

# Intellectual Capital of Technology Park Structure as a Factor of Its Advanced Development

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**Abstract**— article represents the results of express-analysis of the importance of intellectual capital management for the purpose of improvement of technology park structures activity. The author shows that intellectual capital is the key competitive advantage of specific structures for efficiency and financial sustainability at the micro-level.

**Keywords**—Technology park structures, intellectual capital, brand, resident, human capital.

## I. INTRODUCTION

THE forming of the knowledge-based economy is the priority direction for the development of modern society.

The Strategy-2020 of the innovative development having been accepted by the Russian Federation in 2011 has put in the forefront the ambitious tasks of achieving the world economic leaders' level and integrating into the global innovation space that should be ensured with the direct support from the state as the initiator and guarantor of the development of innovative systems at all levels.

Analysis of the successful experience of the different European countries [1, 2] having stable and high dynamics of the innovation development can become a basis for designing our own decisions which will be aimed at the global and overall formation of system's support for the processes of generation and innovation transfer at all levels.

Creation and development of science and technology parks, innovative business-incubators (hereinafter - technology parks structures) as the integrated elements of innovative infrastructure of the innovative systems have been determined with their essential features which had provided the integrated technical and material, socio and cultural, financial and another services for the efficient startup, development and support of small innovative enterprises.

Scientists and experts offer a variety of methodological approaches to creation of effective technology park structures which are based on individual effects of activity and on a relationship between them.

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Molina Arturo [3] and others considered different models of science and technology parks.

Schwartz Michael [4] used two main characteristics of science and technology parks which are incubation time and incubation age.

Maxwell Andrew and Lévesque Moren [2] 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.

Complex investigation which was made by author [5] shows what typical management approaches using in common companies don't work with case of technology park structure.

The phenomenon of technology park structures is that they are the subjects of economy meso - and micro-level. Management of technology park structures should take into account their dual nature: on the one hand, take into account the requirements of the normative-legal base of the state and the basis of classic management, on the other - their mission as centers to generate and support of innovative business requires significant features in management, including the impossibility of attaining absolute resource efficiency due to the reduction of tariffs and prices business services for residents in the incubation period, as well as the synergies that result from the interaction of main stakeholders of technology park structures (innovative companies, anchor residents, service companies, the managing company).

The results of the analysis of the Russian Federation innovation infrastructure activity show the system problems, especially on micro-level. For instance, many structures, providing merely the implementation of its own mission, are marginally profitable or inefficient, regularly getting public subsidies to finance their debts as a result of their activity.

Thus, the results of the author of the sample analysis, presented in the monograph "Financial analysis and management of technology park structures", indicate that more than 45% of the examined technology park structures are unprofitable, more than 50% are liabilities losses of the previous years.

Presidential Address to the Federal Assembly of the Russian Federation on the 12th of December 2013 gave an additional impetus to this problem. The need for further increasing the technology park structures effectiveness and the opportunity for the creation of the new mechanisms for the financial stimulation of regions to solve the problem mentioned on federal level are among issues that are considered in this

document. It is necessary to find new sources of technology park structures development in modern condition.

## II. A MAIN PART

For the research of a current state of the technology park structures in Russia and abroad and their further development the author had conducted a questionnaire and studied the official documents and internet recourses.

The reason for more detailed research, based on the different sources, is the difference in the structures of leading world science and technology park associations and the lack of representativeness of Russian science and technology parks.

In the designing questionnaire there were 30 questions having touched the key aspects of technology park structures' functioning; it had been sent out to more than 450 respondents.

Processing and analysis of 120 valid questionnaires have identified the key features of technology park structures in Russia and abroad of today (see table 1).

According the results of present study we can identify the following features of Russian technology park structures in compare with the foreign ones.

Analysis has showed the prevailing share of the technology park structures which had the public form of ownership. At the same time abroad the percentage of structures with the mixed and private property had been higher.

This, on the one hand, guarantee financial stability which in some cases is provided by state subsidies, on the other hand, complicates the management of technology park structures due to the need of coordination of actions with state authorities.

A majority of Russian and foreign technology park structures render services on the rental of office space, some consulting services, telephone and Internet services, security services and parking. It may be noted that the Russian technology park structures are more oriented for giving the rental space than the foreign ones. The foreign technology park structures use the mechanisms of outsourcing more than Russian structures, especially in some consulting services.

The research showed that in some cases the Russian technology park structures are engaged exclusively in providing services of rent without additional sources of income from the provision of other services. This trend does not allow to ensure the effective management of technology park structure as a business because there are no opportunities to increase revenue due to diversification of services pool. The reason of solely rental orientation of technology park structures is the lack of effective residents or low qualification of personnel providing services for business development. Cost of business services in the most Russian technology park structures is below market price and in the foreign countries it is similar market price. Key factor that attracts residents in Russian technology park structures is a price, while abroad a key factor is the integrated system of support for residents. Efficient development of business services and formation of the needs of the residents, as well as confidence in their quality is the key task in the development of Russian technology park structures.

TABLE I  
THE AVERAGE STATISTICAL INDICATORS OF SOME TECHNOLOGY PARK STRUCTURES IN RUSSIA AND ABROAD

Classification characteristic	Russian structure	Foreign structure
Form of ownership of the organization	Public form of ownership	Public form of ownership
Basic economic activity according with the statutory documents	Leasing out of own real estate	Provision of intermediary services, associated with the real estate
Technology park structure's space	Less than 200 hectares	Less than 200 hectares
Site area	More than 80 per cent of technology park area	60 per cent – 80 per cent of technology park area
Share of built-up area reserved with the residents	More than 90 per cent	More than 90 per cent
Number of employees of the management company	Up to 5	10-15
Main objects of infrastructure	Technology transfer centre, conference-centre, business-incubator	Business-incubator, conference-centre, technology transfer centre
Evaluation of business services	Services on the rental of office space, consulting on issues of commercial activities management, telephone services, Internet access services, security services	Services on the rental of office space, telephone services, Internet access services, security services, consulting on business development
Cost of business services	Below market cost	The price of a similar market cost
Level of local competition	Low	Medium
Support from regional and federal authorities	Financing of infrastructure	Financing of infrastructure, tax remissions
Level of profitability of management company	0 per cent – 10 per cent	0 per cent – 10 per cent
The management company's dependence on the external sources of funding	High	Medium
Key success factors	Strong science and technical, technological and resource potential, which has a competitive edge; the technology park infrastructure and adequate technical equipment; stable partnership with the industrial companies	Successful experience of the scientific and innovative activities of the residents; stable partnership with the industrial companies; the multiplicity of sources for the financial support

Russian respondents have drawn attention to the predominantly low level of local competition, while the foreign participants of the questioning (more than 50 per cent) have indicated the average level of the competition due to good development of the innovative infrastructure.

Competition creates objective conditions for further improvement of activity of technology park structures in terms of fulfilling its mission which is to support innovative business and maximize profits. In addition, competition is only possible

in real necessary branches and it is possible to earn income.

Almost half of respondents in Russian Federation have pointed on the high, more than 12 per cent have characterized it as disastrous and that shows their low financial sustainability. The dependence on the external sources of funding in one third of the foreign technology park structures is medium, it is normal in one third, it is absent in more than 17 per cent.

Low financial stability of the Russian technology park structures is also one of the main arguments as to the substantiation of formation of fundamentally new approaches to their management.

Since 1998 the Tver InnoCenter under the direction of E.A.Lurye monitored the university science and technology parks and as a result the Catalogue of university science and technology parks had been published. It was the first similar edition in the Russian Federation. Using the previously developed method to study of the dynamics of these structures in 2011 a new monitoring of university science and technology parks was fulfilled and the second issue of the Catalogue of university science and technology parks has been prepared for the edition.

For the purposes of classification of objects of university innovative infrastructure on the basis of the studied quantitative indicators was carried out clustering into 3 groups with the use of software SPSS.

The scatter plot of objects of innovation infrastructure shown in figure 1, provides a graphical interpretation of the research results and allows to see the location of each structure in two-dimensional space. It is determined by a system of indicators characterizing efficiency of residents' activity and the efficiency of management of innovative infrastructure object.

In accordance with the results of clustering investigated objects of innovative infrastructure were divided into highly developed (5%), developed (19%) and developing (76%). Among the highly developed based on the results of data processing were identified as objects of innovation infrastructure of the Lomonosov Moscow State University, St. Petersburg Agrarian University, Moscow State Technological University «Stankin», National Research University «Moscow Aviation Institute», National Research University «High School of Economy».

Among the highly developed innovation infrastructure objects the structures which are located in universities with high business reputation and well-known brand presence. The trust to basic University in stakeholder environment is the key competitive advantage of these structures. However, they have possibility of selecting the most promising innovative companies and projects that provide a greater number of success stories in technology park structure and, as consequence, growth of business reputation and popularity and trust to the brand.

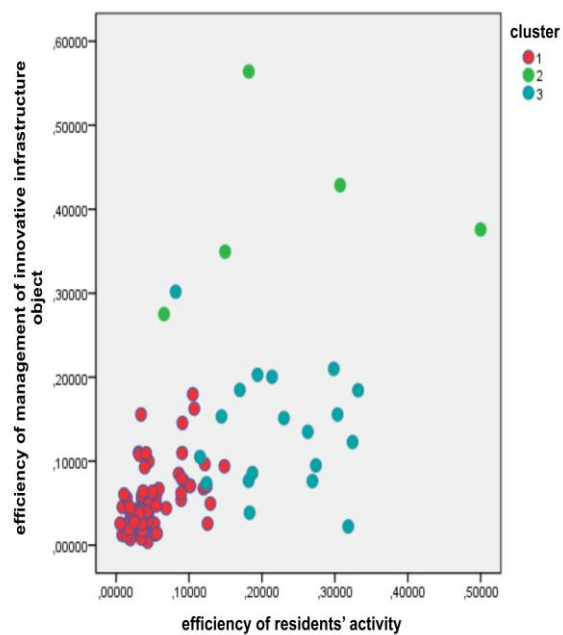


Fig. 1 Results of clustering of object of university innovative infrastructure

Thus, analysis of the success stories of the leading technology park structures shows a significant relationship between their business reputation, brand and received financial result. Leading technology park structures have management levers of organizational, resident and financial sphere unlike their beginners analogues. They may use different pricing mechanisms for their services.

The main reason for this trend is competition among prospective technological business representatives for the status of a resident of a similar structure which will allow not only to get its guarantees for attraction of investors and contractors but also to use the opportunities created the innovation environment in their territory. It is the communication with colleagues, possibility to participate in specialized training programs and competitions, information support is attractive to innovative companies, and, consequently, promotes the growth of financial indicators of the managing company for the technology park structures. The development of high goodwill of technology park structures is carried out, first of all, if successful activity of companies-residents. Business reputation and goodwill of innovative companies depends on quality of its promotion in technology park structure.

Accordingly, there is a chain of interests by mutual influence of residents and the managing company of technology park structure, aimed at the increase of goodwill, which allows to talk about the formation of a synergy from their interaction.

Conducted by the author study of applicability of the classical indicators for analysis of technology park structures, as well as possibilities of use of the tenets of corporate governance to the study of their activities, have shown that the use of a standard methodology management company is able to provide a solution some tactical tasks of technology park structures. According the specifics of their activity this

requires its own methodology which is offered to apply the methodological approaches of intellectual capital management.

It includes development of business reputation (goodwill), human resources, skills and achievements of personal, brand, specific system of management, intellectual property, market capital, etc.

Research of intellectual capital currently fragmented, are made on the standard to non complex polystructural systems, which are technology park structures, not related to the structures of support of innovative business.

In the framework of research the intellectual capital of technology park structures includes specifics of their organization as structures of the corporate type. This defines the structural features of their intellectual capital, which consists of the intellectual capital of the management company and individual residents innovative companies taking into account the effect of synergy.

Main components of intellectual capital of technology park structure based on Bookings' model (fig. 2) are below.

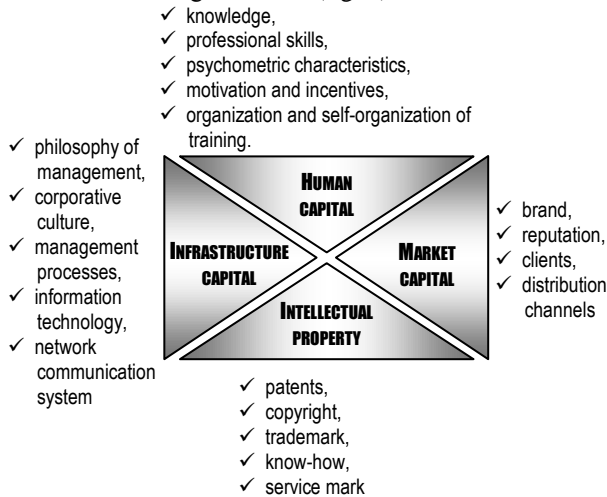


Fig. 2 Booking's model of intellectual capital

The system of knowledge of technology park structure is the accumulated information about the condition of business services market and the areas of specialization of residents, effective decisions aimed at development of innovation business and technical solutions in the area of innovative products and services, socio-economic information about the functioning of technology park structure. An important element of the system is gained by the employees of the management company experience of rendering of services including their specificity and uniqueness. Together with the professional knowledge and professional experience of the residents of technology park structure it provides an implementation of innovation projects at a higher level, as a result, creates opportunities for additional income as an innovative company, or management company for the extra volume of rendered services.

The system of training and self-study are those sources that provide the basis for the formation of new knowledge and as a consequence will contribute to the potential increase in the income of technology park structure as a whole.

An important element of human capital of technology park

structure that is not highlighted in the standard Brookings' model is an expert capital. It includes expert community what has been called to assess innovative projects and consulting of technology park structure management company. Capital value of the expert is to use the knowledge and skills of qualified professionals for the selection of projects in framework of residents competitive selection which is a determining success factor of residents business and provides increased purchased in technology park structure services and as a result, revenue growth.

Role of reputation of technology park structure is to provide investors quality innovative projects with very high probability of realization that is result of joint activities of the management company and residents. Technology park structure brand is a source of attracting of residents with the most promising projects. In terms of its operation it is formed with the tool of co-branding on the basis of brands management company, residents and base organization (university, company). Source of additional income from the brand equity is the possibility of implementing a larger volume of business services to residents. Technology park structure client capital consists of established relations in a business environment. Thus, the involvement of suppliers, contractors in projects residents, investors and creditors, as well as potential customers is carried out within the client capital management policy and is to establish a close long-term contacts for current and future activities.

Intellectual property of technology park structure residents is the source of their business and safeguard against competitors, so provide additional revenue as the companies themselves, and technology park structure in whole.

Special elements of technology park structure intellectual capital are management philosophy and corporate culture. In modern day conditions namely the presence of a cohesive team that is integral under the influence of corporate culture which recognized by all employees and stakeholders values and a specific management tools can be a major key to the success of individual residents and technology park structure as a whole.

Further study of the issues of technology park structures intellectual capital is part of the project "Methodology of intellectual capital management of technology parks and scientific structures" with a fixed state status which implemented by Tver InnoCentre on require of the Ministry of education and science of the Russian Federation.

There are main prospective results of the project

- scientific-theoretical and empirical generalization of the organizational, functional and strategic role of technology park structures intellectual capital to ensure their effective functioning;
- scientific-theoretical description of the structure and typology of technology park structure intellectual capital;
- multicomponent hierarchical structure-factor models of technology park structure intellectual capital;
- scientific-theoretical generalization of methodological approaches to the assessment of intellectual capital for the purposes of technology park structures research;
- hierarchical structural model of technology park structure intellectual capital evaluation;

- methodical approaches to the organization and implementation of technology park structure intellectual audit;
- stakeholder environment models of technology park structure as an object of external management of intellectual capital;
- methodical approaches to the implementation of the external management of technology park structure intellectual capital;
- scientific-methodical tools for implementation of the internal management of technology park structure intellectual capital;
- methodological approaches to the development of the intellectual capital of the companies-residents using tool of co-branding;
- efficiency criteria of the system of technology park structure intellectual capital management;
- strategic and tactical multi-criteria structural-factor model of the influence of technology park structure intellectual capital on the resulting economic indicators - effectiveness and sustainability;
- methodological approaches to calculation of an integral index of technology park structure intellectual capital;
- methodical approaches to ranking of technology park structure structures on the level of intellectual capital;
- the concept of intellectual fields formation on the basis of neoinstitutionalism theories;
- methodical approaches to the creation and purposeful management of technology park structure intellectual field.

Research project should become the basis for the formation of fundamentally new approaches to the management of technology park structures on the platform of classical and postclassic methodological principles

### III. CONCLUSION

Thus, at the present stage technology park structures play an important role in the implementation of innovative orientation of the territories development and fulfilling the mission of innovative business support, not fully able to use standard methodology in management practice. For increase of functioning efficiency of technology park structures as business requires a special approach for the formation of added value on the basis of competitive advantages. Technology park structures intellectual capital can be defined as a key factor in achieving of activity maximum effectiveness due to the nature of the innovation sphere and the possibility of synergy from the interaction of individual intangible components of intellectual capital of residents and the management company.

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