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The Theory of Technology Business Incubation and Opportunities of Application in the Less Favoured Regions of Hungary

Theses of PhD Dissertation

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1. Importance of the topic

The development of the regions occurs by the transformation of the economic structure, by the diffusion of new productive (innovative) industries that provide a high income level. In this process those small and medium-sized enterprises (SMEs) that are capable of catalysing the regional economy owing to their high growth potential, or their role played in the innovation system, or their participation in the inter-regional trade (these three are usually accompanied) have an outstanding role. However in the early phase of their life span these firms face such difficulties that may lead to their failure.

In the developed countries more than half of the enterprises leave the market within five years. In Hungary only 53% of the firms that were established in 2000 were still in business by 2004. Would the survival of some of these small enterprises accelerate the development of new “knowledge-based” industries? Would the support of the “weak but promising” firms recover through the later growth? Although this is theoretically not at all obvious, the answer given by the practical economic policy is fairly spectacular, which can be proved by the fast-rising number of business incubators. By today business incubators have become an integral part of the economic policy toolbar in numerous developed and developing (and in almost all of the European) countries.

Business incubation refers to complex services and special environment provided temporarily for start-up enterprises with the aim of improving their chance of survival in the early phase of the life span and establishing their later intensive growth (this definition is used for business incubation throughout the dissertation). The term incubation refers to the process of support, while incubator stands for the organization and infrastructure (most often a building, a group of buildings or a park) that are set up for these purposes.

In recent years the intensification of a spectacular process gave new dynamism for business incubators: the increasing participation of universities in local economic development. The frequent application of incubators and the active role of universities induced the theoretical examination of the topic. Incubation has got a place now in the “vocabulary” of enterprise- and innovation policy, and entrepreneurship. On the top of the economic policy documents, and the underlying research reports, the academic literature of business incubation has also increased in great deal. The focus has shifted
from the problems of establishment and management to the economic development effects and most recently to theoretical underpinning. The examination of the distinct part-areas are based on different theoretical bases, hence the conceptual framework of the examination is rather heterogeneous. The Hungarian literature of the topic is unfortunately still quite scarce.

The intertwining innovation- and enterprise-policy, and the increasing importance of universities in incubation resulted in the strong development of technology business incubation (TBI). TBI refers to the type of incubation where the focus group consists of innovative, mostly technology-oriented, or knowledge-intensive service sector enterprises and interactions with the academic sphere giving a substantive element of the incubation process. The pushing forward of TBI occurred in parallel with the vigorous transformation of today’s spatial economic processes, it can be interpreted as a reply for the challenges of the learning-based economy.

A new approach is required for the explanation of the processes of the learning-based economy, and the (economic development) intervention carried out into them. This is also true for TBI, since the processes into which we intervene by the incubation have altered. However the international literature of business incubation seems to be quite insensitive to the systematic examination of the consequences of the learning-based processes. Studies that examine certain aspects of incubation in-depth are rather insensitive to apply such an approach that analyses the incubation process from the perspective of the change of the local economy. And those papers that place incubation in a wider context only occasionally take further steps beyond the declaration of the possible role of incubation in the enhancement of entrepreneurship, in the support of start-up enterprises, or in the initial strengthening of local SME networks or clusters.

Thus there is a need for analyzing the consequences that arise from the intervention to the processes of learning-based economy, and to interpret TBI from the perspective of the local industrial and economic evolution (change).

Above the theoretical questions several practical economic development problems also make the examination of technology business incubation a current topic. The possible development ways of the Hungarian incubator system, and the opportunities of setting up technology business incubators with strong university ties in less developed regions are issues that give rise to lively disputes. It is also discussed in the “Hungarian Technology Business Incubator and Seed Capital Strategy” from which certain
propositions emerged in “The New Hungary Development Plan” (the national development plan of Hungary in the period of 2007-2013). The question is practically the ability of Hungarian incubators (that mostly operate in less favoured regions) to integrate innovation- and enterprise policy and to apply it in the local economic development. According to several authors this might be the key for successful development.

Furthermore, in connection with the Hungarian “Growth Pole Programme” almost all of the large Hungarian university cities plan to set up university technology business incubators. This is based on a more and more common approach: in the local economic development universities and research institutions are increasingly considered as potential sources of local / regional development. In addition the change in the financing structure of Hungarian universities, the need for the economic utilization of research achievements has been quite a spectacular process in recent years. But above the research the traditional function of teaching has also undergone a significant changing process. On the whole to meet the requirements of the economic sphere and the involvement is local economic development has become an integral part of universities’ strategies. These naturally inferred the universities’ needs for increased participation in business incubation.

However the possible application of university tied technology business incubators in less favoured areas raises several unresolved questions, since the successful cases, the “best practices” almost always derive from highly developed central regions. While the literature of business incubation is quite abundant in connection with the evaluation of existing programmes, the examination of the opportunities has gained little attention. It might be due to the fact that those studies that deal with incubation in-depth do not endeavour to place the issues of the opportunities, scope and possible effects of incubators into the broader perspective of local industrial and economic evolution (change). Hence the influencing role of these processes, which give a wider context of incubation, is hardly recognized.

2. Research objectives and theoretical background

The examination of business incubation therefore holds out promises of numerous interesting and current research areas both in theoretical and practical level. Hence the
The objective of the dissertation is twofold. The heterogeneous literature of incubation and the challenges in interpreting the processes of the learning-based economy raises the necessity of resolving theoretical issues. But based on the current Hungarian economic development issues it is also definitely important to analyse the opportunities of technology business incubation with university ties in the less favoured regions of Hungary.

After reviewing the conceptual framework of business incubation and placing TBI into this context, the dissertation focuses on two main issues:

- **First**, a theoretical underpinning of technology business incubation that is able to place the incubation process into the wider context of local industrial and economic change (reflecting to the new conditions of the learning-based economy).
- **Second**, the opportunities of the application of TBI in Hungary, mainly in the less favoured regions.

As TBI intervenes into the spatial processes of the learning-based economy, integrates innovation- and enterprise-policy, and is implemented with the active participation of the academic sphere, it has such characteristics that outline the main fields and the conceptual background of the theoretical analysis:

- TBI fosters innovative start-up firms, thus the process of incubation is strongly intertwined with the innovation process that occurs in the supported enterprises.
- The objective of TBI is the realization of certain local economic development goals (ultimately the enhancement of the competitiveness).
- TBI aims at the development of new innovative industries by stimulating the establishment and early growth of start-up firms.

Accordingly to interpret technology business incubation we need to analyze the characteristics and spatiality of the innovation process, the role of highly innovative industries in economic development and the peculiarities of the early stage of industrial evolution.

All of the abovementioned issues can be approached from the angle of several theoretical schools. However by applying the concepts of the evolutionary economics we can discuss these topics on a unique basis. It qualifies us to examine TBI within a framework that is able to handle the interactive feature of the innovation process, and
the uncertainty and bounded rationality it implies, *both on individual and economic policy level*. Therefore the examination that builds upon the achievements of evolutionary economics seems to be capable of the interpretation of TBI within the conditions of the learning-based economy. On the top of the theoretical underpinning of the examination, evolutionary concepts can also lead to the better understanding of the incubation process.

The main *theoretical objective* of the dissertation is exactly the adaptation of the achievements of evolutionary economics to TBI, which opens up a mainly unexplored area in the international literature of business incubation, but it contributes to a more detailed (hopefully better) understanding of certain aspects of TBI.

The most important *practical objective* of the dissertation is to examine the opportunities of the application of TBI in the less favoured regions of Hungary, with a main focus on Szeged, the location of this dissertation. When dealing with this issue I build on the results of the theoretical chapters, but I approach an important and current practical problem here, and do not intend to provide a detailed empirical testing of the theoretical part. This is also due to the fact that only a part of the examined theoretical issues can directly be connected to the analysis of TBI’s opportunities in Hungary.

### 3. The structure of the dissertation and applied methods

The dissertation consists of four main chapters and a short summary that draws general conclusions and provides possible future research directions. The logical structure is as following: *chapter 1* presents the conceptual background and the international and Hungarian practice of business incubation, and places TBI into this framework. This is achieved by synthesizing the Hungarian and international literature of the topic, and on purpose of a more detailed presentation of the Hungarian practice, it contains a brief empirical analyses. The chapter points out the growing importance of TBI within incubation and (the necessity of) universities’ increasing participation, which raises the need for examining two basic problems:

- *First*, the evolutionary underpinning of business incubation’s conceptual framework.
- *Second*, the analysis of the opportunities of university technology business incubation in the less favoured regions of Hungary.
The evolutionary underlying of TBI makes the analyses of evolutionary economics’ main concepts and through this the spatial processes of the learning-based economy inevitable. This is the objective of chapter 2. Then I attempt to adapt the evolutionary achievements to TBI. This is the subject of chapter 3 in which I deal with the following questions:

1. *Why does local economic development choose TBI as a means of development?* In order to understand this I analyze the evolutionary process of the emergence of TBI’s market solutions.

2. What is the *role and scope* of TBI in the development of new industries?

3. How is the value addition of TBI realized, what is the intervention’s *mechanisms of action*?

4. *How can TBI programmes be designed* in such a way that they are able to meet the constantly changing needs of the supported enterprises without hindering or distorting the emergence of the adequate market solution?

*Chapter 4* focuses on the other main field of problems, namely: what are the opportunities of the efficient application of TBI in the less favoured regions of Hungary, with special regard to Szeged. By building on certain results of the former chapters I attempt to set up an analytical framework that is able to explore those background-factors that affect the opportunities of TBI, and that can be applied also in less favoured regions.

On the basis of this analytical framework I conduct an analysis in Szeged. For this purpose, on the top of statistical data and other secondary sources I also utilize the results of two empirical surveys that were conducted in 2006. One of them surveyed the SMEs of the “knowledge-based” sector of Szeged (on a sample of 401), while the other one surveyed the undergraduate and doctoral students of the University of Szeged (on a sample of 420).

To summarize: the first chapter raises two important research questions in the field of technology business incubation, which are unfold in chapters 2 and 3 by theoretical and in chapter 4 mainly by empirical methods.
4. Main findings

The different types of business incubators are participants of an “industry”, since all of them attempt to satisfy the (basically similar) incubation demand of new, innovative SMEs. The incubation demand derives from the problems of the initial phase of life span, the small size and the uncertainties of the innovation process (they can be summarized as “capital and knowledge gap”). The distinct types of corporate and economic development incubators, that constitute the supply side of the business incubation industry, have different capacity to generate value-addition and economic development effects.

Thesis 1. Out of the several historically developed types of business incubators in the learning-based economy technology business incubators with strong university ties have become the adequate form. They can give the most appropriate economic development response to the arising incubation challenges. But owing to the significant inertia of the institutional structure the transformation of the former types is a lengthy process. This is why numerous types co-exist today.

Evolutionary underpinning of technology business incubation

The intervention into the processes of the learning-based economy raises challenges for the theoretical interpretation of technology business incubation. Regional economic change, which is based on innovations, technological change and (in close relation with these) learning ability, can be described by such evolutionary concepts such as: positive feedbacks, dynamic increasing returns, uncertainty, unpredictability, path dependency or lock-in. The recognition of present situation’s historical roots, the consideration of small historical events and cumulative processes have outstanding importance. The institutional mechanisms, the traded and untraded interdependencies that are specific to a given region can stimulate but also hinder the shift along certain development paths. This certainly affects the framework of TBI’s examination:

- The fostering of the innovation process can not be successful without putting emphasis on feedbacks, external interactions and the reinforcement of the connections among the elements of the (regional) innovation system.
• In the different phases of an industry’s evolution different challenges arise. This envisages the different role and scope of technology business incubation in different situations.
• It is inevitable to pay attention to the selection environment above the stimulation of new variations.
• The indeterministic and uncertain (evolutionary) feature of the enhanced processes infer that even the policy makers can not be fully informed about them. Thus technology business incubation must be interpreted in the world of bounded rationality.
• The historically developed structures and relational systems of an area affect the subsequent (future) economic processes. Therefore technology business incubation must be embedded into the historically developed peculiarities of the local area.

Responding to these theoretical challenges I attempted to conduct a theoretical examination that interprets TBI (which is strongly intertwined with the innovation process, and intends to enhance new innovative industry) in the world of uncertain processes and bounded rationality. By doing so I adapted the evolutionary achievements to technology business incubation. I focused on four basic fields: the emergence of the market solutions of TBI, the role and scope of TBI in local economic development, the distinction of the value-adding functions of TBI, and the logic (mode) of the programmes’ operation.

Thesis 2. The emergence of the market solutions of (technology) business incubation is a complex process which presumes learning, and the co-evolution of several competences. The quick development of market solutions is likely to occur in those regions where the emergence of new variations is intensive and the channels of information flow among the innovation system’s participants are established. It can be fostered by such factors that have significant influence during the early phase of industries’ evolution like economies of urbanization, the presence of similar activities and entrepreneurial experience. This also involves that the probability for the emergence of market solutions in less favoured regions and non-metropolitan areas is low, thus policy makers often face the non-sufficient operation of the business incubation industry.
Thesis 3. Technology business incubation has significant scope of action in the period of an industry’s evolutions when path-dependency has not yet emerged. In such a situation TBI, as a “small historical event”, can play an important role in the establishment of the self-reinforcing processes of the industry. Owing to TBI’s niche-creating function (able to affect both new variations and the selection environment) they are partially able to fulfil this task even when the historically developed dominant structures of the region (the presence of mature industries or clusters) hinder the emergence of new industries. But simultaneously the uncertainty and risks of the intervention are significant, especially in non-metropolitan regions.

Thesis 4. The two components of the value-adding capacity of TBI (fostering the innovation process by complex services and providing special environment) are originated from the dual ability explored in the previous thesis: fostering and steering of new variations and modifying the selection environment. The co-productive feature of the service provision (requires learning both from the provider and user) infers that in order to the significant value-addition the supported enterprises must posses adequate learning capacity (search routines).

Thesis 5. The function of providing “special environment” is able to become efficient only when connected to real service provision. The “special environment” must contain the mechanisms and services that transmit the impacts. The frequent failures of technopoles and technology parks also indicate this.

Thesis 6. The uncertainties of the processes of the learning-based economy, the selective channels of perceiving development problems and the adaptation of the economic actors result in the process of technology business incubation consisting of “trials and errors” in the practice. Within such circumstances of bounded rationality efficiency (impacts on the enterprises and on the local economy) can only be ensured if such mechanisms are established that provide feedbacks from the induced effects and select out solutions that had proved to be unsuccessful. The “facilitate the market” approach of incubation, which has been developed in the dissertation, provides a method to achieve this. Its main elements are the division of services provision’s
risks and the intensive role play by the local knowledge intensive business service (KIBS) sector.

The Opportunities of Technology Business Incubation in Hungary

The analysis of the Hungarian practice of business incubation highlighted that the operation of the incubation system dominated by traditional incubators is not sufficient. I attempted to complement the results of former studies (that focused on the programme features) by conducting and empirical analyses in Békés county that puts emphasis on the supported enterprises.

Thesis 7. In Békés county’s incubators (on the analyzed sample) the expected impacts of business incubation can not be revealed. The supported enterprises are unable to attract additional income into the region and thus to generate regional multipliers. The innovation activity of the firms in the sample is average or below the average. The value-addition of incubation can not be revealed in the growth of the net returns or the number of employees. Furthermore the strong local orientation of the supported enterprises makes the presence of unintentional market distorting effects probable. These results infer the need for improving the value-adding capacity of Hungarian business incubators.

A change in the Hungarian business incubation practice is desirable: incubation modes with more significant economic development impacts and smaller “side-effects” must be put ahead. According to the theory and practice of business incubation the establishment of technology business incubators with strong university ties can be regarded as a possible way of development for the Hungarian incubation system.

Considering the interactive relation between incubation and its local economic environment, and the spatial distribution of the large (research) universities, the centre cities of the Hungarian NUTS 2 regions seem to be able to provide possibly the most beneficial circumstances for this (besides Budapest). But this does not infer that there is a real opportunity or necessity for the establishment of technology business incubators in these regions.
Accordingly – building on the former theoretical results – I attempted to create an analytical framework that is able to reveal the background factors affecting the opportunities of TBI even in less favoured regions. Further expected feature of the framework is its ability to be applied in different regions as well, which makes the comparison of the gained results possible. The examination of the factors affecting the opportunities of TBI was carried out in four steps (focusing on Szeged):

- analyzing the presence of dominant local industries (clusters),
- analyzing the factors that affect the emergence of new variations,
- exploring the occasional impacts of niches (created by local economic development policy), and
- examining the traits of the potential focus groups of a TBI (SMEs in “knowledge-based” sectors, academic spin-off firms, graduate and doctoral students) with special regard to their entrepreneurial activity, their ability to utilize the “knowledge-intensive services”, and their demand for incubation services.

**Thesis 8.** The results of the analyses based on the set up framework show that there is an opportunity for technology business incubation in Szeged, however there seems to be no possibility for strong specialization neither to a given industry (or cluster), nor to the utilization of solely the academic sphere’s knowledge base. These result in a longer process of reaching sustainability and lingering intensification of the economies of localization. This latter infers the low intensity of the possible development impacts.

But the aforementioned elements were solely the background factors of TBI’s opportunities, necessary but not sufficient conditions of success. In connection with the launch of a technology business incubator – above them – the operational features of the programme (the realization of the “facilitate the market approach”) and the participation of universities (to remove the barriers and to facilitate entrepreneurship) have decisive importance as well. The success of a potential technology business incubator in Szeged is therefore not at all obvious.

**Thesis 9.** The analysis of the features of incubator service demand and the ability of service utilization (the search routines of the firms) showed that a potential technology business incubator in Szeged must put emphasis on the
admission (selection) criteria, since those who would demand the services and those who would be able to utilize them indeed only partially coincide. The reinforcement of the local KIBS sector must become an important function of the incubator, because the local “knowledge-based” sector consists mainly of service firms. As the KIBS firms’ demand for “hard” services (e.g. premises, laboratory, appliances) is scarce, it is advisable to establish the (non-premises) business development services (BDS) first and by doing so initiate the learning process. Heavy emphasis must be put on pre-incubation, which contains the removal of the barriers of entrepreneurship, the development of an inspiring milieu, entrepreneurial education and the fostering of the development of business ideas in an interactive process. It could be concluded from the analyses of academic entrepreneurs and university students.

The background factors that affect TBI and the outlined strategic decisions arise similarly in connection with the TBI programmes of other larger Hungarian cities. Since the result were not fully convincing in case of Szeged contrary to its outstanding research capacity and level of education, thus it would be advisable to apply the presented analytical framework in other Hungarian university cities as well. Presumably, the unfavourable opportunity for the specialization, the partial overlapping of the real focus group and those who would demand the incubator services, the “informal spin-off activity” of the academic employees (it usually means only secondary employment), or the poorish entrepreneurial skills of university students are not solely peculiar to Szeged. Therefore it would be practical to integrate the analysis of opportunities (background factors) into the Hungarian TBI policy.

Thesis 10. In connection with the restructuring of the Hungarian business incubator system the challenge is not the establishment of new “incubator-houses” (a common term in the Hungarian business incubation practice, referring primarily to traditional business incubators), but the emphasis on the admission (selection) criteria, on real value-adding (mainly non-premise) services, on the appropriate connection with the market and on the rethinking of the operational and evaluating system of incubators, in essence the realization of the “facilitate the market” approach of business incubation.
Naturally the achievements of present dissertation that were epitomized in the above theses raise a series of further research questions that could be unravelled in future studies. Certain consequences of the adaptation of evolutionary concepts to TBI could be easily applied to other local economic development tools as well, like industrial parks, technology parks, or cluster development. A way much wider research field is provided by the application of evolutionary thinking to regional economics, which facilitate the examination of such areas – amongst others – like the spatial evolution of industries, or the path-dependency or lock-in of a region.

In connection with the opportunities of TBI in Hungary – on the top of the elimination of recent analyses’ insufficiencies – the testing of the results in other regions and the integration of the presented analytical framework into the design process of the programs seem to be the most important fields of future research and application.
5. Related publications of the author

A. Books and Chapters


B. Academic Journals

C. Refereed Conference Volumes

D. International Conference Papers

**E. Manuscripts of the Most Important Research Reports**


