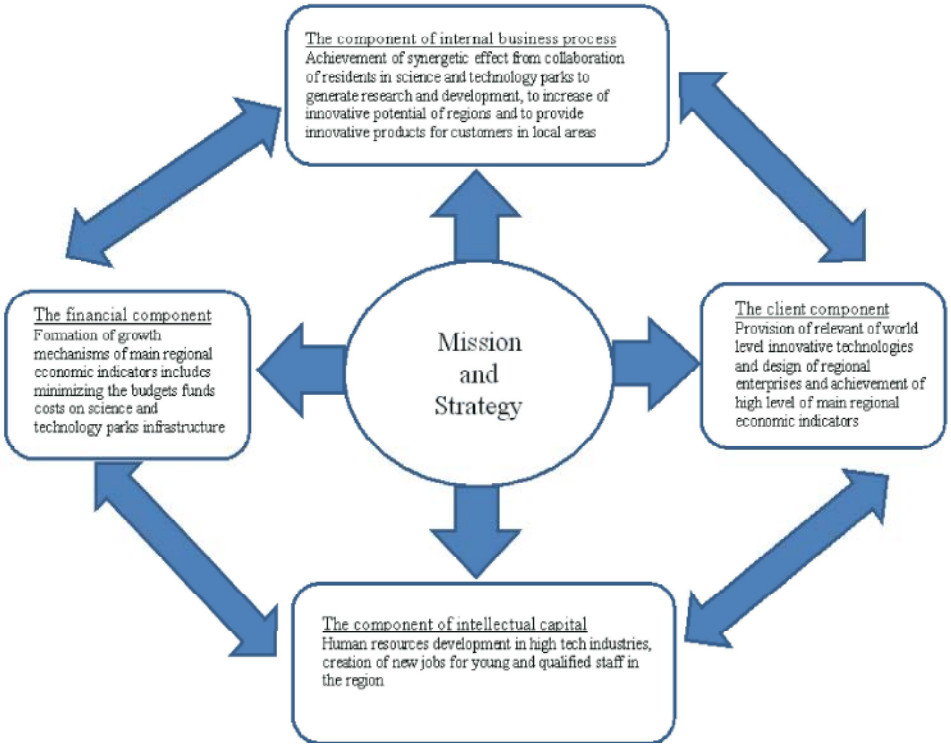

Fig. 1: The Balanced Scorecard of the science and technology park as the center of an innovative cluster

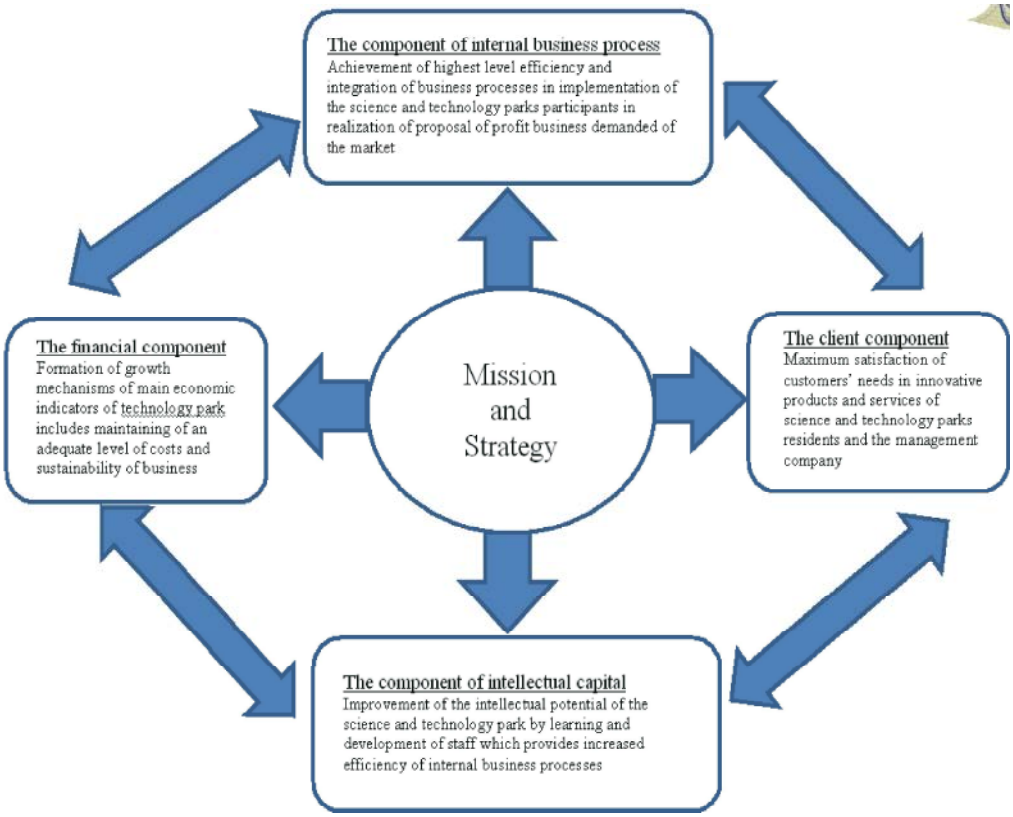

Fig. 2: The Balanced Scorecard of the science and technology park as the commercial enterprise

Table 1: The strategy map of the science and technology park as the centre of the innovation cluster in the region

Mission: providing of the accelerated development of high-tech industries and their transformation into one of the main drivers of economic growth in the region through effective use of scientific and technological potential, material and financial resources directed to the creation of knowledge-intensive, resource-saving technologies and innovative products for the region	
Objectives	Criteria of estimation (indicators)
The financial component Strategy goal: formation of growth mechanisms of key economic indicators in the region while minimizing the cost of funds for regional and local budgets for the establishment and maintenance of the science and technology parks infrastructure	
- The achievement of increased GRP growth over the volume of innovative products (works, services)	1. The growth rate of the volume of innovative products (works, services): - established in the science and technology parks; - established in the region. 2. The share of products (works, services) residents of the science and technology park in the total value of the GRP. 3. The share of gross value added innovative products and services to its overall value: - established in the science and technology parks; - established in the region.
- Increase of the regional and local budgets revenue	1. The growth rate of revenue from innovative companies and organizations in the region. 2. Budget efficiency of the science and technology park - the value of revenues and reduce budget costs to finance the project of the science and technology park creation
- Minimizing of the cost of establishing and maintaining of the science and technology park infrastructure	1. The total area of ??the premises established in the science and technology park referred to the budgets of all levels aimed at organizing of the science and technology park infrastructure in the reporting period. 2. Profitability of the public investment in infrastructure of the science and technology park - the amount of income received by the residents and the management company for the entire period of operation referred to the total value of public investment of the science and technology park of the science and technology park creation.
The client component Strategy goal: provision of relevant to the world level innovative technologies and designs to the regional enterprises and organizations to achieve high levels of key economic indicators in the area	
- Stimulation of the innovative production and service demand	1. The share of the consumers of innovations: - established in the science and technology park; - established in the region. 2. The share of goods turnover of innovative production (works, services) of residents of the science and technology parks in total amount of goods turnover of region
- Full satisfaction of the innovations technological inquiries in region	1. The share of technological inquiries of the enterprises and the organizations of region satisfied in full: - by the residents of the science and technology park; - by the enterprises and organizations in the region. 2. Rate of a gain of number of innovative projects in the incubatory and post-incubatory period realized: - in the science and technology park area; - in the region as a whole.
- Again of new segments of the market of innovative production and services	1. Rate of a gain of volume of realized innovative production and services outside of region: - by the residents of the science and technology park; - by the enterprises and organizations in the region. 2. The share of exported innovative production and services: - by the residents of the science and technology park; - by the enterprises and organizations in the region.
- The increase of investment appeal of region	1. The share of investments into fixed capital of innovatively active enterprises and the region organizations in GRP. 2. The share of the invested capital in innovative projects of residents and of the science and technology park infrastructure development in total amount of investments into innovations in region
The component of internal business processes Strategy goal: synergic effect achievement between participants in science and technology parks to generate research and development, increasing of innovative potential in the region, accelerating the development of high-tech enterprises and provision of economic subjects of high quality innovative products	

Table 1: Continue

- Creation of the condition for growth of innovative activity of the enterprises and the region organizations	1. Rate of a gain of the organizations which were carrying out innovations in region. 2. The growth rate of the shipped goods, the executed works, services of the organizations which were carrying out innovations, in their total amount. 3. The growth rate of expenses for innovations in total amount of expenses of the enterprises and organizations of the region: - carried out in the science and technology park; - carried out in region. 4. The growth rate of the organizations having research and design divisions in total number of the organizations.
- Achievement of the synergy effect from interaction of residents of the science and technology park	1. The share of the organizations for which innovations were designed together - with residents of the science and technology park; - with other organizations of region. 2. Rate of a gain of quantity of joint projects in the organizations which were carrying out innovations.
- Structural reorganization of specialization of region and strengthening of a role of hi-tech branches	1. The share of the enterprises concerning sphere of high technologies in total number of the enterprises of region. 2. Manufacture indexes by the separate kinds of economic activities concerning highly technological sector of economy.
- Maintenance of growth of scientific activity	1. Rate of a gain of number of the organizations which were carrying out researches and designing. 2. Rate of a gain of financing volumes of researches and designing from various sources: - in the science and technology park; - in region. 3. Rate of a gain of number of the submitted patent demands for the invention counting on 10 thousand persons of the population: - in the science and technology park; - in region.
The component of intellectual capital	
Strategy goal: human resource development in high technology industries, creating new jobs for young professionals and qualified staff	
- The growth of researchers number	1. The share of the workers occupied in innovatively active organizations. 2. Rate of a gain of number of the personnel occupied with researches and workings out (in a full employment equivalent).
- Creation of new workplaces	1. Quantity of the new workplaces created by the science and technology park. 2. The relation of the new workplaces created by the science and technology park to number of the unemployed in region.
- achievement of positive dynamics of shots of the top skills (candidates and doctors of sciences) and their attraction to researches and workings out for real sector of economy	1. Rate of a gain of number of shots of the top skills - in the science and technology park; - in region. 2. The share of shots of the top skills in an aggregate number of workers of real sector of economy
- Stimulation of fastening of youth in sphere of high technologies	1. Dynamics of middle age of researchers: - in the science and technology park; - in region. 2. The share of workers till 35 years in an aggregate number of the personnel of the enterprises and the organizations of hi-tech branches
- Achievement of high level of satisfaction of the personnel of hi-tech branches	1. Dynamics of the monthly average nominal added salary of workers: - of the science and technology park; - of the enterprises and the organizations of sphere of high technologies of region. 2. The share of the workers completely satisfied with working conditions and material stimulation in their total: - of the science and technology park; - of the enterprises and in the organizations of sphere of high technologies of region.

Table 2: The strategy map of the science and technology park as commercial organization

Mission: creating of conditions for the formation of an integrated triad of "science - education - business" in order to accelerate the development and application of scientific-technical and technical-technological achievements in production qualitative and market demanded innovative products and services through the concentration of skilled professionals and using of equipped industrial, experimental, information base.	
Objectives	Criteria of estimation (indicators)
The financial component Strategy goal: formation of growth mechanisms of key economic indicators of science and technology park participants while maintaining an adequate level of costs and sustainability of business	
- Maintenance of efficiency of investments into development of the science and technology park infrastructure and business of its residents	1. Profitability of investments: - in the science and technology park infrastructure; - in the innovative projects of residents – profitability of innovations. 2. Time of recovery of outlay of investments taking into account discounting: - in the science and technology park infrastructure; - in the innovative projects of residents. 3. Profitability of actives: - of the management company; - of the science and technology park residents.
- Optimization of expenses for manufacture and production realization (works, services)	Dynamics of costs corrected for percent of sales: - of the management company; - of the science and technology park residents (total volume).
- Achievement of greatest financial results indicators at available organizational and technological level	1. Rate of a gain of sales volume and the added cost in the comparable prices and a parity between them: - of the management company; - of the science and technology park residents. Criterion of efficiency is excess of growth of the added cost in comparison with dynamics of a gain. 2. Dynamics of volume of innovative production (works, services) of the science and technology park on the resident.
- Maintenance of stability of a financial condition of the science and technology park	1. The net current assets. 2. The current liquidity ratio: - of the management company; - of the science and technology park residents. 3. The own circulating assets: - of the management company; - of the science and technology park residents (total volume). 4. The share of losses residents of the science and technology park by results of the accounting period.
The client component Strategy goal: maximum satisfaction of customer needs in innovative products and services of science and technology park residents and the management company by increasing the flexibility and customer value of the proposition of products and services to achieve good financial results	
- Stimulation of demand of innovative production and service of the science and technology park residents	1. Factor of client base – the relation of quantity of clients to total number of potential consumers of production and services of the science and technology park residents. 2. The share of repeated transactions in their total amount.
- Again of new segments of the market of innovative production and services of the science and technology park	1. Rate of a gain of volume of realized innovative production and services by the science and technology park residents outside of region 2. The share of exported innovative production and services by the science and technology park residents.
- Formation of effective strategy of business services by the science and technology park management company	1. Rate of a gain of volumes of the realized business services by a management company. 2. Rate of a gain of quantity of the science and technology park residents.
- The maximum satisfaction of requirements of clients	1. The share of the clients completely satisfied by production and services of the science and technology park residents, calculated according to specialized polls. 2. The share of the science and technology park residents completely satisfied with services of the management company calculated according to specialized polls.
- The formation of positive image and brand of the science and technology park	The rating of the science and technology park defined by independent experts

Table 2: Continue

The component of internal business processes Strategy goal: achievement of the highest level efficiency and integration of business processes in the implementation of the science and technology park participants in realization of the profitable business proposals demanded by the market	
- Increase of efficiency of research and designing	1. The share of resident's projects on the incubatory period finished to a commercialization stage in the accounting period in their total number. 2. Average duration of the incubatory period of resident's innovative projects. 3. The share of volumes of the executed design and research works by residents in their total amount. 4. Dynamics of number of the patent demands submitted and commercialized by residents.
- Maintenance of development of products or services of the science and technology park residents	1. The share of volume of production and services with the proved scientific, technical or technological novelty produced by residents in their total amount. 2. The share of innovative production and services of the residents which do not have analogs in their total amount. 3. The share of import replacing production and services of residents to their total amount.
- Improvement of quality of production, services of the science and technology park residents	1. Percent of marriage and claims of production and services of the science and technology park residents. 2. The share of certificated production and production of the highest category of quality in total amount of production and services realization by the science and technology park residents.
- Achievement of optimization of production of the science and technology park residents	1. Dynamics of duration of a production cycle of the science and technology park residents. 2. Efficiency of production cycle – the relation of time of manufacture to duration of production cycle of the science and technology park residents
- Maintenance of efficiency of commercialization of researches and designing in the science and technology park	1. Rate of a gain of the innovative projects accepted to realization in the science and technology park. 2. The share of the suspended innovative projects owing to impossibility of their finishing to a stage of commercialization. 3. The share of innovative projects of the post-incubatory period in their total number. 4. Rate of a gain of investments into innovative projects of residents. 5. The share of residents projects for which investors have been found in the accounting period in their total number.
The component of intellectual capital Strategy goal: improvement of the intellectual potential of science and technology park based in learning and development staff which provides increased efficiency of internal business processes	
- Maintenance of high level of satisfaction of the personnel of the science and technology park	1. The share of the science and technology park workers completely satisfied with working conditions and material stimulation in their total amount calculated according to specialized polls
- Achievement of peak efficiency of use of potential of each worker	1. Profitability of the personnel – the level of profitableness calculated on one worker. 2. The received economy from the offered introduces of the science and technology park personnel
- Preservation and increase of personnel potential of the science and technology park	1. The share of expenses of residents and a management company of the science and technology park on training, retraining and improvement of professional skill of workers in total amount of expenses. 2. Factor of strategic conversion training – the relation of workers number of the science and technology park prepared for specificity of its activity to total number of demanded experts. 3. Factor of staff turnover of the science and technology park.
- Maintenance of residents of the science and technology park by office, industrial premises and the equipment	1. Factor of security by the areas – the relation of a useful area of premises of science and technology park to number workers. 2. The capital-labor ratio of science and technology park. 3. Rate of a gain of units of the hi-tech equipment got or rented by science and technology park.

synergies between residents and mechanisms to stimulate the growth of investment attractiveness, innovation and receptivity to innovation actors of the economy, including non-residents of the science and technology park;

- Working out of a system of initiatives that can be implemented by regional authorities and top managers of the management company.

BSC of the science and technology park has been developed and in its bounds the park is considered from meso-economic positions (Fig. 1 and Table. 1).

The analysis of the science and technology park in sphere of high technologies has allowed offering the commercial organization model of strategic cards with using of methodology of BSC (Fig. 2 and Table. 2).

CONCLUSION

The complex multidimensional estimation of the science and technology park with using BSC allows not only to identify the basic problems of its development but also to compare a complex of actions according to the put strategic targets formulated on the basis of its mission.
The state authorities responsible for effective development of elements of an innovative infrastructure at formation of mechanisms of BSC estimation of the science and technology park use receive additional possibilities of monitoring of the most significant directions of perfection of their activity as subjects of regional economy and the central elements innovative clusters capable to have essential influence on region economy.

Exclusions: The BSC will provide effective approaches to designing of strategic plans of the science and technology park (system input parameters).

As a result of analytical research of the BSC of the science and technology park as the center of an innovative cluster possible initiatives on perfection of administrative control system over its functioning can be revealed. It will provide highest possible effective achievement of strategic targets of innovative development of the science and technology park and region in whole.

Due to the BSC estimation of activity of the science and technology park by management company the initiatives promoting fulfillment of its financial and economic activity and the social importance can be offered to realization.

Thus, formation of effective business model of the science and technology park allows reaching the maximum effects from its activity, to provide realization of directions of innovative development in region at the expense of growth of key economic indicators and generation of a wave of small high technology business.

REFERENCES

1. Molina, A., J.M. Aguirre, M. Breceda and C. Cambero, 2011. Technology parks and knowledge-based development in Mexico: Tecnológico de Monterrey CIT experience. Int. J. Entrepreneurship and Innovation Management. 13(2): 199-224.
2. Schwartz, M., 2012. Incubation time, incubator age and firm survival after graduation. Int. J. Entrepreneurship and Innovation Management. 15(1/2): 108-130.
3. Maxwell, A. and M. Lévesque, 2011. Technology incubators: facilitating technology transfer or creating regional wealth? Int. J. Entrepreneurship and Innovation Management, 13(2): 122-143.
4. Kartsev, D.A., 2000. Technopolises and technology parks in the world economy and characteristics of their development in Russia. Thesis of dissertation of Candidate of Economic Sciences.
5. Simonenkov, V.P., 2004. Principles and organizational-economic mechanisms of technology parks in the Northern region. Thesis of dissertation of Candidate of Economic Sciences.
6. Miner, R.G., 2009. The relationship between economic and social indicators in technology parks system. Innovation, 5: 92-96.