

THE ROLE OF BUSINESS INCUBATORS AS INSTRUMENT MANAGEMENT IN CONTEMPORARY ECONOMY

Professor Ph.D. Svetlana GOROBIEVSCHI

Technical University of Moldova, Republic of Moldova

E-mail: gsvetic@gmail.com

Senior Lecturer Ph.D. Aliona DODU

Technical University of Moldova, Republic of Moldova

Email: alionadodu@mail.ru

Abstract: *The development of entrepreneurship in the economies of different countries is the driving force of the economic competitiveness, which ensure the innovation on the market of the product and service. In the literature there are different opinions about the role of business incubators in countries with a transition economy. This is confirmed by current economic development practice in European Union member countries. Using comparative management, the authors of this article have formed the theoretical concept on the role of incubators in society, and through mathematical instruments prove that in the contemporary economy they become important forms of entrepreneurial support at early stages of the business, being recognized as „ABC” in entrepreneurial skills training. Authors explain the special role of business incubators in creating conditions to explore the intellects of the unemployed, who were forced to invent workplaces in order to generate a multitude of the business ideas that favored their opening towards various approaches, perspectives, visions and which eventually helped them become entrepreneurs.*

Keywords: *unemployed people, the business incubator, economic drivers, startup company, entrepreneurial skills, business efficiency, complex business environment, business cluster.*

JEL Classification: *M1, M2.*

1. Introduction

World economy nowadays demands development of more and more businesses, but not all of them can survive and get big revenue from their activities. Recent research by world institutions have shown that first time entrepreneurs, whose business has been incubating business ideas in business incubation program, on average have a higher success rate than their competitors who are trying to increase their business and market themselves. Thus, the American Center's Startup Hub and Technology Incubator and The National Business Incubation Association (NBIA) have the mission of providing large quantity of information worldwide based on different examples of entrepreneurial education, the provision of legal assistance with examples of excellence in the process of helping small firms in the early stages of entrepreneurship. NBIA said that 87 percent of businesses that launched business in 2011 by incubating within Business Incubators (BI) continue to remain in the BI, because 9 out of 10 firms fail in the next 2-3 years, to launch into business environment. The biggest challenges businesses face today, NBIA says, is that each enterprise needs a certain type of support from a certain BI when it starts its entrepreneurial activity (NBIA, 2011).

2. The Purpose of Business Incubators

As we know, BI provides entrepreneurs with a favorable environment for the development of business projects and ideas. By delivering on-stop-services and allowing global costs to be reduced with sharing facilities, business incubators can significantly improve survival and the growth of start-ups and small start-ups at an early stage of development (NBIA, 2006).

The term "business incubator" is often used to describe a wide range of organizations that in one way or another help entrepreneurs to develop their idea from start to marketplace and launch a new business. First definition of the business incubator in the **European Union** was formulated in the workshop "Best Practices in Incubator

Infrastructure and Innovation Support" organized in 1998 by the European Commission in Helsinki. According to the definition of the European Commission, a "Business Incubator is a place where newly created businesses are concentrated in a limited space. The objective of the incubators is to increase the chances of growth and the survival time of these enterprises by providing them with modular spaces with common services (telecopiers, computers), as well as a service for the purpose of providing specific services. The focus is based on local development and job creation. Technological orientation is often left at a secondary level" (NBIA, 2006).

Another important definition for this concept is that of the National Association of Business Incubators of the USA (NBIA), according to which: "Business Incubators are a dynamic process of business development. This term covers a wide range of processes that helps to reduce the innovation failure rate in the initial phase and accelerate the development of those who have the potential to become jobs and generators for powering welfare. A business incubator is usually an area where small work units are located that provide support to entrepreneurs in the initial and middle stages of the business. Incubators offer three main elements for developing a successful business: business and environmental entrepreneurship training, access to mentors and investors, and market visibility" (Post-Privatization Foundation, 2009).

Based on the theoretical aspects of the Business incubator, the common element of these definitions, as well as others from other sources, is their purpose: *The Business Incubator is a management tool for economic development, designed to provide new business suport, oriented to achieve sustainable development, having its own internal organization and offering employment and managerial assistance, access to financial services and other important services related to technical support for business.*

The worldwide history of business incubator's development is reflected in Figure 1, where we can see the classification of business incubators.

The most recent types of incubators are the "new economy", which is based, in principle, on access to modern technology and activities related to the Internet. They are different from the traditional because their main objective is not about creating new jobs or providing physical space (Post-Privatization Foundation, 2009).

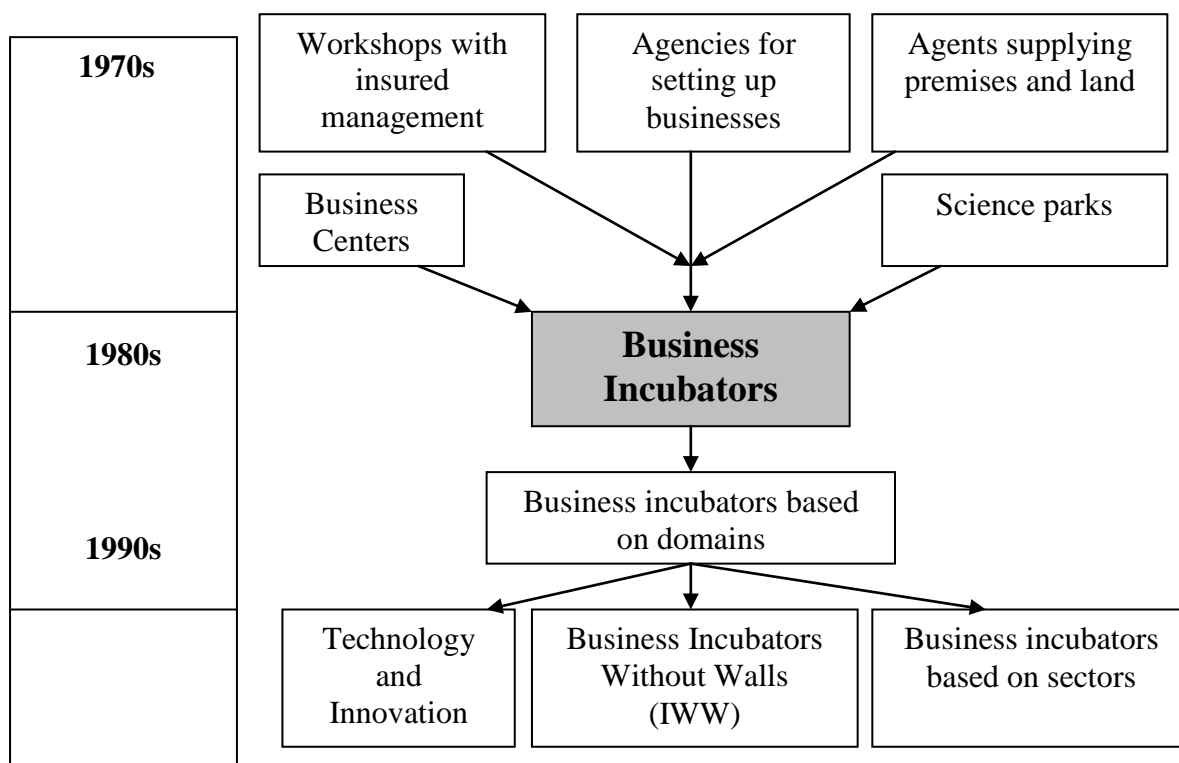


Figure no. 1. The History of Business Incubation

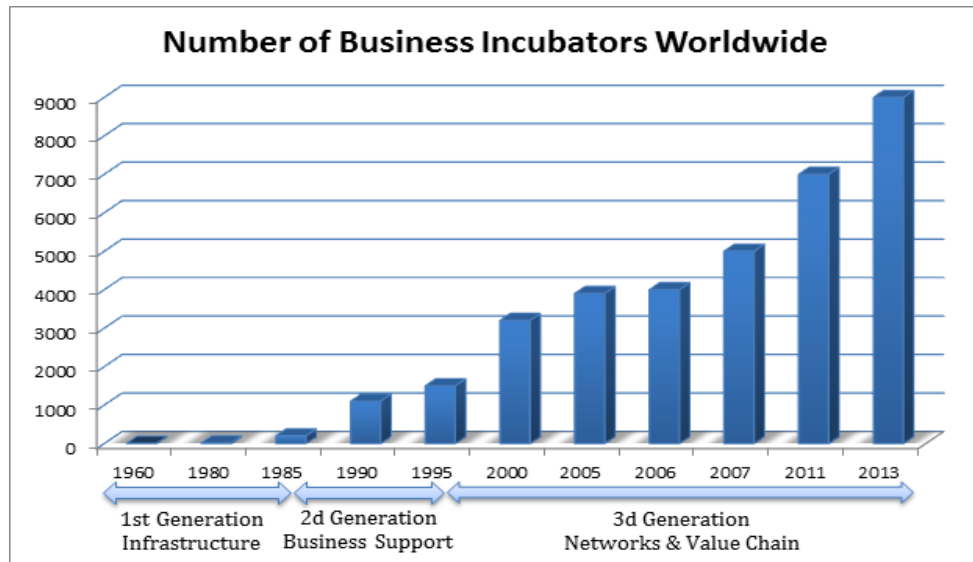
Source: Lalkaka and Bishop, 2000, pp.20-25

Traditional type of incubators aims to promote entrepreneurship and enhance innovation, increase employment, and are generally managed by local or national public authorities. Specialized technological incubators usually belong to universities, private sector organizations or partnerships between them.

3. International practices of business incubators

The concept of the BI in world is based on countries experiences that have given and continue to give permanent priority to the development of private initiative, small and medium-sized enterprises, such as Germany, USA, Great Britain, Hungary, Poland etc. In practice, business incubators have proven to be effective mechanisms for creating small and medium-sized businesses and new jobs. It has been proven that they increase the success rate of start-ups from 45% to 85%, while also having established best practices and business tests.

According to the latest statistical data, at the end of 2013 there were around 9000 incubators around the world, the number of which is growing steadily (Figure 2). In contrast, if in 2000, 3200 incubators were active, in 2007 the number grew to 5000.



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Figure no. 2. Dynamics of the number of business incubators in the world

Source: <http://worldbusinessincubation.wordpress.com>.

A significant increase in the number of BI has changed since the *first generation of business incubators*, which have provided huge affordable office space and resources for *second generation* when incubators began to provide additional business support services, such as training, coaching, mentoring and so on, until 1985. Later, the *third generation of incubators* took place with the main value of the network (Brunnel, Ratinho, Clarysse and Groen, 2012).

With reference to the above mentioned subject, we can mention the following evolution of business incubators:

- *For the first generation of incubators* it was characteristic to provide space and common facilities.
- *The second generation of incubators* is characterized by providing consulting for services, developing entrepreneurial skills, networking.
- *The new incubator model* provides the establishment of sector incubators.
- *The modern incubator becomes* a “spin-off” business generator with high added value and facilities for innovation and technology transfer, regional, national and transnational networking.
- *The future BI model provides* development and further integration of incubators in innovation policy.

Numerous investigations can not yet provide accurate information about the BI distribution worldwide. Figure no. 3 provides a rough estimate of the number of BIs in North America, Latin America, Western and Eastern Europe, Asia, Africa and the Middle East.

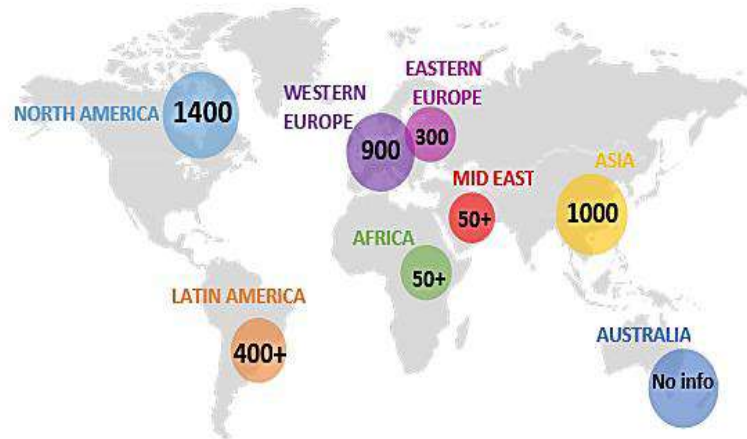


Figure no. 3. The distribution of business incubators based on geographical areas in the world

Source: NBIA, 2006.

In North America, there are over 1,400 BI, distributed as follows: 1250 incubators (NBIA, 2013) in the United States, 191 in Mexico, and 120 incubators in Canada. Most incubators are non-profit organization, affiliated with universities. Incubation programs in the US usually appear as local initiatives of economic development organizations.

The main reasons for creating these programs are creating local jobs (84%), promoting entrepreneurship (77%), selling technologies (54%), accelerating local industry growth (48%), encouraging female entrepreneurship and others (NBIA, 2006).

In Southeast Asia there are more than 1,000 BIs. There are 460 BIs in China, one of the developing countries has set the foundation for the largest incubation program. Most of China's BIs have been funded by the government, with very rare private funds being used. There are 203 business incubators in Japan, one third of which offers classical services. In the European Union, the first positions, taking into account the number of existing incubators, are occupied by Germany, France and the United Kingdom. At the end of 2013, according to the statistical data presented in (Table no. 1, BI benchmarking), the number of incubators in Germany was 300. There were 192 BI on France territory, and in the UK the BI number was 144 units.

Table no. 1. Benchmarking of Business Incubators in some parts of the world, 2013

Country	Number of business incubators	Country	Number of business incubators
Austria	63	Portugal	23
Belgium	13	Sweden	39
Denmark	7	Spain	38
France	192	Great Britain	144
Finland	26	China	460
Germany	300	Japan	203
Grecce	7	Korea	333
The Republic of Ireland	6	Taiwan	64
Italy	45	Singapore	55
Luxembourg	2	India	31
Netherlands	6	Rusia	150

Source: <http://worldbusinessincubation.wordpress.com>.

In Germany, BI started to appear in the economy much later than in other countries. The reason was that economic development policies at municipal level began to develop only in the 1980s (due to the limited influence of local authorities). However, a major restructuring of the market research industry has led Germany to become the leader of the development of the BI over the past 15 years. In Germany, the most important institution with a particular impact on business environment is the German Association of Innovation, Technology and Business Incubation Centers (ADT), which estimates that there are currently over 300 innovation centers and BIs in the country. Their objectives are as follows: supporting new companies focused on "spheres of the future" - cutting-edge technologies and services, helping the unemployed and encouraging their entrepreneurship; supporting technology transfer by promoting spin-offs and facilitating regional economic development, contributing to the growth of less developed areas. Most German BIs are nonprofit centers. To confirm all of the above, we should mention that startup companies oriented to modern technologies represents 77% of all companies in Germany's incubators (Gross, 1997).

The history of business incubators *in Russia* dates back 20 years. As in many other countries, incubators began to emerge during the global economic crisis, when institutional changes took place. The first business incubator - the Innovation Center (ITC) has been created since 1996 in Russia, working in close cooperation with universities. Their main focus was technology development and less - marketing. Currently, there are more than 150 business incubators in Russia, 58% of which are owned by the state, 32% have municipal and mixed ownership, and only 9% are private. The composition of incubators varies across regions, but on average, residents are mostly manufacturing enterprises - 74%, around 46% are incubators whose activity is based on research and development and nearly 60% - provide information technology services (Ernst & Young, 2014).

Creating business premises in terms of 2-3 years is based on the assumption that Moldova's economy is an integral system in which economic success in a field, sector or business will contribute to the improvement of other fields, sectors, businesses, supported, protected and favored by the state, which will later turn into driving forces for the rest of the forms of entrepreneurship. The vulnerable part of this hypothesis lies in the fact that, under open market conditions, the success of some national firms could stimulate the prosperity of foreign firms (Gorobievski, 2008).

Intramural connections in the country are greatly influenced by external goods and services flows. Moldova's economic system does not have an internal market capable of covering the supply of agricultural producers. Demand for consumers of industrial, pharmaceutical and other products exceeds domestic supply, and the level of domestic cooperation of domestic producers is very low. Consequently, the success of "incubators" as a form of business could be below the expected level if we do not take into account the seemingly provisional success of offering hundreds of jobs for the unemployed. The favors created by the state for some people, "beginners", can be interpreted as some implications of the state in economic competitions, the support of the "weak" and outdated moral ideas. Some of the "beginners" will please the favors of the state and turn into "eternal beginners", perhaps changing their business (Gorobievski and Cojuhari, 2011).

4. Applied methods

To avoid these risks in "incubating" business processes, there is a need for a concept through which incipient businesses can and must be sustained. This time, we will resort to a "metaphor" taken not from the "incubator", but from the way it organizes the operation of the computer. Many operations that your computer has to perform on a variety of

occasions are already scheduled, and these softwares are developed. These softwares can be categorized into: (1) - program-mode; (2) - programs-services in the processes of organizing the calculations; (3) - operational systems; (4) - computer hardware.

To use the already programmed potential, a process management mechanism from a complex, multi-hierarchical, multiconexional system called the driver (drivers) is programmed into the computer.

Driver (drivers) - has the function of acting as an interface between a particular hardware and software component. The hard drive commands come from various programs through the operating system, and the driver's role is to transmit commands to the hard drive. The better the driver is written by programmers, the better the performance and stability of the hard drive.

In computer, the problems and areas that need to be elaborated to create computational capabilities in the most diverse situations are established, which is why such a "driver" is also necessary to determine the activities to be included in the "incubator". The economic driver can not be defined, it can only be interpreted as a set of complex mechanisms that can trace the domestic demand for domestic products and many positive consequences on the level of social and economic development.

Economic drivers may have their own specific problems, but they have something in common they are aimed at solving vertical, horizontal issues related to internal market exclusivity, internal economic interconnections, multiplying indirect positive consequences on national economy, whole. Economic drivers must be productive, ensure the development of social infrastructure, logistics solutions, create a business-friendly environment, maintain a sustainable social and economic development in the territorial aspect, cross-border, interregional, inter-regional cooperation, social capital development, intellectual capacities of society (Catarniuc, Căpățîna and Maximilian, 2013).

Moldova's economic drivers must be used to solve the problems of rural areas, organize the processing of agricultural raw materials, diversify the final products created on the basis of local raw materials. Business start-ups, favored by the government, must be part of a major regional, national project. Mega projects can be developed in order to solve energy problems, rural space, population health protection, diversification of final products created from local raw materials, creation and use of communication, information, education, contemporary society (Catarniuc, Căpățîna and Maximilian, 2013).

The successes of functioning of driver-economic mechanisms can not be developed by democratic methods, by some governmental structures with poor intellectual training. In creating economic drivers, specialists from academia, universities, equipped not only with "diplomas", but also with valuable scientific publications, must be selectively trained. Economic drivers must also be geared to creating clusters of economic, industrial parks in the territorial aspect.

Businesses, SME (Small and medium-sized enterprises) must be clustered, focused on the principle of mutual benefit of products, mutual activities, creating a "microclimate" for increasing demand on the local market, reducing specific costs for the creation of common comfort (social infrastructure, productive). In such cases, economic drivers become coordinating mechanisms with various activities of small and medium-sized businesses, beginners in economic affairs.

The aim of the drivers is to develop the internal market, to create demand that makes it possible to develop local products for the local consumer, initiate and amplify, multiply the country's social and economic development, increase social and economic indicators, reduce unemployment, increase GDP.

If the activities of the self-employment population are at the discretion of the population, then the activities of the incubation system are managed by the public

authorities in the territory, being oriented towards solving some useful problems both for the individual and for the local, rayonal and municipal economy as a whole.

Business drivers allow a systemic approach to a sufficiently large number of businesses located in the commune, district, and city. No matter how necessary a business is, it's going to be "singular" in a locality, as a rule, it will not make any success. Businesses must be large enough for them to create their own entrepreneurial comfort, marketing of products and services, to complement each other, create supply, market demand, reduce the costs of productive, social, institutional infrastructure.

The authors believe that business, being deployed in a village, district or city, should constitute a Business Complex (BA). The BA includes: the activities of early-stage entrepreneurs (at the "incubation" level), these being small, medium-sized enterprises or corporations. The composition of CA may be unique, but it is not preferable to repeat it for all cases in territories.

BAs are set up to achieve goals, the realization of which requires the creation of the conditions for each form of activity and, first of all, the mutual complementarity of the activities. BAs must ensure a relatively independent economic and social functioning, performance conditions corresponding to the European standards for the organization of the production processes, the markets in the respective locality, including outlets outside the territory; conditions for horizontal economic development, by encouraging related services, consultancy services, auxiliary production trade for BA components - the conditions for making the innovations.

Thus, the BA of the Republic of Moldova can contribute to increasing the number of businesses, diversifying them, developing the companies in the respective territory, increasing the number of direct commercial contracts between the representatives of the local business environment and the foreign partners, increasing the number of exhibitions and fairs, reducing the level of unemployment, increasing social indicators (quality of life, living standards), reducing labor emigration.

However, not all unemployed, for various reasons, show their desire to start a firm. In the Republic of Moldova, a large part of the rural population mobilizes their physical and intellectual efforts to survive, overcome social, economic problems. It is about self-employment without being legalized. The positive side of this process would be that the population finds an alternative for survival; the weak part - the population does not participate in the creation of the social fund, so in this way many problems will arise during the retirement period. The evolution of self-employment efforts by the working population has not been monitored, supported by official structures. This development was generated by the unemployed.

The evolution of self-employment efforts in the workforce can be outlined schematically (Figure no. 4): (1) - needs in services lacking in society, demand - is, supply - missing; (2) - the individual-unemployed person establishes, on its own, its form of activity, provision of services; (3) - public structures favor the activities of the insurer with work; (4) - the activity of the individual is not always qualitative; (5) - activity is not always solved in the local market; (6) - the individual increases the quality of services, products; (7) - the individual establishes the legal form of his entrepreneurial activity; (8) - increasing the number of the employed population in the workplace; (9) - the structure of the company changes over time; (10) - increase social indicators; (11) - GDP growth; (12) - increases the standard of living; (13) - increasing demand for products and services on the local market; (14) - increase the supply of products and services; (15) - increase the professional level of the entrepreneurs etc.

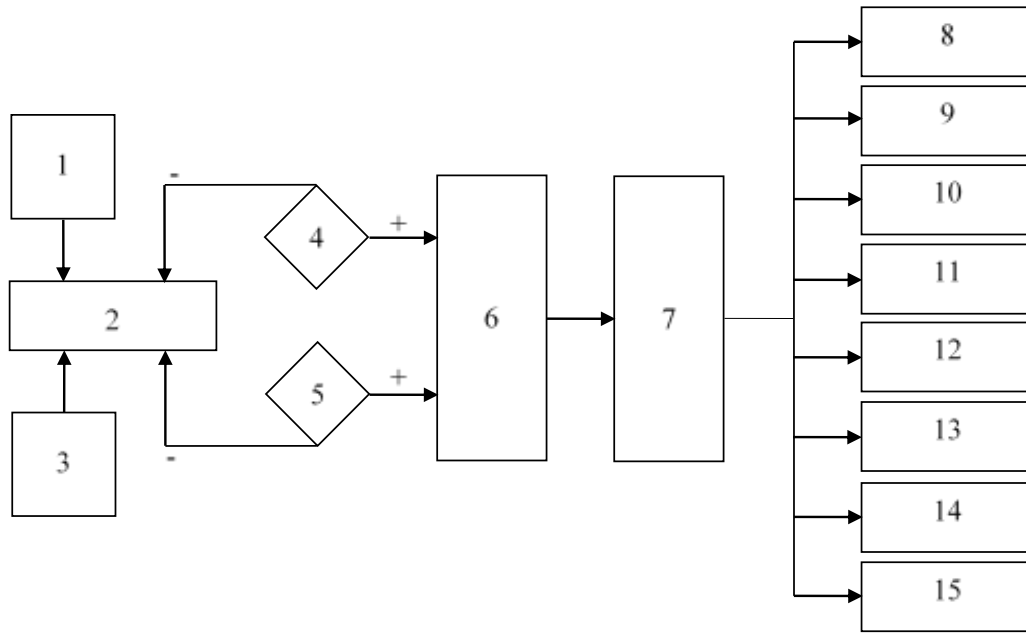


Figure no. 4. Block diagram of evolution process of the population self-insurance efforts with labour

Source: drawn up by authors

Some of the self-employment occupations in principle can serve as "ideas" for initiating, legalizing a firm, favored and supported by governmental structures, if they are part of the driver's mechanisms.

Business Incubators create a favorable environment for the unemployed in order for them to be able to start a business, a socially useful business. Businesses desired by the unemployed, at the initial stage, by far, can not be considered as (SMEs) (Taha, 2002).

The unemployed are looking for ways of doing things that would allow them to survive. At the initial stage, the unemployed in "incubators" are trained in the legal, fiscal, marketing „ABC”. The business tha unemployed are studying at the "incubator" may turn into a small or medium-sized enterprise. The success of the unemployed depends on the "quality" of their idea, their ability to turn idea into a profitable business.

Universities are not incubators, they have theoretical and practical programs for studying areas, technologies, sciences, etc. The incubator is a not very successful term of some centres for initiation in the knowledge needed to develop a business. Incubators do not have to be confused with technology centers and equipment centers within that enterprise. The unemployed are studying for a very simplistic program or the ABC of activities, so the technologies, principally new, studied by the staff of large corporations can not be studied in incubators. Incubator programs are limited to the minimum required for future entrepreneurs, while new technology study programs are complex, based on new theoretical concepts.

5. Research results

Incubators are ways to enable the unemployed to survive, and studying technologies and new innovations are ways of expanding knowledge. In the economic publications, the notion of "incubator", unmerited, has become a scientific category. Incubators do not have the goal of technology for businesses that are already in operation, but of providing some kind of service indemnity to unemployed people who have reached desperation.

Incubators contribute to reducing the number of unemployed by speed; where the rate of reduction of the number of unemployed is directly dependent: on the number of unemployed (n) who have already been included in the incubation processes; by the number of unemployed potential to be employed in incubation institutions, ie with $(N-n)$, where N is the number of unemployed; of the salary, the income that the former unemployed in the incubation system can achieve, ie bn .

In formal language, the dynamics described above can be expressed by a first-order differential equation with separable variables:

$$\frac{dn}{dt} = an \times (N - n) + bn, \text{ where:} \quad (1)$$

$\frac{dn}{dt}$ expresses the speed of reducing the number of unemployed;

an – number of unemployed that already activate in incubators;

$(N-n)$ – the number of unemployed who potentially can be hosted in incubators;

bn – the income of the former unemployed, already in incubators.

We transform the right side of the equation (1):

$$\begin{aligned} an(N - n) + bn &= anN - an^2 + bn = -a(n^2 - n(an + b)) = \\ &= -a(n^2 - 2\frac{n}{2}(aN + b) + (aN + b)^2 - (aN + b)^2) = -a((n - (aN + b))^2 - (aN + b)^2) = \\ &= -a(n - aN - b + aN + b)(n - aN - b - aN - b) = -a \times n(n - 2(aN + b)) \end{aligned} \quad (2)$$

The relation (2), being substituted in the differential equation (1) and as a result we obtain:

$$\frac{dn}{dt} = -a \times n(n - 2(aN + b)). \text{ Separate the variables:}$$

$$\frac{dn}{n(n - 2(aN + b))} = -adt \quad (3)$$

We reduce fraction:

$$\frac{1}{n(n - 2(aN + b))} = \left(-\frac{1}{n} + \frac{1}{n - 2(aN + b)} \right) \times \frac{1}{2(aN + b)} \quad (4)$$

Equation (3) can be transcribed:

$$\frac{1}{n(n - 2(aN + b))} = \left(-\frac{1}{n} + \frac{1}{n - 2(aN + b)} \right) \times \frac{1}{2(aN + b)} \quad (5)$$

Or

$$-\frac{1}{2(aN + b)} \left(\frac{dn}{n} - \frac{dn}{n - 2(aN + b)} \right) = -adt$$

$$\frac{dn}{n} - \frac{dn}{n - 2(aN + b)} = 2a(aN + b)dt$$

$$\int \frac{dn}{n} - \int \frac{dn}{n - 2(aN + b)} = 2a(aN + b) \int dt$$

$$\ln n - \ln|n - 2(aN + b)| = 2a(aN + b)t + C$$

$$\frac{n}{n - 2(aN + b)} = e^{2a(aN + b)t} \times e^C \quad (6)$$

At the initial stage, $t = 0$ the number of unemployed trained in business incubators is $n = n_0$. Relation (6) for $t = 0$ has the form:

$$\frac{n_0}{n_0 - 2(aN + b)} = e^{2a(aN + b) \times 0} \times e^C \text{ or } e^C = \frac{n_0}{n_0 - 2(aN + b)} \quad (7)$$

The relation (7), being substituted in the differential equation (6) and as a result we obtain:

$$\frac{n}{n - 2(aN + b)} = e^{2a(aN + b)t} \times \frac{n_0}{n_0 - 2(aN + b)} \quad (8)$$

From relation (8) we determine the variable n :

$$n = e^{2a(aN + b)t} \times \frac{n_0}{n_0 - 2(aN + b)} (n - 2(aN + b)).$$

$$n(1 - e^{2a(aN + b)t} \times \frac{n_0}{n_0 - 2(aN + b)}) = -e^{2a(aN + b)t} \times \frac{n_0(aN + b)}{n_0 - 2(aN + b)}$$

$$n = \frac{-e^{2a(aN + b)t} \times \frac{2n_0(aN + b)}{n_0 - 2(aN + b)}}{1 - e^{2a(aN + b)t} \times \frac{n_0}{n_0 - 2(aN + b)}} \quad (9)$$

For value $t = 0$ the value of the variable $n = n_0$. Indeed:

$$n = \frac{2(aN + b)}{1 - \frac{n_0 - 2(aN + b)}{n_0}} = \frac{2(aN + b)}{\frac{n_0 - n_0 + 2(aN + b)}{n_0}} = n_0.$$

For $t \rightarrow \infty$ $n = 2(aN + b)$.

The dynamic $n(t)$ of the employment of the unemployed in the initiation processes in the socially useful activities can be interpreted graphically as follows, Figure no. 5.

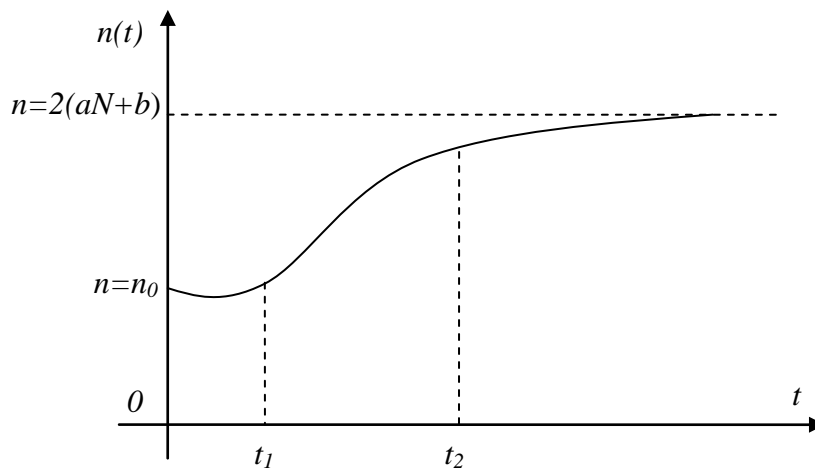


Figure no. 5. Dynamic of unemployed enrolment in incubation processes

Source: drawn up by authors

6. Conclusions

The intensity of using business incubators is not homogeneous, so it is not linear over time. Only in the range of (t_1, t_2) "incubators" are very useful.

The positive part of BI consists of: providing opportunities, variants and opportunities for the unemployed to survive; creating the conditions for exploring the intellects of the unemployed through the multitude of business ideas that may appear and highlighting the idea with the greatest prospects; stimulating businesses that drive people's income growth and increased market demand; improving the economy as a whole; performing activities, services that are more economically advantageous for small and medium-sized enterprises (SMEs); contributes to solving social problems (Taha, 2002).

The negative parts of the incubators are expressed by the fact that not all incubators "stand by" the implementation of technical and scientific progress - some activities, ideas implemented can be morally overcome, generating material losses for the state and material and moral damages for young entrepreneurs, frustrated by the idea of business.

Worldwide and national experience confirms that the average business incubation period lasts from three to four years. Thus, the concept developed by the authors of the article that the incubation period is limited and that this period is sufficient to select and implement a good business idea for the national economy.

At the same time, the development of business incubators is also possible in the context of the formation of economic clusters. Clusters include an essential number of different types of entrepreneurial structures that ensure entrepreneurial competition through its governing bodies, scientific institutions, brokerage firms, centers of standardization, trade associations, providing education, continuing specialized training, computerization, research and support technical.

Clusters are built on the principles of a sectoral or regional (interprofessional) association between members, based on vertical relationships between heterogeneous firms and on the interaction between innovative processes and the changing nature of market relations (Acayi, 2008).

In an innovative business cluster, high-tech companies, research and education centers, foreign investors play an important role. The best-known example of the innovation cluster is Silicon Valley in the United States. At the core of such a group, there is always a high-tech company that brings together a significant number of SMEs and business support institutions.

The rich international experience demonstrates the variety of forms of cooperation between large businesses and SMEs. For example, in Belgium, the Small Business Support Center, organized by 18 shareholders, including the "Volvo" and "Honda" companies, the five largest banks, the city administration, and various publicly funded organizations, operates. Thus, public authorities participate in the activity of the centers by creating funds to support small businesses. Large companies assume a part of the cost of the centers, help in organizing work. As business partners, universities can also be seen, which allows the upgrading of university specialists and the more efficient use of university skills.

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