

# The effectiveness of business incubators as the element of the universities' spin-off strategy in Russia<sup>1</sup>

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## Abstract

The common vision on business incubators considers them as an important part of the regional innovation infrastructure, which has a special mission to promote the development of innovation-based start-ups and to create an innovative eco-system. The role of business incubators as the part of the universities' system of knowledge and technology transfer also seems to be beyond the questioning. The idea prevails that universities' researchers and students may create spin-off companies to commercialize the valuable R&D results, while universities are interested in profits and knowledge sharing and thus try to nurture these spin-off companies via business incubators support. Despite the prevalence of this vision of business incubating, the problem of its effectiveness assessment is not solved in a systematic way. Researchers and organizations argue on the possibility of developing a single methodology of such assessment.

We have revealed rather small amount of research papers devoted to the problem of business incubators effectiveness assessment. One of the reasons is the diversity of models and institutional contexts which may have impact at their role and effectiveness. The large amount of studies considers the universities' role in regional innovation systems and in the knowledge and technology transfer through spin-off companies. From this point of view, business incubators play an important role in universities' spin-off strategies.

In this investigation the stakeholder's approach to business incubators performance was used. The methodology is based upon the elaboration of indicators of performance for universities, which establish business incubators, and the real options-driven approach.

Results of the survey of business incubators authorities and residents in 8 regions of Russia helped us to create the system of indicators of business indicators performance. We took into consideration stakeholders interests when created the questionnaire. Then we constructed the single indicator of efficiency and examined variables influencing at it.

**Key words:** business incubators, spin-offs, universities technology transfer

## Introduction

Business incubators are usually considered as the element of the regional innovation infrastructure, that has a special mission to promote the development of innovation-based start-ups. Different countries demonstrate the variety of business incubating models (commercial vs non-profitable, publicly funded vs private etc.), but the role of business incubators as the part of the universities' system of knowledge and technology transfer seems to be a commonplace. This approach is based upon the idea that the universities' researchers and students may create spin-off companies to commercialize the valuable R&D results, while the universities are interested in profits and knowledge sharing and thus try to nurture these spin-off companies via business

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<sup>1</sup> The study is supported by the Programme of fundamental research of National Research University Higher School of Economics

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incubators support. Despite the prevalence of this vision of business incubating, it should be mentioned that the problem of its effectiveness assessment is unsolved. Moreover, there is no single methodology of such assessment. The statistical data collected by international and Russian organizations (such as the European Business and innovation centre Network, EBN) also does not help to elaborate the approach because it covers more the sphere of the business incubators' performance than the effectiveness. This paper is an attempt to fill this gap.

### **The literature review**

We have revealed rather small amount of research papers devoted to the problem of the business incubators effectiveness assessment. There is no consensus on their effectiveness. One of the reasons is that business incubators operate in “different institutional contexts, which influence their role and effectiveness, but which have not been taken account of in the literature” (Radosevic and Myrzakhmet, 2009). Though business incubators have been investigated for a long period of time, since the beginning of 1980<sup>th</sup> (Temali and Campbell, 1984; Allen and Rahman, 1985; Feeser and Willard, 1989), there is still a wide variety of researchers' opinions concerning both the definition of business incubators and their functions. In (Peters, Rice, Sundararajan, 2004) the list of definitions culled from the literature is provided, but the number of definitions is still expanding. The general trend is the extension of business incubator's functions from the “real estate appreciation” and “managing the start-ups development” (Martin, 1997) to their appreciation as the “key component of regional and national economic development strategies, supporting and accelerating growth across all sectors” (Voisey, Gornall, Jones and Thomas, 2006). Alongside with the growth of the business incubators number their typology has been developed. The main dimensions are “technology – non-technology” business incubators, “for-profit – non-profit” incubators, “publicly sponsored – university sponsored – private” incubators (Hacket and Dilts, 2004a). In (Grimaldi and Grandi, 2005) two principal models were defined. One model is corresponding to Business Innovation Centers and other publicly funded incubators that provide to tenant companies tangible assets and help them with market-oriented services and expertise. Other one is corresponding to private (corporate and independent) business incubators, whose services are oriented towards the provision of finance (including venture and business angels) capital and managerial skills. Universities may relate their business incubators with both models. It is evident that the objective and success factors, and consequently, key parameters of effectiveness may differ from type to type, depending on the typology chosen by researchers.

The large amount of papers considers the universities' role in the regional innovation systems and their role in the knowledge and technology transfer through spin-off companies. For

example, a useful vision is the one provided by (Youtie and Shapira, 2008), who consider universities at transition “from that of a knowledge factory to a knowledge hub, to advance technological innovation and economic development in its region”. So business incubators are the important part of this hub creation. The spin-off process success depends heavily on the entrepreneurial environment, networking and feedback (Druilhe and Garnsey, 2006), and it is the common vision now that business incubators are the places where academic and entrepreneurial strengths merge (Phillips, 2002).

We also consider the results of assessments of business incubators established by universities in different countries (Mian, 1997, Shelton and Margenbhalter, 2002, Palmari, 2004, Aerts, Matthyssens, Vandenbempt, 2007, Rumph, 2010). The annual surveys of business incubators classified as Business and Innovation Centers (BIC) is made by European Business and innovation centre Network, EBN. The recent report, published in 2013, contains the information on the performance indicators of BICs for the period 2010-2012(EBN-BIC, 2013). It demonstrates us the “portrait” of a typical BIC (Table 1).

Table 1

The “portrait” of a typical business incubator classified as Business and Innovation Center

Estate operated by BIC	4,700 m <sup>2</sup>
Staff	14 persons
Rate of adoption	10,6 %
Companies ready for investment	20
New jobs in start-ups	57
Jobs in existing tenants	42
Availability of financial resources	1,450,900 Euro
Average incubation time (years)	2,71
Survival rate (3 years after graduation)	88,3%

Source: EBN, ebn.eu

These data may be taken as the starting point for the benchmarks, but it should be mentioned that only some European incubators may be accredited under the conditions of EC-BIC programme. National Business Incubators Association also reports on the survival rate of about 87% as an average for American business incubators for 2012 (NBIA, 2013).

There are also various investigations of the performance of the firms located in business incubators (Colombo and Delmastro, 2002), management of business incubators (Albert and Gaynor, 2004) and some other related issues. It should be noticed that there is a contradiction between the optimistic evaluations of business incubator performance from international and national organizations like EBN or NBIA and the results of some investigations where the positive role of business incubators as accelerators of regional innovativeness growth or technology transfer tools is doubted (Tamasy, 2007, Tavoletti, 2012).

We did not find any systematic research on business indicators effectiveness related to the former Soviet countries, though some European reviews include, for example, Ukraine (Sipos, Szabo, 2006; Rumpf, 2010) and Kazakhstan (Radosevic and Myrzakhmet, 2009). There is no systematic assessment reports on business incubators activities in Russia. Though it should be mentioned that some hot issues were stated at (Buev, 2012), and these issues correspond in general with the opinion of researchers who doubt in the success of business incubators and business incubation.

So the questions posed on the base of the literature review are the following:

1. What approach should be chosen for the assessment of business incubators effectiveness?
2. How universities may capture benefits from their spin off companies launch via business incubators?
3. What are milestones and barriers for university-based business incubators development in Russia?

### **The research framework**

The literature analysis helped us to develop the research framework. We use the stakeholder's approach to business incubators performance (fig. 1). Though business incubators usually are established by universities, their strong performance is interesting for different groups of stakeholders.

Understanding the differences in stakeholders' expectations from the business incubators effectiveness, we divided the possible indicators into 3 groups:

- 1) indicators of business incubators performance;
- 2) indicators of residents development;
- 3) indicators of business incubators' influence at residents development (Table 2).

Each of the directions, that are represented in Table 2, may be adapted according with a special stakeholder needs and transformed into an accountable indicator. The general success indicator we use is the survival rate (Aernoudt, 2004, Aerts, Matthyssens, Vandembempt, 2007, EC-BIC, 2013, NBIA, 2013). For different stakeholders it may be transformed further in some financial data (for business incubator graduate it may be connected with return on assets, for regional and local authorities with the volume of tax payments, for the incubator itself with the maintenance fees etc.), but this is beyond the framework of this study.

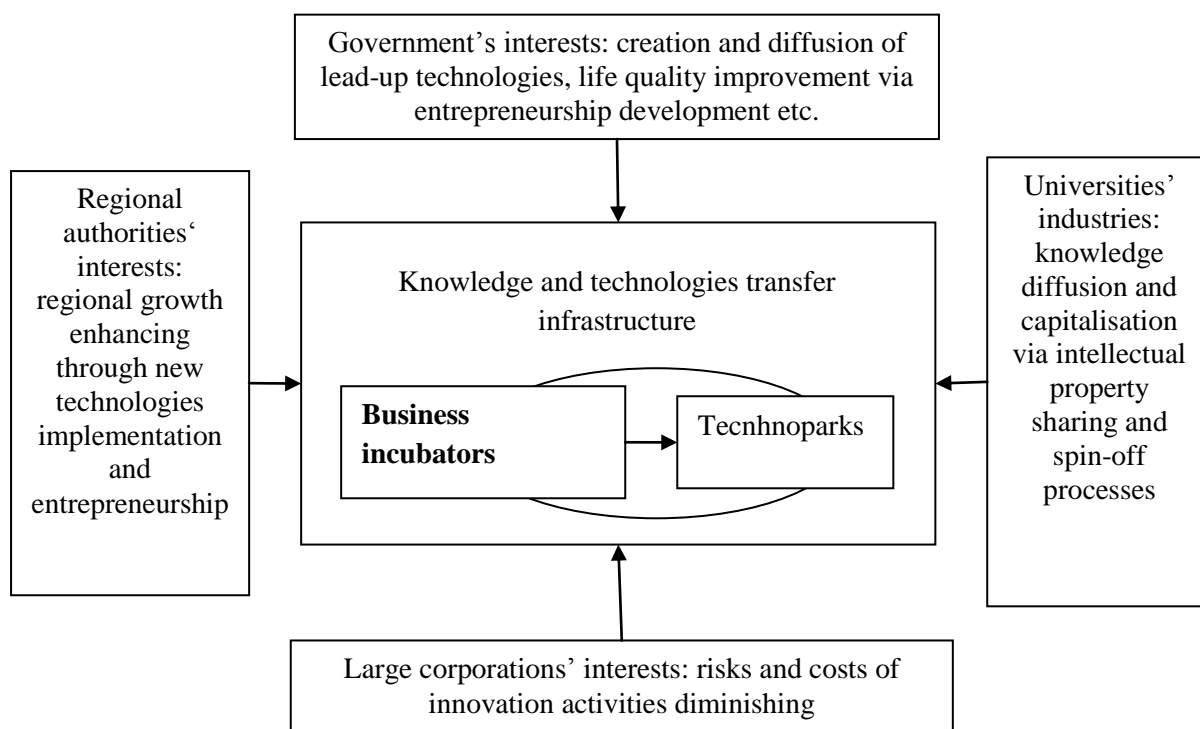


Fig. 1. Stakeholders approach to business incubators

Table 2

Directions of business incubators effectiveness and performance evaluation

Business incubator performance indicators	Residents performance indicators	Indicators of the business incubator impact at the residents development
Incubator services variety	General information about each resident	Residents guidance services assessment
Physical assets characteristics	Key features of the resident's business model	Consulting services assessment
Number of residents, their specific features (specialization)	The level of the resident's innovativeness	Funding seeking services assessment
Business model of the incubator	Financial performance indicators	Residents promotion services assessment
Revenues and costs	The resident's needs in business incubator resources and services	Education and training programmes assessment
Investments attracted		Residents monitoring regularity and usage
Management quality assessment		
Networking intensity assessment		
Partners involvement and eagerness to promote the business incubator		

For universities, that are the founders of business incubators, all groups of indicators are important. Besides the developing of spin-off companies (business incubators residents), it is also essential to provide students with jobs, practice, entrepreneurship competencies, as well as to create the favorable environment for investors' appeal to business incubators. Industrial corporations may also invest in business incubators' residents and universities may identify their need in R&D directions and thus increase their profits. The universities' objectives in spin-off processes are demonstrated at Fig. 2.

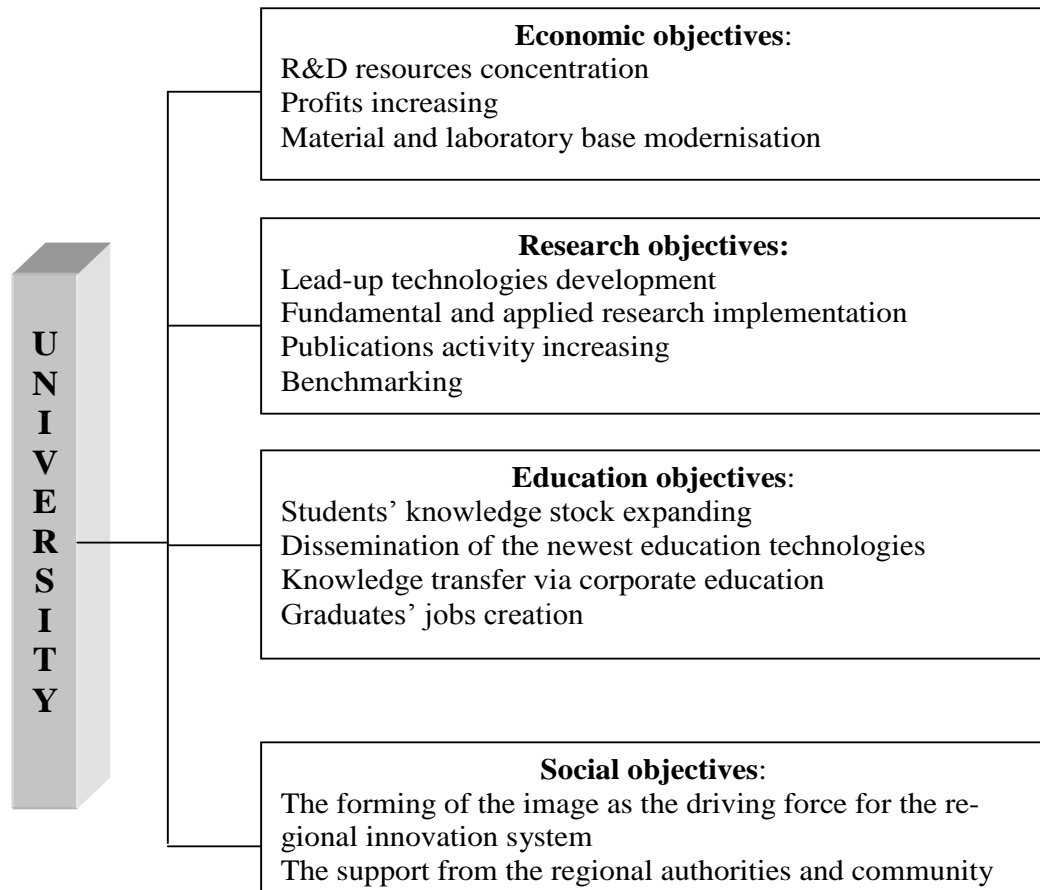


Fig. 2. Universities' objectives in the spin-off process

For universities, the creation of the incubators is viewed as the investment project with possible outcomes as real options. So the overall approach is based upon the elaboration of the indicators and the real options assessment approach. As for other stakeholders, the majority of this indicators cannot easily be monetized and described in cash flows terms. This consideration makes it reasonable to define different types of spin-off process effectiveness.

1. The general efficiency is described by the level of accordance of spin-off processes to economic, technological, educational, research and social objectives, posed by the university. This approach is proposed in (Hughes, Ireland and Morgan, 2007) in terms of value creating

through incubation. Each university's objective may be concretized with indicators, as it is demonstrated in Table 3.

Table 3

Business incubators-for-universities performance indicators<sup>3</sup>

Indicator	Result
Number of residents, total	
Number of residents, founded by faculties staff or students (spin-offs)	
Number of students, involved in the incubator activities	
Number of course and graduation papers (including master theses), created on the base of business incubator practice (stage, employment, expertise, research etc.)	
Number of patent applications and licensing agreements obtained by business incubator residents	
Number of papers published by the faculties staff or students on the base of the projects or expertise obtained from business incubator activities	
Number of students and graduates who had become the residents' and business incubator employees	
Number of business incubator experts from the faculties staff	
Number of educational programmes for the business incubator needs organised by the faculties staff	
Number of consultancies for the business incubator needs held by the faculties staff	
Number of entrepreneurs (business incubators residents, graduates and members of their networks), involved in the university activities (programmes, research projects, events etc.)	
Number of residents using the university labs and other facilities	
Number of research and consultancy projects obtained by the university through business incubator residents	
Number of projects fulfilled by faculties staff and business incubator residents together	
Number of projects fulfilled by faculties staff and business incubator residents for the local, regional and national needs (through the procurement tools)	
The university income from business incubator activities	

2. The economic effectiveness of spin-offs is expressed in revenues and costs connected with spin-offs creation and their support. If business incubator is considered as a tool for spin-offs creation and support, the economic effectiveness of spin-offs may be tightly connected with the effectiveness of the business incubator.

As a business incubator development may be considered as an investments (it requires substantial costs for creation and facilities maintenance, the results are appearing after a time period), with uncertain results (considering the high risk of technology-based new firms), it

<sup>3</sup> We use here the Russian university model with its specifics.

seems reasonable to follow the real option-driven approach proposed by (Hacket and Dilts, 2004b).

Real options (the term had been proposed in (Myers, 1977) take into account the managerial flexibility, i.e. creates the opportunity (but not the liability) for investors to capture additional value from risky investments. There is an opportunity to use this methodology every time when it is possible to take consequent investment and managerial decisions (Trigeorgis, 1996).

Real option creation and exercising<sup>4</sup> is depending on different factors, among which there are the following ones (Rosenberger, 2003):

- high technical and commercial risks of the project implementation;
- the volatility of market prices on the basic assets under risk factors;
- the low converse rate of investments (once an investment is made, it is impossible to exit from the project before its exploitation stage without financial losses);
- the cost of an option exercising (additional investments are costs of a project ceasing);
- the high level of competition on markets of resources and project results.

From a real options-driven vision, a business incubator may be considered as a project containing call options for expansion or for further investments. Spin-offs activities create real options and university's support for a business incubator is the exercising of these options.

In (Hacket and Dilts, 2004b) five possible outcomes of incubation for a resident are described:

1. The resident demonstrates high growth rates, captures a substantial market share and gains a higher rate of return than that is average for the market (the "star" incubatee).
2. The rate of growth of the resident corresponds to the market rate and its profitability is generally the same as the average market one.
3. The resident survives but it is balancing at the break-even point or below it (the "zombie" incubatee).
4. The resident terminates its operation within the incubation programme and its financial losses are minimized.
5. The resident terminates its operation within the incubation programme, but its financial losses are substantial.

From the real options-driven approach, these possible outcomes are demonstrated at Fig. 5.

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<sup>4</sup> At "exercising" we mean the approving or declining the round of investments which should be made after the initial investment is made. Strictly speaking, the initial investment creates an option to make or not to make further investments at the next stages of the project implementation.



The function described in (Hacket and Dilts, 2004b) is expressed as follows:

$$P_{bi} = f(S, A, R) \rightarrow \max$$

where

$P_{bi}$  = integral expression of business incubator performance;

S = selection performance;

A = quality and diversity of services and assistance to residents from the business incubation management and the parent university;

R = resources operated by the business incubator and available for its residents.

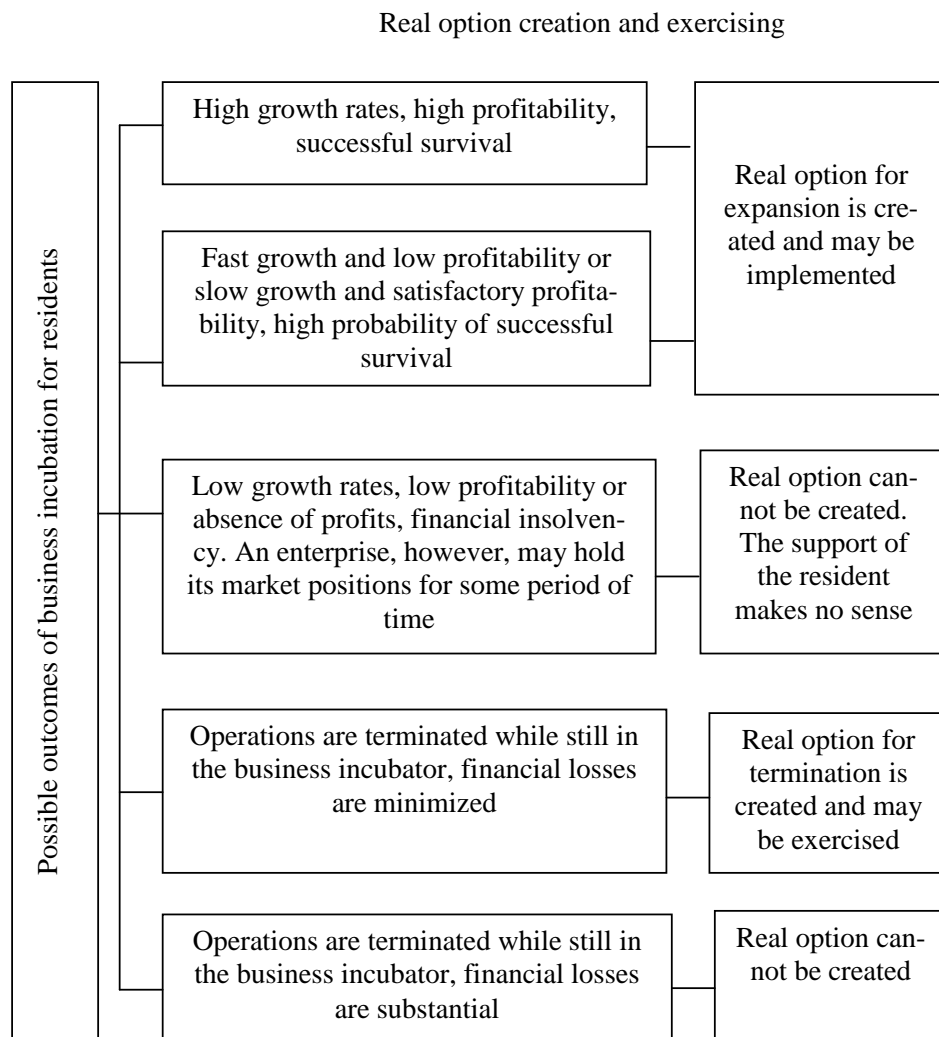


Fig. 5. Possible outcomes of business incubation programme from the real options-driven approach

Selection performance (S) characterizes the competences of a business incubator administration in residents' portfolio shaping. Different selection criteria are aimed at an applicant testing at financial and non-financial feasibility. It should be noticed that new technology based firms operate under substantial uncertainty and it is rather difficult and

sometimes useless to check their financial model<sup>5</sup> in details. The decisive criterion goes to market potential of the project and team capability.

Some recommendations should be made on the selection performance improvement. The outcome increases when business incubator:

supports projects that seem prospective from the market potential but weak in financial performance (during the incubation period spin-offs may attract investments and improve financial performance. Cost reduction via business incubation programmes also seems probable);

terminates the support for projects without growth potential at their early stages, thus ensuring cost reductions and market failure probabilities. This is the reason why it is so important to organize monitoring of projects within business incubators;

lets the teams, whose applications were rejected, to make improvements in their business plans. Many successful incubators reports on their pre-incubation programmes, promoting the development of realistic and investors-appeal business plans<sup>6</sup>.

It should be added, that the understanding of high selection criteria, established by business incubators administrations, makes applicants to pay more attention to business plan development. Better business plan provides with better understanding of strength and weaknesses of an applicant and increases the success probability. The hidden potential of potential residents is revealed, i.e. the “shadow option” is created (MacGrath, 1999).

The quality and diversity of services and assistance (A) may be measured by different indicators like the range and variety of services for residents, their accordance to residents’ needs, total number of consultancies (in events and in hours) per one resident, the level of residents’ satisfaction with the quality of services and consultancies. To measure this parameter, the systematic monitoring is needed.

Resources operated by the business incubator and available for its residents (R) may be measured with physical assets and intangible assets. As in (Daft, 1983), we include in this category all the physical assets, competences, procedures, information and knowledge which the managers of a business incubator possess and use for implementation the strategy of development. It seems reasonable, that a business incubator, operating successfully with different resources, would gain better results, than a business incubator, which management operates with scarce assets and has a modest level of managerial competences.

We use these parameters in our model in a following way (Fig. 6).

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<sup>5</sup> The author’s long-time practice of innovation-based start-ups expertise forms the opinion that financial model at this stage looks very conventional. This consideration, however, does not reject the necessity for applicants to provide the financial model, because it helps them to understand investments needs, their sources and parameters of profitability, efficiency and payback period for their projects.

<sup>6</sup> For example, Aalto Start-Up Center Report – 2010. [URL: <http://www.start-upcenter.fi>]

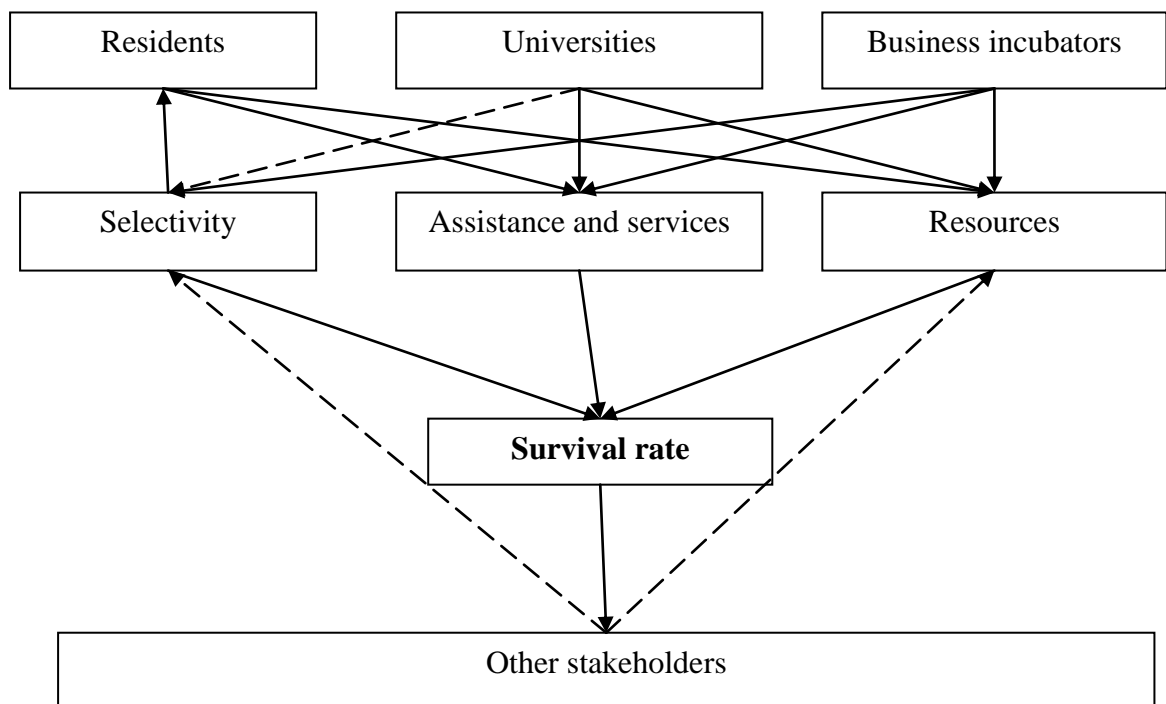


Fig. 6. The key factors of the business incubator success

In our research we used the survival rate of residents as an integral expression of business incubator performance, because there was no possibility to collect data on financial performance indicators.

### Methodology

The selection of business incubators was made on the base of the internet resources screening. Because of the intention to investigate spin-off processes, the scope of the survey was shaped only by universities' business incubators. As it revealed, this has been the serious restriction, because the volume and quality of the primary information collected from the official sites of publicly sponsored non-universities' business incubators could be much better than of universities' ones. After the primary data collection, the managers' survey was launched. It contained a questionnaire of 32 questions, mostly quantified, but also there was a space for free comments. 41 questionnaires were sent, and 27 responses were collected, so the rate of response was rather high. Though it should be noticed that the quality of responses was rather low, and only few respondents answered all the questions.

The data was collected from business incubators, located in 8 Russian cities. Most of the respondents were in Moscow (8) and St.-Petersburg (6). Other regions included Nizhniy Novgorod, Saratov, Krasnodar, Chelyabinsk, Tomsk and Novosibirsk.

The following criteria were used to categorize the sample (table 4).

The sample categorization

Characteristic	Types	Number	Comments
Age	Old	15	Business incubator is established before 2010
	New	12	Business incubator is established after 2010. In April 2010 the Russian Government has launched the programme on development the universities innovative infrastructure, and thus many business incubators were established by universities.
Funding	Private	2	Investors are initiators or corporations
	Public	25	Sponsors are universities and ministries
Organization	Departments of the university	27	
Business model	Non for-profit	27	Even if residents pay fees, the profit is not claimed as the aim of business incubator development. The fee is invested in maintenance and improvement of business incubators facilities
Openness	Open	9	The incubator is open for every applicant, no matter from the university or from external environment
	Semi-closed	10	Every start-up may apply, but the priority is given for faculties staff and students of the university
	Closed	8	Only faculties members and students may become the residents
Specialization	Specialized	6	The specialization corresponds to the university specialization
	Soft specialization	8	The priority is given to specialized start-ups, but the other projects also may apply
	No specialization	13	Every sphere of business may be presented

As the success criteria the survival rate was used. The survival rate exceeding 80% marks the successful business incubator. This meaning corresponds to what other researchers mean (Bears, 1998, EC-BIC, 2012), though because of the young age of a good deal of business

incubators in the sample the correct measurement of the survival rate (two kinds of measurement – on the graduation and at three years after graduation) seems difficult.

### **Findings**

The survey has revealed some interesting findings.

Five from six successful business incubators and the absolute majority in the sample are connected with economic universities or economic faculties of technical or classic universities (for example, the most known and successful business incubator, established by Moscow State University, is operated and consulted by the faculty of economics). This means that the residents' needs in assistance are rather concentrated in business planning, financial modeling, capital investments decision-making and legal advice, than in the sphere of research and technology innovation. This fact is also approved by competences of external experts attracted by business incubators, where the representatives of economic and business skills are prevailing.

All business incubators in the sample have non-commercial business model, even if residents pay fees. The maintenance fee and donations from sponsors are being spent at development objectives. So there is a certain lack of entrepreneurial approach to business incubators activities, and this business model do not create serious stimulus for venture investments and attraction of industrial enterprises.

Though there are several specialized business incubators (established by technical universities), the majority of respondents does not support specialization. This approach reduces commercial risks due to diversification but does not create technology transfer stream. It should be mentioned, further, that the absolute majority of residents in all the business incubators in the sample are involved in projects based upon information technologies development. It seems reasonable from the management's point of view, because such projects do not require much space, specialized equipment and substantial investments. But the innovativeness of these projects may be doubtful.

Four of the six successful business incubators are open to every applicant (or semi-closed). Thus, the business incubator of Moscow State University is opened for every prospective applicant. The business incubator of National Research University Higher School of Economics also may settle each applicant with interesting business plan, but the priority is given to students or graduates of this university. The openness, combined with the high selectivity, may reduce risks and increase the survival rate (thus, managers of the business incubator of Moscow State University reported on 86% survival rate). But all the business incubators have limitations in space and facilities, and due to the openness, students and faculty members may lose their opportunities to spin off their research results.

One of the peculiarities of Russian universities is the relatively short longitude of their programmes (1-2 years in comparison with usual 3 years in Europe or the USA). This limitation helps to increase the turnover of facilities and thus promotes the short-time economic efficiency. But it shortens also the possibility for the university to capture benefits from the long-term projects. This is where real option for extension may be implemented.

No one of the business incubators surveyed has toolkit for regular monitoring and self-assessment. This is why managers had difficulties when answered the questionnaire. So it is very hard to make any appropriate opinion on the real performance and effectiveness of Russian business incubators.

As for the key success factors, the survey revealed the substantial difference between business incubators across the sample.

The selection performance is rather high and the adoption rate varies from 10,6% at Moscow State Institute for international relations (MGIMO) to 24% at Novosibirsk State University. The level of selectivity in Moscow is higher than in regions. This fact may be partly explained by facilities limitations, and approved by the existence of so called associated residents, who do not settle at the facilities of a business incubator but take part in its programmes and receive some assistance and support. To increase the selection quality, successful business incubators launch different pre-incubation programmes aimed at providing the applicants with assistance and consultancy in business plan elaboration.

As for the quality and diversity of services and assistance, the survey confirmed that managers of business incubators do not consider them as a “business residence” or a developer’s project. They offer different programmes to their residents. The most successful business incubator also try to serve as business accelerators or venture market place. They also have educational programmes in entrepreneurship, business and management. But they do not pay much attention to networking and feedback collection. Thus, one of the key functions of business incubators, connected with ecosystem creation, is not achieved in Russia.

Considering resources operated by the business incubator and available for its residents, the investigation has revealed the substantial variety of facilities. In comparison with European business incubators (EC-BIC, 2012) Russian ones are relatively small (from 800 to 3000 m<sup>2</sup>) and definitely less equipped. Residents rent an office space or working place in the co-working zone and share access to infrastructure and common facilities.

### **Conclusions and applications**

Business incubators in Russia are at the stage of development. Now more than 300 hundreds of business incubators operate in different regions of the country. Our study revealed some problems connected with the of performance of universities’ business incubators. In their

current state they learned how to support start-ups in general but they do not promote spin-offs and technology transfer processes.

It should be stated, however, that this paper marks only the beginning of the investigation and does not provide with the full picture of business incubators activities. It reflects the vision of only one of the stakeholders (the universities). And even in this projection, further research is needed.

There are some evident limitations on the methods applied, and it is rather difficult to generalize the results obtained. The larger number of business incubators should be involved to conduct the regression analysis. And the real options-driven approach may be applied on the case of several business incubators to be totally confirmed.

Another limitation that cautions the results of the study is its application only to universities' business incubators. The results are to be tested at different types of business incubators operated in Russia.

Still, the study reveals the need in systematic monitoring and assessment of universities' business incubators and their residents.

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## **Appendix**

The questionnaire used in the study

### ***General business incubator indicators***

Average number of employees per 1 resident

Average annual turnover per 1 resident, mln RUR

Average lifecycle of residents, months

Survival rate, %

Longitude of the programme

Profit to business incubator

Rate of students and faculty members involved, %

Rate of adoption, %

### ***Resources and services***

Square of the facilities, m<sup>2</sup>

Payback period of investments in facilities, months

Number and description of services, offered to residents

Average need for services (number of residents, who used a special service)

Number of consultancies per 1 month

Facilities usage rate, %

Number of residents

Number of partners

Types of special equipment

Rate of annual special equipment usage, %

Application and maintenance fees, RUR

### ***Managerial skills and team***

Staff, persons

Experts and external consultants involved, persons

Experts and staff per one resident

Residents per one manager / expert

Period for activities planning (weekly, monthly, annually)

Time distribution of managers (how much time is spent for a direct work with residents), hours a month

Period for data collecting and reporting (weekly, monthly, annually)

Is monitoring and data collecting obligatory for managers and residents?

Are there any formal requirements to the:

- application for the support;
- programme prolonging;
- graduation in time;
- graduation before time

Is management collecting information about former graduates?

Distribution of managerial time to different activities, %

- events organizing

- investments attracting
- networking
- residents attracting
- public relations
- university connections
- facilities management